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СОДЕРЖАНИЕ

CONTENTS

Assessment of Trends and Prospects for the Development of the Russian Economy in the Context of Sanctions Pressure

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ABSTRACT

Improving the competitiveness of the national economy is one of the priorities of the socio-economic policy of the Russian Federation. In this regard, the identification of factors for increasing competitiveness is highly relevant for achieving the goals of sustainable development. In this paper, attention is paid to updating the problem posed and assessing the degree of influence of investment, technological, industrial, labor, social and financial factors on increasing Russia's share in global GDP. The **purpose** of this study is to systematize the factors and identify promising areas for improving Russia's competitiveness in the global economy. The **object** of the study is the development of the Russian Federation in 2014–2023 and for the future until 2026, and the **subject** is the study of factors and an assessment of their impact on improving the competitiveness of the national economy. Economic, mathematical and statistical **methods** were used as research methods. In particular, trend, correlation, regression, and comparative analysis have found practical application. As the main **results** of the study, it is necessary to highlight the justification of the influence of factors on increasing the competitiveness of the Russian economy; rank the influence of investment, technological, industrial, labor, social and financial factors on increasing Russia's share in world GDP; determine the forecast values of Russia's share in world GDP based on the construction of the trend equation; identify the degree of influence of factors on the competitiveness of the national economy based on the calculation of correlation coefficients; and analyze the best practices of Russian raw materials companies in achieving world-class competitiveness.

Keywords: competitiveness of the national economy; sanctions pressure; forecasting based on the trend equation; sustainable development; factors of national competitiveness

INTRODUCTION

In recent years, the global economy has been in a state of dynamically increasing turbulence, caused by both objective and subjective factors. Against the backdrop of deepening contradictions between key stakeholders in the global economic and political arena, on the one hand, sanctions pressure is increasing, and on the other hand, processes of import substitution are intensifying to protect national interests.Russia has fully become a key player facing unprecedented sanctions pressure, which requires, firstly, an understanding of the scale of the sanctions pressure; secondly, the development of measures for operational response to existing and newly introduced sanctions; and thirdly, the justification of strategic development directions from the perspective of ensuring national interests (economic and social) and protecting the interests of individual economic entities.

METHODS

The purpose of this study is to systematize factors and identify promising directions for enhancing Russia's competitiveness in the global economy. The objectives of the research are: to structure the measures of sanctions pressure on Russia; to identify key factors influencing the prospects for increasing Russia's role in the global economy; to assess the implementation of effective corporate strategies in the global market, taking into account the experience of leading Russian raw material companies.

The subject of the research is the development of the Russian Federation from 2014 to 2023 and the outlook until 2026, while the object is the study of factors and the assessment of their impact on enhancing the competitiveness of the national economy. The special methods of cognition chosen include econometric and statistical methods, trend analysis, correlation analysis, regression analysis, and comparative analysis.

The examined direction is highly relevant. Numerous studies by domestic and foreign authors are dedicated to it, based on which a qualitative and quantitative analysis of this issue has been conducted. The issues of the systemic reboot of the Russian economy to enhance Russia's role in the global economy have been studied in the papers of V.V. Ivanter and G.B. Kleiner [1, 2]. Domestic authors also investigate the issues of the impact of business models and import substitution strategies on achieving stability in the Russian economy [3–6]. Issues of countering sanctions have been studied in the papers of M.V. Rukinov, D.A. Lipinskii, and others [7–9]. Issues related to the analysis of risk factors for the sustainable development of individual sectors were examined in the papers of E. Chatkina and N.A. Kazakova, M.E. Dobbs, V.B. Minasyan, M.M. Yumaev, J.J. Szczygielski, and others [10–14].

However, comprehensive studies on the systematization of factors to enhance Russia's competitiveness in the global economy are still lacking.

The scientific novelty of the research lies in the systematization and quantitative assessment of the impact of factors capable of increasing Russia's share in the global GDP.

The practical significance of the research lies in the fact that the conclusions and proposals presented in the article can form the basis for developing a long-term strategy for managing the growth factors of the national economy.

RESULTS

Russia's national interests have undergone significant transformation over the past 30 years. The dynamics of national economic and social interests are presented in *Table 1* [9].

Thus, starting from 2014, a new significant phase begins in the Russian economy, associated with the active dissemination of the principles of national economic security and the formation of a social state under the conditions of increasing sanctions pressure. The development of import substitution, social entrepreneurship, and the implementation of

Table 1

Dynamics of National Economic and Social Interests in Modern Russia

Period of time	National economic interests		National social interests	
	Direction of movement	Tools of Achievement	Direction of movement	Tools of Achievement
1992–2000	The elimination of the planned economy, the introduction of market instruments	Liberalization of the economy	Differentiation of the population by standard of living, formation of the «new» poor	Abandonment of social obligations, emergence of a class of property owners
2000–2008	Creating conditions for economic growth	Strengthening the role of the state in the economy	The continuing decline in the standard of living of the population	Deterioration of social infrastructure
2008–2014	Formation of economic sovereignty	Pushing foreign manufacturers out of the national market	Improving the quality of social services provided to the population	Development of social infrastructure
2014–2020	Formation of national economic security	Import substitution in sectors related to consumer markets	Strengthening the role of the state in the social sphere	The implementation of advanced technologies in the social sphere, including consumer markets
2020 to present	Formation of technological sovereignty under conditions of severe sanctions pressure	Import substitution in the technological sectors of the economy	The establishment of a sovereign social state under conditions of severe sanctions pressure	Widespread implementation of the principles of the welfare state, development of social entrepreneurship

Source: Compiled by the authors using data [9].

domestic advanced technologies, including in the social sphere, becomes relevant to enhance Russia's role in the global economy.

In the last decade, Russia has found itself in a complex geopolitical situation related to the formation of a unipolar world led by the USA. Moreover, China is also vying for the role of a global leader. Therefore, it is very important for our country not only to maintain but also to enhance its role in the global economic and political space. However, the tightening sanctions are primarily aimed at turning Russia into a second-rate country that will not play any significant role in the world, up to the actual collapse of the Russian state. We are structuring the principles on which the sanctions pressure on Russia is based:

• precise target orientation;;
• multi-stage process with a clear direction of tightening when transitioning from one package of sanctions to another;

• the comprehensive nature of the action, affecting various sectors and industries of the economy;
• efficiency, i.e., achieving a positive financial, economic, and technological effect for the countries imposing sanctions;
• effectiveness, i.e., the decline of Russia's economic and technological potential;
• the speed of adopting and implementing sanctions pressure measures;
• the interconnection of sanctions between countries;
• wide publicity to the entire global community;
• dishonesty, unscrupulousness, and unethical behavior, which cannot be justified by any goals or objectives.

Although the goals of sanction pressure are political, the achievement of these goals is primarily carried out through economic and social impact tools. The main beneficiary

appears to be the United States, which seeks to strengthen its geopolitical dominance by any means and improve its economic and social development indicators. The focus is on research and development expenditures, which as a percentage of GDP in the USA increased from 2.74% in 2010 to 2.83% in 2018, and by 2021 already amounted to 3.46%. Therefore, the highest growth rates occurred in 2019–2021. A similar indicator also increased in Germany from 2.73% to 3.13%, and in France from 2.18% to 2.35% for 2010–2021.

As for Russia, during the period under consideration, the share of research and development expenditures to GDP fluctuated between 1.00% and 1.13%, i.e., there was actually no growth. This means that for our country, the risks of technological lag and technological dependence on the leading economically developed countries of the world, including the USA, Germany, France, etc., are significant. The established trends give Western countries confidence in the effectiveness of their sanctions pressure and stimulate them to increase it [7].

The structure of the sanctions pressure measures on Russia is presented in *Fig. 1*.

Thus, Western countries predominantly use measures of an economic, technological, and social nature to achieve their political goals regarding Russia. Economic and technological impact tools have a distinctly targeted nature and are primarily directed against enterprises in the military-industrial and fuel-energy complexes, as well as the aerospace and electronics industries. Their influence is manifested in the slowdown or halt of operational processes in business functioning, as well as the need to restructure logistics chains or develop domestic production of previously imported technological components, which leads to an increase in the cost of high-tech products and an extension of operational and financial cycles.

Special attention should be paid to social measures, as the growth rates of final consumption expenditures in Russia are higher than in many European countries. This means that consumers are increasing their propensity to consume, and characteristics such as quality, modernity, novelty, and availability are becoming increasingly important to them.

Despite their anti-Russian orientation, sanctions can contribute to the growth of Russia's competitiveness on the global stage. In the context of this study, competitiveness is viewed as a country's ability to achieve high economic growth rates and successfully compete in international markets.

KEY FACTORS INFLUENCING THE PROSPECTS FOR INCREASING RUSSIA'S ROLE IN THE GLOBAL ECONOMY

One of the most significant and resulting indicators reflecting the impact of sanctions is Russia's share in the global GDP. From 2012 to 2022, Russia's share in the global GDP was adjusted slightly — within the range of 3.04% (2016) to 3.76% (2021). To forecast Russia's share in the global GDP, a linear trend model can be used, formula (1):

$$Y = at + b, \tag{1}$$

where Y — resulting indicator, a — parameter that accumulates the influence of factors, excluding time, t — time, b — parameter that reflects the relationship between the resulting indicator and time.

We will determine the parameters of the trend equation using the least squares method. Based on the initial data on Russia's share in the global GDP for 2014–2022, we will construct a linear trend equation, formula (2):

$$Y_m = 3,31 + 0,48t, \tag{2}$$

where Y_m — Russia's share in the global GDP.

Based on the linear trend model we constructed, we will assess Russia's dynamics in the global GDP and make a forecast of its values until 2026 (*Table 2*).

Thus, given the current dynamics, Russia's share in the global GDP could increase by 0.048

The goal of the pressure is to reduce Russia's role in the global economy and the disintegration of the Russian state					

Tasks of sanction pressure					
Restriction on the inflow of financial resources into the country			Restriction of the influx of advanced technologies and the technological development		

Methods of influence					
Direct			Indirect		
Prohibitive	Restrictive	Controlling	Supportive	Encouraging	Stimulating

Economic and technological impact tools							
Export				Import			
Ban on the supply of oil and gas, metals, coal, etc. from Russia.	Ban on the export of defense industry products from the Russian Federation	Restriction on the use of foreign assets	Restrictions on transportation services	Ban on the supply of advanced technologies and equipment to the Russian Federation	The exit of foreign companies from Russia	Ban on financing Russian banks	Freezing of Russia's gold and foreign exchange reserves

Social impact tools					
Export			Import		
Growing Russophobic sentiments abroad	Exclusion from international professional communities	Restrictions on Russian citizens traveling abroad	Restrictions on the import of luxury goods into Russia	The severance of twinning between cities	The gap in the implementation of many educational and scientific programs

Fig. 1. **Structure of Measures of Sanctions Pressure on Russia**

Source: Compiled by the authors using data [7].

percentage points per year, reaching 3.60% in 2024, 3.65% in 2025, and 3.69% in 2026, which is slightly lower than the maximum value in 2021 (3.76%). Therefore, new, more modern technologies are needed for a significant breakthrough for Russia in the global economy.

What can and should Russia offer as a countermeasure to the increasing Western sanctions? The most obvious answer is the active promotion of an import substitution strategy, enhancing the effectiveness of factors contributing to the competitiveness of the national economy. To identify the most significant factors affecting the country's competitiveness on a global scale, a correlation analysis was conducted to assess the impact of various relative indicators on Russia's share of the global GDP.

The selection of factors for assessing their impact on Russia's dynamics in the

Table 2

Dynamics of Russia's Share in World GDP for 2014–2022 and for the Future Until 2026

| Index | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | Forecast | | | |
										2023	2024	2025	2026
Russia's share in the global GDP, %	3.44	3.15	3.04	3.08	3.22	3.29	3.36	3.76	3.49	3.56	3.60	3.65	3.69

Source: The author's calculations according to Rosstat data. URL: https://rosstat.gov.ru/folder/210/document/12994 (accessed on 11.06.2024).

Table 3

Grouping of Factors to Assess their Strength of Influence on Russia's Dynamics in Global GDP

| No. | Factors | | | | |
	Investment and technological	Production	Labor	Social	Financial
1	Share of investments in the active part of fixed assets, %	The share of gross value added (GVA) of the creative economy in Russia's GDP, %	Employment rate, %	The share of the population with incomes above the poverty line, %	Profitability ratio of sold goods, works, services, %
2	The share of high-tech goods in the volume of imports, %	Share of oil and gas GDP in Russia's GDP, %	The number of pensioners per 1000 people in the population	Gini coefficient	Return on Assets Ratio, %
3	Share of innovation expenditures in GDP, %	The share of small and medium-sized enterprises (SMEs) in Russia's GDP, %	The number of individuals with newly diagnosed occupational diseases per 1000 workers	The share of household spending on leisure activities and cultural events	The share of profitable organizations, %
4	Degree of suitability of fixed assets, %	The share of gross value added of industrial production in Russia's GDP	Labor productivity index, %	Incidence of disease per 1000 people	Current liquidity ratio, %
5	Rate of fixed asset renewal, %	The share of GDP from the type of economic activity 'Crop and Livestock Production' in Russia, %	Average monthly real wage of workers, as a percentage of the previous year	The demographic load ratio per 1000 working-age population	Autonomy ratio, %

Source: The compiled by the authors according to Rosstat data. URL: https://www.file:///C:/Users/User/OneDrive/%D0%94%D0%BE%D0%BA%D1%83%D0%BC%D0%B5%D0%BD%D1%82%D1%8B/Ejegodnik_2022.pdf (accessed on 11.06.2024).

global GDP was carried out based on criteria of high scientific and practical significance of the factors' influence on macroeconomic indicators, the integrity of the content of strategic tasks for the development of the national economy, the correspondence of the content to the capabilities of the Russian economy, and the consideration of international experience.

Initially, we will group the factors by investment and technological, production, social, labor, and financial indicators and present them in *Table 3*.

Thus, for conducting factor analysis, 20 indicators were selected, for which values from 2014 to 2022 were analyzed, i.e., since the introduction of sanctions against the Russian Federation. The dynamics of the indicators and the correlation coefficient with a level of no less than 0.3 (the relationship is practically absent) for direct action factors are presented in *Table 4*, and for reverse action factors in *Table 5*.

Thus, the conducted analysis shows a high direct degree of impact (over 0.7) of factors such as the share of investments in the active part of fixed assets, the share of the creative economy's GDP in Russia, and the profitability ratio of sold goods, works, and services. Therefore, increasing Russia's share in the global GDP is most effectively achieved by changing the production structure towards the development of creative sectors of the economy, improving the profitability of activities, and expanding investment processes.

It should also be noted that all identified financial factors demonstrate a moderate or strong influence on Russia's share of the global GDP, which requires increased attention to strengthening the financial condition of companies.

Now we will evaluate the impact of reverse action factor signs (*Table 5*).

Therefore, among the feedback factors in terms of impact, the demographic load coefficient per 1000 working-age population (0.8041) dominates, which poses a serious challenge for the Russian economy. The solution to the current situation lies in the high relevance of implementing a policy to preserve the Russian population by increasing birth rates, natural growth, and life expectancy.

Moderate feedback with Russia's share in the global GDP is demonstrated by factors of financial stratification of society, represented by the Gini coefficient and the decile coefficient of income differentiation of the population (0.3–0.5). This means that reducing income differentiation among the population will contribute to increasing the competitiveness of the Russian economy in the world.

Regarding the level of expenditure on innovation, it is important to note their significance for the future development of the Russian economy. At the same time, attention should be paid to the need for a more thorough consideration of the issues of organizing and investing in innovation processes at all levels of management. Unfortunately, not all innovation-investment projects are effective, which is reflected in the negative value of the correlation coefficient between the share of innovation expenditure in GDP and Russia's share in the global GDP.

Innovations need to be given priority attention in Russia, as there is an unfavorable trend of maintaining a moderate influence of the share of high-tech goods in the volume of imports to the Russian Federation (0.5756), which need to be replaced by domestic products. This once again underscores the importance of implementing an import substitution strategy in high-tech sectors of the economy. Russia faces significant challenges in achieving import substitution in high-tech industries, but the situation is not hopeless. The process of building productive cooperative ties between science and business is slow and fraught with numerous

Table 4

Dynamics of Direct Factor Indicators for 2014–2022 and Calculation of the Correlation Coefficient with the Indicator of Russia's Share in World GDP

Indicators – factors	Year					Correlation coefficient
	2014	2017	2020	2021	2022	
Investment and technological factors						
Share of investments in the active part of fixed assets, %	29.0	28.3	29.4	31.9	30.8	0.7072
The share of high-tech goods in the volume of imports, %	61.2	71.5	75.3	76.2	76.0	0.5756
Degree of suitability of fixed assets, %	50.6	52.7	61.0	59.5	59.5	0.5001
Production factors						
The share of the creative economy in Russia's GDP, %	…	2.8	3.2	3.2	3.5	0.7033
The share of SMEs in Russia's GDP, %	…	22.0	20.8	20.6	21.0	0.4046
The share of industrial production in Russia's GDP, %	25.5	28.0	27.5	30.4	30.9	0.3769
Labour factors						
Average monthly real wage of workers, as a percentage of the previous year	101.2	102.9	103.8	104.5	100.3	0.3025
Social factors						
The share of the population with incomes above the poverty line, %	83.7	87.1	87.9	89.0	90.2	0.5895
Financial factors						
Profitability ratio of sold goods, works, services, %	7.3	6.7	9.4	14.7	14.2	0.7700
Current liquidity ratio, %	121.1	124.4	133.4	135.4	151.9	0.5284
Return on Assets Ratio, %	2.5	3.8	4.1	8.9	5.5	0.5149
Autonomy ratio, %	40.1	41.7	42.7	43.3	49.5	0.3997
Share of profitable (efficient) organizations, %	67.0	68.1	67.3	70.8	70.7	0.3285

Source: The compiled by the authors according to Rosstat data. URL: https://www. file:///C:/Users/User/OneDrive/%D0%94%D0%BE%D0%BA%D1%83%D0%BC%D0%B5%D0%BD%D1%82%D1%8B/Ejegodnik_2022.pdf (дата обращения: 11.06.2024) / (accessed on 11.06.2024).

bureaucratic obstacles; nevertheless, political will and the desire to protect national interests can set Russia on an innovative and technological development trajectory. Moreover, Russia retains the necessary production capacities, personnel, and technologies that have persisted since the Soviet era [10–12].

Let's summarize the results of the conducted analysis and construct a matrix

Dynamics of Factor Indicators of Reverse Action for 2014–2022 and Calculation of the Correlation Coefficient with the Indicator of Russia's Share in World GDP

Indicators – factors	Year					Correlation coefficient
	2014	**2017**	**2020**	**2021**	**2022**	
Investment and technological factors						
Share of innovation expenditures in GDP, %	29.0	28.3	29.4	31.9	30.8	−0.6225
Production factors						
–	–	–	–	–	–	–
Labour factors						
The number of individuals with newly diagnosed occupational diseases per 10,000 population	101.2	102.9	103.8	104.5	100.3	−0.3182
Social factors						
Demographic load ratio per 1000 working-age population	83.7	87.1	87.9	89.0	90.2	−0.8041
Gini coefficient	0.415	0.411	0.406	0.409	0.395	−0.3780
Decile coefficient of differentiation of monetary income of the population, in times	7.2	7.0	6.9	7.0	6.5	−0.3389
Financial factors						
–	–	–	–	–	–	–

Source: The author's calculations according to Rosstat data. URL: https://rosstat.gov.ru/folder/210/document/12994 (accessed on 11.06.2024).

of the impact of factors on the dynamics of Russia's share in the global GDP (*Fig. 2*).

Let's combine the most significant factors, given in percentage values, and construct a multiple regression linear equation, formula (3):

$$Y = 0,2992 + 0,03X1 + 1,0239X2 + {} + 0,0015X3 + 0,064X4 + 0,007X5, \quad (3)$$

where Y — Russia's share in the global GDP, $X1$ — the share of investments in the active part of fixed assets, $X2$ — the share of innovation expenditures in GDP, $X3$ — current liquidity ratio, $X4$ — profitability ratio of sold goods, works, and services, $X5$ — the share of the population with incomes above the poverty line.

If we take the best performance indicators in Russia from 2014 to 2022, the possible share of Russia in the global GDP in 2024–2025 could be 4.20% instead of 3.60–3.65%, formula (4):

$$Y = 0,2992 + 0,03x31,9 + 1,0239x1,11 + 0,0015x151,9 + {} + 0,064x14,2 + 0,007x90,2 = 4,20. \quad (4)$$

The connection is strong (0.7 and above)	
Direct	Indirect
Profitability ratio of sold goods, works, services The share of the creative economy in GDP Investment ratio in the active part of fixed assets	Demographic coefficient per 1000 working-age population
The correlation is moderate (0.5–0.7).	
Direct	Indirect
The share of high-tech goods in the volume of imports Coefficient of suitability of fixed assets The share of the population with incomes above the poverty line Current liquidity ratio Return on Assets Ratio	The share of innovation expenditures in GDP Gini coefficient Coefficient of monetary income of the population
The connection is weak (0.3–0.5)	
Direct	Indirect
The share of SMEs in Russia's GDP Autonomy ratio The share of industrial production in Russia's GDP Average monthly real wage of workers The share of profitable organizations	Gini coefficient Decile coefficient of monetary income of the population The number of individuals with newly diagnosed occupational diseases per 10 000 workers
The connection is practically non-existent (up to 0.3).	
Direct	Indirect
Chain index of labor productivity The share of oil and gas GDP in the total GDP of Russia The number of pensioners per 1000 people in the population The share of gross value added of crop and livestock production in Russia's GDP	They are absent

Fig. 2. **Ranking of Factors According to the Strength of their Impact on Russia's Share in World GDP**
Source: Compiled by the authors.

Hydrogen technologies	• production of ultra-pure hydrogen; • storage and transportation of hydrogen; • the creation of hydrogen recombiners for combining with oxygen, which enhances fire safety in areas where hydrogen accumulates; • application in electrolyzers and fuel cells to enhance data performance
Production of biofuel	• the use of biofuel from biomass; • the production of biological stimulants and pesticides for agricultural needs, which reduces the use of chemical plant protection agents
Electronics	• production of computer boards, transistors, and capacitors; • production of superconductors capable of conducting electricity without resistance
Pharmaceuticals	• the use as a basis for creating anti-inflammatory and anti-edema drugs to combat oncological diseases

Fig. 3. **Promising Directions for the Use of Palladium as a Key Element of the Hydrogen and High-Tech Economy in the Medium-Term Period**

Source: Compiled by the authors based on palladium market research.

Thus, Russia's share in the global GDP in 2024–2026, with a high level of efficiency in managing the most significant factors, may range from 4.2% to 4.5%, despite the sanctions pressure.

IMPLEMENTATION OF EFFECTIVE CORPORATE STRATEGIES IN THE GLOBAL MARKET

It is advisable to consider the positive experience of domestic companies in strengthening their competitiveness in global markets and countering sanctions pressure. Individual leading Russian raw material companies, including Norilsk Nickel, Gazprom, Severstal and others, are actively subjected to sanctions pressure from economically developed countries. The aim of these restrictions is to disrupt supply chains and financial channels for Russia's military-industrial complex.

The market share of most of these companies is over 40% and it has been stable over the past decade.

For example, Norilsk Nickel is a global leader in the palladium market, Gazprom in the gas market, and Severstal in the aluminum market, so they can dictate the rules of the game in these markets. This is possible even under sanctions pressure, thanks to competent corporate management.

For example, palladium is a key element in the hydrogen and high-tech economy. The main advantage is the catalytic properties of palladium in the form of nanoparticles (properties that accelerate chemical reactions), which will allow for the production of gaseous hydrogen (*Fig. 3*).

Key trends in the use of palladium in industry:

- the development of hydrogen transport will create a stable industrial demand for palladium from the automotive industry;
- active use of palladium in the chemical and pharmaceutical industries;
- production of equipment and tools using palladium in medicine;
- the use of palladium in electronics (*Fig. 3*).

Thanks to the investment policy and the development of a set of measures to expand the areas of palladium application, for example, Norilsk Nickel managed to ensure stable growth in key performance indicators of its activities. Thus, the return on assets in 2018–2022 was 6.24% higher than the industry average; the return on investment was 10.75% higher. Therefore, the investment policy was highly effective in 2018–2022 for the following reasons:

The return on investment exceeded the industry average by 10.75%.

The financial leverage effect of the companies is significantly higher than the industry average, indicating a favorable structure of business financing sources.

The companies adhere to a moderate investment policy.

Consequently, over the past twenty years, Russian companies in the raw materials sector have maintained leading positions and a high level of competitiveness among the largest producers, thanks to the low level of financial and real investment risks, support for socially and environmentally significant projects, and the implementation of market capture strategies [13–15].

Moreover, the leading role of Russian raw material companies in oligopolistic markets for primary raw materials (palladium, gas, aluminum) protects them from sanctions, which can be considered a significant factor in their sustainable development in a sanctions-driven economy.

In August 2024, the U.S. authorities imposed a new package of sanctions against Norilsk Nickel and Severstal. However, the American sanctions may have a rather limited impact on the companies. The management of these Russian companies is assessing the impact of the sanctions and promptly identifying ways to navigate potential difficult situations, with the assistance of the Government of the Russian Federation being crucial.

CONCLUSION

Thus, the example of leading Russian companies in the raw materials sector is very indicative. Even under the conditions of sanctions pressure, they ensure high business competitiveness through the implementation of an effective financial and investment strategy. The investment prospects of Russian raw materials companies look quite attractive compared to their competitors for the following reasons:

1. The level of unsystematic risk of securities, reflected in the beta coefficient, is characterized by the lowest indicator compared to competitors.

2. The market capitalization of the companies is quite large among global competitors in the market.

3. The companies adhere to a moderate investment strategy aimed at enhancing the investment attractiveness of the companies and protecting their market share.

4. Companies are adjusting their financial strategies to enhance interaction with minority shareholders in order to increase the liquidity and investment attractiveness of their securities.

5. Companies adhere to ESG principles based on environmental protection, creating favorable social conditions, fair treatment of employees, suppliers, and customers, and effective strategic corporate governance.

At the level of the national economy as a whole, the most significant factors influencing Russia's competitiveness in the global economy have been identified. All factors are grouped into five blocks:

1) investment and technology;
2) manufacturing;
3) labor;
4) social;
5) financial.

The most significant factors are those from blocks 1), 3), 4), and 5), among which are: the share of the creative economy in GDP, the level of demographic burden on the working-age population, the share of investments in the active part of fixed assets, and profitability ratios. By influencing these factors, including the activation of investment processes, it is possible to ensure the accelerated growth of Russia's share in the global GDP within a three-year perspective [16, 17].

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S.V. Karpova — substantiation of research methods, analysis of the implementation of effective corporate strategies in the global market.

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Prospective Models of Financial Forecasting of Budget Revenues

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ABSTRACT

The **subject** of the study is the choice of a model for financial forecasting of budget revenues, which allows the most correct assessment and obtaining a forecast value for the next period. The **purpose** of the study is to identify promising models of financial forecasting of budget revenues of the Russian Federation. DSGE models used since the 60s of the twentieth century have failed to identify a number of crises and timely predict the level of changes in government revenues in the United States, the Eurozone, and Russia, which did not allow for prompt adjustment of the policy pursued in the field of public revenue management. The **novelty of the study** consists in identifying the shortcomings of the modern methodology of financial forecasting associated with the obsolescence of the approaches used and the need to search for new models that allow you to quickly refine the prognostic results. The study used such **methods** as measuring predictive values and the size of their errors, analyzing and comparing the results obtained using methods and models of machine and deep learning. As a **result** of the study of predictive methods and models of machine and deep learning used in real business, the stock market and public finance, the most promising of them were selected. The main selection criteria were the possibility of modeling nonlinear relationships of parameters, the efficiency of calculation, the minimality of error, and the absence of a problem with retraining. In the course of the study, the expediency of time series decomposition was revealed, which made it possible to minimize predictive errors and choose the most accurate model for forecasting budget revenues of the Russian Federation. The results of the study can be used to form a system of predictive indicators used to develop a dashboard system for civil servants in order to improve the accuracy and efficiency of their decisions.

Keywords: predictive model; financial forecasting; budget revenue forecasting; neural networks; vivlet transformation

INTRODUCTION

Significant changes in the global economic and political situation necessitate prompt responses to ongoing transformations. The digitalization of a substantial number of processes in the national economy, the increase in instability, and the rapid development of technologies present fundamentally new challenges to the system of public administration. As a result, there is an acute need for methods that allow for the prompt forecasting of key financial indicators in the public sector to make management decisions in real-time based on them.

In a significant number of Russian studies, the main focus was on issues of planning budget indicators based on the norms of the Budget Code of the Russian Federation [1, p. 186], assessing the reliability of forecasts [2, p. 2020], their cognitive modeling [3, p. 179], as well as the quality of forecasting [4, p. 40]. The issues of selecting the methodological framework for forecasting key indicators are actively being developed [5, p. 599]. It has been proven [6, p. 5] that for the purposes of forecasting macroeconomic indicators, a significant number of methods can be applied. Some methods involve the use of a large amount of data, macroeconomic and financial indicators, which have varying levels of availability. Others, on the contrary, show good results under conditions of limited samples. A number of indicators are high-frequency, while others do not possess this property. The paradigm of machine and deep learning has been actively developing recently. The analysis and comparison of models presented in this work will allow for the selection of the most promising ones for use in predictive purposes.

The **purpose** of the paper is to identify the most promising methods for forecasting the revenues of the Russian Federation's budget. To achieve this:

• a review of studies has been conducted, showing the key reasons driving the shift from DSGE to alternative models;

• the main forecasting methods have been identified, and their characteristics have been provided;

• the process of selecting a model for forecasting budget indicators is presented.

REASONS FOR THE SHIFT FROM DSGE TO MACHINE LEARNING MODELS

Today, DSGE models are used for forecasting, which are actively criticized for: instability of results, increased sensitivity to data quality, inability to account for uneven loading of production capacities and the degree of their renewal [7, p. 205]; the complexity of implementation due to the absence of a nonlinear trend; reliance on the hypothesis of rational expectations, despite the proven formation of waves of optimism and pessimism associated with the irrationality of decision-making, etc. [8, p. 125]. There are studies summarizing individual critical remarks on the DSGE model [9, p. 77]. They present the main reasons that contribute to the transition to alternative forecasting models in the public sector. The authors point to the difficulty of explaining the duration and depth of recessions. Rapidly evolving DSGE models have failed to predict a number of crisis phenomena and the consequences of the pandemic (2007, 2008, 2020, etc.) due to the need for regular model calibration, superficial evaluation results, and their poor ability to capture changes in market trends. In the early 2000s, studies began to emerge that forecasted budget revenues using autoregression methods, mixed data models, and others [10]. In the forecasting of macroeconomic indicators, vector autoregression, integrated autoregressive moving average models, and reservoir computing [6] started to be used. This led to the emergence of alternative forecasting model options for central banks and finance ministries in several countries, based on machine learning (ML) and deep learning (DL) methods and algorithms. They reduce the use of statistical (econometric) models, which yield decent results when there

are linear relationships between indicators, as these do not capture a significant portion of the signals [11, p. 187]. These models demonstrate sensitivity to relationships between indicators, require the exclusion of multicollinearity and heteroscedasticity, and the assessment of residual autocorrelation, showing high predictive ability when forecasting budget revenues in a stable situation.

In most countries, the time series for forecasting government revenues is limited to 30–40 years, and there is a need to consider a significant number of factors in the models. These aspects are taken into account in machine learning and deep learning methods and algorithms, whose effectiveness depends on the sample size. Their application involves tuning parameters and hyperparameters that affect the quality of the model. At present, they are recognized as some of the most promising.

FINANCIAL MODELING OF BUDGET REVENUES: SEQUENCE AND MODEL SELECTION

Definition of the Base for Financial Forecasting of Budget Revenues

The stage involves collecting data for forecasting and placing it in a unified database. This allows for an increase in data processing speed, which impacts the efficiency of the modeling process. This database contains three levels according to the ANSI-SPARC architecture: external, conceptual, and internal. The technical description of the physical implementation of the database is beyond the scope of this study.

Deep and Machine Learning Models Tested for Budget Revenue Forecasting: Characteristics, Advantages, and Disadvantages

In the study, machine and deep learning models and algorithms (*Table 1*) were tested, which work with data in the presence of a certain type of noise, can identify and account for nonlinear relationships between individual data groups, and are free from multicollinearity considerations. A comparative characterization of the models is presented in *Table 2*. Understanding the mechanism of the model allows for taking into account the necessary information processing features for the specific situation when forecasting government revenues, and the hyperparameters can be adjusted accordingly.

To improve the accuracy of forecasts, time series decomposition is used. Within this framework, a time series is divided into several components: trend, seasonality, cyclicality, residuals, or noise. Time series decomposition allows for: separating raw data into different components to enhance the quality of time-based analysis, identifying anomalies, conducting data visualization, and improving the quality of time series forecasting.

The disadvantages of the method include:
• the need for assumptions about components that may be disrupted by changes in dynamics and external factors;
• the need to identify data that distort trends, reduce decomposition accuracy, and affect component reliability;
• the possibility of obtaining a low-quality predictive model when using standard decomposition methods;
• the impracticality of using the approach for irregular or noisy data;
• the dependence of the accuracy of the obtained forecast results on the correct selection of parameter values [12].

A trend represents a long-term movement or general direction in which the analyzed data increases, decreases, or stabilizes over time. Different trends can be used: upward, downward, or stable. Understanding them will allow determining the overall trajectory of the data movement.

Cyclicality represents recurring patterns that do not have a fixed period. The trend and the cyclical component are usually combined into a single trend-cyclical component. The specific functional relationships between these components vary.

Comparative Characteristics of Machine Learning Methods and Models

Comparison criteria	Linear and generalized regression models	Decision trees	Random Forest	KK-nearest neighbors	Support Vector machines	Neural networks	Naïve Bayes	Gradient boosting	Extreme gradient boosting
The possibility of forecasting a time series	+	+	+	+	+	+	+	+	+
The necessity of accounting for the effect of variable collinearity	+	–	–	–	–	–	–	–	–
The possibility of identifying and accounting for nonlinear relationships	+	+	+	+	+	+	+	+	+
Building a classification based on data characterized by a specific type of noise	–	–	–	–	–	–	+	+	+
Labor intensity in model training	–	–	–	–	–	+	–	+	–
The complexity of interpreting the results of the calculation of parameter value selection	–	–	–	–	+	+	+	+	+

Source: Developed by the authors.

Seasonality allows for the identification of recurring patterns or fluctuations in data that occur over specific intervals of time, such as monthly, quarterly, or annual cycles. In our case, the season of the year has an impact, as cash flow depends on obligations imposed by the tax code and other regulatory documents, among other factors. Identifying these patterns enables a more accurate forecasting process and describes the cyclicality of the data.

Residuals represent the remaining random variations or deviations in the data after identifying the trend, cyclical, and seasonal components. They are noise. It is impossible to predict them in time series. The assessment conducted is necessary to understand the overall variability of the data.

For decomposing time series, it is common to use methods such as classical decomposition, moving average decomposition, seasonal and trend decomposition using LOESS, singular spectrum analysis, and seasonal extraction in ARIMA time series. After performing the calculations, all elements of the time series are combined, which improves the quality of the forecast.

To clean the time series from noise and random outliers, the wavelet transform method will be used in the work. It allows for filtering and preprocessing the data, which will subsequently be used for building the forecast.

Each of the methods and algorithms is appropriate for forecasting the studied time

Characteristics of the Models Used in Calculations for Forecasting Budget Revenues of the Russian Federation

Name of the model	The mechanism of operation of the model	Hyperparameters	Advantages of the model	Model Type
Gradient Boosting Regressor	The essence of the algorithm: creating a forest with a fixed number of decision trees. The model fitting begins with determining the average value of the target indicators. Next, a forecast is added based on subsequent trees. In the following stages, decision trees are fitted to predict the negative gradients of the samples. The gradients are updated in each iteration	• the number of trees; • maximum depth of the tree; • scalability speed; • loss function	• applicable for poorly trained and poorly predictive models	Ensemble model
CatBoost Regressor	It is built on the assumption of the mean value of the target variable. It involves the formation of an ensemble of decision trees. Each new tree minimizes the errors or residuals of the previous ones. The trees are grown by introducing the rule: all nodes at the same level are checked by the same predictor with the same condition. The leaf index is calculated using bitwise operations	• depth of the tree; • learning speed; • number of iterations	• has advanced features compared to Gradient and XGBoost algorithms, enhancing its reliability, speed, and accuracy; • used for integrating data types into a unified structure, categorical functions, and processing non-numeric values; • has open source code	Extreme gradient boosting
Extra Trees Regressor	In the calculations, the initial dataset is used. The selection of "cut" points for node splitting is done randomly. The algorithm determines the best subset of features, which allows for maintaining optimization in the model when adding randomization	• the number of features considered at each • decision node; • minimum number of samples for the node; • the number of trees in the forest	• the number of features considered at each decision node; minimum number of samples for the node; • the number of trees in the forest is used to improve the performance of calculations; • has a simple decision tree construction algorithm; • contains a small number of key hyperparameters, easy to configure; • characterized by low systematic error and high model fitting speed	Random forest method, decision tree

Name of the model	The mechanism of operation of the model	Hyperparameters	Advantages of the model	Model Type
LTSM	The architecture of the model consists of an input, hidden, and output layer. They regulate the state and response of the cell. The input and output layers control reading and write access, while the hidden layer resets the contents of the memory cells as soon as they become outdated. The cell state is updated upon receiving information. The learning algorithm in the model is local in space and time. It is trained to overcome minimal time delays exceeding 1000 discrete time steps	• standard cell; • number of epochs; • function g, regulating the cell input; • function h, regulating the output of the cell	• allows solving complex tasks with a long delay; • improves the quality of the model based on non-stationary data through preprocessing; • leads to improved modeling results when used in conjunction with convolutional neural networks; • allows not to conduct tests for stationarity, seasonality, etc.	Neural network
Gated Recurrent Units	The model is based on two vectors that determine the type of information transmitted to the output. A feature of the vectors is the ability to store old information. The update gate determines the amount of preceding information. It is defined by the current input and the previous hidden state, expressed by a sigmoid activation function. The output values of the update gate are between 0 and 1. The reset gate evaluates the size of the ignored information. The reset gate determines the values using the current input and the previous hidden state, expressed by a sigmoid activation function. The hidden state is determined after calculating the update and reset gates. It represents new information. The "calculated state" is then combined with the previous hidden state. As a result, the current hidden state is formed, combining old and new information. The application of the update and reset gates helps solve the vanishing gradient problem in recurrent neural networks	• size of the input vector; • size of the hidden layer	• captures dependencies by using retrospective information from the data array in the model; • solves the vanishing gradient problem; has a simple modification unlike LSTM; • allows obtaining quality results with a small sample size; has fewer parameters than LSTM; • requires minimal computational power	Neural network

Table 2 (continued)

Name of the model	The mechanism of operation of the model	Hyperparameters	Advantages of the model	Model Type
N-BEATS	The architecture of the model is formed by combining blocks into a hierarchical structure. In a branched architecture, the blocks are characterized by fully connected equations. Each block receives data at the input. At the output, two signals are generated: 1) direct forecast; 2) inverse forecast. Each block receives data, generates a forecast, and performs an inverse transformation. The input data for the next block is formed by subtracting the output data of the inverse forecast of the previous block from its input data. The resulting residue is processed by the network. The forecasts of the blocks are combined into the final result — a general forecast	• planning horizon; loss function; • the number of past lags of the model; • integer values for each type of stack (seasonality, trend, identity); • integer value determining the number of harmonic terms for the seasonal stack type; • integer value, for the degree of the trend polynomial; • categorical value determining the type of normalization; • floating-point value representing the learning rate for the model optimization process	• has a transparent model structure and high interpretability of results; • is characterized by increased performance, high accuracy, and minimal training time compared to other deep learning architectures	Neural network

Source: [10, 13–18].

series. They differ in terms of the level of study, the accuracy of the forecast results obtained with their help, and the ability to account for the individual characteristics of the time series.

SELECTION OF A PREDICTIVE MODEL
The selection of budget revenue forecasting models calculated by the authors is based on a number of criteria. These include: approximation accuracy; cross-validation; expert evaluation.

To justify the criteria used in the work, a number of studies were reviewed. Each of them employed cross-validation and expert evaluation methods. Significant differences in the studies [10, 13, 19–22] were related to the indicators based on which the model selection was made. As a result, the errors used for

selecting the model for forecasting the revenue of the Russian Federation's budget were identified.

RESULTS OF FINANCIAL MODELING OF THE RUSSIAN FEDERATION'S BUDGET REVENUES
The choice of methods and algorithms in the study is determined by the necessity to avoid adhering to the stationarity of time series. Calculations were performed in Python and Wolfram Mathematica 12.0. The models are built on the basis of 80% of the sample used. The remaining 20% of the sample were set aside to verify the quality of the obtained forecasts. Monthly budget revenues were used as regressors in the models. The results are presented in *Table 3*.

Errors and Coefficient of Determination of Forecast Models of Budget Revenues of the Russian Federation

No.	Name of the model	MAE	RMSE	MAPE	R 2
1	Модели машинного обучения				
1.1	CatBoost Regressor	57.87	70.32	0.24	–
1.2	Gradient Boosting Regressor	61.41	76.17	0.25	–
1.3	Extra Trees Regressor	71.15	82.36	0.27	–
2	Модели глубокого обучения				
2.1	Gated Recurrent Units, GRU	131	168	17	0.66
2.2	LTSM	119	144	17	0.69
2.3	N-BEATS	92	115	14	0.76

Source: The calculation was made by the authors based on data from the Ministry of Finance of the Russian Federation. URL: https://minfin.gov.ru/ru/statistics/fedbud (accessed on 24.03.2024).
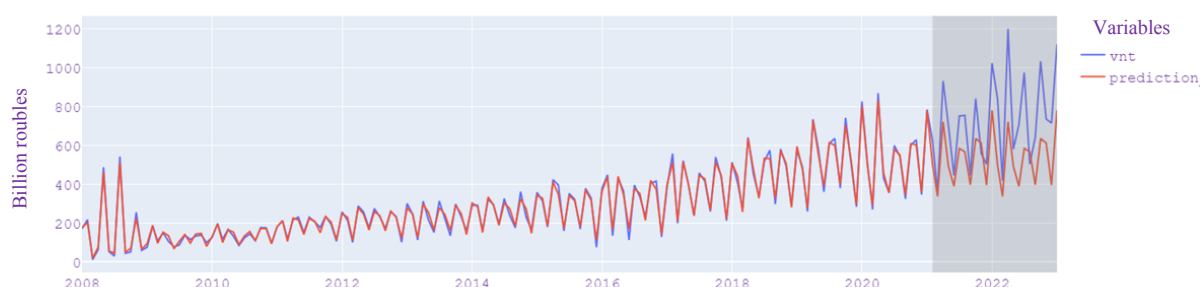
Fig. 1. **Budget Revenue Forecast Using the Catboost Model**
Source: Developed by the authors.

The criterion for selecting a predictive model is the minimum error magnitude (MAE, RMSE, MAPE). For deep learning models, the value of the coefficient of determination (R^2) was taken into account. Among the machine learning models, the CatBoost Regressor algorithm showed the best results. The size of the three errors according to the algorithm is minimal. Among deep learning models, N-BEATS has the smallest errors. The coefficient of determination for this model is the highest. Next, a comparison of error sizes between CatBoost Regressor and N-BEATS was conducted. The advantage of the first algorithm has been identified. Budget revenue forecasts obtained from test samples showed that the CatBoost Regressor predicts the training sample well, clearly capturing the dynamics of changes, but does not work on the test sample (*Fig. 1*). It is evident that the forecast (red trend line) for 2021–2023, made on the test sample, significantly differs from the actual federal budget revenues (blue trend line), demonstrating model overfitting. Therefore, its use for forming a predictive model requires correction. In subsequent studies, normalized samples that have undergone data preprocessing will be tested, including first differences, logarithms of first differences, and 2011 prices, as well as models with retuned hyperparameters (*Table 2*).
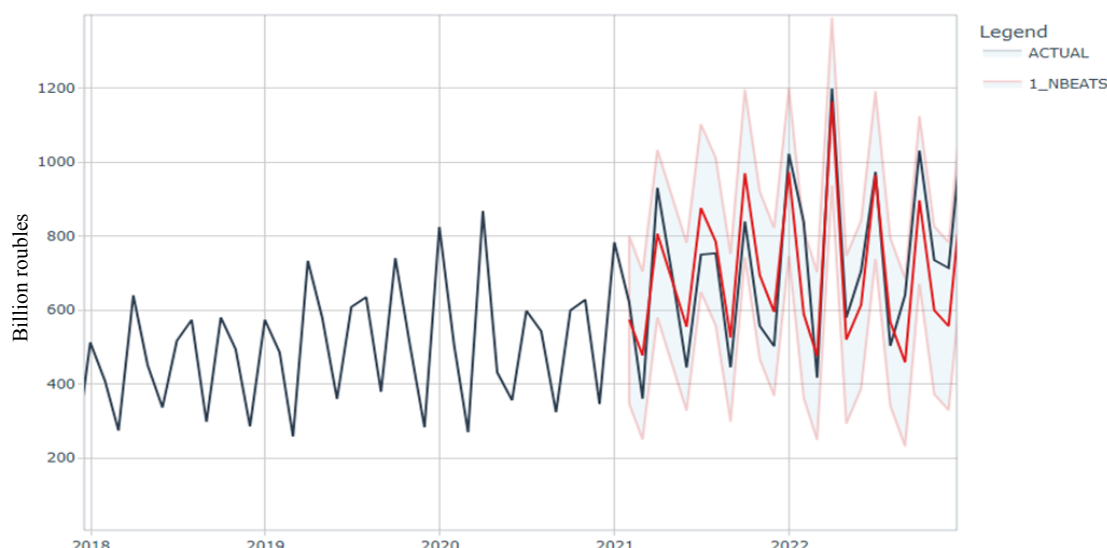
Fig. 2. **Budget Revenue Forecast Using the N-BEATS Model**
Source: Developed by the authors.

The forecast using the N-BEATS model shows that it better captures the trend in the test sample (2021–2023) (*Fig. 2*). The deviations of the forecast (red trend line) from the actual federal budget revenue (blue trend line) are minor. They fall within the confidence interval (represented by the pale red boundary). The predictive ability of the model is higher. The model makes mistakes in the fall of 2022 due to the presence of anomalous data behavior. This is due to a significant increase in domestic production and a sharp decline in import revenues, as, on the one hand, the policy of import substitution was activated, and on the other hand, sanctions were imposed against Russia. We also note the increase in the volatility of other revenues during this period.

The forecasted values fall within the confidence interval, and there is no autocorrelation of the residuals. Therefore, the N-BEATS model is advisable to use for forecasting in the public sector, which proves the proposed hypothesis.

Next, we will consider an approach that allows minimizing predictive errors.

The ambiguity of the obtained results led the authors to the necessity of using a preliminary decomposition procedure for the time series, which was tested on the revenues of the budgets of the subjects of the Russian Federation taken from the period from 01.2013 to 03.2023. The source of the data is the website of the Treasury of Russia.[1]

The study used aggregated values of the revenues of the consolidated budgets of the subjects of the Russian Federation. In the future, it is planned to develop models for forecasting the revenues of the budgets of specific subjects of the Russian Federation. Short-term forecasting of revenue receipts throughout the financial year, on a monthly basis, is a key contribution to effective Treasury Cash Management. The seasonal nature of these revenues must align with the planned budget support payments for expenditure obligations throughout the financial year,[2] as well as the need to attract

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[1] Federal Treasury. Consolidated Budgets of the Subjects of the Russian Federation and the Budgets of Territorial State Off-Budget Funds. URL: https://roskazna.gov.ru/ispolnenie-byudzhetov/konsolidirovannye-byudzhety-subektov/ (accessed on 24.03.2024).

[2] Main directions of budgetary, tax, and customs-tariff policy for 2024 and the planning period of 2025 and 2026: approved by the Ministry of Finance of Russia. URL: https://www.consultant.ru/document/cons_doc_LAW_429950/ (accessed on 24.03.2024).
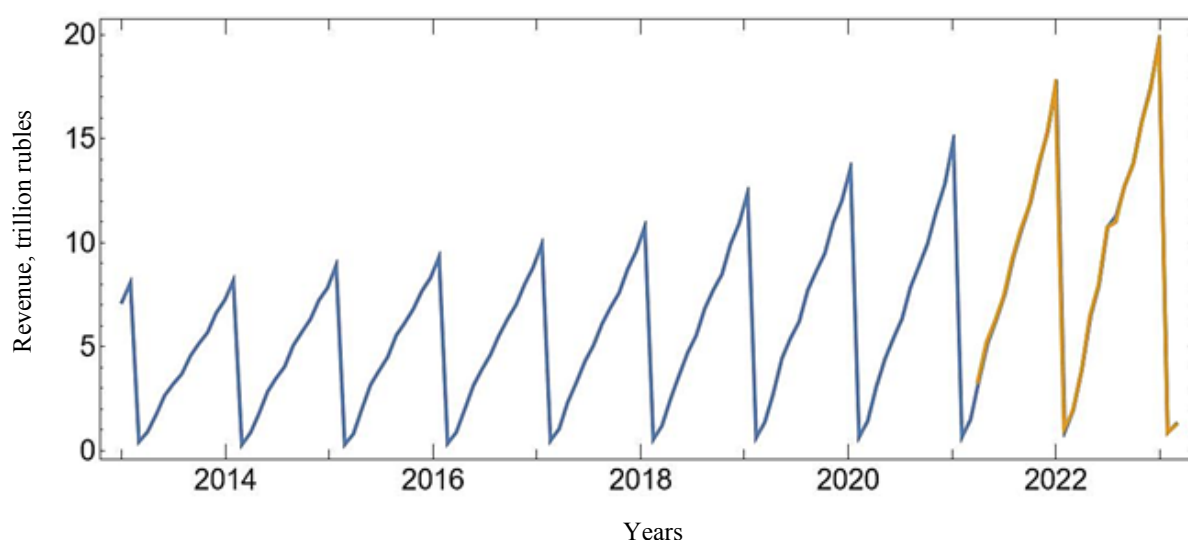
Fig. 3. Real and Projected Monthly Aggregated Revenues of the Budgets of the Subjects of the Russian Federation

Source: Developed by the authors.

Note: The blue line represents real data (period 01.2013–03.2023), the yellow line represents predicted values (period 03.2021–03.2023). The study was conducted in 2023 using the initial data available at that time.

short-term financing to cover any short-term budget deficits. The expected seasonal nature of revenue collection is also crucial for monitoring the targeted revenue collection indicators throughout the financial year.

Their forecast using the preliminary time series decomposition procedure through discrete wavelet transform (family of ReverseBiorthogonalSplineWavelet) allowed for the identification of high predictive accuracy of the model ($R^2 = 99.9\%$).

Several different families of wavelets were tested. The calculations used a forecasting procedure based on interpolation and extrapolation of time series data. The calculations were made using series decomposition based on DWT. The highest forecast accuracy was achieved using the ReverseBiorthogonalSplineWavelet 8.8 family. The results are shown in *Fig. 3*.

When comparing N-BEATS and the model built on the basis of the preliminary time series decomposition procedure using discrete wavelet transformation according to the R^2 criterion, the advantage of the latter is evident.

Therefore, the hypothesis proposed by the authors is proven. The method has the highest predictive potential.

The use of the proposed model will allow civil servants to make responsible and well-founded decisions.

Revenue forecasting models serve three interconnected but distinct budgetary purposes. First, they are in demand for preparing medium-term budgets (both federal and regional budgets); second, for short-term cash management during the financial year; and third, for expenditure forecasting.

Reasonable revenue forecasts are necessary to achieve sustainable funding for public projects and programs and to avoid large unplanned and potentially unacceptable budget deficits that may arise over the next year.

An important aspect of revenue forecasting is its connection to short-term and medium-term budget stability. A bias towards revenue optimism and political pressure to spend budget amounts or beyond them generally lead to deficits exceeding target levels.

Therefore, revenue collection policies and forecasting strategies should be coordinated with budget management strategies to better account for the variability of expenditures and revenues in both the short-term and medium-term perspectives.

CONCLUSION

Financial forecasting is one of the most important aspects in the context of increasing instability and growing sanctions pressure. The contribution of this research lies, firstly, in the attempt to use alternative DSGE methods and models to minimize the identified weaknesses. Secondly, the work allows for the comparison of machine learning and deep learning methods and models to identify the most promising ones for further use. Specific aspects that need to be considered when choosing models for calculations have been identified. Thirdly, the study demonstrates the feasibility of using the N-BEATS method for financial forecasting of budget revenues. The effectiveness of applying the procedure of preliminary decomposition of a non-stationary nonlinear time series using discrete wavelet transforms has been proven. The procedure used for forecasting allowed increasing its accuracy from 65–80% to 99%. At the same time, the selection of the most accurate method was carried out using a traditional approach.

The study has limitations. Firstly, the methods and models compared are used for forecasting purposes to predict budget revenue indicators since January 2011, which is due to the limited data on the monthly revenues of the federal budget provided by the Ministry of Finance of Russia. Secondly, only open data from official sources were used for the forecast. Thirdly, calculations were conducted on monthly data, as the developed models assumed obtaining forecasts in real-time. This allowed the model to be trained and its quality to be tested. For indicators of other frequencies, the models were not tested due to a significant reduction in the sample size, which could negatively affect their predictive power.

The results obtained by the authors indicate the need for further research. It is necessary to seek ways to improve the accuracy of forecasts for the indicators of the federal budget of the Russian Federation. To this end, it is advisable to test preliminary decomposition of time series with discrete wavelet transforms from various families.

In the long term, it is advisable to develop a system of forecasting methods and models using machine learning to predict aggregated revenue and expenditure items of federal and regional budgets with the aim of creating a dashboard system based on them. This would allow government officials to receive real-time information on forecast indicators to make managerial decisions on reallocating funding for specific activities within the framework of national projects in the Russian Federation, distributing available financial resources for the upcoming year, and more.

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Assessment of the Impact of the Money Supply on Russian GDP Growth Rates

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ABSTRACT

The **subject** of the study is the dynamics of real and nominal GDP in Russia for the period from 1995 to 2024 inclusive. In this study, the impact of the money supply on the economic growth rate and the level of inflation in the Russian Federation is assessed, and a forecast of such an impact is made for 2025. The **purpose** of the study is to determine, using quantitative methods, the degree of influence of the money supply on the dynamics of Russian GDP and inflation in order to identify the direction and limits of monetary management of the economy. The **relevance** of the study is that the results allow obtaining a higher rate of economic growth in Russia. The **result** of the study is the constructed stochastic model of the annual balanced increment of the money supply, as well as the discovered non-linear statistical relationship between the dynamics of the increments of the money supply and GDP. Dynamic modeling of the money supply was used as a **method** of analysis. Dynamic modeling of the money supply was used as a method of analysis. The model constructed by the authors, which includes the Keynesian demand function for the money supply and the neoclassical Cobb-Douglas production function, approximating the dynamics of GDP, helped to calculate the annual volume of money supply growth (M2 aggregate), accelerating the GDP growth rate in modern economic conditions. A non-linear relationship between the dynamics of the money supply and GDP was confirmed in the course of the study, which made it possible to evaluate the most optimal increase in the money supply in the country to accelerate the growth of Russian GDP. The result that was obtained indicates that one should not artificially restrain the growth of the money supply, since the analysis of time series using vector autoregression recorded a positive effect of the growth of the money supply on the dynamics of Russian GDP and the absence of any impact on the dynamics of inflation.
Keywords: monetization of the economy; inflation; inflation targeting; the economic growth; econometric modeling; monetary policy; stochastic model

INTRODUCTION

The money supply, gross domestic product, and price levels are considered the three main macroeconomic variables that play an important role in determining the rate of economic growth. The relationship between the money supply and the volume of goods and services produced has recently attracted increasing attention from researchers due to the slowdown in global GDP growth. Most empirical studies on this topic are conducted based on statistical data from foreign countries. A significant number of economists analyzing the impact of monetary policy on economic growth conclude that an increase in the money supply has a direct positive effect on the dynamics of gross domestic product in both developed and developing economies. However, some researchers do not find such an effect or even argue that an increase in the money supply has a negative impact on production volumes in certain countries.

Ambiguous results of empirical studies on the impact of money supply on GDP growth rates seem to reflect the ongoing theoretical debates in this area of economic analysis. If we recall the structure of the main interest rate channel of monetary transmission, an increase in the money supply should lead to a decrease in interest rates in the economy, which in turn would increase borrowing and consumption in the short term and lead to GDP growth. It seems that the result of such monetary impact on the real sector of the economy is obvious, but some economists dispute it.

Evaluating the long-term impact of the money supply on GDP is even more difficult. If, over extended time horizons, it is not the real demand for goods and services that increases, but the nominal demand, then following the increase in the money supply, there is a rise in the prices of capital assets (stocks, real estate, equipment), which in turn stimulates speculative investments in the capital and real estate markets. The cyclical formation of liquidity bubbles in modern developed countries inevitably leads to their collapse, followed by a crisis contraction of the money supply, an economic recession with a significant decrease in business activity and a reduction in GDP volumes.

In the presented paper, the direct impact of the money supply on the gross output of goods and services will be analyzed. The conducted study uses annual, quarterly, and monthly data of the analyzed variables for the period from 1995 to 2024. The **purpose** of the study is to determine, through mathematical modeling, the existence of a relationship between the Russian money supply and GDP in contemporary market conditions. This study addresses two questions:

1. Does an increase in the money supply contribute to economic growth?

2. Does an increase in the money supply lead to an increase in the inflation rate?

The results of such research are relevant for decision-making at the macroeconomic level.

LITERATURE REVIEW

In economic journals, one can find a significant number of publications on the impact of the money supply on the economy. For example, M. A. Abramova, S. E. Dubova, and Z. Bayarsaikhan examine the role of money in the reproduction process and propose to revive the Russian economy by ensuring an adequate money supply in our country [1]. About the negative consequences for the Russian economy from the monetary policy conducted by the Central Bank of the Russian Federation, which leads to a contraction of the money supply and a slowdown in economic growth, writes S. Yu. Glazyev [2]. As M.V. Ershov [3, p. 358] notes, the monetary regulator is constantly trying to solve the dilemma of how to stimulate economic growth while simultaneously combating inflation. O. S. Sukharev in the paper [4] asserts that the increase in the money supply was not a determinant of inflation and contributed to sustaining growth.

Usually, the impact of the dynamics of the money supply on GDP is studied through channels of monetary transmission [5], where monetary impulses are transmitted to the real sector of the economy through chains of various macroeconomic variables. There have been increasing instances of assessing the direct impact of the money supply on GDP dynamics [6]. This paper concludes that in many countries, there is a positive long-term effect from an increase in the monetization ratio, which affects economic growth. Moreover, there is a threshold level of monetization, the overcoming of which is fraught with increased inflation and can lead to other negative consequences.

More than fifty years ago, M. Friedman and A. Schwartz [7] provided evidence that changes in the money supply precede equivalent changes in output and cause their fluctuations. R. Lucas discovered a connection between the dynamics of the money supply and GDP using a dynamic stochastic general equilibrium model [8]. M. T. Belongia and P. N. Ireland [9] confirmed the presence of similar correlations in more recent data. Using structural vector autoregression, they showed that identified monetary policy shocks generally have a strong and persistent impact on output and prices. The results of existing studies on this topic allow us to conclude that in developed countries, changes in monetary policy affect real output in the short term, but in the long term, they only impact prices. However, in developing countries, this issue remains open and not fully resolved [10].

In the paper of O. Evans [11], the nonlinear relationship between money supply, inflation,

and output is studied in accordance with the hypotheses of Friedman and Schwartz that monetary policy affects prices in the long term but not in the short term, and output in the short term but not in the long term. The study examines statistical data for Nigeria and South Africa for the period 1970–2016 using the ARDL (autoregressive distributed lags model) approach. The study concluded that Friedman and Schwartz were correct in asserting that the growth of the money supply affects output in the short term, rather than in the long term.

The nature of the relationship between money, inflation, and output is explored in the works of M. Jarociński and M. Lenza [12]; X. Zhang, X. Liu et al. [13]. In recent decades, a significant amount of research has been conducted in this area. Most of these studies have focused on the relationship between the growth of the money supply and output. For example, J. Benchimol [14] identified how money and monetary policy affected output and inflation in Israel. The author of this paper showed that the sensitivity of output to monetary shocks increased during crises. F. Canova and T. Menz [15] used a small structural macroeconomic model for the U.S., the Eurozone, Japan, and the UK and found that monetary aggregates play an important role in business cycles.

The main question of P. Caraiani's paper [16] is whether the money supply affects output in the USA. The paper conducts Granger causality tests between money and output, as well as money and inflation, using simulated data from estimation models. A causal relationship between money and output was found. Another part of the literature is dedicated to the relationship between the growth of the money supply and inflation. For example, M. El-Shagi and S. Giesen [17], using a multidimensional state space framework to analyze the short-term impact of money on prices in the U.S., provided evidence of a significant influence of money on prices.

An important issue in the field of monetary policy for many countries in the post-Soviet space, including Russia, is the search for ways to increase the level of monetization of national economies without causing inflation. The paper by E. M. Sandoyan and L. M. Akopyan [18] is dedicated to identifying the causes of the low level of monetization in the Armenian economy and the impact of this process on economic growth. The paper provides evidence that in countries with a low level of monetization, a high level of inflation is observed, i.e., it draws a conclusion that is directly opposite to what can be found in the pages of textbooks on economic theory.

G. Dai [19] determined the optimal growth of the money supply for China to be in the range of 14–15% to maintain real economic growth at 10.5%, because such rates of money supply growth, in the author's opinion, are unlikely to lead to high inflation. A. Haug and W. Dewald [20] studied the correlation between fluctuations in money supply growth and fluctuations in real output growth and inflation in 11 industrialized countries from 1880 to 2001. The authors of the paper concluded that fluctuations in the growth of the money supply do not systematically affect the business cycle. However, in the long term, the growth of the money supply leads to inflation but does not affect the growth of real output. Probably, that's why in new Keynesian models, money does not play an explicit role [21].

In the paper by A. A. Hossain [22], the issue of high and unstable inflation in nine Muslim countries is addressed. The results of the study demonstrate the presence of a causal relationship between money and prices. The author of the paper also found that money has a certain stimulating effect on real output in the short term. It is expected that low and stable inflation, all else being equal, will contribute to long-term production growth and increase the demand for Islamic financial products, leading to higher long-term real investments and economic growth.

RESEARCH METHODOLOGY

Let's recall the well-known exchange equation of I. Fisher between the monetary and commodity masses [23]:

$$MV = PQ, \qquad (1)$$

where M — money supply (aggregate M2), V — velocity of money circulation, P — price level in the country, Q — volume of production of goods and services, usually over one year. Periodically, articles appear in scientific journals that provide well-founded criticism of the equality between the right and left sides of this equation in the context of an open modern economy [24]. However, if we assume that all the variables in equation (1) depend on time, and then find the time derivative of the right and left sides of this equality, i.e., transition from the static form of equation (1) to the dynamic form, we can find a sufficiently accurate match between the left and right sides of Fisher's equation [25]. Therefore, when constructing the model of the impact of money supply dynamics on economic growth rates, we will rely on the equation (1).

The first equation of our model will determine the growth rates of real GDP, adjusted for the impact of inflation. We will calculate the annual growth rate q of the production volumes of goods and services Q using the following formula:

$$q = \frac{1}{Q}\frac{d(Q)}{dt} = \frac{P}{MV}\frac{d\left(\dfrac{MV}{P}\right)}{dt}. \qquad (2)$$

After finding the time derivative of the complex function, we will obtain the following result:

$$q = \frac{1}{M}\frac{dM}{dt} + \frac{1}{V}\frac{dV}{dt} - \pi, \qquad (3)$$

where $\pi = \dfrac{1}{P}\dfrac{dP}{dt}$ — the rate of increase in consumer prices. Thus, according to Fisher's equation, the rate of increase in GDP is positively influenced by the rate of increase in the money supply and the velocity of money circulation. Inflation has a negative impact on GDP dynamics. But this is theory; Russian

practice shows that the rise in prices in the modern Russian economy, as will be shown further, is not statistically related to either the money supply or GDP. To increase the money supply, scientifically justified limits need to be found; otherwise, the solution to equation (3) will be an unlimited increase in the money supply in the country, theoretically increasing GDP volumes.

As a constraint, we will choose the demand for money by economic agents. According to J. Keynes's monetary theory, the demand for money depends on the volume of GDP (transactional demand), the level of bank interest rates (speculative demand), and does not depend on inflation [26, p. 88]:

$$M = kY + \xi\frac{1}{r}, \qquad (4)$$

where Y — GDP, r — the weighted average bank interest rate on loans to non-financial organizations for a term exceeding three years, k and ξ — are proportionality coefficients. In a somewhat modified form, this relationship is presented in the paper by S. Goldfeld et al. [27]:

$$ln(M_t) = a + b\ln(M_{t-1}) + c\ln(Y_t) + d\ln(r_t). \qquad (5)$$

In equation (5), just like in equation (4), it is assumed that the demand for the money supply depends on the levels of GDP and the level of bank interest rates. Moreover, S. Goldfeld suggested that the current level of the money supply depends on its past values, which is quite realistic. The form of equation (5) suggests that the relationship between its variables is nonlinear. The original function before logarithmization has the following form:

$$M_t = g \cdot M_{t-1}^b \cdot Y_t^c \cdot r_t^d, \qquad (6)$$

where $a = \ln(g)$. Equation (6) is structurally similar to the well-known Cobb-Douglas function in economics. Differentiating equality (6) with respect to time under the condition $\dfrac{dY}{dt} > 0$, we obtain constraint (9) on

the growth of the money supply (8). Our model will not include the equation describing the money supply because it is almost entirely controlled by the actions of the Central Bank of the Russian Federation and commercial banks.

Thus, the system of equations, the solution of which will allow determining the increase in the money supply that accelerates the growth rate of Russia's GDP, can be written as follows:

$$q_t = \frac{1}{M_t}\frac{dM_t}{dt} + \frac{1}{V_t}\frac{dV_t}{dt} - \pi_t \to \max, \qquad (7)$$

$$M_t = g \cdot M_{(t-1)}^b \cdot Y_t^c \cdot r_t^d, \qquad (8)$$

$$\frac{dM_t}{dt} \le gb \cdot M_{t-1}^{b-1} \cdot Y_t^c \cdot r_t^d \cdot \frac{dM_{t-1}}{dt} +$$
$$+ gc \cdot M_{t-1}^b \cdot Y_t^{c-1} \cdot r_t^d \cdot \frac{dY_t}{dt} + gd \cdot M_{t-1}^b \cdot Y_t^c \cdot r_t^{d-1} \cdot \frac{dr_t}{dt}, \qquad (9)$$

$$Y_t = a \cdot K_t^\alpha \cdot L_t^\beta, \qquad (10)$$

$$V_t = \frac{Y_t}{M_t}, \qquad (11)$$

$$\frac{dV_t}{dt} = a\left[\alpha \cdot \frac{K_t^{\alpha-1}L_t^\beta}{M_t} \cdot \frac{dK_t}{dt} + \beta \cdot \frac{K_t^\alpha L_t^{\beta-1}}{M_t} \cdot \frac{dL_t}{dt} - \frac{K_t^\alpha L_t^\beta}{M_t^2} \cdot \frac{dM_t}{dt}\right], \qquad (12)$$

$$dY_t = a_1 + \beta_1 \cdot dY_{t-1} + \beta_2 \cdot dY_{t-2} + \beta_3 \cdot t, \qquad (13)$$

$$dr_{t+1} = \mu \cdot dt + \sigma \times \varepsilon \cdot \sqrt{dt}, \qquad (14)$$

$$\frac{dK_{t+1}}{dt} = (v^e - \mu^e) \cdot K_t. \qquad (15)$$

As a function that most adequately describes GDP dynamics, we will also choose the Cobb-Douglas production function (10), where K — is the value of fixed assets in the country, L — is the number of employed people in the economy. When conducting calculations to account for inflationary processes, a time series of real GDP values was used. The increment in the velocity of money circulation

(12) was found by differentiating the equation used to find the velocity of money V over time, equality (11). To find the annual GDP increments (13) included in inequality (9), we will use vector autoregression. Considering the high volatility of the increments of bank interest rates on loans to non-financial organizations, we will use the Wiener model (14) for their approximation, which has shown the most adequate results in the analysis of this variable, where μ — is the expected value of the interest rate increment, σ — is the standard deviation of these increments, ε — is a random variable with a standardized normal distribution, dt — interval time. The expected annual increase in the value of fixed capital is determined by formula (15), where v^e — the expected value of the fixed asset renewal rate, μ^e — the expected value of the fixed asset disposal rate (a brief description of the calculations for these values is provided in *Table 1*).

Empirical analysis. The system of equations (7) — (15) includes one equation (7) for the extremum, one inequality, and seven equations that constrain the feasible region of the objective function. Such systems of equations are solved using the method of Lagrange multipliers, i.e., it is necessary to find the derivative of the GDP growth rate with respect to the money supply, taking into account the constraint relationships (the Solver menu in Excel). But first of all, it is necessary to calculate the coefficients of these equations. The coefficients g, b, c and d can be found from equation (8) by first taking its logarithm. The time interval of the data on which the regression is based spans from 1997 to 2024. The GDP value for the fourth quarter of 2024 is obtained through forecasting. In the calculations, we will use the values of real GDP, which can be obtained by dividing the nominal GDP of any year by the GDP deflator of that same year. The use of real GDP values in the calculations is aimed at eliminating the impact of inflation on the assessment of gross domestic product.

Before constructing the regression equation, it is necessary to perform a stationarity test on the time series dynamics that will be used in the calculations. The analysis for stationarity was conducted using the augmented Dickey-Fuller test, implemented in the Gretl software. The calculations showed that the logarithmically transformed time series *M, Y* and *r*, which are involved in the regression analysis (equation 8), are stationary when tested with a constant and trend for ln(*M*) and with a constant for ln(*Y*) and ln(*r*). The coefficients of equation (8) turned out to be the following:

$$M_t = M_{t-1}^{0.75} \cdot Y_t^{0.25} \cdot r_t^{-0.09}. \qquad (16)$$

The coefficients of equation (8) are as follows: $g = 1$, since $a = 0$ (the constant of equation 8 turned out to be statistically insignificant); $b = 0.75$; $c = 0.25$; $d = -0.09$. The statistical characteristics of this model are as follows: $R^2 = 0.96$, Student's *t*-statistic for its coefficients *b* is 20; *c* is 6; *d* is minus 2.04; the Durbin-Watson statistic is 1.8. The White test at a significance level of 0.05: $\chi^2_{test} = 9.7$; $\chi^2_{critical} = 16.1$. The equation turned out with good predictive characteristics. The negative exponent over the variable *r* (long-term loan rates) draws attention, i.e., with an increase in bank interest rates, the money supply begins to decrease. Conversely, with an increase in GDP, the demand for the money supply starts to grow, i.e., all the signs of the beta coefficients in equation (8) correspond to the economic theory of J. Keynes (equation 4).

Let's calculate the regression coefficients of equation (10). To do this, we will collect data on the dynamics of fixed asset values in the country, the number of employed individuals aged 15 to 72 in the Russian Federation, and GDP volumes from 2000 to 2023 inclusive. The series turned out to be stationary $\ln(L_t)$ and $\ln(K_t)$. As a result, the following values for the equation coefficients were obtained (10):

$$Y_t = 1.4504 \cdot 10^{-51} \cdot K_t^{0.58} \cdot L_t^{10.508}. \qquad (17)$$

tatistical characteristics of this model: $R^2 = 0.91$, the *t*-statistics of its coefficients are -10; 14.2; 9.5; and the Durbin-Watson statistic is 1.38. The White test at the 0.05 significance level: $\chi^2_{test} = 2.34$; $\chi^2_{critical} = 16.9$. The equation turned out with decent predictive characteristics. Let's check the accuracy of GDP approximation, for example, for the year 2020 using the model:

$$Y_t = 1.4504 \cdot 10^{-51} \cdot 362\,191\,650^{0.572594} \cdot$$
$$\cdot\, 70\,976.9^{10.5079} = 108\,977.3, \qquad (18)$$

which is quite close to the size of Russia's GDP this year (107 658.2 billion rubles).

The mathematical expectation of inflation in 2024, when analyzing the annual values of this variable from the crisis year of 2008 to 2024, is 7.4%. However, the actual inflation rate for the first 11 months of 2024 has already reached 8.1%. The Bank of Russia expects inflation in 2025 to be at 4%,[1] so for calculations, we will take the average value, i.e., 7.4% per annum.

As the bank interest rate, we will choose the weighted average interest rate on loans to non-financial organizations for a term of over 3 years at the end of the year. The choice of this particular rate is due to the fact that investments in the fixed assets of enterprises, which are financed through long-term loans, have an impact on GDP dynamics. To approximate the value of ε in equation (14), we will use the random number generator built into Excel by calling two functions in a cell: =NORM.S.INV(RAND()).

The coefficients calculated in December 2024 for the system of equations (7)—(15) are presented in *Table 1*.

When solving the system of equations (7–15), the results presented in *Table 2* were obtained.

Calculations show that if the increase in the money supply in 2025 is above the arithmetic

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[1] Medium-term forecast of the Bank of Russia following the Board of Directors meeting on the key rate on February 16, 2024. URL: https://www.cbr.ru/Collection/Collection/File/48891/forecast_240216.pdf (accessed on12.01.2025).

Numerical Values of the Coefficients of the System of Equations (7)–(15)

Name of the constant	Numeric value of a constant	Name of the constant	Numeric value of a constant
$v^e = M(v)$ — the expected value of the fixed asset renewal rate over the period from 2009 to 2023 (in %)	4.23	g	1 (5.3)
$\mu^e = M(\mu)$ — the expected value of the fixed asset depreciation rate over the period from 2009 to 2023 (in %)	0.78	b	0.75 (20)
K_{2023} — the value of fixed assets in the Russian Federation in 2023 (in million rubles) at full accounting value	460 370 094	c	0.25 (6)
K_{2024} — forecast of the value of fixed assets in the Russian Federation at the end of 2024 (in million rubles) at full accounting value K_{2025} — forecast of fixed asset value in the Russian Federation in 2025 (in million rubles) at full accounting value	498 718 922 540 262 209	d	−0.09 (−2.04)
M_t forecast — M2 money supply as of 01.01.2025 (billion rubles)	113 001.1	a1	0
$E\left(\dfrac{dL_t}{dt}\right)$ — the expected increase in the number of employed individuals aged 15–72 in the Russian Federation (in thousands) in 2025	308.7	β_1	0
$\pi_t = E(\pi)$ — the expected value of the consumer price index in the Russian Federation (evaluation period — from 2008 to 2024), in %.	7.4	β_2	0
a	$1.4504 \cdot 10^{-51}$ (−10)	β_3	440 (7.5)
α	0.58 (14.2)	μ	0.462
β	10.508 (9.5)	σ	1.89

Source: Compiled by the authors.

Note: in parentheses is the Student's t-statistic for the regression coefficients.

Table 2

Results of Solving the System of Equations (7)–(15) for 2025

M_t on 01.01.2026 (in billion rubles)	dM_t (in billion rubles)	V_t (turnovers per year)	$\dfrac{dV_t}{dt}$ (increase in turnover per year)	ᴨ expected inflation rate (in %)	q_t estimated values of real GDP growth rates (in %)
129 501.23 (optimistic version)	17 453.47	1.55	0.0029	7.4	6.1
122 000.00 (pessimistic version)	9 000.00	1.55	0.0029	7.4	0.2

Source: Compiled by the authors.

mean of this value over the past three years (15 582.73 billion rubles) and amounts to 17 453 billion rubles (the maximum allowable according to inequality 9), then the growth rate of Russian GDP could be 6.1% per year. If the increase in the money supply is chosen at the lower limit of the allowable range (9 000 billion rubles), then the economic growth in the country will be almost zero.

Let's calculate the volume of the increase in the money supply in equation (7) without considering the constraint (9), which will most effectively impact the increase in GDP without triggering an inflationary spiral. To do this, we will assess the direct impact of annual increases in the money supply on the increase in Russian GDP. The Dickey-Fuller test with a constant and trend showed the stationarity of these series. The best equation in terms of statistical characteristics turned out to be the following:

$$dY_t = 2.81 \cdot dM_{t-1} - 0.00012 \cdot dM^2_{(t-1)}. \quad (19)$$
$$(2.9) \qquad\qquad (-2.14)$$

The coefficient of determination of this equation is 0.83, the Durbin-Watson statistic was 2.6. The White test at the significance level of 0.05: $\chi^2_{\text{test}} = 7{,}83$; $\chi^2_{\text{critical}} = 9.48$. Taking the derivative in equation (19) with respect to dM_t

and setting the right side of the equation to zero, we get:

$$2 \cdot 0.00012 \cdot dM_t = 2.81$$
$$\text{or } dM_t = 11\,708.33 \text{ billion rubles.}$$

Therefore, the optimal M2 growth in 2025 is 11 708.33 billion rubles, with GDP growth at 2.2%. With such an increase in the money supply, there will be no accumulation of excess monetary surplus in the economy. In 2022, the money supply growth was a record 16 135.1 billion rubles, and in 2023, it was 15 997.4 billion rubles. The average actual annual growth of the money supply from 2010 to 2023 inclusive is 5 936.98 billion rubles. However, in 2024 and 2025, the growth of the money supply will likely be significantly lower than in 2022 due to the increase in the key rate values.

The authors of the paper do not claim high accuracy in their calculations, as the dynamics of GDP volumes are influenced not only by the money supply but also by a vast array of economic, political, and social variables and factors. In this case, the discovered trend is important: it is necessary to increase the money supply in the country to sustain economic growth.

In conclusion of our study, we will analyze how strongly Russian inflation is related to the growth rate of the money supply. Will

an acceleration in the growth of the money supply in the country lead to an increase in the inflation rate? A vector regression model was constructed, in which inflation (monthly values of the consumer price index from January 1995 to November 2024) was the dependent variable, and the money supply with time lags from one to twelve was taken as regressors. The model turned out to be statistically insignificant based on the coefficient of determination (around 0.18) and the Student's t-statistic for all regression coefficients (less than one). From this, it can be concluded that the dynamics of consumer prices are not related to the growth of the money supply in the country, i.e., Russian inflation at the current stage of economic development has a non-monetary origin. O.S. Sukharev came to similar conclusions in article [4]. In Russia, which has a low level of the economy's monetization coefficient, there is no need to fear a surge in inflation with an increase in money issuance and growth in money multiplication, at least in the coming years.

CONCLUSION

Summarizing the conducted research, we will formulate the main conclusions regarding the activation of the emission process as one of the most powerful levers for the growth of the Russian economy.

Firstly, using the constructed dynamic stochastic model, the value of the annual increase in the money supply, balanced with changes in the velocity of money circulation, as well as with the projected GDP, employment, and long-term loan interest rate increases for 2025, was obtained. An increase in the money supply of this magnitude, constrained by the equation of exchange of I. Fisher, will not lead to inflation growth, but it will also not allow the Russian economy to enter a trajectory of sustainable economic growth. To accelerate economic growth, it is necessary to switch to a monetary policy that allows for a more extensive money emission.

Secondly, the conducted statistical analysis of the relationship between the dynamics of the money supply and GDP revealed its non-linearity, which allowed for the calculation of annual increments in the money supply that would lead to growth in Russian GDP without accumulating excess money supply in the economy. Accelerated monetary emission within the limits established in this work will not lead to inflation growth, as at this stage of development of the Russian economy, there is no statistical correlation between the dynamics of the money supply and inflation.

Thirdly, the following methods of money issuance with reduced inflation risk can be proposed:

a) financing state infrastructure and investment projects by acquiring the corresponding bonds;

b) increasing the share of gold in the structure of Russia's international reserves to 80% as in developed countries, which will support the gold mining and related industries, protect this part of the gold and foreign exchange reserves from confiscation, and create a barrier against the penetration of foreign inflation into the country during the formation of gold and foreign exchange reserves.

Thus, the Russian monetary authorities possess a very powerful and effective lever of influence on the real sector of the economy, so it would be logical to expand the list of main monetary policy instruments by adding not only the key rate but also the money supply.

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The Impact of Inflation Targeting on Inflation

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ABSTRACT

The **purpose** of the paper is to assess the impact of the transition to the inflation targeting regime on inflation in modern conditions. To achieve this goal, we carry out econometric modeling of the impact of this monetary policy regime on the dynamics of the overall price level. As an empirical strategy, we use the estimation of models with fixed effects on cross-country panel data containing information up to and including 2022. In addition, to clarify the long-term effects of changing the monetary policy regime, we use the difference of differences estimator with the inclusion of additional control variables. The modelling results demonstrate that even in today's shock conditions for the global economy, inflation targeting remains an effective tool for achieving price stability. This effect is observed for various subsamples of countries. In relation to Russia, it is important to **conclude** that inflation targeting is an effective tool for achieving price stability for oil-exporting countries.

Keywords: inflation; inflation targeting; difference in differences esimator; panel data; monetary policy; central bank

INTRODUCTION

High and volatile inflation makes it difficult to predict future price levels, hinders households and firms from making sound investment decisions, and leads to inefficient allocation of limited resources. This exacerbates social inequality and slows down long-term economic growth [1]. In the context of such negative consequences, the primary task of central banks around the world is to maintain a low and stable level of inflation, which explains the widespread adoption of inflation targeting regimes.

According to the 2021 report on Exchange Arrangements and Exchange Restrictions (AREAER),[1] the IMF recognizes the inflation targeting regime in 45 countries, whose central banks not only set an inflation target but also directly engage in targeting it, without being distracted by other macroeconomic indicators.Such popularity of inflation targeting is due to the consensus in the scientific literature regarding the effectiveness of this regime in combating inflation. This consensus largely formed in the early 21st century, when low inflation was consistently observed in most developed countries for decades. Price stability was not shaken even by the Great Recession of 2008–2009. In many developing countries, including those that adopted inflation targeting, the rate of overall price growth also decreased on average. Therefore, it seemed that the task of combating inflation worldwide was solved.

However, starting from 2022, inflation in Russia and around the world, on the contrary, is increasing. Record rates of overall price growth were observed even in economies that had not seen double-digit inflation since the 1980s. At the same time, unemployment increased and overall economic activity decreased, which also limited the central banks' room for maneuver. Apparently, this effect is related to prolonged negative supply shocks resulting from the pandemic in 2020–

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[1] URL: https://www.imf.org/en/Publications/Annual-Report-on-Exchange-Arrangements-and-Exchange-Restrictions/Issues/2022/07/19/Annual-Report-on-Exchange-Arrangements-and-Exchange-Restrictions-2021–465689 (accessed on 23.01.25).

2021 and disruptions in logistics chains in 2022–2023. By now, this surge in inflation has only been partially mitigated, and the rate of price growth worldwide remains relatively high.

E. L. Goryunov and co-authors [2], considering possible scenarios of global inflation dynamics, note that the scenario of developed economies falling into a prolonged stagflation trap is quite realistic (although not the most likely yet). In this regard, the fight against inflation is becoming a relevant task again, and the inflation targeting regime is facing, perhaps, one of the main challenges in its more than thirty years of existence.

The effectiveness of traditional inflation targeting in the context of modern stagflation raises doubts among some researchers. This situation revives the previously quiet discussion about the advisability of abandoning this regime in its current form or at least revising the quantitative values of the monetary policy targets used [3].

Therefore, it seems important to understand to what extent recent data confirms the hypothesis that inflation targeting can reduce inflation.

In this regard, the aim of our work is to assess the impact of the transition to an inflation targeting regime on inflation under current conditions..

The novelty of our research compared to similar literature lies in the fact that we consider data from 2019–2022, during which the global economy faced significant shocks that led to an acceleration in the overall price level growth. We primarily focus on developed countries, as many of them have long since overcome the problem of inflation, even before the popularization of inflation targeting, and some researchers question the significance of this regime's contribution to the fight against inflation specifically in developed countries [4]. Moreover, we additionally evaluate the effect of inflation targeting for oil-exporting countries, as such economies are significantly oriented towards the external market, and

therefore inflation in them can substantially depend on exchange rate fluctuations, which potentially affects the effectiveness of pure inflation targeting.

Our paper consists of three parts and a conclusion. The first part offers a literature review on the research topic. In the second part, we describe the empirical strategy and data. The third part contains the modeling results. In the conclusion, we summarize the research findings.

INFLATION TARGETING AND INFLATION
Early papers dedicated to analyzing the impact of inflation targeting on inflation date back to the period of relative macroeconomic stability in the 1990s and 2000s, before the onset of the global financial crisis [4–6]. The empirical strategy used here includes the difference-in-differences method and propensity score matching. The general conclusion of such studies is that inflation targeting weakly reduces inflation in countries where it was relatively low at the time of transition, and strongly reduces inflation in countries where it was high at the time of transition. Moreover, the transition to inflation targeting reduces not only the level of inflation but also its volatility [1].

The mentioned papers instill some optimism regarding the success of inflation targeting during the period of great moderation; however, they leave open the question of how this regime operates under conditions of strong shocks. M. Pourroy [7] attempted to fill this gap by investigating how effective inflation targeting was during the Great Recession. Modeling using the difference-in-differences method revealed that this regime contributes to the rapid adaptation of the economy to the consequences of the crisis, which is reflected in a more accelerated recovery of output. At the same time, hybrid inflation targeting, within which the central bank considers not only inflation but also smooths exchange rate volatility, proves to be a more effective regime

compared to pure inflation targeting, where monetary authorities ignore any other goals besides the inflation target. Experimental confirmation of the advantages of mixed targeting over pure targeting has also been obtained in work [8]. In work [9], modeling was also carried out taking into account data from the period of the global financial crisis of 2008–2009. Based on the analysis of dynamic panel models with fixed effects, it has been shown that inflation targeting contributes to reducing inflation in developing countries.

Another argument in favor of the effectiveness of inflation targeting can be considered the work of M. Fratzscher et al. [10]. The peculiarity of this study is that it analyzes the effectiveness of this regime under conditions of severe exogenous shocks —natural disasters that have a direct negative impact on the economy through the destruction of physical capital and durable goods. In order to capture a sufficient number of such episodes, the study uses a broad sample of 76 countries (both developed and developing) over the period from 1980 to 2015, and based on this, a dynamic panel model is constructed. As a result of the evaluation, the authors find that inflation targeters cope better with the consequences of shocks than countries with other monetary policy regimes. This superiority manifests in less significant reactions of inflation and output to negative shocks, in particular:

the level and volatility of inflation increase as a result of natural disasters less than under alternative monetary policy regimes, with the average rate of price growth remaining at a lower level for four years after the exogenous shock;

under inflation targeting, GDP experiences a smaller immediate decline, recovers faster, and, moreover, subsequently settles at a higher level than under other monetary policy regimes.

Such results have passed a robustness check, during which the authors took into account the quality of public institutions and the presence of various fiscal rules in some of the countries included in the sample. Moreover, inflation targeters managed to better anchor inflation expectations after exogenous shocks.

It can be concluded that the literature has identified some evidence in favor of the idea that inflation targeting allows for successful combat against inflation not only under conditions of macroeconomic stability but also during crises caused by cyclical fluctuations in economic activity or other reasons. In our paper, we will test this conclusion by supplementing the data with periods of the COVID-19 pandemic, as well as the current period of geopolitical instability.

DATA AND EMPIRICAL STRATEGY

Following the approach [4], we use data from all developed countries that are members of the Organisation for Economic Co-operation and Development: Australia, Canada, Finland, New Zealand, Spain, Sweden, the United Kingdom, the United States, Japan, Denmark, Austria, Belgium, Ireland, Italy, the Netherlands, Portugal, Norway, Switzerland, Germany, and France. Additionally, to study the effectiveness of inflation targeting in oil-exporting countries, we analyze data from the fifteen largest oil exporters. These include Canada and Norway, as well as Saudi Arabia, Russia, Iraq, Canada, the UAE, Kuwait, Iran, Venezuela, Angola, Nigeria, Norway, Kazakhstan, Mexico, Oman, and Brazil.

Information on inflation rates and the dynamics of other macroeconomic indicators is taken from the International Monetary Fund's database. Modern statistics on the monetary policy regimes used are taken from the Annual Report on Exchange Arrangements and Exchange Restrictions (2022), while earlier data are from the paper [11].

To assess the impact of the transition to inflation targeting on the level of inflation, we use two approaches: the difference-in-differences method, as well as panel models with fixed and random effects.

The first approach is based on the traditional starting point of research on the effectiveness of inflation targeting — the paper [4]. In addition to the monetary policy used, we consider whether the country is an oil exporter or not:

$$INFL_{i,post} - INFL_{i,pre} = \beta_0 + \beta_1 IT_i + \\ + \beta_2 IT_i OilExp_i + \beta_3 INFL_{i,pre} + \varepsilon_i,$$

where $INFL_{i,post}$ and $INFL_{i,pre}$ — average inflation rates in i-country — over the five years before the transition to inflation targeting and average inflation rates over the five years after the transition to this monetary policy regime; IT_i — dummy variable equal to one for inflation-targeting countries; $OilExp_i$ — dummy variable equal to one for oil-exporting countries; ε_i — random regression errors.

Such long-term averages, like $INFL_{i,post}$ and $INFL_{i,pre}$, allow capturing the long-term effect of the change in the monetary policy regime on inflation, separating it from short-term cyclical fluctuations. For countries in the control group (that is, for countries that did not switch to inflation targeting), the boundary point between the before and after periods is the sample average year of the transition to inflation targeting for the countries in the experimental group.

As already noted in the review of the work, adding the regressor $INFL_{i,pre}$ to the right side of the equation helps solve the endogeneity problem and distinguish the mean reversion effect (coefficient β_3) from the effect of transitioning to an inflation targeting regime, the magnitude of which is indicated by the β_1 (дfor non-oil-exporting countries) or the sum of the coefficients $\beta_1 + \beta_2$ (for oil-exporting countries).

In this specification, if we conclude that the coefficient β_1 is less than zero, it will mean that target countries have indeed managed to achieve a stronger reduction in the inflation rate compared to countries using an alternative monetary policy regime. Furthermore, a negative coefficient value β_2 will indicate that for oil-exporting countries, inflation targeting contributes more significantly to disinflation compared to countries that are not oil-exporting.

The second approach involves estimating the model on panel data with random or fixed effects and a number of control variables: the primary balance of the government budget (the overall difference between government revenues and expenditures, excluding interest payments on accumulated government debt) and the level of imports of goods and services (both variables taken as a percentage of GDP). This choice is based on the paper [12] and allows for the consideration of the features of fiscal policy, which may affect the effectiveness of the actions of monetary authorities. Country effects capture those specific socio-economic and demographic characteristics of economies that change slowly over time, as well as the initial level of economic development, so there is no need to consider these factors as separate control variables [13].

Thus, the evaluated specification of the equation looks as follows:

$$INFL_{it} = \beta_0 + \beta_1 * IT_{it} + \beta_2 * govpribal_{it} + \beta_3 * import_{it} + \\ + \beta_4 * OilExp_i + \beta_5 * IT_{it} * OilExp_i + \mu_i + \varepsilon_{it},$$

where $INFL_{it}$ — the level of inflation in i-country; IT_{it} — dummy variable equal to one if i-country targeted inflation in year t; $govpribal_{it}$ — the level of the primary balance as a percentage of GDP in i-country in year t; $import_{it}$ — the level of imports of goods and services as a percentage of GDP in i-country in year t; $OilExp_i$ — dummy variable equal to 1 for oil-exporting countries; μ_i —country fixed effect; ε_{it} — random regression errors.

To verify the robustness of the results, we also evaluated bidirectional models that account for time effects.

RESULTS OF MODELING AND STABILITY CHECK

The obtained estimates of the parameters of the difference-in-differences model are

Assessment of the Influence of Inflation Targeting on Inflation Using the Difference-in-Differences Estimation

Variable	Dependent variable:		
	$INFL_{i,\text{post}} - INFL_{i,\text{pre}}$		
	Full sample	**Oil exporters**	**Non-oil exporters**
IT_i	−3.464***	−5.365***	−0.966***
	(1.103)	(1.934)	(0.342)
$INFL_{i,\text{pre}}$	−0.318**	−0.425***	−0.801***
	(0.148)	(0.156)	(0.055)
Constant	2.229***	5.570***	1.815***
	(0.671)	(1.371)	(0.275)
Number of observations	30	12	18
R-squared	0.521	0.702	0.908

Source: Compiled by the authors.

Notes: Robust standard errors are reported in parentheses under the coefficient estimates; ** and *** indicate the significance level of 5% and 1%, respectively.

presented in *Table 1*. The calculations were carried out for both the full sample and separately for countries that export and do not export energy resources.

Based on the analysis of the obtained results, it can be concluded that the transition to inflation targeting on average helps countries in the fight against inflation, reducing its level by 3–4 percentage points. Oil-exporting countries manage to reduce the level of inflation more effectively when transitioning to IT than countries whose economies are not focused on oil exports: while in the first group the transition to the new policy allowed an average reduction of inflation by approximately 5 percentage points under otherwise equal conditions, in the second group the similar effect was only 1 percentage point. This difference can partly be explained by the fact that among oil exporters there are developing countries for which the transition to inflation targeting is more important in terms of combating high rates of overall price level growth [14].

The level of inflation in the economies of countries before transitioning to inflation targeting is also a significant factor in determining its level after the transition, meaning that the mean reversion effect identified in work [4] is also observed in recent data.

The model underwent two robustness checks. First, we altered the sample: regardless of the exclusion from or inclusion in the sample of countries that faced hyperinflation during the period under consideration (Angola and Brazil), the conclusion about the sign of the inflation targeting effect remains unchanged. Second, we implemented a placebo test, in which countries were randomly assigned to the experimental group. When countries were randomly assigned to the experimental group, the impact effect became insignificant, which serves as indirect confirmation of the adequacy of the methodology used.

The results of the model evaluation using the second approach (panel models with control variables) are presented in *Table 2*. The first column contains the model without country effects, the second and third with fixed and random effects, respectively. The Hausman test does not reject the hypothesis of the consistency of the random effects

Table 2

Assessment of the Influence of Inflation Targeting on Inflation Using the Models with Fixed and Random Effects

Variable	Dependent variable:		
	$INFL_{it}$		
	Pooled	Fixed effects	Random effects
IT_{it}	−1.641***	−2.673**	−2.510***
	(0.623)	(1.065)	(0.921)
$OilExp_i$	9.472**		10.026***
	(3.714)		(3.737)
$IT_{it}*OilExp_i$	−7.864**	−11.015	−10.759
	(3.510)	(7.653)	(7.020)
Control variables	Yes	Yes	Yes
Fixed effects	No	Yes	No
Random effects	No	No	Yes
F-test	p-value < 0.05		
Breusch-Pagan test		p-value < 0.05	
Hausman test			p-value > 0.05
Number of observations	996	996	996
R-squared	0.210	0.111	0.121

Source: Compiled by the authors.

Notes: Robust standard errors are reported in parentheses under the coefficient estimates; F-test — test to check the hypothesis of the absence of fixed effects; Breusch-Pagan test — test to check the hypothesis of the absence of random effects; Hausman test — test to check the hypothesis of the validity of estimates in a model with random effects; *, ** and *** indicate the significance level of 10%, 5% and 1%, respectively.

model estimates. The conclusions regarding the implications of implementing inflation targeting as a result of applying these two approaches remain robust, so the choice between them is not critical. Additionally, we estimated a two-way panel model, but formal tests did not confirm the necessity of including time dummy variables in the regression.

The coefficient estimates obtained from the implementation of the second approach correspond to the results of the difference-in-differences method: the application of inflation targeting is associated with a lower level of inflation. This effect of inflation targeting remains statistically significant at least at the five percent level in all specified models. The difference in conclusions is that in this case, we do not observe significant differences in the effect of inflation targeting in oil-exporting countries compared to the rest of the sample.

For additional verification of the robustness of the obtained conclusions, it would be advisable to increase the sample size by including a greater number of countries, which would allow for conclusions that are valid for developing economies that are not oil exporters. Such an expansion of the research object remains outside the scope of our work; however, it certainly represents an area of interest for the future.

CONCLUSION

In the course of econometric modeling, we have found evidence that inflation targeting contributes to the reduction of inflation. Moreover, this effect is observed both in developed countries, characterized by relatively low rates of overall price level growth, and in oil-exporting countries, some of which have faced prolonged periods of high inflation in recent decades. For economies

that were initially characterized by high inflation, the benefit of transitioning to inflation targeting is more significant. However, the effectiveness of this regime is maintained even when accounting for differences in the initial inflation level (i.e., the average inflation level over the five years prior to the transition to targeting) in the model construction.

Econometric estimates show the effectiveness of inflation targeting even when considering the most recent data, that is, data related to the pandemic periods and the current global stagflation.

A possible explanation for this result is the anchoring of inflation expectations near the inflation target for those countries that have long and successfully been inflation targeters. In other words, in countries that have been targeting inflation for a long time, economic agents, when forming expectations, are more oriented towards the inflation target and the forecasts of the central bank than towards fluctuations in economic conditions caused by contemporary global shocks. As a result, when contracts are concluded, the expected price increase specified in them turns out to be less significant, which prevents inflation from accelerating. As I. Buono and S. Formai [15]

show, the anchoring of inflation expectations, firstly, plays an important role in the dynamics of inflation after crises, and secondly, can be easily lost if monetary policy is not sufficiently consistent.

In such conditions, abandoning inflation targeting or even revising the inflation target appears impractical, as any of these decisions will inevitably undermine the credibility of central bank commitments, leading to increased inflation expectations and, consequently, raising the likelihood of an accelerated inflation scenario not only in the medium term but also in the long term.

The possible theoretical contribution of our work lies in demonstrating evidence in favor of the effectiveness of the inflation targeting regime under conditions of strong inflationary pressure faced by the global economy. We hope that this result will also contribute to the discussion on what the regime of Russian monetary policy should be. Within this discussion, arguments are made both for and against the use of inflation targeting [16, 17]. The practical value of our work, as we see it, lies in the fact that the obtained estimates can be used to justify the choice of the monetary policy format in contemporary conditions.

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Economic (De-)Globalization: Who Does Determine It?

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ABSTRACT

The subject of the study is the dynamics of world economic relations in the context of a conflict between national industrial policies and the interests of multinational enterprises (MNEs). **The purpose** of the paper is to establish whether the country's industrial policy determines the international activities of national corporations, or, on the contrary, this policy only reflects the actual competitiveness of such companies. **The methodological basis** of the study was the theoretical concepts of economic globalization. Methods of qualitative and quantitative analysis of the theory and practice of world economic relations were used. **As a result** of a study of the consequences of economic globalization for developed and developing countries in the context of national industrial policies, it was established that the interests of MNEs originated from matured economies in maximizing profits and, on this basis, sustainable growth of their value in many cases diverges from the preferences of their countries of origin's authorities in the field of world economic relations. It is **concluded** that the specified motivation of MNEs will most likely prevail over the desire of the authorities to limit the geography of their presence.

Keywords: economic globalization; national industrial policy; multinational enterprises (MNEs); international competition; open markets; profit maximization; protection of values; irrational economic behavior

INTRODUCTION

Analyzing issues related to the globalization of economic ties, researchers primarily focus on interstate relations and differences in national industrial policies. This paper examines the impact of the dynamics of global economic ties on their main actors — companies that engage in export-import operations and foreign direct investments. The purpose of the study is to determine to what extent changes in the specified activities are driven by the motivation and capabilities of these companies to maximize profits through the use of global value chains, and to find out whether country-specific industrial policy determines the international activities of national corporations, or whether this policy merely reflects the actual competitiveness of such companies.

CONCEPT OF GLOBALIZATION

Trade relations between countries existed even in the pre-Christian world, and they received significant development as a result of the strengthening of market relations, technological progress, and improved logistics, when the foundations for intensive exchange of goods were created and the need for cooperation between companies from different countries increased to enhance the financial efficiency of their activities.

The modern stage of globalization began after World War II, when American corporations, which had grown on military supplies, were granted access to Western European countries whose economies were recovering, and local companies were unable to meet the demand for capital equipment and consumer goods. Later, in many mature markets, large corporations emerged, whose further development required scaling their activities beyond national borders, i.e., international expansion. At this time, the colonial political-economic system, which allowed developed economies to exploit the natural resources and labor of the colonies rather than engage in equitable trade, began to collapse and made the use of previous practices impossible. Such a situation required a new approach to organizing interaction between developed

countries and the rest of the world to ensure access for Western corporations to cheap labor and natural resources, as well as entry into new markets.

The recovery of the economies of Western European countries was seen by experts as a positive example for newly formed states in that the benefits of barrier-free trade would be received not only by exporting countries and multinational corporations, but also by the states on whose territory they would operate. It was expected that the latter would benefit both from the opportunity for local companies and consumers to acquire previously unavailable goods and services, and from establishing by these corporations their production facilities there, which would improve the economies of the recipient countries by increasing industrial potential, enhancing the qualifications of local employees working at such enterprises, improving their financial support, and developing industrial infrastructure, all of which would have a multiplying effect on the economy of the country receiving foreign direct investments. And many countries adopted this approach, opening their markets to highly competitive, financially powerful Western multinational enterprises (MNEs).

As noted by F. Erixon[1] [1, p. 2], the implementation of the idea of intensifying world economic ties on a global scale has brought enormous benefits to the Western economy. In particular, economic globalization has allowed:

• deepen Western corporations' production specialization, increase the intensity of innovations and capital's utilization;

• scale their operations, reduce production costs, and maximize profits on this basis;

• increase household incomes;

• reduce the high inflation rates in Western economies;

• increase the real wages of workers in developed countries by reducing the cost of consumption;

• make many goods accessible that only a few could afford before;

• stimulate the spread of new technologies, helping to make the economy more environmentally friendly and productive;

• improve the quality of management in companies and the working conditions of people.

Some of the mentioned benefits of economic globalization have also been realized in developing countries, where, for example in India, the influx of foreign direct investments, according to N. Mehta et al. [2, p. 122], contributed to significant growth in the country's manufacturing sector. Data from the World Bank on GDP per capita dynamics, presented in *Table 1*, indicate that the growth rates of developing countries' economies over 50 years have been impressive and often outpaced the growth dynamics of developed national economies. But the difference in absolute figures shows that the greatest benefits from this process were received by mature economies, whose gap with similar indicators of developing countries increased tenfold during this period: it was in the range of 3–5 thousand USD, and now it is 63–73 thousand USD with the United States, and 1.6–1.7 thousand USD and 25–35 thousand USD, respectively, with the European Union.

The figures in *Table 1* show that the impact of the globalization process on the growth of individual countries' economies has been far from uniform, and it is hardly possible to speak of a leveling of wealth in the world. Therefore, the rhetoric of globalization has shifted towards poverty reduction, which more accurately reflects the reality of economic processes in many developing countries.

The fact is that for the overwhelming majority of developing countries, the road from poverty to economic prosperity lay through the mandatory adherence to neoliberal recommendations from Western countries regarding the opening of their markets, the urgent and comprehensive privatization of the public sector, and the introduction of strict fiscal and monetary policies. The aforementioned recipes, known as the Washington Consensus (among Western economists and led by the International

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[1] Founder and Director of the European Centre for International Political Economy, an independent non-profit research center focused on international economic policy issues of significant importance to Europe.

Table 1

Dynamics of GDP Per Capita in Selected Countries/Regions

Country/Region	USD 1970	USD 2022	Growth (in times)	Difference with USA in USD	
				in 1970	in 2022
Bangladesh	133	2 688	20.2	−5 101	−73 641
China	113	12 720	112.4	−5 121	−63 609
Egypt	231	4 295	18.6	−5 003	−72 034
EU	1 880	37 433	19.9	−3 354	−38 896
USA	5 234	76 330	14.6	0	0
World	816	12 688	15.6	−4 419	−63 642

Source: Compiled by the author based on data: World bank. URL: https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?locations=US-1W-CN-BD-EG-EU (accessed on 14.03.2024).

Monetary Fund (IMF) and a group of World Bank organizations), emerged in the 1980s after many developing countries, having opened their borders to Western capital, were unable to conduct a balanced economic policy in the context of the expansion of transnational corporations, which, demanding economic benefits for their presence, actively employed the practice of reducing the tax base[2] [3, p. 132], while simultaneously diminishing the ability of local companies to compete in the relevant business sectors.

Western economies, moving the extraction of minerals, environmentally harmful and labor-intensive industries that mainly require unskilled labor beyond their national borders, have focused on developing their intellectual capabilities and high-tech industries, which has led to developing countries exchanging their low value-added goods for Western high value-added goods and services. Such an exchange left little chance, except for some developing countries with rich natural resources (a number of OPEC countries) and a balanced industrial policy (China, South Korea), for a balanced trade turnover, and consequently led to a constant deficit in foreign trade, a shortage of foreign currency to pay for high-tech Western

products necessary for economic development, and high inflation. Loans and assistance from international financial organizations to cover emerging balance of payments and government budget deficits were provided only with the consent of developing countries to implement the aforementioned recommendations, the implementation of which implied the effective influence of the invisible hand of the market, which would correct all imbalances in the economies of developing countries.

But in most developing countries, this did not happen. As J. Stiglitz [4, p. 53–54, 59–61, 65] points out, the problem was that many of these measures became an end in themselves rather than a means to achieve more equitable and sustainable growth in the economies of developing countries. The IMF demanded vigorous privatization and liberalization at such paces and in such ways that often entailed very real costs for countries poorly prepared to implement them. Excessively stringent austerity measures caused a recession, and high interest rates hindered the development of young enterprises. The IMF assumed that new, more productive jobs would be created as old, inefficient jobs, which had emerged during the protectionist period, were eliminated. However, the creation of new firms and jobs requires capital and an entrepreneurial class, which were lacking in developing countries. Western countries insisted on liberalizing trade

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[2] In 2012, for example, the amount of losses to the budgets of developing countries from the reduction of the taxable base of MNEs and the use of transfer pricing was estimated at 100 billion USD, which is comparable to the 115 billion USD in official development assistance to these countries in that year.

in the products they exported, but at the same time continued to protect those industries where competition from imports from developing countries could threaten their economies. In contrast to their recommendations for developing countries to immediately liberalize capital markets, the industrialized countries themselves did not attempt to liberalize their markets until a later stage of their development (European countries, for example, waited until the 1970s to remove controls over such markets).Overall, J. Stiglitz concludes that the conditions of international trade agreed upon in the 1980s and 1990s protected the interests of developed industrial countries — or, more precisely, specific interests within these countries — without accompanying benefits for less developed states.

The aforementioned revelations largely explain the reason for the increasing gap in the ability of most new economies to efficiently and abundantly produce goods and services compared to developed countries, which, under the pretext of potential benefits from the implementation of neoliberal reforms in the economies of developing countries, actually created conditions for the international expansion of their transnational corporations.

The effectiveness of reforms in any economy is manifested through the creation of competitive products that it can supply to the global market and, consequently, take its place in international trade. The international exchange of goods and services is constantly growing (from 1950 to 2022, it increased 45 times and reached $ 24.7 trillion,[3] not least due to direct foreign investments (from 2012 to 2022 alone, they averaged $ 1.5 trillion per year worldwide[4]), aimed at increasing the financial efficiency of multinational corporations by utilizing more optimal production and sales conditions. The production of goods by Western multinational corporations beyond the national

borders of their home countries has accounted for a significant portion of the aforementioned growth in world trade, as shown in *Table 2* using the example of US MNEs.

In 2014, 58% of exports to its subsidiaries consisted of semi-finished products, 30% of equipment, and only 12% of finished products, while imports from its foreign branches accounted for 48%, 36%, and 16% of these categories, respectively [5, p. 6]. Thus, using the example of US MNEs, it can be assumed that a significant portion of global trade has come to represent supplies between the subsidiaries of transnational corporations, primarily components from their enterprises specializing in their production within the framework of international division of labor, a significant part of which is located in developing countries. P. Conconi et al. [6, p. 32] state that new subsidiaries increase trade with the countries where their parent company is present. This network effect of MNEs is stronger for more distant countries.

Foreign trade statistics, which are traditionally compiled by country, create the impression of growth in the exports of developing countries, an increase in their participation in world trade, claiming that they supply competitive goods produced by local businesses in these countries. In fact, for the most part, these figures reflect the development of multinational corporations, some of the benefits from their activities in a developing country go to the local budget, local workers and specialists, and local businesses servicing the enterprise created by the MNE through foreign direct investments. Accordingly, this does not mean that in most cases it relates to the products of the national business of a developing country, which emerged and developed as a result of following the liberal recommendations of developed countries, but rather significantly reflects the activities of foreign subsidiaries of foreign MNEs.

Therefore, it can be concluded that the main beneficiaries of economic globalization are multinational enterprises (MNEs), which are not interested in reducing international trade, as it provides them with the best financial results by leveraging the advantages of international

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[3] Evolution of trade under the WTO: handy statistics. World Trade Organization. URL:: https://www.wto.org/english/res_e/statis_e/trade_evolution_e/evolution_trade_wto_e.htm (accessed on 17.03.2024).

[4] Value of foreign direct investment inflows worldwide from 2012 to 2022. Statista. URL: https://www.statista.com/statistics/326496/inflows-foreign-direct-investment-worldwide/ (accessed on 17.03.2024).

Share of US MNEs in US Foreign Trade

The role of US MNEs in world trade	2002	2014	2022
Share of US MNEs in US exports to their foreign affiliates	42%	30%	34%
Share of US MNEs in US imports from their foreign subsidiaries	48%	50%	47%
Share of developing countries in US MNE exports	46%	25%	no data
Share of developing countries in US MNE imports	42%	40%	no data

Sources: U.S goods trade: Imports & Exports by related parties 2022. U.S. Census Bureau. September 06, 2023 URL: https://www.census.gov/foreign-trade/Press-Release/related_party/rp22.pdf (accessed on 17.03.2024).

division of labor and entering new markets for their products.

NATIONAL INDUSTRIAL POLICY

Developed market relations imply the presence of funds accumulated by hired managers as a result of their successful activities, or family savings over several generations, as well as an entrepreneurial spirit to have the courage to invest them in a risky venture for which no one guarantees success. Free cash is also necessary for the emergence of a capital market as an alternative to bank deposits. Developed market relations, which imply constant innovations to win in competitive battles, also require a large number of people with a high level of education, which is necessary for managing technological systems, processes, and businesses to create products with high added value. The transition to developed market relations in countries that previously did not have such experience and do not possess the specified characteristics is a complex process.

The assumptions of Western economists that the second and third worlds (former socialist countries and developing states, respectively) would successfully integrate into the global market economy with great benefits for themselves as a result of following neoliberal recommendations (e.g., J. Sachs et al. [7]), which were correct for

societies where all the specified conditions for the functioning of a market economy were met, turned out to be untenable in terms of the scale of the required transformations and the speed of their implementation in countries that were not ready for such relations.

The practice of globalization has shown that there are three possible responses to the demand for opening markets to foreign companies. The first is to comply with this call, which means that if a country does not have competitive goods for the global market, it is forced to service the businesses that foreign companies establish there and do what it can to meet the urgent needs of its population. If a country is capable of producing goods in demand on the global market, it focuses on the corresponding industries, believing that it can purchase all other goods with the revenue from exports. The problem in this case may be that other industries, in which the developing country has competencies, do not develop, and the products of foreign companies from developed countries, due to their technological and financial power, turn out to be more attractive to buyers. The remaining demand that goes to local companies does not allow them to improve, as they operate on the brink of breakeven. Accordingly, the country has weak prospects for comprehensive economic development. As noted by F. Rodriguez

and D. Rodrik [8, p. 316], empirical data do not support the view that reducing trade barriers significantly impacts the country's growth rates. Moreover, there is a risk of introducing non-economic restrictions on the export of goods produced by the developing country and the acquisition of necessary products from abroad. Thus, overly narrow sectoral specialization poses threats to the economy of such a country.

The second option involves introducing some restrictions on the expansion of foreign companies in the domestic market, which do not prohibit their activities but give local businesses and specialists time to prepare for more equal competition. Interestingly, as early as the mid-19th century, J.S. Mill, one of the founders of liberalism and a proponent of free trade, noted that producers of goods that were previously only imported need time to reach the level of those for whom the processes are traditional [9, p. 502]. Accordingly, for such companies during the period when domestic costs in the industry exceed the import price of the product, a foreign trade tariff is a socially desirable method of financing investments in human resources that are necessary for successful competition with foreign producers.

In the third scenario, the country closes itself off or is closed off from international economic cooperation, forcing it to produce everything it needs on its own. This does not always succeed, and if local companies do manage it, the price/quality ratio for consumers often significantly lags behind the best global standards.

The mentioned approaches to participation in the development of global economic ties determine the industrial policy of a developing country and the prospects for its prosperity. It is evident that the second option is the most promising in this regard, and there are examples of its successful application in the People's Republic of China (PRC) and the Republic of Korea. An important aspect of the industrial policy of both these countries is the focus on creating internal potential to transition from the production of simple goods using low-skilled labor to the creation of high-tech sectors of the economy, which require high professional competencies and generate greater added value.

In other words, these countries have targeted those segments of the economy where developed countries have built competencies over decades and have become undisputed leaders in the respective industries. As a result, it turned out that, for example, Chinese companies are winning in the global competitive struggle in the markets of energy-saving technologies, electronics, software solutions, machine engineering, and shipbuilding, while the MNEs of the Republic of Korea are gaining leading positions in the production of land and sea transport, electronics, and complex machine engineering equipment. The PRC constantly registers more patents than any other country in the world and is becoming one of the world leaders in the field of artificial intelligence [10], the competencies in which are expected to determine future leadership in the global economy.

An important aspect of the development of these countries was the focus not on import substitution, i.e., the production of foreign analogs, and not on trying to win competition through cheaper labor (although this was practiced at the initial stage) to increase foreign supplies, but on technological innovations, which in the modern world provide a sustainable advantage over competitors. B.D. Matrizaev's research confirms [11, p. 101] that economic growth in China is explained by technological innovations, as well as the improvement in the quality of labor resources. R. Baldwin [9, p. 518] notes in this regard that the increase in exports is a consequence of economic growth, which arises as a result of a balanced industrial policy, rather than its cause.

One of the elements of national industrial policy is the material support of priority industries by the state and the actual suggestion to other industries to increase their competitiveness independently. It cannot be said that subsidizing national industry is a rare tool, as there are many examples of its use in both developed and developing countries. The assessment of the role of such support is determined by the goal it pursues.

Developing countries do this to create more equal competitive conditions for local enterprises with foreign ones, when initially they are not

equal. For example, if the largest MNEs enter the local market, where companies cannot compete with foreign ones in terms of technological and financial power, local enterprises become unviable in an open, competitive market [12, p. 101]. After leveling the playing field, subsidies are abolished. As a result, countries that prudently approached economic reforms, taking into account their specific circumstances, managed to build a successfully functioning market economy.

Developed countries also often subsidize their industries or apply anti-subsidization (bans and extremely high import duties), but under different circumstances: when, on the contrary, in conditions of open competition with equal competitors from other countries, national companies are unable to win the competition. Thus, the USA banned the import of advanced telecommunications equipment from Huawei in 2019 under the pretext of technology espionage, although before and after that, the company demonstrated its capabilities in independently developing high-tech components, such as the launch of the new 5.5G communication standard in 2024.[5]

In 2022, The Inflation Reduction Act was passed in the USA, under which $ 369 billion in subsidies and tax incentives will be provided to companies that increase capacity or establish/create new production facilities in the country.[6] In the same year, a law was passed to subsidize the electronics industry, under which Intel Corporation received $ 19.5 billion from the U.S. government to build a $ 28 billion chip manufacturing plant, Taiwanese company TSMC and South Korean Samsung Electronics received $ 12 billion and $ 6 billion, respectively, to create similar facilities in the U.S.,[7]

so that they, as it was explicitly stated, would not do this in China.[8]

At the same time, the production of goods and equipment in the PRC and their export to Europe and the USA is referred to as a consequence of the deliberate creation of excess industrial capacity for dumping on international markets. Last year, the EU initiated an investigation into subsidies in the Chinese electric vehicle industry, which they call an unfair trade practice by China.[9] That is, when the export of goods and services occurs from developed countries to developing ones, it is not a result of the creation of excess capacity, but when the situation develops in the opposite direction, it is, of course, unacceptable.

The presence of financial incentives in national industrial policy for the development of one's own competencies primarily means better utilization of one's comparative national advantages in the context of international division of labor and freedom of international trade. However, if financial incentives or direct import bans are a means of competitive struggle against equally economically powerful companies from other countries that supply the most economically efficient goods and services for consumers, then such an approach contradicts the very idea of economic globalization.

Increasing the efficiency of the production of goods and services through the use of the advantages of international division of labor, which is expressed in the deep specialization of companies and the geographical distribution of their activities, was recently considered a great achievement of the global economy, which reduced costs and ensured the availability of goods for consumers. Moreover, global industrial specialization enhances the dependence of

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[5] Huawei claims it's ready to ship entire 5.5G networks — whatever they are — in 2024. The Register, June 30, 2023. URL: https://www.theregister.com/2023/06/30/huawei_5point5_g_2024_boast/ (accessed on 21.03.2024).

[6] As Congress funds high-tech climate solutions, it also bets on a low-tech one: Nature. The Washington Post. August 14, 2022. URL: https://www.washingtonpost.com/climate-solutions/2022/08/14/nature-climate-solutions-inflation-reduction-act/ (accessed on 21.03.2024).

[7] Intel inside Ohio. Bloomberg. May 01, 2024. URL: https://www.bloomberg.com/features/2024-intel-comeback-chipmaking/?srnd=businessweek-v2 (accessed on11.05.2024).

[8] Fact sheet: CHIPS and Science Act Will Lower Costs, Create Jobs, Strengthen Supply Chains, and Counter China. The White House. Statements and releases. August 09, 2022. URL: https://www.whitehouse.gov/briefing-room/statements-releases/2022/08/09/fact-sheet-chips-and-science-act-will-lower-costs-create-jobs-strengthen-supply-chains-and-counter-china/ (accessed on 11.05.2024).

[9] US warns China against dumping goods on global markets. Financial Times. February 18, 2024. URL: https://www.ft.com/content/96dc71be-b795–47dc-a1cc-cccc7aa6a481 (accessed on 28.02.2024).

buyers on sellers, as well as sellers on buyers. Such interdependence significantly reduces the incentives for hostile relations between countries and increases their security, as there is no point in undiplomatic solutions if countries are so dependent on each other.

For the authorities of economically developed countries, such mutual dependence was acceptable as long as its balance tilted in their favor, and they could dictate their terms to the rest of the world. As soon as other countries had the desire and ability to become economically independent and their share in the production of globally important goods significantly increased, i.e., companies from new economies began to win international competition, the positive connotation of the concept of economic interdependence took on a negative hue of dependence on certain countries, which threatens the economies of developed states. At the same time, no practical actions to disrupt the integrity of the global economic space were taken by other countries, and companies around the world continued to benefit from the global economy. As a result of artificially created obstacles for free trade by the authorities of some countries, aimed at limiting/eliminating such dependency, companies in these countries are forced to switch to less efficient economic solutions, leading to increased production costs and reduced purchasing power of households.

Other consequences of economic disintegration include the introduction of restrictions for companies from other countries to benefit from the advantages of international division of labor and aggressive non-economic actions.

According to IMF experts [13, p. 38], the fragmented world that this policy leads to will be more unstable. Commodity price volatility may increase due to smaller market sizes and reduced incentives for producers to expand the geography of their activities for a more stable supply base of raw materials and components, as well as the sale of finished products. This could also lead to higher inflation, complicating monetary stability.

The shift in the balance of global economic relations occurs not only between developing and developed countries, but also among the latter.

In this process, the USA quite aggressively and consistently attempts to make the economies of other developed countries uncompetitive.

M. V. Margelov, head of the UNESCO Department at the Institute of Asian and African Studies of Lomonosov Moscow State University, notes that in the last century, thanks to the efforts of the USA to dismantle the English and French colonial system, they replaced these metropolitan countries with their economic interests.[10] At the end of the last century, prohibitive tariffs on car imports forced European and Japanese corporations to relocate their production for the local market, then the largest in the world, to the USA. Recently, the aforementioned laws have economically incentivized companies from industrially developed countries to move their production to the USA.

Thus, it can be concluded that the development of international trade and foreign direct investment is largely determined by national industrial policies, which are generally aimed at creating advantages for the national economy. At the same time, the growth rates of the national economy depend on the successful activities of national corporations both in the local market and in other countries.

HOW MUCH DO THE INTERESTS OF MNES AND AUTHORITIES COINCIDE?

National industrial policy is aimed at addressing issues relevant to the given economy as perceived by the authorities. However, since such policy affects other states, it is reasonable to assume that it should take into account common principles of economic interaction, such as free trade and open markets, for which the World Trade Organization (WTO) was established by the international community to promote and regulate, including resolving trade disputes between countries. By the way, precisely because in some cases the principles of free trade do not align with the current interests of the United States, they have made the

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[10] The Renaissance of political Islam is coming to an end. Monocle; 2024(7):63–70. URL: https://monocle.ru/monocle/2024/07/renessans-politicheskogo-islama-zakanchivayetsya/ (accessed on 22.07.2024).

functioning of the WTO appellate body impossible by failing to agree on arbitrators. As a result, it has become impossible to resolve trade disputes using the universally recognized WTO mechanisms, and other mechanisms are practically non-functional. Perhaps one can agree with P.J. Buckley [14, p. 1589], who believes that in recent years the United States has not been a supporter of international law, rules, conventions, or institutions. Perhaps, he believes, 'the aggressive replacement of international law with sovereign national laws is a defining feature of technonationalism.[11] If this is the case, then … the most significant structural change in globalization is the retreat from international commitments by the leading world power'.

Disagreements between states are one area of confrontation, but there is another plane of differences in interests: between transnational corporations and the governments of their home countries. In this context, understanding the reasons why companies go beyond their national borders is important. It was previously believed (for example, J. Dunning [16]) that such feasibility is determined by the possibilities of using more efficient production conditions, the availability of certain resources, access to new markets to maximize profits through technologies, financial capabilities, and managerial skills possessed by MNEs and absent in the country where they intend to operate. And the authorities of developed countries encouraged such an approach by corporations, as it involved developing countries into the sphere of Western influence.

However, in modern conditions, according to D. Teece [17, p. 508], the framework for analyzing the relationships between MNEs and governments should be expanded to encompass a broader range of geopolitical contexts. Once this happens, the relevance of existing theories and models can, in his opinion, be reassessed and new ones developed. This broader approach, D. Teece further points out, calls into question the adequacy of many efficiency-based theories of international

business and strategic corporate governance. 'Cost minimization, although still relevant, will lose its predictive power and normative appeal. Theories of the internationalization of economic relations [18] and theories of transaction costs of MNEs [19] are losing their relevance. Resource-based theory (overview of theories in [20]) also proves ineffective when the focus is on innovations and geopolitical upheavals. Similarly, the structure of advantages specific to a particular firm and country [21] needs modification to encompass the merging of firm and country'.

The basis of this approach lies in D. Teece's confidence [17, p. 494] that 'decades of large-scale investments by MNEs in cheap resources have deepened the transfer of technology and the development of offshore potential to such an extent that they have begun to have a negative impact on the home countries of MNEs'. Supporting this position, G. Pisano and W. Shih [22] argue that as a result of the focus on high-tech sectors of the economy, the production of other industries was largely moved abroad, causing the USA to lose the ability to integrate the processes of innovation creation and their implementation in product manufacturing within the country. In Japan, according to K. Cowling and P. Tomlinson [23], there was an empting of the industry due to the relocation of many productions outside the country.

As a result, economic efficiency or profit maximization as such should no longer, according to O. Petricevic and D. Teece [24, p. 1499], be priorities for MNEs, since the main thing is the protection of their intellectual property, which, in their opinion, is impossible in developing countries. They believe this is a manifestation of the changing global economic order and should motivate MNEs to reduce their presence in such markets. At the World Economic Forum in Davos, a non-economic component was added to this argument, stating that 'the protection of values [implying protection from the influence of the Russian Federation (RF) and the PRC] is more important than free trade and… profit'.[12]

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[11] Technonationalism was first described by S. Ostry and R.R. Nelson [15] and refers to the state's desire to have on its territory the enterprises that are leaders in high-tech industries.

[12] NATO Secretary-General Tells World Leaders "Freedom Must Come Before Trade". The World Economic Forum. May 24, 2022. URL: https://www.weforum.org/press/2022/05/nato-

The opinions expressed above significantly diverge from the fundamental tenets of economic globalization and the objectives of corporate governance aimed at maximizing profit and creating sustainable growth in company value, which are generally closely linked to innovations. The financially effective implementation of these innovations often becomes impossible without organizing production on a global scale. In other words, excluding economically viable locations for their production and sales for non-economic reasons can render innovative products commercially unviable. As a result, the companies themselves will suffer first and foremost, as it makes no sense for them to spend their money on innovations that are financially unpromising.

It seems that the mentioned experts in their analysis rely on general assessments of the level of globalization, which indicate its slowdown, or they exaggerate the significance of one of its aspects. For example, the composite index of global cooperation developed by the World Economic Forum in Davos and the consulting company McKinsey has been stagnating since 2020 after a period of growth starting in 2012. Meanwhile, its decomposition shows that during the period 2012–2022, the only declining component since 2016 is cooperation in the field of peace and security, i.e., the political factor, while the largest other components (the dynamics of international trade and capital movement, international cooperation in climate and nature conservation, foreign investment in innovation and technology) are steadily growing.[13] A study by scientists from the Republic of Korea [25, p. 100] also shows that among the three factors of the KOF globalization index, which considers the economic, social, and political aspects of this process, political efforts at the national level have the greatest impact on deglobalization. At the same time, the negative influence of the global political factor originates from developed countries. Therefore, it can be concluded that international business is interested in the development of global economic ties and ensures their positive dynamics, while the authorities of some countries, for the sake of their political preferences, hinder this movement.

The objective picture of the state of economic globalization is unlikely to be complete without considering consumer behavior, for whom companies are willing to develop their international presence to ensure the best price/quality ratio of their product. However, consumers can be influenced not only by price and quality. Their purchasing preferences can be irrational and are associated, as A. Greenspan [26] points out, with emotional factors such as fear, sympathy, herd behavior, the desire to deal with things familiar to the target audience in terms of culture and interests, and alignment with their accepted value system. These circumstances may change the preferences of some consumers, who instead of the best price/quality product will purchase an alternative with less favorable characteristics and may pay a higher price for it in order to align their consumer behavior with the mentioned tendencies, as well as the suggested non-economic narratives. And such consumer attitudes can, in turn, change the behavior of corporations regarding their international presence. However, consumer adherence to these narratives is possible if, as noted by O.D. Hart, D. Tesmar, and L. Zingales [27, p. 3], the price they pay for it is relatively small. When a certain threshold is exceeded, he becomes indifferent to irrational impulses and is more guided by the capabilities of his wallet. This sensitivity to costs is quite significant and suggests that consumers exchange their moral obligations for saving their funds. And international division of labor precisely ensures the preservation and increase of consumer purchasing power.

To assess the fairness of the aforementioned expert considerations regarding the feasibility of economic deglobalization, the opinions of the multinational corporations themselves regarding their activities, for example, in the world's second-largest GDP country, are representative. The data presented in *Table 3* are the results of surveys

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secretary-general-tells-world-leaders-freedom-must-come-before-trade/ (accessed on 24.03.2024).

[13] The Global Cooperation Barometer 2024. World Economic Forum In collaboration with McKinsey & Company. January 2024. 26 p. URL: https://www3.weforum.org/docs/WEF_The_Global_Cooperation_Barometer_2024.pdf (accessed on 24.03.2024).

Table 3

Responses from US and EU Companies about their Business in China

Question	Response	US companies	EU companies
Is your business unprofitable in China?	yes	17%	15%
Is China an unimportant destination for your investments in the coming years?	yes	18%	13%
Are you planning to reduce your investments in China?	no	91%	78%
Is the government's attitude towards a foreign company worse than towards a Chinese one?	no	70%	69%
Is intellectual property protection in China adequate or improved?	yes	68%	80%
Has your company begun the process of withdrawing production facilities from China?	yes	11%	27%
If you plan to withdraw your production facilities, then move them to the USA and the EU?	yes	21%	37%
When reviewing your supply chain, do you want to eliminate suppliers from China?	no	no data	78%
Is China's share of your global revenues more than 10%?	yes	37%	no data
In your business model, do you manufacture a product or buy components in China to sell locally?	yes	53%	no data
In your business model, do you manufacture a product or buy components in China to sell in the US?	yes	6%	no data
Did your business revenue in China decrease in 2023 compared to 2022?	yes	28%	30%
Is your business profitable in China?	no	18%	15%
Has your company's EBIT decreased in 2023 compared to 2022?	no	29%	15%
Is your company's EBIT worse for its China operations than for all of your global operations?	no	67%	36%
Are business prospects in China getting worse?	yes	16%	9%
Is your company's goal in China to increase its key business in 2024?	yes	63%	no data
Is your company's goal in China to cease business in 2024?	yes	4%	18%
Is the investment climate in China getting worse?	yes	35%	no data
Are you disclosing your technologies to China for your own interests voluntarily?	yes	82%	58%

Source: (accessed on 20.03.2024); European Business in China. Business confidence survey 2023. European Union Chamber of Commerce in China. June 2023. 54 p. URL: https://europeanchamber.oss-cn-beijing.aliyuncs.com/upload/documents/documents/European_Business_in_China_Business_Confidence_Survey_2023[1124].pdf (accessed on 25.03.2024).

Note: Percentage data represents the proportion of respondents with the appropriate response.

of US and EU companies about their business in China, conducted by the American Chamber of Commerce in China in 2024 and the European Chamber of Commerce in China in 2023.

From the responses of Western corporations one gets the impression that they feel quite confident in the PRC due to the following circumstances:

• China's share in the total revenues of companies is quite high;

• business in China often generates an operating margin higher than all global operations of such companies;

• Western companies in China mainly operate in the local market;

• few people complain about the unequal treatment of foreign companies' businesses by the Chinese authorities compared to local ones;

• the majority do not believe that the business climate in China is deteriorating;

• the overwhelming majority do not believe that intellectual property protection is bad;

• few foreign companies want to exit the business in China;

• most Western companies voluntarily disclose their technologies in China for their own interests;

• the overwhelming majority of Western companies plan further investments in China.

It is hardly possible to assert that foreign companies were forced to make direct investments in China, and not yesterday, but when this country was not yet the second-largest economic power in the world, and they did not know what they were doing. Most of them now want to increase their investments. It is obvious that they came to this country hoping to take advantage of the potential of its vast market and the prospects for its growth, which are still the best in the world. It is equally clear that precisely for the sake of future profits, which are already higher there for many companies than the global average, they are willing to share technologies with Chinese partners. Moreover, they do this voluntarily, and the protection of intellectual property suits them just fine. Importantly, a significant portion of the products produced by MNEs in China is directed to developed countries, which thus benefit from the fruits of international division of labor.

Japanese business has also firmly established itself in China: according to the Ministry of Trade of Japan, China ranks first in the number of overseas branches of Japanese companies and is Japan's largest trading partner.[14] At the meeting in November 2023, the leaders of both countries stated the need to develop 'mutually beneficial relations based on common strategic interests',[15] since 'Japan is largely dependent on China, where Japanese companies have invested for many years in building supply chains and establishing relationships with local partners'.[16]

As can be seen, the responses of practicing businessmen contradict the opinions of some experts and officials. It is doubtful that Western businesses will massively abandon the chicken that lays golden eggs for them, which in the form of dividends and increased stock prices go to the shareholders of these companies located in the USA and Western Europe. It is equally doubtful that the majority of consumers will give up products with the best price/quality ratio.

Supporters of deglobalization also intensively use the thesis that the relocation of businesses to developing countries has contributed to a decrease in employment in developed countries. Meanwhile, the corresponding statistics show that unemployment in mature markets has steadily decreased over the past 30 years in almost all of

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[14] China's Economy Overview. Ministry of Foreign Affairs of Japan. January 2024. URL: https://www.mofa.go.jp/files/100540401.pdf (accessed on 24.03.2024).

[15] The Diplomat, February 29, 2024. URL: https://thediplomat.com/2024/02/china-and-japan-whats-in-a-term/ (accessed on 24.03.2024).

[16] Japanese business leaders return to China seeking to boost cooperation. Reuters, January 25, 2024. URL: https://www.reuters.com/markets/asia/japan-business-leaders-return-china-seeking-bolster-cooperation-2024–01–25/ (accessed on 24.03.2024).

Table 4

Unemployment Rate in a Number of Countries (Share of Working People in the Working-Age Population, in %)

Years	China	EU	Japan	USA
1991	2.4	8.6	2.1	6.8
2022	5	6.1	2.6	3.7

Source: Всемирный банк / World bank. URL: https://data.worldbank.org/indicator/SL.UEM.TOTL.ZS?locations=US-CN-EU-JP (accessed on 24.03.2024).

them, while in China it has doubled (*Table 4*). Rather, China should complain about such consequences of globalization.

The above facts show that transnational companies from industrially developed countries are unlikely to agree to a reduction in their revenues and profits in order to adhere to values according to which they have made massive investments in developing countries for decades, and now they must devalue them, creating problems for their shareholders. At the same time, some companies may leave China, but the reason could be their insufficient competitiveness compared to local producers of similar products.

It is unlikely that the authorities of developed countries will take radical steps to worsen the situation of their companies operating worldwide, and consequently reduce the purchasing power of their citizens, who are consumers of their products, investors in these companies, and people who choose the government, as the economic consequences of such decisions are quite significant. Thus, according to Oxford Economics, as a result of the tariff war between the USA and China from 2017 to 2019, the U.S. GDP lost $ 108 billion (0.5%), households lost $ 68 billion (both estimates in 2020 prices), and the labor market lost 245 000 jobs. The losses from potential future trade wars are expected to be an order of magnitude higher.[17]

CONCLUSION

The conducted research allows us to draw the following conclusions:

• state intervention in the actions of MNEs within the framework of protectionist policies does not contribute to maximizing corporate profits, as it restricts competition and access to certain markets where they operate as part of their international expansion strategy to ensure this maximization;

• companies in countries subjected to restrictions are increasingly motivated to create competitive products with limited access, which, if successful, worsens the competitive position of multinational corporations from developed countries;

• the purchasing power of consumers is decreasing in countries that impose restrictions and in countries that are subject to restrictions, which worsens the ability of corporations to sell their products.

The reduction of global economic ties due to the introduction of elements of protectionism in the policies of developed countries seems unlikely. Rather, the geography of such ties for certain product groups may change somewhat, because the objective need for multinational corporations, which are the main drivers of globalization, to maximize profits and create sustainable growth in the value of their companies compels them to optimize their value chains and expand markets, which will not be limited to the countries designated by the authorities.

Answering the main question of the study, it can be concluded that despite the authorities' desire to politically encourage their companies to avoid countries with which they are not friendly, the motivation of companies to maximize their profits may prevail, especially in those locations where the volume of generated profits significantly impacts the company's overall financial result. It's a different matter if the authorities create conditions in which logistics and payments are maximally complicated, making it impossible to continue business as usual. No one will work at a loss. However, when international activities are restricted, companies can avoid a negative financial result by raising prices while reducing sales volume, but such an option is unlikely to be of interest to consumers in these countries.

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[17] The impact of China PNTR repeal and increased tariffs on the US economy and American jobs. Oxford Economics. November 2023. 39 p. (10). URL: https://www.uschina.org/sites/default/files/the_economic_impact_of_china_pntr_repeal.pdf (accessed on 24.04.2024).

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Analysis of Cointegration Relationships Between Azerbaijan's Balance of Payments and World Oil Prices

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ABSTRACT

In a number of countries, an important economic problem is the imbalance of foreign economic relations, which manifests itself, in particular, in the positive and negative balances of the current account of the balance of payments. The **purpose** of the study is to investigate the impact of rising oil prices on Azerbaijan's balance of payments using a vector error correction model (*VECM*). In the paper, the analysis correctly applied econometric methods, the necessary statistical procedures to determine the order of integration of non-stationary time series of Azerbaijan's current account balance and the prices of Brent crude oil and West Texas Intermediate, covering the period from 1995 to 2024, to identify and evaluation of the model parameters to check the adequacy and validity of the forecast values both in the short term and in a long term. When constructing survey graphs and implementing econometric test procedures, the Eviews and Excel application packages were used. As a result of this study, a *VECM* was formulated, which makes it possible to carry out an economic and statistical analysis of the functioning of the current account of the balance of payments and world oil prices. The constructed models make it possible to measure both deviations from the equilibrium state and the rate of equilibrium recovery. It is **concluded** that the long-term equilibrium relationship between the variables can be considered stable, as stability is restored in short periods after disturbances from shock reactions to changes in world oil prices. The constructed models make it possible to measure both deviations from the equilibrium state and the rate of equilibrium restoration.

Keywords: payment balance; oil prices; stationarity; Dickey–Fuller test; cointegration; error correction model; responses of impulse functions

INTRODUCTION

Statistical study of the development of the modern Azerbaijani economy for analysis and forecasting is only possible with an accurate description of its interaction with the outside world. The reasons for this are integration into world market relations, strong dependence on foreign trade, and the movement of investments in "two" directions between countries. In close dependence on foreign trade relations, the processes of raw material exports and consumer and investment imports are highlighted.

One of the tasks of Azerbaijan's macroeconomic policy, as well as in many countries with a market economy, is to ensure a positive balance of payments and foreign economic trade. The importance of solving the above problem is also related to the role of Azerbaijan in the world economy in the form of energy trade.

Processes in the global economy are complex processes. The decisions of the leading central banks,

the growth of supplies in the world energy market, the economic slowdown in some developing countries, and other global factors can lead to a sharp decline in oil and gas prices in the world market. And this leads to cheaper national currencies. The exchange rate of national currencies and the state of the balance of payments are closely interconnected. Since the result of the balance of payments, a deficit is a change in the national currency's exchange rate. And the exchange rate of the national currency is one factor that significantly affects the state of the country's balance of payments. A long-term deficit in the balance of payments or a fall in the value of the national currency leads to other economic problems, such as covering the foreign exchange deficit by using official reserves, reducing their volumes, etc.

REVIEW OF LITERATURE

Many scientific articles have been written about these issues, taking into account regional differences

in the process of national economic transformation and analyzing integration processes between individual countries and groups of countries in the post-Soviet space. The works frequently employ complex economic and statistical analysis methods to identify patterns of development of foreign economic cooperation and the direction of improvement of economic integration processes. In works [1–5], using the methods of complex economic and statistical analysis, regularities in the development of foreign economic cooperation, directions for improving economic integration processes are revealed. In studies of the dynamics, crises of the balance of payments, models of a small open economy are often used. Small open economy models are often used in studies of the dynamics of the balance of payments crises. Article [3] considers Azerbaijan's trade and investment relations for 2000–2014 in the context of problems of regional integration. A comprehensive analysis of foreign non-economic ties has shown that Azerbaijan seeks to pursue a multi-vector and balanced foreign policy, taking into account the interests of the leading regional players (the EU, Turkey, and Russia) but avoiding direct participation in integration. Considering the model of limited growth in the balance of payments in [6] the authors, assuming an insignificant effect of changes in the real exchange rate, in this paper predict that the long-term growth of a country's GDP can be approximated by the ratio of real export growth to the income elasticity of demand for imports. The formation of the model is studied, taking into account capital flows, interest payments on public debt, and terms of trade, and various tests are carried out for the model. The paper [7] deals with the problems of the balance of payments associated with rising oil prices. Necessary adjustments need to be made to the current account or trade balance subcomponents that take into account the country's high energy bills caused by persistently rising crude oil prices to prevent persistent oil price shocks from having a permanent impact on the current account deficit. The authors in the study look at empirical data collected in Turkey and show that, in the long run, a steady increase in net exports of products and services supports the current account balance. The studies performed

were statistically significant for more than 24 periods. In the study [8], three structural equations are estimated as long-term equilibrium relations using Johansen's cointegration analysis for Brazil, Korea, Mexico and Turkey for 1980–2016. Hypotheses about the homogeneity of the real exchange rate and world income are also tested using adjustment factor tests. The Thurlwall Act was in favor of Brazil and Korea. In [9], an equilibrium business cycle model has been examined in which the probability of devaluation is an endogenous variable dependent on foreign exchange reserves. In [10], the authors conclude that the addition of controls for other important macroeconomic variables, which have risen significantly in recent decades, has little effect on the results regarding unemployment and inflation. Greater reliance on international trade increases inequality in some specifications. In works [11, 12], systems of cointegrated equations are studied. The simulation results show that the growth of government consumption does not change the real exchange rate and depreciates [13, 14], the nominal rate. Here, dependencies between cross-sectional units (countries) and cointegration between growth and trade openness were tested. The results reject the hypothesis of a general, unidirectional and homogeneous relationship between trade openness and economic development in Latin American countries.

EMPIRICAL TESTS AND RESULTS

Dynamic descriptions of the considered time series of the current account of Azerbaijan's balance of payments and world oil prices are shown in *Fig. 1.*

The average annual oil prices shown in *Fig. 1* are inflation-adjusted using a standard consumer price index. It should be noted that the combined chart includes a histogram describing the dynamics of the current account of Azerbaijan's balance of payments and polygons characterizing the growth or decline in prices for Brent and West Texas Intermediate oil in 1995–2024. This type of graph creates conditions for comparative analysis and visibility of patterns in time series.

The analysis of the cointegration of time series should begin with studying the order of integration of the series under study according to the Dickey-Fuller
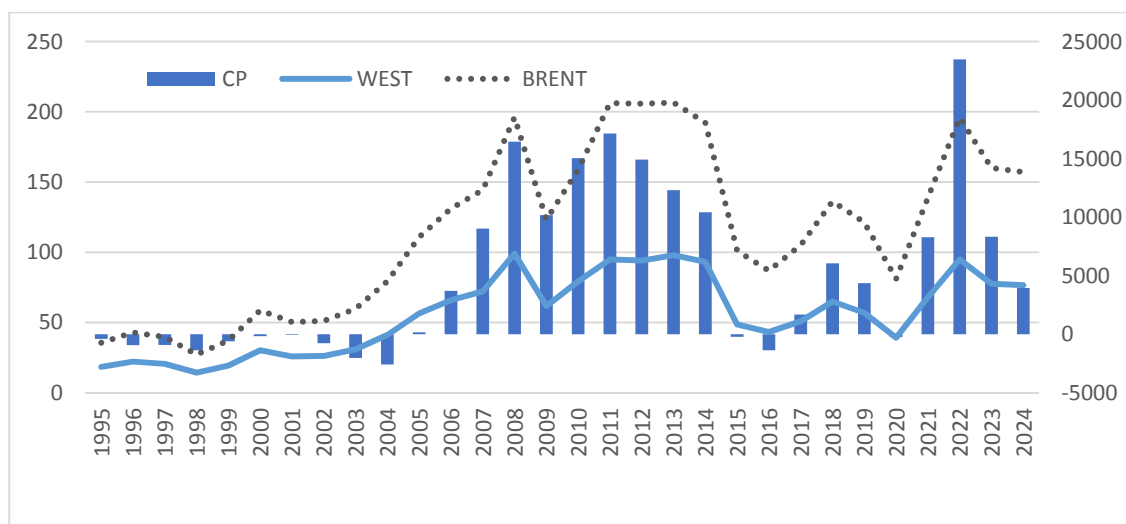
Fig. 1. **Time Series Dynamics of Azerbaijan's Current Account Balance of Payments, Brent and West Texas Intermediate Oil Prices in 1995–2024 (Million US Dollars)**

Source: Prepared by the author in the Excel program. Macroeconomic statistics URL: https://www.cbar.az/ (accessed on 16.01.2025). Central Bank of Azerbaijan. URL: https://www.cbar.az/page-41/macroeconomic-indicators (accessed on 16.01.2025). Average annual Brent crude oil price from 1976 to 2024. Empowering people with data https://www.statista.com/statistics/262860/uk-brent-crude-oil-price-changes-since-1976/ (accessed on 16.01.2025). Crude Oil Prices — 70 Year Historical Chart. Macrotrends is the premier research platform for long-term investors. URL: https://www.macrotrends.net/1369/crude-oil-price-history-chart (accessed on 16.01.2025).

criterion, that is, with the definition of stationarity or vice versa. Unfortunately, often the statistics of a linear relationship between non-stationary variables lead to the misconception that the relationship between the dependent and independent variables is not random, but strong. In particular, any two nominal economic variables are likely to be correlated with each other, even if neither has a causal effect on the other. To substantiate the above and demonstrate possible false dependencies, we first performed a regression analysis.

Analyzing the works [15–19] carried out in this area and this direction, based on a comparative analysis of the considered studies, the results of descriptive statistics in *Table 1* and the combined graph in *Fig. 1* in this study, which include the dynamics of the development of time series of the current account of the balance of payments of Azerbaijan, prices for Brent and West oil and characterizing the primary growth trend of these variables, it can be assumed that the functional relationship between the considered time series under consideration can be described by a linear model of multiple regression. Let us designate the current account of the balance of payments as the dependent variable (y), and the prices for Brent and West oil as independent variables (x_1, x_2):

$$y_t = a_0 + a_1 x_{1t} + a_2 x_{2t} + \varepsilon_t, \qquad (1)$$

where ε_t is the random component of the multiple regression model, which includes all unaccounted-for factors that affect the dependent variable. a_0 the free term of the model, a_1 and a_2 the regression coefficients that explain and estimate the influence of independent variables x_1 and x_2 on the dependent variable y.

The method of least squares was applied. The studied time series covers the periods from 1995 to 2024. The initial data in the development of the model were taken from official sources.

Based on the results obtained, the multiple regression model can be represented in the following formal form:

$$y_t = \underset{(0.334582)}{53.427 x_1} + \underset{(0.918517)}{166.283. x_2} - \underset{(-4.509531)}{7339.198}. \qquad (2)$$

According to the results of regression analysis with the above parameters, the number of observations was

Descriptive Statistics of Variables y, x_1, x_2

Descriptive Statistics	CP(y)	brent(x_1)	west(x_2)
Mean	5129.350	58.50900	56.18400
Median	2696.300	57.94500	56.71500
Maximum	23478.10	111.6300	99.06000
Minimum	−2589.000	12.80000	14.39000
Std. Dev.	7104.365	31.39784	27.69499
Skewness	0.870958	0.189600	0.083397
Kurtosis	2.709828	1.830549	1.708003
Jarque-Bera	3.898091	1.889258	2.121345
Probability	0.142410	0.388824	0.346223
Sum	153880.5	1755.270	1685.520
Sum Sq. Dev.	1.46E + 09	28588.91	22243.36
Observations	30	30	30

Source: Prepared by the author in the EViews program.

30; $R^2 = 0.77$; F-*stat.* = 47.7; probability = 0.00; $DW = 0.93$. The coefficient of determination indicates that the independent variables included in the model explain the dependent variable by 77%. Despite the fact that *Criterion F* received a fairly reliable estimate with high probability, the F and t criteria usual limiting Gaussian distribution or χ^2 [20]. With degrees-of-freedom $k1 = m + 1 = 3$, $k2 = n − m − 1 = 27$, where m is the number of independent factors in the model, tabular value for the criterion $F_{tab.} = 2.3$. Since the condition $F_{calc.} > F_{tab.}$ is satisfied, this allows us to speak about the significance of the coefficient of determination. The t-test for brent oil is 0.33 (*prob.* = 0.7405) and for west oil is 0.91 (*prob.* = 0.3665). This indicates the low significance of independent factors. The result obtained by the DW criterion cannot be considered satisfactory, which is likely a symptom of spurious regression that occurs with non-integrated, non-stationary time series. The critical limits of the DW criterion at $n = 30$ and $k = 2$ are $D_L = 1.070$ and $D_U = 1.339$. Observed value $D_{obs.} = 0.93$. Since $D_{obs.} < D_L$ and D_U then, we can conclude that there is a positive autocorrelation of the residuals of the model.

The Jarque-Bera test indicates the normal distribution of the levels of the series y the current account of the balance of payments, and x_1 is the price of Brent crude oil, x_2 is the price of West Texas Intermediate oil. As can be seen from the results of descriptive statistics in *Table 1*, $JB_{CP} = 3.898091$, with *prob.* = 0.142410 > 0.05, and $JB_{Brent} = 1.889258$, with *prob.* = 0.388824 > 0.05, $JB_{West} = 2.121345$, with *prob.* = 0.346223 > 0.05, which confirms the normality of the distribution for all variables.

Although most of the results are satisfactory and indicate a strong relationship, this cannot justify a cointegrating relationship. which is what we wanted to show.

To check the stationary of the times series *CP, brent, west* under consideration, an extended *Dickey-Fuller* test (*ADF*) should be carried out [21, 22]. The *ADF* test for the original series, for series with first and second differences with input parameters constant, maximum lag = 7, lag length = 0, gave the following results (*Table 2*).

The original rows show not the best results. This means that the original series *CP, brent, west* are non-stationary and, in particular, are $I(1)$-series. t-tests with breakpoints of 1%, 5%, and 10% give low scores with low probability. What cannot be said about series with the first and second difference — rather high t-tests, with high probabilities. The results showed that the first

Results of the Dickey-Fuller Test

Variables	Critic. 1%	Critic. 5%	Critic. 10%	t-statistic	Probability
According to original rows					
CP	−3.679322	−2.967767	−2.622989	−2.316491	0.1738
brent	−3.679322	−2.967767	−2.622989	−1.788418	0.3785
west	−3.679322	−2.967767	−2.622989	−1.872646	0.3398
By rows with first differences					
CP	−3.699871	−2.976263	−2.627420	−5.027421	0.0004
brent	−3.689194	−2.971853	−2.625121	−4.969133	0.0004
west	−3.689194	−2.971853	−2.625121	−5.517640	0.0001
By rows with second differences					
CP	−3.711457	−2.981038	−2.629906	−7.219804	0.0000
brent	−3.711457	−2.981038	−2.629906	−6.996703	0.0000
west	−3.711457	−2.981038	−2.629906	−6.917630	0.0000

Source: Prepared by the author in the EViews program.

and second order difference operators are stationary series.

When modeling, the presence of homoscedasticity in the residuals is significant. This reduces the results' quality and, in general, the model's effectiveness. Since the variances are calculated with large deviations, the values of the F and t statistics become unreliable. To test the homoscedasticity of the residuals, the null hypothesis about their stability is tested $H_0 : \sigma_1^2 = \sigma_2^2 = \ldots = \sigma_n^2$. An alternative hypothesis of heteroscedasticity of the residuals of the regression model $H_1 : \sigma_1^2 \neq \sigma_2^2 \neq \ldots \neq \sigma_n^2$.

Using the Eviews package, a white test is carried out, and the observed value of the statistic and the p-value for it are calculated. The conclusion about the acceptance or refutation of the main hypothesis is made by comparing the p-value with the selected significance level of 0.05. The test results are as follows and are presented in *Table 3*.

At $n = 30$ *Obs*R^2 — the coefficient of determination is 8.143251 and it is less than the value $\chi_{0,148}^2 (5) = 4.61$. The corresponding *p*-value exceeds the significance level of 0.05 (0.148 > 0.05), i.e. the null hypothesis that the random term is homoscedastic may not be rejected.

The *Granger* test was conducted to test the causal relationships between the factors. When implementing this test, lag values are used, the volume limit of which depends on the length of the time series since an increase in the lag values reduces the size of the series under study. The *Granger causality* test with annual years from 1995 to 2024 ($n = 30$) on the studied series gave some positive results, but they were not enough. Therefore, rows with quarterly data were used for the test implementation, which sufficiently increased the possibility of conducting the test. So, with quarterly data from 2000 to 2021 ($n = 88$) with lag values from 2 to 11, the following results are obtained, which confirm the presence of a two-way causal relationship. *Table 4* shows some of them.

Engle-Granger and *Johansen's* test was conducted to identify cointegration relationships and determine cointegration relationships between time series. This test makes it possible to implement different trends and choose the direction with the best performance among them, fulfilling the cointegration test's necessary conditions [23]. According to the test results obtained, with possible data specifications (*Table 5*), where, according to the smallest values of the *Akaike* and *Schwartz* information criteria, the procedures

White's Test Results

F-statistic	1.788354	probability F(5.24)	0.1534
Obs*R-squared	8.143251	probability Chi-Square (5)	0.1485

Source: Prepared by the author in the EViews program.

Granger Test Results

Null hypothesis	F statistic	Probability	Laqs	Number of observations
Brent does not Granger Cause CP	2.75025	0.0342	4	84
West does not Granger Cause CP	2.84778	0.0296	4	84
Brent does not Granger Cause CP	2.69070	0.0130	8	80
West does not Granger Cause CP	2.80038	0.0102	8	80
Brent does not Granger Cause CP CP does not Granger Cause brent	2.44868 2.08150	0.0191 0.0454	9	79
Brent does not Granger Cause CP CP does not Granger Cause brent	2.24732 2.21965	0.0246 0.0265	11	77
West does not Granger Cause CP CP does not Granger Cause west	2.24375 2.03296	0.0249 0.0427	11	77

Source: Prepared by the author in the EViews program.

were carried out to provide us with information on the integration of the first order of the studied time series of the current account of the balance of payments of Azerbaijan, world prices for Brent and West oils, which allows us to perform the *Johansen* test for time series cointegration. *Table 5* analyzes five hypotheses in total. It is determined that the linear and quadratic trends indicate the presence of cointegration relationships between the studied time series *CP, Brent, West*. The lowest values of the *Akaike* and *Schwartz* criteria in *Table 5* for a deterministic linear trend with a constant and a direction are 34.29106* and 35.84984*, respectively, and for a deterministic quadratic trend with a continuous and a movement, 34.34249 and 36.08695. Cointegration tests with linear and quadratic (with regular and directional) types of trends indicate the presence of cointegration relationships. Rejecting the null hypothesis about the absence of co-integrating vectors, we accept the alternative hypothesis about the existence of one vector for both *Trace* and *Maximum Eigenvalue* tests for a linear trend since the calculated values exceed the critical

ones. It cannot be said that there are two vectors for a linear trend because, in this case, the calculated values are less than the critical ones. And for this reason, the null hypothesis is accepted. When testing hypotheses, high probabilities (significance levels) that allow us to make decisions are considered (*Table 6*). For a quadratic trend in both *Trace* and *Maximum Eigenvalue* tests, we reject the null hypothesis and accept an alternative theory about the presence of two co-integrating vectors, taking into account the high probability and the fact that the calculated values exceed the critical ones (*Table 7*).

The above conclusions confirm the following results.

According to the Trace test: for a linear trend 52.28138 > 42.91525 with prob = 0.0045; 21.50599 < 25.87211 with prob. = 0.1590; for a quadratic trend 50.05335 > 35.01090 with prob. = 0.0007 and 20.68863 > 18.39771 with prob. = 0.0235; 2.630865 < 3.841466 with prob. = 0.1048.

According to the Maximum Eigenvalue test: for a linear trend 30.77538 > 25.82321 with prob. = 0.0102; 18.05797 < 19.38704 with prob. = 0.0771; for a quadratic

Table 5

Results of the Engle-Granger and Johansen Test for Time Series Cointegration

Included observations: 27 Sample (adjusted): 1995–2024 Series: CP, brent, west Lags interval: 1 to 2					
Number of cointegrating ratios at the 0.05 level					
Trend	**There are no deterministic trends in the data**	**There are no deterministic trends in the data**	**Presence of a deterministic linear trend in the data**	**Presence of a deterministic linear trend in the data**	**Presence of a deterministic quadratic trend in the data**
Test	No Intercept No trend	Intercept No trend	Intercept No trend	Intercept Trend	Intercept Trend
Trace	0	0	1	1	2
Max-Eig	0	0	0	1	2

Source: Prepared by the author in the EViews program.

Table 6

Trace Test Results (Lag Interval from 1 to 2, First Differences)

a) For a Linear Deterministic Trend

Hypothesis	**Alternative hypothesis**	**Trace statistic**	**Crit.5%**	**Probability**
$H_{0\,:\,r\,=\,0^*}$	$H_{A\,:\,r\,>\,0}$	52.28138	42.91525	0.0045
$H_{0\,:\,r\,=\,1}$	$H_{A\,:\,r\,>\,1}$	21.50599	25.87211	0.1590
$H_{0\,:\,r\,=\,2}$	$H_{A\,:\,r\,>\,2}$	3.448021	12.51798	0.8196

b) For a Quadratic Deterministic Trend

Hypothesis	**Alternative hypothesis**	**Trace statistic**	**Crit. 5%**	**Probability**
$H_{0\,:\,r\,=\,0^*}$	$H_{A\,:\,r\,>\,0}$	50.05335	35.01090	0.0007
$H_{0\,:\,r\,=\,1^*}$	$H_{A\,:\,r\,>\,1}$	20.68863	18.39771	0.0235
$H_{0\,:\,r\,=\,2}$	$H_{A\,:\,r\,>\,2}$	2.630865	3.841466	0.1048

Source: Prepared by the author in the EViews program.

Note: * Rejecting the null hypothesis, accepting the alternative hypothesis at the 0.05 level.

trend 29.36472 > 24.25202 with prob. = 0.0097 and 18.05777 > 17.14769 with prob. = 0.0368; 2.630865 < 3.841466 with prob. = 0.1048.

Recent tests show that there are cointegrated relationships between the variables *CP, Brent, West*. This confirms the authenticity of the correlation and the long-term relationship between them. The generated vector error correction model expresses the long-term relationship of the time series in an equilibrium form. Also, *VECM* confirms the authenticity of close correlations between variables, which allows measuring the distance from the uniform state [23]. The results of the Granger feedback test allow for the construction of vector error correction models for all variables.

Table 7

Results of the Maximum Eigenvalue Test (Lag Interval from 1 to 2, First Differences)

a) For a Linear Deterministic Trend

Hypothesis	Alternative hypothesis	Maximum Eigenvalue statistic	Crit. 5%	Probability
$H_0 : r = 0^*$	$H_A : r > 0$	30.77538	25.82321	0.0102
$H_0 : r = 1$	$H_A : r > 1$	18.05797	19.38704	0.0771
$H_0 : r = 2$	$H_A : r > 2$	3.448021	12.51798	0.8196

b) For a Quadratic Deterministic Trend

Hypothesis	Alternative hypothesis	Maximum Eigenvalue statistic	Crit. 5%	Probability
$H_0 : r = 0^*$	$H_A : r > 0$	29.36472	24.25202	0.0097
$H_0 : r = 1^*$	$H_A : r > 1$	18.05777	17.14769	0.0368
$H_0 : r = 2$	$H_A : r > 2$	2.630865	3.841466	0.1048

Source: Prepared by the author in the EViews program.

Note: * Rejecting the null hypothesis, accepting the alternative hypothesis at the 0.05 level.

The results of the procedures and tests carried out before the construction of vector error correction models are very encouraging and allow us to accept the studied time series *CP, Brent, West* as stationary. Having excluded insignificant variables from the initially obtained *VEC* models, we re-evaluated the models. The following error correction equations (3), (4), (5) for *CP, brent* and *west* for second-order differences are obtained. The exclusion of some variables from the primary models has made it possible to simplify them and improve the qualitative indicators in the *VECM*, such as t statistics and standard errors. Models (3), (4) and (5) are statistically correct, standard errors are indicated in parentheses.

$$\Delta(\Delta CP) = -0.499698(\Delta CP(-1) + 130.5023\Delta BRENT(-1) - 326.7058\Delta WEST(-1) +$$
$$(0.0577) \qquad\qquad (86.2497) \qquad\qquad (89.7339)$$
$$+10681.4) + 0.722694\Delta(\Delta CP(-1)) + 0.303134\Delta(\Delta CP(-2)) - 133.0822\Delta(\Delta BRENT(-1))$$
$$(0.2492) \qquad\qquad (0.2503) \qquad\qquad (53.641)$$
$$- 47.1678\Delta(\Delta BRENT(-2)) \tag{3}$$
$$(0.5947)$$

$$\Delta(\Delta BRENT) = -0.001242(\Delta CP(-1) + 130.5023vBRENT(-1) - 326.7058\Delta WEST(-1) +$$
$$(0.000658) \qquad\qquad (86.2497) \qquad\qquad (89.7339)$$
$$+10681.4) - 0.2534\Delta(\Delta BRENT(-1)) - 0.35008\Delta(\Delta BRENT(-2)) + 0.3168\Delta(\Delta WEST(-1)) \tag{4}$$
$$(0.1247) \qquad\qquad (0.1269) \qquad\qquad (0.1887)$$

$$\Delta(\Delta WEST) = -0.000398(\Delta CP(-1) + 130.5023\Delta BRENT(-1) - 326.7058\Delta WEST(-1) +$$
$$(0.0015) \qquad\qquad (86.2497) \qquad\qquad (89.7339)$$
$$+10681.4) - 0.059322\Delta(\Delta BRENT(-1) - 0.223856\Delta(\Delta WEST(-1)) \tag{5}$$
$$(0.2944) \qquad\qquad (0.4419)$$

Response CP

Response Brent

Response West
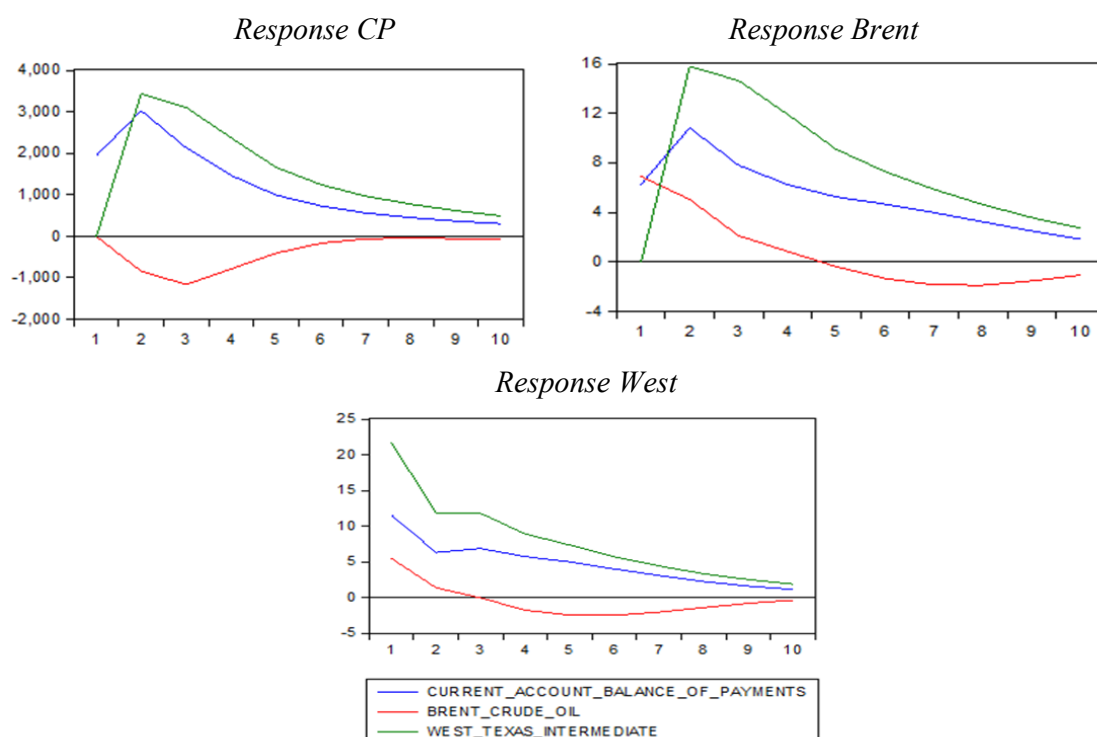
Fig. 2. **Responses of Impulse Functions**
Source: The graph was created by the author in the EViews software.

The obtained *VEC* models correct the short-term dynamics of endogenous variables depending on the deviation from the long-term dependence between *CP, Brent, and West*.

To obtain more comprehensive and detailed information, it is necessary to conduct and analyze the responses of impulse function responses and the composition of variances, which describe the response of a time series to some external shocks. The impulse response function makes it possible to trace the dynamics of the impact of surprises on the future value of variables.

The impulse response functions characterize the time of the return of the endogenous variable to the equilibrium trajectory under a single shock of the exogenous variable. The response responses of the impulse function characterize the median estimate with a 90% confidence interval of the endogenous variable to the standard deviation of the exogenous variable. As a result of the evaluation of the *VECM* model, we obtained the functions of impulse responses to structural shocks. So, plots of the reactions of the series under consideration are built on EViews 10 on 10-year time horizons. As can be seen from the

Table 8

VAR Residual Sequential LM Correlation Tests

Laqs	LM Statistics	Probability
1	7.727057	0.5619
2	4.621512	0.8660
3	10.12649	0.3403

Source: Prepared by the author in the EViews program.

graphs in *Fig. 2* the reactions of the impulse functions of variables to structural shocks cover the first 4–5 years of the 10-year period, with a further gradual transition to a stable period.

When analyzing *Fig. 2*, one can see the responses over time from the shock experienced and conclude the answer of the endogenous variable to the surprise in each of the exogenous variables over ten years. And the fact that the response of variables to the standard deviation is sometimes different.

Also, the residuals of these models should be analyzed to check the adequacy of the constructed vector error correction models. It will be appropriate to

VAR Residual Normality Tests

Component	Jarque-Bera	Degree of freedom	Probability
1	1.460602	2	0.4818
2	0.476875	2	0.7879
3	0.513977	2	0.7734
Joint	2.451453	6	0.8739

Source: Prepared by the author in the EViews program.

check *VAR Residual Serial Correlation LM* Tests — about the mutual independence of residuals, *VAR Residual Normality* Tests — about the normal distribution of residuals, and *VAR Residual Heteroskedasticity* Tests — about the constancy of dispersions of residuals. Let's consider the results of the above tests successively. The number of included observations for the three tests is 24. Lags 1, 2, 3 are applied.

Table 8 shows the results of the *LM* test of the residual serial correlation VAR. The null hypothesis is as follows: no serial correlation with lag delay.

Probabilities are used to make a decision. When testing in all cases, the p-value is more significant than 5%. Therefore, the null hypothesis is accepted, and there is no serial correlation with a delay of lags 1, 2 and 3.

As can be seen from the results (*Table 9*) the asymmetry in the distribution of residuals is close to zero, minimal, which means insignificant. The kurtosis does not pass the value 3. That is, there is no peaked distribution. For both characteristics, the distribution can be considered normal. According to the *Jarque-Bera test*, the distribution is also normal in all cases. JB_1 = 1.460602, with *prob.* = 0.4818 > 0.05, JB_2 = 0.476875, with *prob.* = 0.7879 > 0.05 and JB_3 = 0.513977, with *prob.* = 0.7734 > 0.05, which confirms the normal distribution of all variables. The hypothesis about the normal distribution of the model's residuals is accepted.

When testing heteroscedasticity in the residuals, the probability of the absence of heteroscedasticity is 11%, therefore, the null hypothesis is accepted, and there is no heteroscedasticity in the residuals. The variance can be considered constant in the residuals, and the mathematical expectation is equal to zero. The results were obtained to ensure the fulfillment of the Gauss-Markov conditions for the residuals of the model, thereby substantiating the adequacy of the constructed vector error correction models (3), (4), (5).

CONCLUSIONS

Based on the results of this work, the following conclusions can be drawn:

• The models (3), (4) and (5) obtained in the course of the study can be considered statistically significant. This justifies the positive results of a large number of tests and graphical analysis, both at the beginning of the study based on second-order differences from the original data and when checking the adequacy after the formulation of vector error correction models.

• The constructed model is quite adequate, demonstrates stationarity for time series for both endogenous and exogenous variables, and can be helpful for predictive values of the current account of the balance of payments both in the short term and in a long time.

• The constructed vector model of error correction makes it possible to quantify the characteristics of the studied indicators and the links between them in the short and long term to evaluate the prospective dynamics of the arrows.

• The long-term equilibrium relationship between variables can be considered stable since stability is restored after a violation in short-term periods from shock reactions. The constructed models make it possible to measure both deviations from the equilibrium state and the rate of equilibrium restoration.

• These models make it possible to measure deviations from equilibrium and the rate of its recovery. The obtained *VEC* models correct the

short-term dynamics of endogenous variables depending on the deviation from the long-term dependence between *CP, Brent, and West*. Reactions of the impulse functions of variables to structural shocks cover the first 4–5 years of the 10-year period, with a further gradual transition to a stable period. This mechanism provides long-term dependence. The results obtained can be helpful for identifying actual trends in Azerbaijan's balance of payments on the current account and determining its interdependencies with other macroeconomic variables, for developing recommendations, and for forming directions for future development of the balance of payments.

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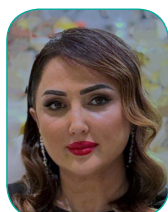
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Theoretical and Methodological Perspective on the Prerequisites of Emergence and Peculiarities of the Functioning of Decentralized Finance

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ABSTRACT

Existing studies of the problem of the emergence and development of decentralized finance (DeFi) are largely limited to non-principled clarification of certain positions and formulations, with emphasis on technical and technological innovations, far from the level of fundamental research. The authors set the task of theoretical understanding of the ongoing transformation processes in the financial sphere. The **purpose** of the study was to identify the conditions, driving forces and nature of the process of development of decentralized finance; to define DeFi and identify its sustainable features; and to substantiate the possibilities of considering DeFi as a separate economic category and institution. Setting the goal determined the sequence of its solution in two stages. The first stage implied a higher level of abstraction, an appeal to the theory of money and its modern achievements. The second stage — "movement to the surface", inclusion in the analysis of specifications accompanying the development of DeFi. The authors used systematic and logical **methods**, induction and deduction as the main methods, which allowed them to generalize and systematize the ideas about the essence of decentralized finance, identify problems in the modern scientific discourse. As a result, the causes are revealed, and the nature of the process of emergence and development of the sphere of decentralized finance is substantiated, the definition of DeFi is given, the principles of their functioning are highlighted and recommendations on structuring the conceptual apparatus of DeFi are developed. It is concluded that the process of formation and development of decentralized finance is objective and driven by changes in the monetary sphere, technological advances, and problems of traditional finance. At the same time, the stable features of DeFi determine the potential of reproduction of financial relations on a decentralized basis, but at the same time do not allow us to qualify DeFi as an independent category and institution. The results of the study can be used both in elaborating the concept of DeFi development and taken into account as part of the regulatory response to DeFi.
Keywords: decentralized finance; traditional finance; denationalization of money; private money; cryptocurrencies; DeFi architecture

INTRODUCTION

The fragmentation of the financial sphere occurring before our eyes, manifested in the formation of its decentralized segment, requires a theoretical understanding of this process both in terms of its prerequisites and the mechanism driving it. The overwhelming majority of studies on the phenomenon of decentralized finance (DeFi) focus on its utilitarian aspect, the implementation of which is aimed at understandable economic benefits for the progressively expanding set of financial market segments encompassed by this phenomenon. An important aspect, considering the speed and scale of the expansion of this sphere, is the regulatory response to the challenges it poses. Without denying the significance of these aspects of the functioning and development of DeFi, it should be noted that the direction of their research aligns with the positivist trend in economic studies that emerged several decades ago.

Giving due credit to the results obtained to date, which are abundant with formalized assessments of various parameters of decentralized financial instruments, recommendations for national regulators and supranational financial institutions, it is necessary to acknowledge that a

qualitative — theoretically saturated — procedure for analyzing the DeFi phenomenon has not yet been implemented. By this procedure, we mean the understanding of the emerging phenomenon at the theoretical and methodological level, especially regarding its prerequisites, the nature of the latter, driving forces, and the relationship with so-called traditional (centralized) finance (TradFi). It is evident that understanding this important fundamental aspect is the key to addressing issues of a more applied nature, including those related to regulatory responses to the opportunities and threats associated with this phenomenon.

GAPS IN THE SCIENTIFIC DISCOURSE ON DECENTRALIZED FINANCE AND THE CHOICE OF METHODOLOGICAL TOOLS

The logic of studying such a new phenomenon as decentralized finance involves building it from the general to the specific, from considering theoretical issues related to identifying the prerequisites for the emergence of DeFi, their nature, and principles in explicit or implicit form, which reflect on the content and contours of this phenomenon, to specific questions that have a pronounced practical, instrumental character, including those addressed within regulatory and supervisory practices. Not claiming to implement such a comprehensive approach, which consists, on the one hand, in understanding the essence of the phenomenon itself, and, on the other, in formalizing the mechanics of its functioning, the present study is limited to the first part of it, based on the obvious assumption that our understanding of the nature and essential characteristics of the phenomenon determines the prospects for its development and the possibilities for regulatory response. This conditioning emphasizes the relevance of the present study, as well as its consistency, expressed in the sequence of using different approaches at various stages — reproductive and heterodox, which opened up opportunities for an adequate reflection of the unique features of DeFi and their similarities with traditional finance.

DeFi today is most often considered as decentralized financial services or decentralized financial protocols managing smart contracts on a specific platform.[1] It should be acknowledged that such definitions obscure rather than illuminate the meaning and potential of this new, purpose-built financial system. DeFi is more like the internet of money [1]. The beginning of this research stems from this important and simple definition. The main reasons for the emergence of DeFi are concentrated in the monetary sphere. The objective nature of the evolution of the latter, driven by equally objective factors of scientific and technological progress, has the most significant impact on the fragmentation of the financial sphere. Moreover, it predetermines the irreversibility of this process, which is already manifesting on the surface of phenomena in the expanding array of private digital currencies, financial instruments, and products. The features of the production of the latter and the operation with them formed the basis of numerous definitions of the phenomenon under analysis (*Table 1*), determining their focus primarily on the functional, instrumental, and technological aspects of the latter, as well as attempts to present it from a systemic perspective.

Without denying the significance of these aspects, it is necessary to note that such a focus brings the external side of the phenomenon to the forefront of research, leaving a whole range of fundamental, theoretical questions on the periphery of scholarly attention. At the same time, following the reproductive approach to the analysis of DeFi implies uncovering the prerequisites for their emergence, sources of development, as well as characteristics that distinguish or bring them closer to the conventional conceptual and categorical apparatus of financial science. Such a

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[1] Decentralized Finance: information frictions and public policies. Approaching the regulation and supervision of decentralized finance. European Commission. June, 2022. URL: https://finance.ec.europa.eu/system/files/2022–10/finance-events-221021-report_en.pdf (accessed on 22.03.2024).

theoretical and methodological reliance on the reproductive approach appears necessary and important. At the same time, not only the mentioned gaps in the modern analysis of the DeFi phenomenon are taken into account, but also its viability.

The initial, fundamental stage of DeFi research involves selecting the basic methodological toolkit. Our research is based on a reproducible approach combined with systemic and functional analysis and a heterodox approach [13]. This allows:

– on the one hand, to investigate the nature of the formation and development of DeFi processes, relationships, and institutions shaped by dynamics, uncertainty, multifactoriality, and irreversibility;

– on the other hand, consider the social aspects of the processes occurring in the DeFi sphere, the peculiarities of organizing economic relations and the activities of institutions, and the level of public trust.

The representation of observed phenomena and processes depends on the questions we pose in our research. The first question from a fundamental approach: is the concept of DeFi an independent economic category, analogous to the categories of money, finance, credit?

In our daily practical dealings with finances, we rarely think about theoretical, fundamental questions. Understanding finance as a scientific category does not happen immediately, as externally, finance appears as an economic phenomenon, as "an object of sensory contemplation, in contrast to its essential basis — the noumenon as an object of intellectual contemplation".[2] It is achieved based on an intellectual perception of finance as an economic category, related to the category of finance in its highest degree of abstraction, i.e., when abstracting from all specific forms and types in which they (finance) function (i.e., as opposed to perceiving finance as a market phenomenon). At the same time, the concept of finance is often identified with its public form. To a greater extent, this is characteristic of the domestic tradition in relevant studies, whereas foreign interpretations are not prone to such "looping" and, paradoxically, a greater degree of abstraction of the essence of the phenomenon from its numerous species composition. That is why the phenomenon received the corresponding name. But be that as it may, without opposing the various positions in the interpretation of the term "finance", we note that most of them recognize the monetary basis of financial relations. Thus, the category "finance" can be considered the foundation of the DeFi sphere, while the latter merely constitutes its specification — a form, type, implemented under specific conditions, the novelty of which does not serve as a basis for shifts in the essence of the phenomenon itself.

The second question from the perspective of institutional studies: does the concept of DeFi relate to the so-called basic institutions, which are understood as "deep, historically stable, and constantly reproduced social relations that ensure the integration of different types of societies, historical invariants that allow society to survive, maintain its integrity, and develop in its given material environment"? [13, p. 57].

The answers to the first and second questions will be negative. The emergence and functioning of finance in their decentralized form of organization do not change the essential foundations of finance, which have been thoroughly and meticulously studied by various branches of financial science, including the Russian one, traditionally relying on the reproductive approach and linking finance with the movement of monetary funds. Similarly, the form of organization of credit relations, insurance, etc., on a decentralized basis does not change the essence of credit, insurance, or bank as a theoretical concept.

Considering the conditionality of financial relationships on the movement of funds regarding the implementation of distribution and other processes in the decentralized sphere,

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[2] Website of the National Encyclopedic Service. URL: http://terme.ru/termin/noumen.html (accessed on 22.03.2024).

Table

Definitions of Decentralized Finance

No.	Determination	Author
1	"Financial infrastructure built on public smart contract platforms, … based on open protocols and decentralized applications"	F. Schär [2]
2	"An open financial system based on blockchain technology without centralized financial intermediaries"	Y. Chen, C. Bellavitis [3]
3	"An alternative form of financial planning that allows bypassing inefficient government institutions and insolvent banks, based on decentralized applications operating using blockchain protocols"	R. Leonhard [4]
4	"An emerging field at the intersection of blockchain, digital assets, and financial services, which, using blockchain protocols, eliminates financial intermediaries through specialized financial services [decentralized applications (dapps)], used without a single centralized mechanism"	DeFi Beyond the Hype. The Emerging World of Decentralized Finance*
5	"Decentralized database stored on a certain number of nodes"	I.A. Dokukina, A.V. Polyanin [5]
6	"Decentralized monetary system"	M.G. Zhigas, S.N. Kuzmina [6]
7	"One-tier (decentralized) credit system model based on blockchain technology with the identification of individual participants and levels of their interaction"	S.A. Andryushin [7]
8	"Financial services based on distributed ledger technology"	T.A. Kudryashova, T.V. Fedosova, E.A. Shulgina [8]
9	"Financial instruments that are services and applications built on blockchain platforms"	A.V. Aleshina, A.L. Bulgakov [9]
10	"A new direction for the development of the financial system and the creation of analogs of traditional financial management tools in a decentralized architecture"	H.S. Umarov, H.S. Umarov, T.S. Umarov [10]
11	"An alternative financial system aimed at replicating existing financial services in a more open and transparent manner"	I.V. Pashkovskaya [11]
12	"The principle of operation of decentralized services, applications (Dapps), and protocols"	A.V. Pomogalova, E.A. Donskov, I.V. Kotenko [12]
13	"A model of financial organization in which there are no intermediaries, transactions are carried out automatically using smart contracts executed on the basis of distributed ledger technology, and users have direct control over their assets"	Decentralized Finance. Report by the Bank of Russia**

Source: Compiled by the authors.

Note: * DeFi Beyond the Hype. The Emerging World of Decentralized Finance. Research produced by the Wharton Blockchain and Digital Asset Project, in collaboration with the World Economic Forum. May, 2021. URL: https://wifpr.wharton.upenn.edu/wp-content/uploads/2021/05/DeFi-Beyond-the-Hype.pdf (accessed on 22.03.2024). ** Decentralized Finance. Report by the Bank of Russia. M: Bank of Russia; 2022. URL: https://www.cbr.ru/Content/Document/File/141992/report_07112022.pdf (accessed on 22.03.2024).

clarity is required regarding the presence of a basic set of characteristics in the funds servicing it, confirming the mentioned status. Overall, sharing the position on such existence, since otherwise monetary theory would ignore an important object of analysis, losing its adequacy in reflecting modern economic reality, we will further focus on confirming this thesis and then on the objectivity of the processes occurring in the monetary sphere that have led to the fragmentation of finance. Essentially, these processes, among other things, are expressed in the movement of money towards their denationalization and dematerialization. But the next question is: is this process objective, and to what extent are its driving forces inevitable? Answering this requires addressing the essence of decentralized payment means, justifying their place and role in the species composition of money.

The current opinions on the status of decentralized payment instruments underlying DeFi are extremely polarized. Moreover, such discussions, which are significantly less heated in contemporary foreign analysis compared to domestic analysis, resemble the difficulties that accompanied all stages of the evolution of economic thought regarding the definition of money as such. British economists Jevons and Andrews pointed this out as early as the 19th century. Thus, the former drew a parallel between the non-triviality of the tasks of defining money — an economic science — and the squaring of the circle — mathematics [14]. The second one spoke more extensively and less allegorically: "Although money was among the first economic phenomena to attract human attention and has since remained at the center of economic research, there is not even relative agreement on what this word should denote" [15, p. 3].

The relative coherence of Marx's theoretical construct, often unconditionally transferred by domestic tradition to the modern context, richly fertilized by an expanded species composition of money and tools for its regulation, is opposed by a diversity of foreign interpretations, not without reason focusing on the functionality of money (their functions) and their social underpinnings. These differences are already today superimposed on the notions of the nature and essence of decentralized payment instruments. Namely, they evidently constitute the economic basis of the corresponding sphere of modern financial reality, having reached the pinnacle of the evolutionary movement of money, realizing the possibility of competition in the monetary sphere, as well as between decentralized and traditional finance.

Thus, the object of DeFi (not only as part of the mentioned reality but also of finance as such in all its theoretical content) includes new forms of payment instruments and other financial assets, such as cryptocurrencies, stablecoins, and digital financial assets, identified by some researchers as new forms of money [16]. This position is opposed by another one, which denies the monetary status of these instruments and appeals only to new ways of conducting transactions with their help [7, 17, 18]. In the modern world, "monetary funds" can take various forms over time and space, moreover, they may not have a tangible form and, most importantly, can still be liquid, trusted, and therefore in demand to the extent that is determined by the trust in them, and reflect a certain value. The value of these "monetary funds" is based more on economic expectations and behavioral preferences. Besides the absence of real assets backing them, there is also no institution endowed with the right to unilaterally influence their key characteristics, such as issuance volumes and exchange rate dynamics. Although this defect of decentralized issued currencies can transform into an advantage by minimizing arbitrary decisions and policy bias.

These features testify to the monetary filling of these means not only in terms of functionality but also in their basic characteristics. These means should be considered as a result of the dematerialization and denationalization of money, a process

that is objective in its essence and driving forces. The latter, as is known, bring productive forces to a new stage of development, or level, which is today commonly referred to as a new technological order, shifting the frontier of production relations that are becoming inconsistent with this level. In our case, we are talking about changes in the traditional financial architecture, and these changes are of a radical nature, but at the same time, they do not affect the essence of the categories with which we describe the ongoing changes and the emerging reality.

CHANGES IN THE MONETARY SPHERE, TECHNOLOGICAL SHIFTS, AND PROBLEMS OF TRADITIONAL FINANCE AS PRECONDITIONS FOR THE EMERGENCE AND DEVELOPMENT OF DEFI

The dynamism of the monetary sphere today is characterized not only by revolutionary changes in the payment industry, although underestimating them is at least reckless, considering the speed of digital technology implementation in the creation of fiat payment instruments, the infrastructure supporting their movement, and so on. This dynamism is more prominently expressed in the formation of an increasingly tangible alternative to fiat money. It is about the denationalization of money, essentially a reversal in their evolutionary movement, the emergence and expansion of the composition of decentralized currencies — private money. The concept of private money, updated by the aforementioned changes, was thoroughly and originally studied in its time by F. Hayek [19]. Moreover, the corresponding phenomenon as a result of the evolutionary development of money was not considered by this outstanding economist. At the same time, he discovered numerous historical confirmations of this phenomenon, proved the possibility of productive competition between concurrently circulating currencies, and refuted the thesis, first put forward by W. Jevons, that there is nothing less suitable for competition than money [14, p. 64]. By doing so, he opposed

his position to the "dogmas" of the quantitative theory — universals whose immutability is still not questioned by many today. F. Hayek's concept does not exclude the possibility of the emergence and spread of "parasitic currencies", which we can see today in the world of DeFi. At the same time, F. Hayek believed that *banks* would control "their currency" or resort to "reliable private currency" from other issuers. Today, this role can be performed by DeFi *institutions*. Both in F. Hayek's concept and in the concept of decentralized finance, the factor of trust is of great importance, not least determining the scale and stability of one of the fundamental characteristics of money. Just as in both concepts, the possibility of productive circulation of several currencies and simultaneously the rejection of the inferior from their totality is allowed. In this context, it is appropriate to recall the Gresham-Copernicus law, according to which "bad money drives out good".

In economic history, we find numerous confirmations of the issuance and circulation of non-state payment instruments, which were subsequently centralized and codified by corresponding legislative establishments. The subsequent development of financial reality gives rise to many instruments that take on the attributes of payment means, often interpreted as "near money". Private issuance at this stage is a settled reality, expressed in the issuance and active operation of these highly liquid instruments (for example, government debt instruments, highly liquid corporate securities of private companies, whose market authority is undisputed). The competition between these means of payment, which evidently possess distinct monetary qualities, is "the only market-efficient way for multiple such issuers to coexist" [20, p. 27]. That is, financial resources can also include so-called "financial money" [21] (in the context of DeFi — issued on a decentralized basis, serving as a store of value, but with predetermined yield and default probability). The successful implementation of both new forms of money and new payment

instruments largely depends on the ease with which the issuer or intermediary can become part of a reliable and efficient financial system, while part of the "money" itself may be a "no one's" obligation.

Thus, the culminating phase of the temporally fragmented process of developing the phenomenon of private money is the denationalization of money, caused by technological and social factors, which, in their action, impart a distinctly objective character to the entire process. The role of the technological factor in this process is also explained by the action of objective forces and fits into well-known theoretical constructs about the development of productive forces. The social underpinning of this process is the focus of economic sociology, which has developed its own vision of both the essence of money as a social concept and the peculiarities of its development. According to this approach, money cannot be neutral with respect to social processes and culture; moreover, they are deeply infused with the social conditions of their production and use. It is this connection that clearly defines the motivation of DeFi participants, provoking the proliferation of the multiplicity of money, which, apart from their number, manifests itself in different financial behavior strategies, as noted by V. Zelizer [22].

N. Dodd points out that money, being more of a social process than a universal measure, is created by users [23]. Its main properties are not objective; they are socially constructed, which does not negate the objective nature of its movement and changes. Thus, money, according to this approach, is social and pluralistic; it requires the recognition of the pluralism of ideas about various forms of money. A clear reflection and, accordingly, a convincing practical confirmation of this thesis are demonstrated by the history of the establishment and development of DeFi. And at this modern stage of financial development, just as in the times of the emergence of F. Hayek's innovative monetary concept, when

even the boldest forecasts could not reflect the faint outlines of modern financial reality, the question of private-origin payment means is often reduced to denying their monetary status.

One should not forget that the institution of "money" can also be informal in nature, while still performing certain functions of money, if this is the choice of the participants in economic relations and is permissible from a legal standpoint. The very fact of this reality, expressed in the emergence of the digital money phenomenon, its active dissemination, recognition, and trust by financial market participants, determines the possibility of expanding the circulation area of decentralized issued digital monetary funds, capable of performing certain functions of money, but lacking the property of universality in its legal aspect. It is important that universality is initially recorded at the level of the perception of participants in exchange transactions as an informal institution, which should be qualified as a result of an objective process. Only then does formal recording occur at the level of regulations that have the status of law. "The very fact of the development of a decentralized financial reality actively signals the presence of this characteristic in the payment instruments circulating within it, providing grounds for recognizing their monetary essence. Thus, we can hardly speak of a transformation in the essence of money, but rather that the emerging new types have shifts in the ratio of various factors that shape their essential positions" [24, p. 21]. Thus, we can recognize the existence of monetary relationships within the functioning of the decentralized finance sector.

Based on the reproductive approach, decentralized finance can be defined as a distinct part of finance, the development of which is a consequence of the objective process of the denationalization of money, an expanding set of private digital currencies, functioning without intermediaries, encompassing a range of opportunities for adaptation to the complexity and increasing number of needs of the participants involved,

and at the same time — threats inherent to decentralization as such.

The presented definition is generally neutral regarding the technological aspect of DeFi, which produces a complex of opportunities and risks that influence the motivation to participate in its projects. The same can be said about the functional side of this phenomenon.

An attempt to justify the most important condition for its emergence, in our opinion, was made above. This "dilution" of the monopoly on the issuance of payment means due to the influence of the technological factor, the transformation of economic and social institutions predetermined by shifts in the motivational mechanism of market participants, and the influence of the cultural factor in its broad interpretation [25]. That is, everything that constitutes the objective nature of transformational processes, in our case — the denationalization of money. At the core of this movement, we identify:

• scientific and technological progress;

• social and cultural attitudes, manifesting in different directions depending on specific national conditions — from inertia, which reinforces ineffective institutions, to dynamism, ensured by the improvement of regulatory practices;

• the state of national economies, reflected in the global economy and manifested in well-known phenomena of macroeconomic instability, dynamism, and indicators of the functioning of traditional markets;

• regulatory and supervisory practices, combined with the macroeconomic situation and the growing awareness of traditional market participants about the vulnerabilities of these markets, are provoking a shift of activity into unregulated and poorly regulated areas of finance.

These factors are interconnected, and it is often difficult to identify the location of the primary impulses that affect the fragmentation of the financial sphere. At this stage, it can only be asserted with a high degree of certainty that changes in the monetary sphere and

the technological breakthrough that has occurred have constituted the most important conditions for the emergence and spread of private digital currencies. And these conditions and factors themselves extend their influence to the sphere of decentralized finance, fueling it and increasing its potential for expansion.

Transitioning from the fundamental level to the empirical level according to our idea of the "multilayeredness" of research in the field of decentralized finance, we note that the further elucidation of the concept of decentralized finance is characterized by a certain dualism: the combination of objective factors in the development of the DeFi sphere with the high significance of social context, which precisely underscores the importance of a heterodox approach to studying this sphere of financial relations. The effectiveness of this combination in influencing the processes of decentralization in the financial sphere is reinforced by the shortcomings of the traditional model of financial organization. The most obvious of these are: centralized control, limited access, inefficiency or insufficient efficiency, opacity, and lack of functional compatibility.

So, centralization means hierarchy. Most consumers and businesses interact with a single local bank that controls rates and payment amounts. The core of a centralized banking system is a consolidated organization — the central bank, which sets short-term interest rates and influences the level of inflation, often doing so in a manner that is insufficiently transparent and detrimental to numerous interests. This phenomenon extends beyond the financial sector and spreads to technology players.

Decentralized finance potentially reduces barriers to access traditional finance. Currently, more than 1.5 billion people do not have access to banking services, which makes it difficult to obtain loans and participate in online commerce. Many consumers are forced to take short-term loans from microfinance organizations to cover liquidity shortages. And

even having access to banking services does not guarantee their availability.

The most demonstrative example of the inefficiency of traditional finance is transaction fees. The payment systems market exhibits a pronounced oligopoly. Additionally, there are often excessive bureaucratic costs. Other less obvious examples of inefficiency include expensive and often slow money transfers, direct and indirect brokerage fees, lack of security, and frequent inability to conduct microtransactions. Often, bank customers are unaware of their financial institution's condition and are forced to rely on government deposit insurance agencies. This is seen as the essence of the problem of TradFi's lack of transparency. Consumers often find it difficult to understand, for example, whether the interest rates being offered to them are advantageous. Despite the fact that there has been some progress in the financial industry, thanks to fintech services that help find the lowest price, the market remains fragmented. At the same time, all players suffer from the inefficiency of the system. As a result, the lowest price for a financial service may still reflect inflated operating expenses and costs.

The lack of functional interoperability in TradFi manifests in the fact that consumers and businesses interact with financial institutions in an environment that does not allow for interconnectedness. Traditional systems are fragmented and designed to maintain a high switching cost. Mitigating the problem prompts traditional players to seek solutions that allow any company to connect to the information stack of the same banks or payment systems. But such measures do not solve the fundamental problems of centralized financial infrastructure.

The influence of these factors, "burdened" by the advantages of DeFi, amplifies the growing attention to the crypto industry and catalyzes the shift of activity towards DeFi, which the

Russian regulator unequivocally highlights in its documents.[3]

Thus, the formation and development of decentralized financial relations is a product of human activity, but one that is shaped by a whole range of objective factors, including technological ones, in this case, digitalization, the development of fintech, internet technologies against the backdrop of gamification, changes in the nature of online communities, and the increase in online experience of conducting various operations, including operations in the financial market and payment space. These factors enhance the response of participants in financial relationships to the vulnerabilities of traditional (centralized) finance. From this perspective, decentralized finance, in the concept of, for example, D. North's neo-institutional theory, is the rules of the game in society that organize relationships between people and structure exchange incentives in all its spheres — politics, social sphere, or economy [26]. In this case, attention is primarily focused on the possibility of purposefully forming a specific system of financial relations, built on a centralized or decentralized basis. In relation to the organization of financial relations, the formation of its innovative model in the new format of the information and communication environment is taking place.

Thus, the factors determining the organization of financial relations on a decentralized basis are objective in nature, and the sphere of DeFi development is characterized by dynamism and irreversibility, just as scientific and technological progress is dynamic and irreversible. Today, this is a stage of large-scale digitalization of all aspects of social, including economic, life, forming an information-type society. This process is based

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[3] Website of the Central Bank of the Russian Federation. URL: https://www.cbr.ru/Content/Document/File/132241/Consultation_Paper_20012022.pdf; https://cbr.ru/Content/Document/File/141992/report_07112022.pdf (accessed on 22.03.2024).

on the industrial exploitation of high-tech solutions of a new generation, becoming the "new normal" or "new economic normal" of socio-economic reality [27].

The dynamism of the emergence and development of the decentralized finance sector is due to the dynamism of the digitalization process itself. For example, the report by DataReportal provides statistical data that allows for an understanding of the "digital state" in Russia. Thus, at the beginning of 2024, Russia had 130.4 million Internet users with a population of 144.2 million people (in 2023, there were 127.6 million Internet users with a population of 144.7 million people); the internet penetration rate was 90.4% (in 2023 it was 88.2%); 106 million social media users, which is 73.5% of the total population; 227 million mobile cellular connections, which corresponds to 156.9% of the entire population,[4] the development of the digital profile infrastructure, which ensures simple and quick data exchange when receiving financial services in a remote format, continues. The process of remote identification and/or authentication using the Unified Biometric System (UBS) is evolving. Nine Financial Service Providers (FSPs) have been registered, allowing consumers of financial services to remotely purchase products from various financial organizations without geographical restrictions in a 24/7 mode. Open APIs and artificial intelligence (AI) are being implemented in the Russian financial market.[5]

FEATURES OF DEFI, PRINCIPLES OF FUNCTIONING, AND BASIC CONCEPTUAL FRAMEWORK

Despite the dynamism of the objective process for the development of the decentralized finance sector, as well as for the economy as a whole, uncertainty ("measurable" and "unmeasurable") is characteristic, which

F. Knight wrote about back in 1928 [28]. For the decentralized finance sector, this uncertainty is greater than the uncertainty of the economy as a whole. This is not only because periods of uncertainty include unforeseen events to which probabilities cannot be assigned, as they are outside the list of expected events, and the periods of uncertainty themselves cannot be accurately predicted based on available data [29], but primarily because the theory of decentralized finance is still in its infancy. The report for public discussion "Decentralized Finance", published in 2022, is, according to the Bank of Russia itself, merely informational and analytical in nature.[6]

The high uncertainty in the decentralized finance sector is also due to the significant role of social context, public and business trust in the development of decentralized finance objects (cryptocurrencies, tokens, etc.), institutions, instruments, products, and services.

The significant role of the social context is due to the fact that decentralized finance serves as an external environment for the actors involved, but the stakeholders in the processes occurring in the field of financial relations, regardless of whether they are organized in a centralized or decentralized manner, are people. It is precisely their inclusion in the process of financial digitalization (or digital financialization) that determines the reality and future development of any given operation in the financial market. Even if we encounter M2M (Machine-to-Machine) operations within the data exchange process between devices, where a person acts as a "regular observer of the process", we understand that these operations are backed by both their creators and possibly "data and result falsifiers", i.e., fraudsters (any program created, including for conducting operations in the financial market, can be hacked). Financial digitalization in a decentralized form (or digital financialization),

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combined with the increased accessibility of financial services (financial inclusion), is a prerequisite for creating "new frontiers of possibility" in the financial market, including in a decentralized form based on the emergence of an increasing number of "fintech insiders" in the Russian market. They shape the behavior of large groups of people and organizations under the increasing influence of virtualization on both financial culture and the activities of economic entities themselves, even if these activities have not received proper legal regulation. To a large extent, the growth in the number of DeFi users is closely linked to the trust of society members in this innovative form of organizing financial relationships and the rejection of the "overregulation" of the traditional financial sector. Trust in the DeFi sector is an integral part of the progress of decentralized finance development. In our country, it relies, among other things, on clearly formulated and transparent rules and objectives of the National Program "Digital Economy".

At the same time, the decentralized sphere of financial relations traditionally involves the transfer of responsibility and, accordingly, risks for participation in these relations, for the use of resources, tools, and technologies to the users. This is precisely the "reverse side" of decentralization, which, on the one hand, attracts users as an alternative to moving away from the "overregulation" of the centralized (traditional, CeFi) financial sector, while ensuring a high level of financial inclusion, and on the other hand, assumes that participants in the decentralized financial sector understand and adequately assess the level of risks involved, including new risks of hacking attacks, technical errors, and fraud. As interest in decentralized finance services grows, which allow for independent financial services and, consequently, as the level of financial inclusion of the population increases, the attention and demands of financial regulators, primarily the monetary regulator and the state, towards decentralized

finance services and institutions begin to rise. Understanding the risks of deepening financial inclusion in the context of DeFi development, which is related not only to the expansion of access points to innovative digital financial services but also to the adequate modern levels of financial, investment, legal, and cyber literacy, raises the question: how deep should financial inclusion be, conditioned by the development of the decentralized finance sector? Will it not become, at a certain point in time or within certain spatial boundaries, a factor hindering the achievement of the goals of financial market development, which is intended to create the necessary prerequisites for sustainable economic dynamics?

Limited access to financial services, as already noted, constitutes one of the key problems of traditional finance. At the same time, financial inclusion as a concept has a deep semantic context and corresponding significance. It is considered not only as a factor of financial development [30], but also as one of the most important conditions for achieving economic development goals, according to the World Bank[7] and a number of contemporary researchers [31].

Research, including in the context of the development of decentralized finance, has shown that it is necessary to distinguish between financial accessibility and financial inclusivity [32]. Thus, financial accessibility, which is enhanced by the development of decentralized finance, emphasizes the possibility of obtaining and acquiring financial products and services by economic entities [33]. Inclusivity, on the other hand, indicates not only the possibility but also the involvement in the process of acquiring them [34]. That is, the process of inclusion in the financial market, including in the context of the development of decentralized finance, is considered by us in the following way: a transaction or service may be available,

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[7] Website of World Bank. URL: https://www.worldbank.org/en/topic/financialinclusion/overview#1 (accessed on 22.03.2024).

but the consumer cannot take advantage of it due to low financial or digital literacy, and therefore does not participate in the process of acquiring and consuming it. In this case, neither the expansion and deepening of access points to financial services, nor advertising, nor the expected profitability of a particular financial transaction will help. Therefore, understanding "involvement" is important in discussions about financial inclusivity in the field of decentralized finance.

The significance of this aspect, which has not yet received proper development within the framework of a centralized form of financial organization and constitutes one of its key problems, was mentioned above. And it is precisely this aspect that forms one of the principles of decentralized finance. Among other principles, we highlight:

• decentralization and self-governance;
• financial autonomy;
• openness and transparency;
• demandingness and sensitivity to innovations;
• variety of products;
• interoperability;
• transboundary;
• flexibility of user experience;
• safety.

Decentralization and the self-governance that it obviously entails constitute the most important principle of DeFi. Here, there are no centralized governance structures, and the rules of business conduct are reflected in the smart contract. When a smart contract is launched, the DeFi application operates independently with minimal or no human intervention: there is no need for approval from banks or other intermediaries to carry out transactions or access financial instruments.

Financial autonomy is one of the manifestations of decentralization; however, we distinguish it as an independent principle that complements the latter, considering that the degree of decentralization within DeFi can vary depending on the project, and self-governance is not identical to financial autonomy, which implies full control by users over their own funds and financial operations.

Openness and transparency are manifested in the fact that all transactions and operations in DeFi are recorded on a public blockchain, which forms the technological basis of DeFi and, accordingly, serves as the foundation of their entire structure. This makes the operations completely transparent and accessible for verification by any network participant. The source code of DeFi applications is open for auditing, allowing any user to understand the functionality of the contract or identify bugs. All transactional activity is public, which fosters trust and potentially reduces opportunities for fraud.

Demandingness and sensitivity to innovation are expressed in the fact that DeFi must stimulate innovation. This is the key to the viability of this sector, which it generally manages to achieve by demonstrating flexibility towards new solutions and producing new products and services based on smart contracts. The implementation of this principle contributes to the expansion of the product range produced by DeFi, which, in turn, stimulates the involvement of various types of investors, including traditional players.

The principle of interoperability suggests that new DeFi applications can be created by combining other DeFi products (stablecoins, decentralized exchanges, prediction markets, etc.). DeFi represents a unique model in which a certain structure can be assembled in various compatible combinations (the LEGO principle).

Most DeFi applications are accessible to any internet user. This demonstrates their cross-border nature, creating the possibility of implementing the principle of broad financial inclusivity.

The DeFi ecosystem provides the possibility of flexible user reconfiguration: if a user does not like the application's interface, they have the option to use a third-party interface or create their own. "Smart" contracts are similar to an open API, within which anyone can create applications to their own specifications.

The principle of security is predetermined by the characteristics of the technological basis of DeFi — a public blockchain — which closely corresponds with the principle of openness. Moreover, smart contracts and cryptography in the DeFi platform ensure a high level of security. Transactions in DeFi are executed automatically, and they cannot be canceled once they are placed on the blockchain, which protects users from hacking attacks and third-party interference..

The listed principles highlight the advantages of the analyzed sphere and the associated opportunities. However, one must not overlook the fact that any decentralization accompanying the movement of value in one form or another is fraught with threats. In our case, this is a whole set of risks related both to the characteristics of decentralized payment instruments and the technologies that ensure their movement, as well as to unconventional methods of organizing business in a decentralized digital environment. These threats are already in the spotlight of regulators, whose possible responses to them constitute a separate, extremely important issue.

The formation of the conceptual apparatus of decentralized finance necessitates addressing their architecture. A brief overview of its levels is contained in the aforementioned report by the Bank of Russia on DeFi.[8] The construction presented here is reproduced from a more detailed analysis of its components [2], but it also does not contain attempts to classify the conceptual apparatus and focuses on the technological and institutional foundations of the analyzed sphere. Moreover, the institutions in the overwhelming majority are not institutions in essence and are confined within the technological frameworks of platforms that produce various tokens, each serving different purposes, providing a traditional set of composable financial products. In DeFi, unlike traditional finance, the familiar, established institutions are absent. The decentralized digital financial space is saturated

with corresponding platforms — decentralized exchanges (DEX), and solutions for information exchange with the external environment and so on are implemented here as well. Given this, it seems quite logical that the focus of modern analysis is on very specific technical terminology, which imposes equally specific qualification requirements for its mastery to successfully realize the opportunities provided by decentralized finance. That is, the conceptual framework appears to have the same narrowness as the definition of the entire phenomenon of decentralized finance. At the same time, solving research tasks related to justifying the development prospects of the phenomenon and regulatory responses to it requires at least the extraction of its fundamental block and the structuring of the conceptual apparatus. To this block, we refer to components of a monetary nature, expressed in financial assets — those that have broken away from centralized finance and their part (in participants, resources, etc.), which have formed as a result of the action of the aforementioned objective factors into an independent area of modern financial reality. A separate section of it consists of functioning principles, which generate a set of opportunities, and on the other hand — provoke the emergence and growth of vulnerabilities. The "tuning" part of the conceptual apparatus contains components that we attribute to the technological, operational, managerial, and infrastructural blocks. All these components or elements drive the mechanism of decentralized finance. They are represented at various levels of the DeFi stack. Given their multitude and diversity, we do not aim to fully list and describe their functionalities, but merely state their subordinate position in relation to the fundamental components. Thus, the standard toolkit of the systems approach is quite applicable to the analysis of the conceptual apparatus of DeFi, which implies the necessity of isolating a fundamental block within the established decentralized financial sphere. The latter ensures both the viability of the elements derived from it in all their varietal diversity and, accordingly, the possibilities of extended reproduction of

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[8] Decentralized finance. Report of the Bank of Russia for public discussion.. URL: https://cbr.ru/content/document/file/141992/report_07112022.pdf (accessed on 22.03.2024).

relationships implemented on a decentralized economic basis.

CONCLUSION

The emergence of DeFi should be qualified as a result of the action of objective forces. The improving visibility of the contours of this sphere against the backdrop of the power of TradFi, its unstable expansion, draws the attention of national and supranational regulators, especially regarding the opportunities and risks it produces. The research community does not remain aloof from the analysis of this reality, trying to assess the sustainability of these trends and their impact on the potential shift of conventional financial concepts. At the same time, we are still forced to confirm the stated theses that it is premature to qualify DeFi as an independent economic category, just as it cannot be classified as a basic institution. Its development does not exhibit stable and permanently reproducing relationships, despite the fact that its emergence is the result of an objective process driven by socio-economic and technological perturbations.

At this stage, with a high degree of certainty, it can be said that there are quite significant opportunities for positive dynamics here, as well as threats, the prevention of which, due to the lack of regulation, is also a problem of social responsibility for the participants involved in DeFi projects today.

Our research allows us to suggest that significant effects on the national economy from the development of decentralized finance will be achieved through the formation and implementation of a trusted digital space concept, within which the prevention of information falsification, its non-repudiation and integrity, and the reliability of the information placed in the digital financial environment are ensured, along with personal access to it in real-time and an understanding of the operations performed with personal data when providing financial services. At the same time, the so-called boundaries of financial inclusion must be observed, and the protection of the rights of financial services consumers must be ensured, including through sufficient legal regulation of economic processes and platforms in the DeFi sector.

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Analyzing the Relationship between Financial Digitalization and Investment Opportunity Set

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ABSTRACT

The **purpose** of the study is to reveal the nature of the relationship between financial digitalization approved by non-financial institutions such as communication companies (mobile phones) and the size of growth in their investment opportunities. The study sought to analyze the volume of financial exchange resulting from some banking activities adopted by the aforementioned companies through their operations Operational, in a step to facilitate the lives of its customers by providing electronic financial wallets licensed by the Central Bank of Iraq that allow them to deposit, withdrawal and transfer funds. In the current study, the comparative analytical approach was adopted for the study sample which are the two companies: Asia Cell and Zain Iraq, for the period from (January 2018 to December 2022), and the necessary data was obtained from the statistical publications of the Central Bank of Iraq, and the data published in Iraq Stock Exchange market, and this data was processed financially according to mathematical equations to measure the variables of the study, and statistically through the program (SPSS-V: 22) to reach the desired goals. The study reached a number of results, the most important of which is the significant increase in the growth of digitalization of banking business adopted by the two communication companies (study sample) during the specified period despite the clear discrepancy between them, as well as the clear growth in increasing their investment opportunities for the same period. The most important recommendations were the need to work on increasing the banking financial services provided by these companies through their electronic applications, in addition to encouraging mobile phone users to benefit from the banking services provided to them through the electronic applications approved by them, which are (Zain Cash & Asia Hawala).

Keywords: financial digitalization; investment opportunities set; mobile communication companies; Zain Cash; Asia Hawala

INTRODUCTION

In light of the digital transformations that the world has witnessed recently, the issue of financial digitalization has received great attention as a result of the technological developments that we are observing at the present time, which mean mechanisms and techniques through which high returns can be achieved, as they are characterized by speed in completing transactions as well as low costs, through which investment opportunities can be increased that serve as investment options or proposals available to the institution and chosen to maintain the sustainability of the institution and enhance its efficiency.

The study garnered significant attention, highlighting the key challenges institutions faced and compelling them to shift from traditional methods to modern management concepts to keep up with developments and achieve their objectives, particularly digital transformations.

The study problem is represented by analyzing the relationship between the financial and investment opportunities set, as the study sought to analyze the volume of financial exchange resulting from some banking activities and its role in increasing the investment opportunities range.

LITERATURE REVIEW

Financial digitalization is one of the topics that has received great attention in recent times as a result of the technological progress that the world is witnessing today. As referred to, the financial industry has been greatly affected recently by digitization [1], which was reflected in the emergence of financial technology. While added that this transformation process takes place in both developed and developing financial markets [2], despite the division of the two markets in providing financial services through digital media. While referred

to financial digitalization as adopting or increasing the use of digital technology by the customer [3], and that digital transformation has become one of the most used topics in the past decade [4], as it linked enhancing the institutions efficiency and continuity to adopting the digital changes innovation. That digitalization has the ability to change the way most people deal with their daily financial transactions [5], especially at a time of social distancing. Digitalization actively penetrates all areas of public life, and the combination of technology and traditional finance leads to a change in the forms and methods of work of the current commercial entities, and thus leads to increasing the evaluation level on the economy and the risks of money laundering [6].

Financial digitalization is transforming the ecosystems and value chains of manufacturing enterprises [7], changing how these institutions interact in the upstream or downstream stages, improving supplier and customer interactions, and enhancing data acquisition, storage and analysis. While described as the mechanism through which customers can overcome the constraints of time and place in order to increase investment opportunities and achieve high returns [8]. That digitalization in enterprise management means the process of automating the enterprise business and adding the informational character to the management system [9], and this process is represented in the fact that the business operations model of the organization is transformed into a form of digital data, as the analysis and organization of this data leads to improving management activities and increasing the efficiency of decision-making by the administration. Digitalization is the process of digital creation of a product or process, which is the most important change in the global economy since the industrial revolution [10]. In addition, evaluating the level of digitalization of financial services takes place on three levels, namely financial inclusion, digital inclusion and digital financial services [11].

Research indicates that financial digitalization affects economic security through banking infrastructure, because digital innovations in the field of banking help in this [12]. Moreover, a development relatively recent, which emerged mainly in response to the financial crisis of 2008, is digitalization in the banking industry [13]. Since then, banks have been looking for alternatives to help them adapt to innovative changes in order to create new sources of wealth, and he agreed with this opinion [14] and [15] who considers that one of the reasons that encouraged

banks to move towards digital transformation is the low costs and the provision of low-cost services, among other reasons. In conclusion, digitalization is the mechanism through which modern techniques and technology are used and contribute to increasing the investment opportunities available to institutions [16]. Based on the foregoing, it can be said that financial digitalization represents the process of using digital technologies that will achieve high returns in addition to the ease of providing services and low costs.

As for an investment opportunity set, it is one of the topics that attracted the attention of researchers and writers, as defined as an investment decision in the form of a group of assets owned by the institution and future investment options that will positively affect the performance of the institution [17], as referred to the investment opportunity set as the value of the institution that is affected by the size of future expenditures, which is currently an investment option that is expected to provide a greater return [18], and the opinion was shared by both [19] and [20], who Expressed as representing the value of the enterprise that depends on future expenditures determined by management in the future, which are investment options that are expected to produce high returns as well as can affect the growth of the enterprise's assets, that (IOS) has a positive impact on policy enterprise financing [20]. While explaining [21] that (IOS) has a positive impact on the institution's financing policy. Financial leverage can play a supervisory and advisory role that helps institutions reduce their exposure to the problem of excessive investment and thus restricts institutions from investing in opportunities with low returns [22]. While added that (IOS) is one of the factors that can affect the value of the enterprise, as it represents the growth of the enterprise because it is an important element in relation to the market value, as (IOS) represents an investment option that can be made in the future [23].

(IOS) as the institution's choice of the investment opportunities available to it, which can affect the growth of the institution's assets as well as affect the investor's perspective of the value of the institution [24], and it is an investment option available to the institution for growth and is expected to achieve returns greater than the cost [25]. M. Rifai et al. [26] consider that it is used as an alternative to investment decisions because investment cannot be monitored directly and then needs to be His assertion of various measurable variables, and

an investment opportunity set can be used as a basis for determining the classification of the future growth of the institution.

(IOS) represents a picture of the investment opportunities that are available to the institution, and these opportunities depend on investment expenditures which can be used by the institution, as investment opportunities are one of the factors that affect returns [27]. Also indicated [28] that an investment opportunity set represents the value of the institution that is expected to be able to provide large returns in the future because the large investment opportunity depends on the expenses determined by the administration, and based on the foregoing, it can be said that an investment opportunity set means the group of investment proposals and projects that are available to the institution, which represent alternatives that can be used and benefited from in managing money in the long and short term and achieving rewarding returns that help enhance the value and survival of the institution for as long as possible.

METHODOLOGY
Research Type
This research is an analytical study aimed at testing hypotheses about the effect of one variable on another. The two researchers used a set of empirical evidence about financial digitalization adopted by (Mobile Telecom Companies) as an independent variable, and (Investment Opportunities Set) as a dependent variable.

Community, Sample and Research
The population in this study is the mobile phone companies in Iraq, and samples were taken by taking a set of published financial statements for the two companies Asia Cell and Zain Iraq, which are listed on the Iraq Stock Exchange during the period 2018–2022, and that the criteria for adopting this sample in the current research are as follows:

1. Asiacell and Zain Iraq are among the leading companies in the field of telecommunications in Iraq and some Arab countries and are listed on the Iraq Stock Exchange.

2. The two research sample companies publish their financial statements sequentially during the period 2018–2022.

3. The two companies, the research sample, moved to digital financial work at the beginning of 2018, after

obtaining the original approvals from the Central Bank of Iraq.

4. The two companies have complete financial statements for the period 2018–2022 covering research variables.

Data Collection Technique
The type of primary data obtained in this research is historical financial data covering the period 2018–2022, and the two researchers obtained it directly through the data published in the Iraq Stock Exchange, as well as the financial reports published for the researched companies, while the secondary data of the research is that data that have been dealt with through studies of the literature related to the problems encountered and analyzed that were presented in scientific research and reviews such as documents, books or other sources.

RESULTS AND DISCUSSION
Results
Descriptive Statistics
Descriptive statistics aim to provide an accurate and comprehensive description of the data of the research sample companies, as can be seen from *Table 1* the minimum, maximum and average standard deviation values for all data and the following results are obtained from the SPSS statistical test:

Through the outputs of the SPSS program above, we notice that the descriptive statistics for (FD) and (IOS) were as follows:

A — the sample size was (N = 60).

B — the smallest value (i.e. the minimum) of financial digitalization with regard to Asia Company amounted to (4,556,512,354) Iraqi dinars and the highest value is (115,496,109,264), while in Zain Company the lowest value was (6,292,961,459) while the highest value was (153,055,896,360), and thus we see superiority Zain over Asia.

C — the smallest value (i.e. the minimum) for the group of investment opportunities with regard to the Asia Company amounted to (2,140,682,947) Iraqi dinars and the highest value is (74,033,006,038), while in Zain the lowest value was (2,278,052,048) while the highest value was (73,007,662,563), and thus we see Asia beats Zain for the highest value only.

D — the arithmetic mean (average) of financial digitalization with regard to Asia Company was

Descriptive Statistics

Data analysis	N	Minimum	Maximum	Mean	Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Statistic
Financial Digitalization for Asia	60	4 556 512 354.00	115 496 109 264.00	18 141 386 257.0500	21 591 771 628.74102
Financial Digitalization for Zain	60	6 292 961 459.00	153 055 896 360.00	57 235 656 371.2833	28 540 745 104.74484
Investment Opportunity Set for Asia	60	2 140 682 947.91	74 033 006 038.22	10 138 810 829.3345	13 762 281 079.59326
Investment Opportunity Set for Zain	60	2 278 052 048.16	73 007 662 563.72	26 278 397 541.7773	13 890 490 615.44859
Valid N (listwise)	60				

Source: Prepared by the researchers based on the outputs of SPSS.

(18,141,386,257) Iraqi dinars, with a standard deviation of (21,591,771,628), while in Zain the average was (57,235,656,371) and with a standard deviation of (28,540,745,104), and thus we see the superiority of Zain Company over Asia.

E — the arithmetic mean (average) for the investment opportunities group with regard to Asia Company was (10,138,810,829) Iraqi dinars, with a standard deviation of (13,762,281,079), while in Zain the average was (26,278,397,541) and with a standard deviation of (13,890,490,615), and thus we see the superiority of Zain Company over Asia.

F — also, through the descriptive statistics of data analysis, we infer the nature of the changes witnessed by both variables during the research period, which are shown as in *Figure*, in which we notice the clear growth for Zain compared to the fluctuating growth for Asia during the period.

Testing Research Hypotheses
Test the Nature of the Data

Choosing the normal distribution of data is used to test whether the research variables follow a normal distribution or not, to be included later in the regression model, as it is known that the (t) and (f) tests assume that the residual value follows a normal distribution through the use of graph analysis and statistical tests, and in this research, Kolmogorov-Smirnov) test was relied upon to test the normal distribution whose results are shown in *Table 2*.

Testing the Multiple Linear Relationship

The multiple linear relationship test is usually resorted to ascertain whether the regression model between the independent variables has resulted in a close correlation. It is statistically reasonable that there is no strong correlation between the independent variables within the regression model with the dependent variable, and from *Table 2* we note that the aforementioned results In it, it indicates that the value of the variance inflation factor (VIF) for the variables (X_1, X_2) is smaller than five, so it can be said that there is no multiple linear problem between the independent variables. The multiple linear relationship test is usually resorted to ascertain whether the regression model between the independent variables has resulted in a close correlation. It is statistically reasonable that there is no strong correlation between the independent variables within the regression model with the dependent variable, and from *Table 3* we note that the aforementioned results In it, it indicates that the value of the variance inflation factor (VIF) for the variables (X_1, X_2) is smaller than five, so it can be said that there is no multiple linear problem between the independent variables.

Correlation Test

The correlation test aims to reveal the nature and strength of the relationship between the research variables. Through *Table 4*, we note that the value of the correlation between financial digitalization and an investment opportunities Set is a strong direct relationship that reached (99%).
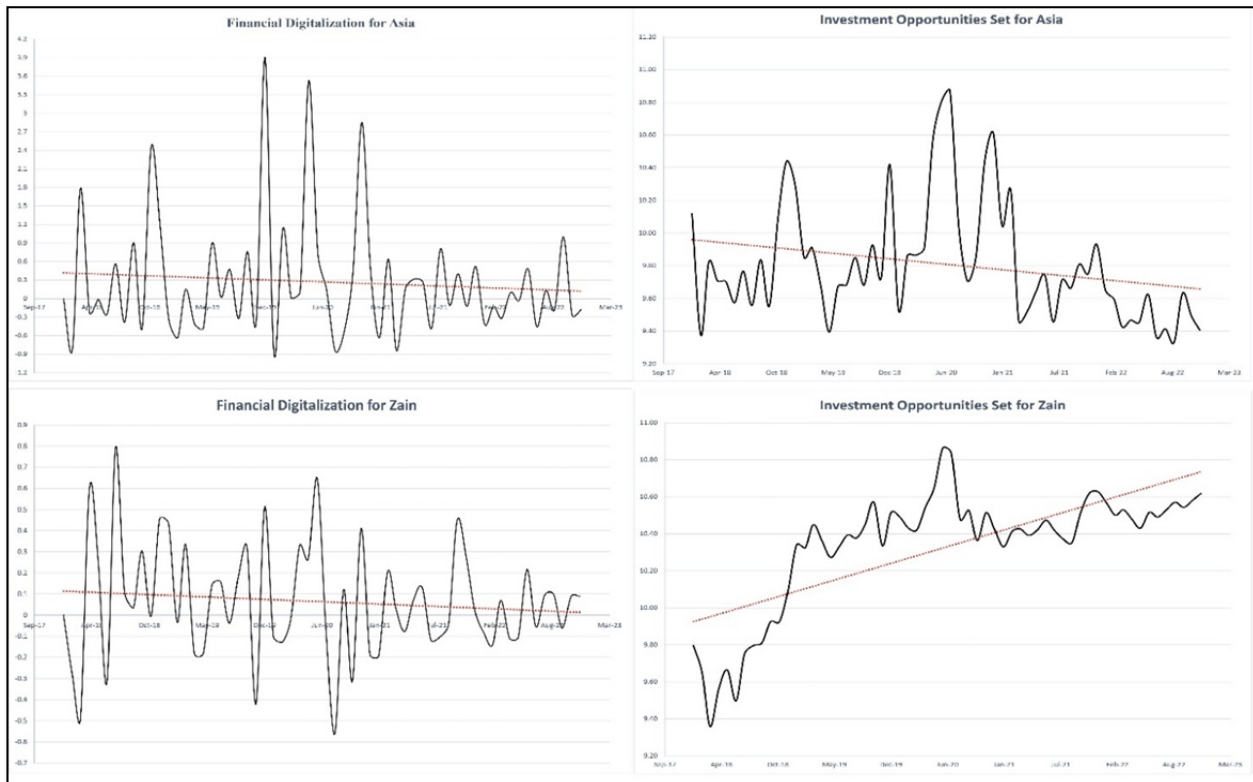
Fig. **A Comparison between Zain and Asia**

Source: Prepared by the two researchers.

Table 2

One-Sample Kolmogorov-Smirnov Test

N			X	Y
			60	60
Normal Parameters[a, b]		Mean	10.3904	10.0691
		Std. Deviation	.24121	.26666
Most Extreme Differences		Absolute	.125	.129
		Positive	.121	.114
		Negative	–.125	–.129
Kolmogorov-Smirnov Z			.971	.998
Asymp. Sig. (2-tailed)			.302	.272
a. Test distribution is Normal				
b. Calculated from data				

Source: Prepared by the researchers based on the outputs of SPSS.

Regression Analysis
Test the Determination Coefficient

The coefficient of determination (R 2) is the statistical tool that shows the extent of the model's ability to explain the variance of the dependent variable, i.e., the extent of the independent variable's ability to interpret the dependent variable. The value of this coefficient ranges between zero and one, and the value close to one means providing almost all the information required to predict the change of the dependent variable and vice versa. Through the value of the modified coefficient of determination contained in *Table 4*, we note that the value of (Adjusted R Square)

Table 3

Multicollinearity Test

Coefficients [a]			
Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	X_1	.961	1.040
	X_2	.961	1.040
a. Dependent Variable: Investment Opportunities Set.			

Source: Prepared by the researchers based on the outputs of SPSS.

amounted to (98.5%), which is a very high value that indicates the great size of the interpretation of financial digitalization in the growth of an investment opportunity set for the research sample companies, as (1.5%) Other variables are not included in this research model.

Hypothesis Testing

In this paragraph, a test of the reliability of the statistics of the independent variable (t-test) is performed, as the statistical (t) test indicates in general the extent to which the independent variable can partially affect the variance of the dependent variable and through the (t-test) presented in *Table 5*.

From the above table, it can be seen that the value (t) of the financial digitalization of Asia Company amounted to (41.698), and then a tabular (t) value of (1.671) was found for the two-tailed test. The following can be concluded: For financial digitalization, it was (T-Calculate > T-Table). Also, the (t) value of financial digitalization for Zain Company amounted to (38.384), and this means that there is a significant impact of financial digitalization

with an investment opportunities Set, and it can be concluded that the financial digitalization of Asia affects an Investment opportunities Set are greater than in Zain, and the regression model can be formulated as follows:

$$Y = -1.372 + 0.537\,(X_1) + 0.563\,(X_2) + e.$$

That is, ($B\_1 = 0.537$), which means that if the value of financial digitalization increased by 1, an investment opportunities Set for the research sample companies will also increase by (0.537) for Asia company, and by (0.563) for Zain company.

Testing Reliability by Simultaneous Statistic

In this section, an analysis of variance test (F-Statistics — ANOVA) is performed, as the statistical test (F) in its general form shows whether the independent variable entered in the model has a direct and simultaneous effect on the dependent variable, and the results of the F test were processed using the program SPSS shown in *Table 6*.

Based on the results of *Table 6*, which were obtained by conducting the (F) test, we find that the calculated value (F-Calculate > F-Table) using a confidence level (95%), meaning that (a = 5%) obtained from Table F is (2.53), while the calculated value of F is (1998.6), and thus (H_0) is rejected. This means that there is a significant effect between financial digitalization and an investment opportunity Set of the researched companies and the alternative hypothesis (H_1) is accepted because (Sig $\leqslant$ 5%).

CONCLUSION AND SUGGESTION
Conclusion

From the results of this research, we can conclude the following:

The financial digitalization adopted by the researched companies has a significant impact on

Table 4

Correlation Test

Model Summary [b]					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.993[a]	.986	.985	.03231	.559
a. Predictors: (Constant), Financial Digitalization					
b. Dependent Variable: Investment Opportunities Set					

Source: Prepared by the researchers based on the outputs of SPSS.

T-Test

Coefficients [a]						
Model	Unstandardized Coefficients		Standardized Coefficients		T	Sig.
	B	Std. Error	Beta			
1 (Constant)	−1.372	.183			−7.497	.000
1 X_1	.537	.013	.668		41.698	.000
1 X_2	.563	.015	.615		38.384	.000
a. Dependent Variable: Investment Opportunities Set						

Source: Prepared by the researchers based on the outputs of SPSS.

F-Test

ANOVA [a]					
Model	Sum of Squares	Df	Mean Square	F	Sig.
1 Regression	4.136	2	2.068	1998.611	.000[b]
1 Residual	.059	57	.001		
1 Total	4.195	59			
a. Dependent Variable: Investment Opportunities Set					
b. Predictors: (Constant), Financial Digitalization					

Source: Prepared by the researchers based on the outputs of SPSS.

achieving a set of investment opportunities, specifically for Asia, which witnessed a decrease in its financial digitalization operations to a lesser extent than what Zain witnessed, and this matter was reflected in the size of the effect that was reached. Moreover, there is a significant increase in the growth of financial digitalization adopted by the two communication companies (research sample) during the specified period despite the clear discrepancy between them, as well as the clear growth in increasing their investment opportunities for the same period.

Suggestion

The researchers present some proposals that can be put forward depending on the results of this study, which are expected to add some knowledge to the research field and other researchers. These proposals are:

1. Carrying out further studies to discover more variables that affect the investment opportunities Set.

2. Other variables that affect financial digitalization, on the one hand, and the investment opportunities Set, on the other hand, must be introduced in the form of intermediate or interactive variables because it is likely that the results will be different when using different variables.

3. The need to work on increasing the financial services that are characterized by financial digitalization provided by these companies through their electronic applications, in addition to encouraging mobile phone users to benefit from these financial services provided to them through the electronic applications approved by them, which are my applications (Zain Cash & Asia Hawala).

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Strengthening the Role of the Unified Agricultural Tax in Economic Incentives of the Agro-Industrial Complex

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ABSTRACT

In the context of countering sanctions from unfriendly countries within the framework of the implementation of the state import substitution program and the food security doctrine, improving measures aimed at developing subjects of the agro-industrial complex is of particular **relevance**. The **purpose** of the study is to formulate proposals for improving the mechanism for collecting the Unified Agricultural Tax based on assessing the effectiveness of tax incentives for agricultural producers, using statistical data from the Federal Tax Service of Russia in form No. 5-Unified Agricultural Tax. To achieve this goal, the following **tasks** were solved: the fiscal and regulatory role of the Unified Agricultural Tax was assessed; tax benefits for agricultural producers were analyzed, including the mechanism for introducing a reduced unified agricultural tax rate in certain regions; The feasibility of applying benefits under the Unified Agricultural Tax was determined using mathematical tools by calculating the pairwise correlation coefficient between the number of registered payers of this tax and the tax payments they paid in the context of federal districts. The **methodology** used in the study includes the compilation of time series, statistical and correlation analysis of statistical tax reporting data of the Federal Tax Service of Russia in the context of federal districts. Based on the identified scholastic relationship between the number of Unified Agricultural Tax payers and revenues from this tax to the budget system, a conclusion was made about the effectiveness of using this special tax regime in relation to agricultural producers, including regions where preferential rates are applied. **The scientific novelty** of the research is to increase the efficiency of the provided tax benefits using mathematical tools by analyzing the received tax payments from this category of taxpayers. Efficiency is achieved by reducing shortfalls in budget revenues by narrowing the circle of benefit recipients. Based on a generalization of the **results** obtained, proposals were made that would allow greater emphasis to be placed on targeting tax preferences to subjects of the agro-industrial complex, manipulating the conditions for their provision, which should strengthen the role of the regulatory function of the Unified Agricultural Tax.

Keywords: unified agricultural tax (UAT); effectiveness of tax incentives; agricultural producers; tax benefits; agro-industrial complex

INTRODUCTION

The tax regulation of the agro-industrial complex takes on special significance due to the urgent need to ensure the food security of the Russian Federation. The doctrine of food security in our country is one of the main directions of state activity that ensures national independence.[1] Foreign researchers consider food security to be a political factor that cannot be neglected [1]. The global increase in food prices compels the improvement of the state support system for entities in the agro-industrial complex in both developed and developing countries [2]. At the same time, it is important to ensure the diversification of stimulating methods. Indicative are the data on soft wheat prices in European countries for the period from 2018 to 2022, presented in *Table 1*. A similar trend is observed for other types of crop production.

Geopolitical processes in recent years, which have led to the introduction of anti-Russian sanctions, have exacerbated the issue of the need for import substitution, including in the agro-industrial complex. It should be noted that the trend of stimulating import substitution is also observed in other countries [3, 4].

Taxes are one of the most effective tools for increasing the investment attractiveness of the agricultural sector. The sustainable development of an autonomous food supply system depends on the effectiveness of state support for agricultural producers.

The insignificant tax burden in the agricultural sector (2021–4.7%[2]) is explained by the existence of a large number of tax benefits available to entities in the agro-industrial complex, including the unified

agricultural tax (UAT) [5]. There are also research data indicating that the weighted average cost-effectiveness ratio is higher for UAT payers than for organizations using other taxation systems [6].

The provision of tax benefits is always associated with the loss of government budget revenues, which is why the evaluation of the effectiveness of existing fiscal preferences becomes particularly important.[3] The system for monitoring and evaluating tax expenditures takes into account both the effectiveness of the provided tax preferences and their demand. The aforementioned circumstances make the study of the choice of method and the direct evaluation of the effectiveness of tax preferences for entities in the agro-industrial complex relevant.

LITERATURE REVIEW

In the paper, T. S. Kravchenko and D. S. Yasyinskaya note the favorable investment climate and the increase in the share of own funds in the structure of investments in fixed capital, while maintaining a significant share of attracted funds, which include budgetary sources of various levels, based on the results of the monitoring and assessment of the investment attractiveness of the Russian agricultural sector [7]. The authors conclude that the significant contribution of state support for agricultural entities has led to the aforementioned favorable structural changes, indicating that entrepreneurs expect stable and high income from agricultural activities.

The study of such issues has also been undertaken by scholars in the USA and the UK, taking into account state support in the strategy of farm business, which includes tax instruments [8, 9]. The analysis of the consequences of the abolition of the

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[1] Decree of the President of the Russian Federation dated January 21, 2020, No. 20 "On the Approval of the Doctrine of Food Security of the Russian Federation". URL: https://www.consultant.ru/document/cons_doc_LAW_343386/ (accessed on 21.11.2023).

[2] Appendix No. 3 to the Order of the Federal Tax Service of Russia dated 30.05.2007 No. MM-3–06/333@ "On the Approval of the Concept of the System for Planning Field Tax Audits". URL: http://base.garant.ru/12153820/ (accessed on 20.10.2023).

[3] Main directions of budgetary, tax, and customs-tariff policy for 2023 and the planning period of 2024 and 2025 (approved by the Ministry of Finance of Russia). URL: http://www.consultant.ru/document/cons_doc_LAW_429950/ (accessed on 20.10.2023).

Prices for Soft Wheat Varieties in European Countries in 2018–2022 (in Euros Per 100 Kg)

Country	2018	2019	2020	2021	2022
Germany	16.84	16.69	17.21	21.96	32.1
Spain	18.29	18.66	18.57	23.64	34.21
Romania	14.61	15.38	16.33	19.51	30.22
Hungary	15.27	15.47	15.35	19.99	32.39
Greece	18.45	19.08	19.77	23.27	38.3
Finland	19.98	18.4	17.05	21.55	33.62
Estonia	16.41	16.79	16.78	21.1	32.02
Croatia	14.61	14.99	13.94	18.15	29.77

Source: Eurostat data. URL: https://ec.europa.eu/eurostat/databrowser/view/apri_ap_crpouta/default/table?lang=en (accessed on 21.11.2022).

agricultural tax in China allowed for the assertion of a negligible impact of the tax factor on the net income of farmers [10]. However, other Chinese researchers do not deny the effectiveness of the regulatory function of taxes, particularly in stimulating the reduction of harmful environmental impacts [11].

Some researchers dealing with regional economic development issues have paid significant attention to tax regulation of the agro-industrial complex in their papers [12, 13].

Individual papers are dedicated to improving tax regulation in agriculture, taking into account specific industry characteristics, such as seasonality. A. I. Borodin et al. established a connection between natural and climatic conditions and the necessity of state support for the agricultural sector. Statistical data and expert assessments, on which the research was based, confirm the need for budgetary support for agriculture in countries where a significant share of land is in a risky farming zone. Tax benefits are a cause of budgetary revenue losses; at the same time, they are a form of state support for agricultural

producers. Therefore, the established pattern can also be applied to them.

Conducting a study based on the example of the Krasnoyarsk, T. A. Borodina et al. also adhere to the viewpoint that SAT rates should be differentiated based on the agro-climatic potential of the region [15]. The conducted correlation-regression analysis allowed for the assessment of the impact of natural-climatic and territorial conditions on the profitability of entrepreneurial activities of peasant (farm) households. As a result, the authors proposed a system of corrective coefficients that would make UAT rates fairer. According to specialists, such an approach could stimulate the activities of entities in the agro-industrial complex, which would ensure the development of rural areas and employment for the population. These ideas are also reflected in the works of foreign authors. Thus, in the scientific article by M. Simbürger et al., an attempt is made to incorporate taxes into the climate risk management system [16].

I. A. Ezangina and O. S. Gromysheva, using Volgograd as an example, raise the issue of

1. Determining the dynamics of UAT tax revenues

2. Comparison of the contribution of individual federal districts of the Russian Federation to the collection of UAT

3. Identification of statistical dependence on the contribution to UAT by federal districts of the Russian Federation

4. Ranking of federal districts of the Russian Federation and the formation of the recommendation section

Fig. 1. **The Procedure for Implementing the Methodology for the Effectiveness of Applying the Preferential Tax Regime of the Unified Agricultural Tax**

Source: Compiled by the authors.

the imbalance between efficiency indicators and the level of costs for the implementation of state programs. The study of tax regulation methods in the context of their improvement involves determining the degree of achievement of the goals of state support for agricultural producers [17].

O. A. Levshukova et al., based on the analysis of quantitative and structural changes among UAT payers against the backdrop of the dynamics of this tax's revenues, propose improvements to the collection of UAT from agricultural producers [18]. The authors advocate for the automatic recognition of entities in the agro-industrial complex as UAT payers, with the exception of small agricultural producers with incomes of less than 8 million rubles.

Moreover, the paper of O. V. Vaganova et al. deserve attention, in which the issues of maintaining a balance between the tax burden on the agro-industrial complex and the revenues to the state budget from this category of taxpayers are raised [19, 20].

METHODOLOGY

To determine the effectiveness of using such a tool as UAT benefits, to assess the feasibility of their application across the

federal districts of the Russian Federation with development potential, and to improve the state's fiscal policy in the context of providing tax benefits to agricultural producers, a developed methodology is proposed, which includes several stages outlined in *Fig. 1*. In order to identify the nature of changes in UAT payments by taxpayers in the Russian Federation, dynamic series have been compiled at the first stage, representing a set of indicator values based on statistical tax reporting forms.

The second stage of the methodological approach involves conducting a statistical analysis by calculating indicators for the elements of the aggregate using forms of statistical tax reporting across the federal districts of the Russian Federation. To assess the contribution of individual federal districts of the Russian Federation to the total amount of accrued UAT, it is advisable to determine the specific weight of each federal district based on the tax base and the structure of UAT accruals.

As part of the ongoing research, a sample of data on UAT collectability has been formed at equal time intervals.

At the third stage, statistical dependence is identified, and causal relationships are
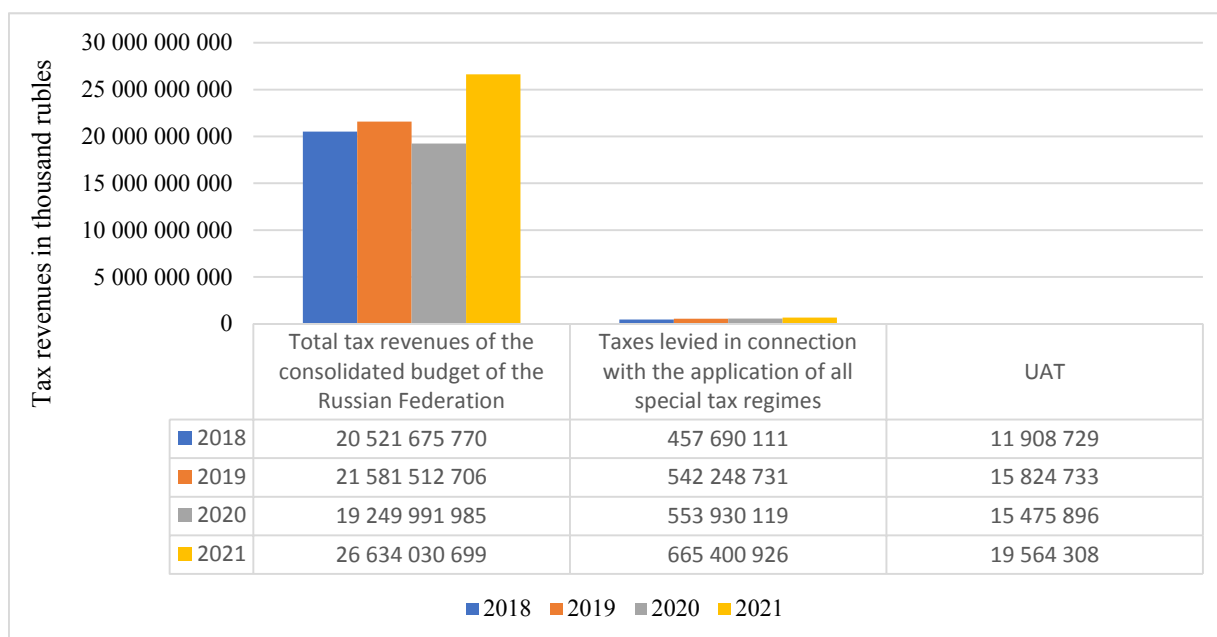
Fig. 2. **Tax Revenues of the Consolidated Budget of the Russian Federation, Thousand Rubles**
Source: Data from the Federal Tax Service of Russia according to form 1-NM URL: https://www.nalog.gov.ru/rn77/related_activities/ statistics_and_analytics/forms/ (accessed on 21.09.2023).

determined at the level of individual federal districts of the Russian Federation in the context of UAT.

Identifying the relationship between features using correlation analysis is based on determining the strength and direction of the relationship through the calculation of the linear correlation coefficient.

The value of the Pearson correlation coefficient is calculated based on the formula provided below and allows determining the type and strength of the linear relationship between two variables, x and y. Generally, correlation relationships indicate that changes in one characteristic are accompanied by changes in another.

$$r_{xy} = \frac{\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^{n}(x_i - \bar{x})^2}\sqrt{\sum_{i=1}^{n}(y_i - \bar{y})^2}} . \quad (1)$$

As the variables *x* and *y* under investigation, data on the number of UAT taxpayers (legal entities and individual entrepreneurs) and

the amount based on the tax base and the structure of UAT accruals are used.

At the final stage, recommendations are being developed to improve the mechanism of state tax regulation for entities in the agro-industrial complex with the aim of increasing efficiency and narrowing the circle of recipients of tax preferences.

The initial information for conducting the research was provided by the statistical observation data of the Federal State Statistics Service (Rosstat), as well as the data from the Federal Tax Service of the Russian Federation on statistical tax reporting forms (5-UAT).

RESULTS AND DISCUSSION

UAT, like other special regimes, creates preferential tax conditions for its payers. This is also one of the reasons for the low budget significance of UAT (*Fig. 2*).

The dynamics of UAT receipts, presented in *Fig. 3*, show the current situation and allow for noting a slight positive growth throughout the studied period. The demand for domestically produced agricultural products has only increased, creating incentives to enhance the
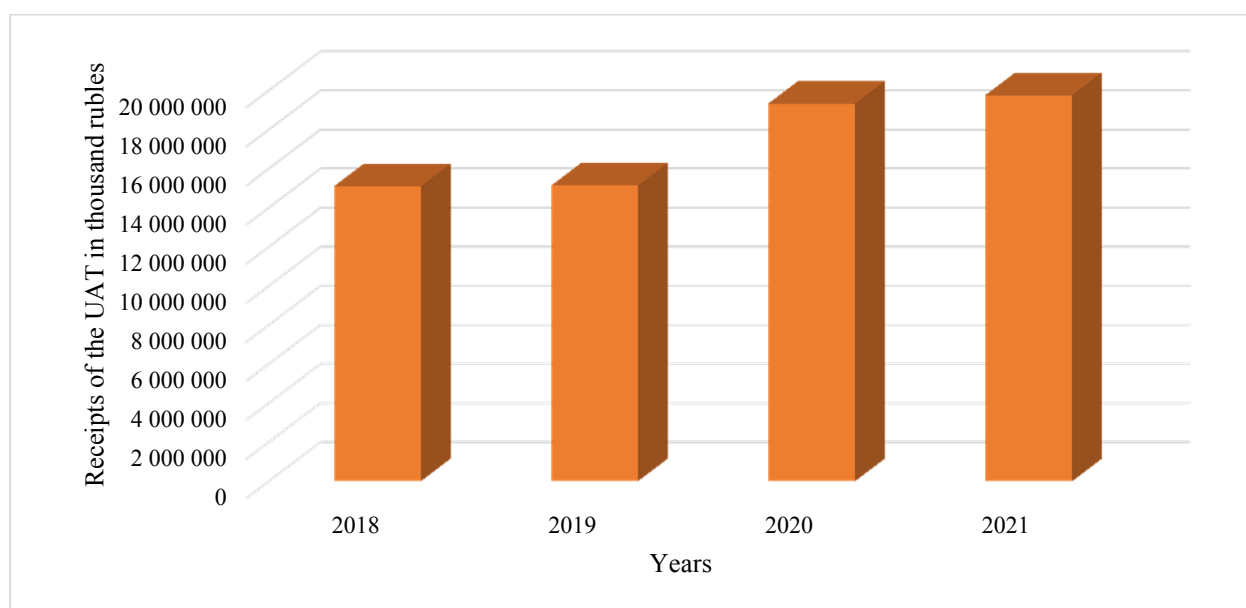
Fig. 3. **Dynamics of Unified Agricultural Tax Revenues for the Russian Federation as a Whole, Thousand Rubles**

Source: Data from the Federal Tax Service of Russia according to form 5-ESKhN. URL: https://www.nalog.gov.ru/rn77/related_activities/ statistics_and_analytics/forms/ (accessed on 21.09.2023).

efficiency of the activities of entities in the agro-industrial complex.

Next, we will present the results of the assessment of the structure of UAT revenues by federal districts (*Fig. 4a — 4g*). The largest share of UAT payments during the study period falls on the Far Eastern, Southern, and Northwestern Federal Districts. The leading positions of the Southern Federal District are due to the natural and climatic conditions and population density, which affect the number of taxpayers and the size of their income, and in turn, the amounts of tax assessments depend on these factors. It is the Southern Federal District that dominates in the number of taxpayers who submitted UAT declarations. The figures for the Far Eastern Federal District are mainly due to UAT revenues from the Sakhalin Region and the Kamchatka, whose agricultural producers traditionally engage in fishing and fish processing. Similarly, the situation is the same with the Northwestern Federal District, where the main share of tax payments is formed by Murmansk.

To determine the existing relationships between the objects of the study, it is

advisable to consider the data on the number of UAT payers (legal entities and individual entrepreneurs), the size of the tax base, and the structure of UAT accruals as variables. To build the model, we use retrospective indicators of the activities of Russian taxpayer organizations. Form 5-UAT allows for the comparison of calculated UAT amounts by subjects and federal districts of the Russian Federation and the number of taxpayers who submitted UAT tax returns. To simplify the process of statistical analysis, it is advisable to use the Analysis ToolPak add-in in MS Excel. By comparing the datasets using the statistical macro function to calculate the correlation coefficient between two sets of indicators for each of the N subjects of the Russian Federation that are part of the federal districts, it is possible to form the resulting correlation matrix (*Table 2*). It characterizes the degree of association between the data sets.

The obtained results indicate the presence of statistically significant dependencies between the variables, which can be used for making managerial decisions regarding state policy to stimulate agricultural producers

Fig. 4a. **Structure of Unified Agricultural Tax Revenues by Federal Districts for 2018**

Source: Constructed by the authors based on data from the Federal Tax Service of Russia (form 5-ESKHN). URL: https://www.nalog.gov. ru/rn77/related_activities/statistics_and_analytics/forms/ (accessed on 07.09.2023).\
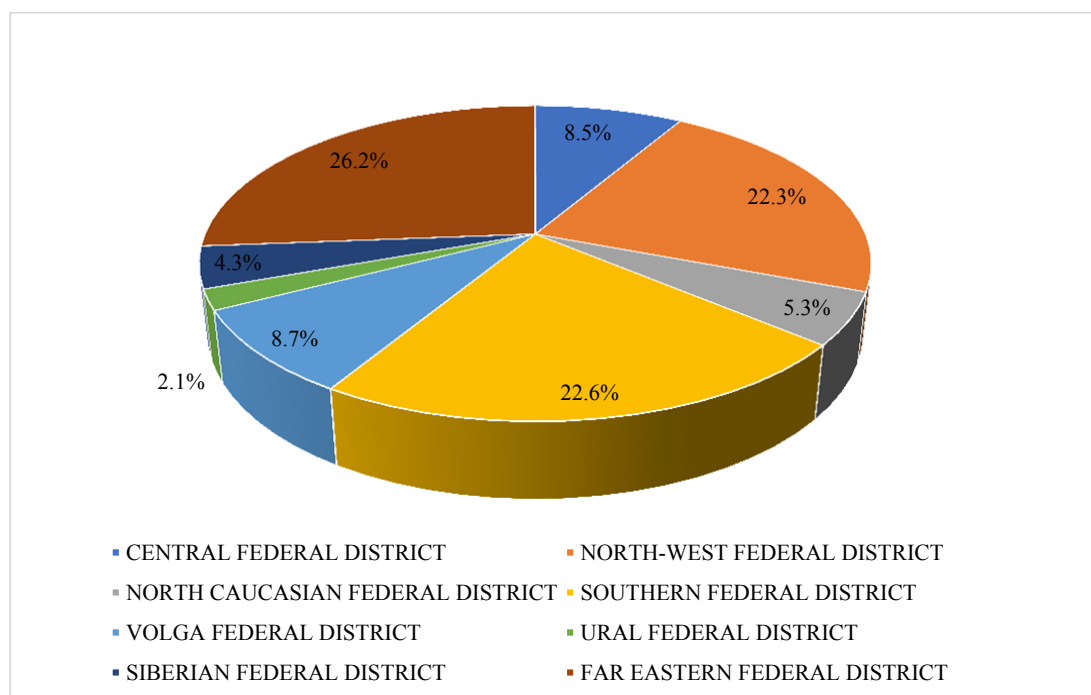
Fig. 4b. **Structure of Unified Agricultural Tax Revenues by Federal Districts for 2019**

Source: Constructed by the authors based on data from the Federal Tax Service of Russia (form 5-ESKHN). URL: https://www.nalog.gov. ru/rn77/related_activities/statistics_and_analytics/forms/ (accessed on 07.09.2023).
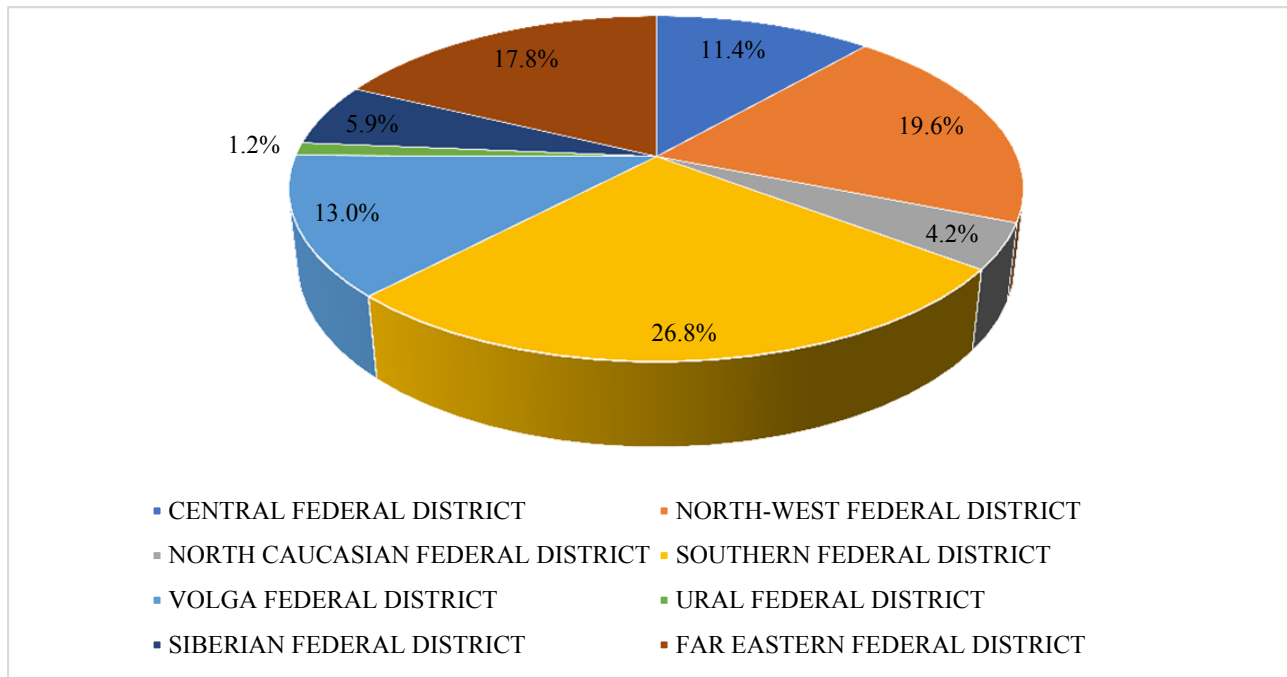
Fig. 4c. **Structure of Unified Agricultural Tax Revenues by Federal Districts for 2020**

Source: constructed by the authors based on data from the Federal Tax Service of Russia (form 5-ESKHN). URL: https://www.nalog.gov.ru/rn77/related_activities/statistics_and_analytics/forms/ (accessed on 07.09.2023).
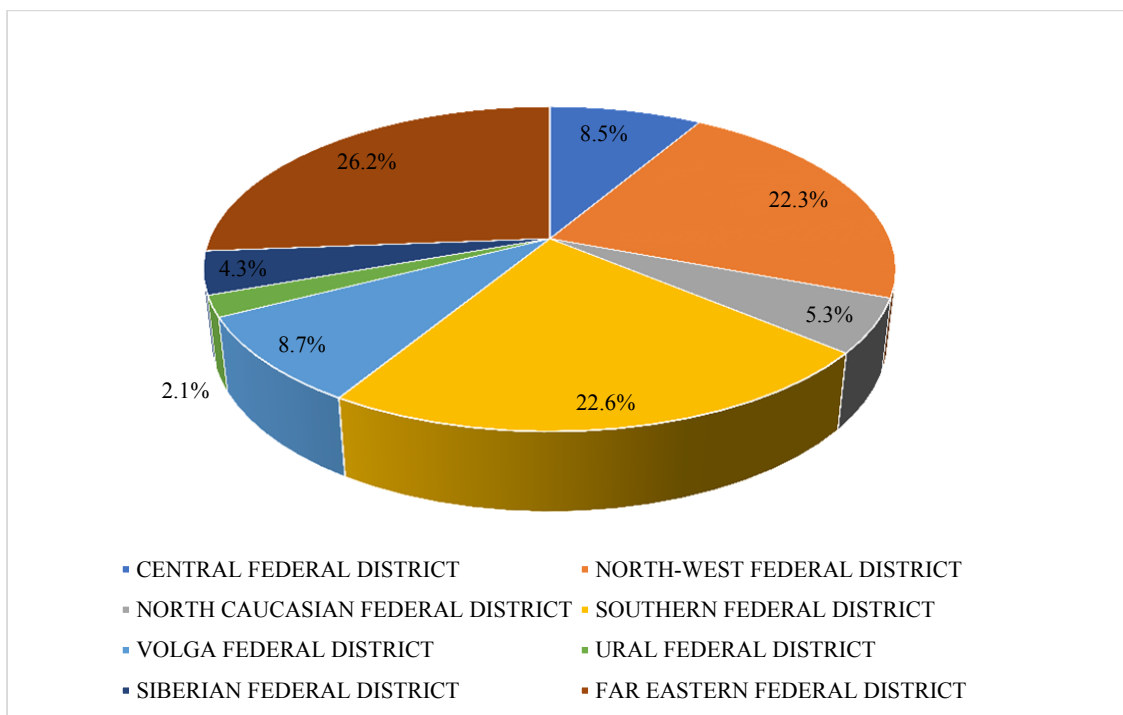

Fig. 4d. **Structure of Unified Agricultural Tax Revenues by Federal Districts for 2021**

Source: Constructed by the authors based on data from the Federal Tax Service of Russia (form 5-ESKHN). URL: https://www.nalog.gov.ru/rn77/related_activities/statistics_and_analytics/forms/ (accessed on 07.09.2023).
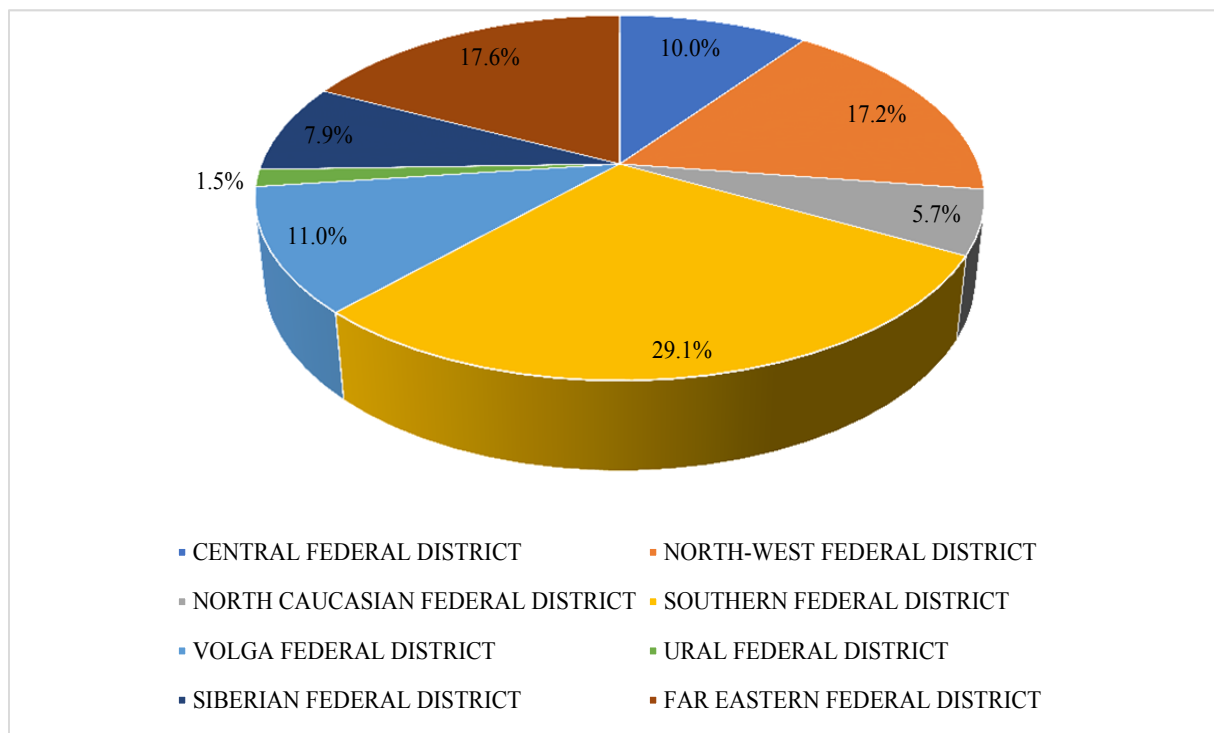
Correlation Matrix of the Dependence between the Number of Taxpayers of the Unified Agricultural Tax (Legal Entities and Individual Entrepreneurs) and Tax Revenues from the Unified Agricultural Tax by Federal Districts

Russian Federation	2019	2020	2021
Central Federal District	0.939	0.896	0.878
Northwestern Federal District	−0.202	−0.184	−0.200
North Caucasian Federal District	0.913	0.894	0.860
Southern Federal District	0.977	0.976	0.965
Volga Federal District	0.584	0.556	0.584
Ural Federal District	0.966	0.919	0.852
Siberian Federal District	0.944	0.926	0.932
Far Eastern Federal District	−0.315	−0.331	−0.332

Source: Compiled by the authors based on correlation analysis data.

through the introduction of special tax regimes. The state faces a dual task: on the one hand, it needs to perform fiscal functions, and on the other hand, it is precisely state policy towards entrepreneurial structures whose activities are related to one of the agricultural sectors (crop production, animal husbandry, fishing, or forestry) that can stimulate the development of the industry by providing tax preferences.

The obtained correlation coefficients can be interpreted as follows. For the five studied federal districts, the correlation coefficient values range from 0.852 to 0.977, indicating a strong dependence between the studied parameters. For the Northwestern and Far Eastern federal districts, a weak inverse dependence is characteristic. One of the likely reasons for this phenomenon is the specificity of agricultural activities. The growth of tax

revenues in these districts occurs without a comparable increase in the number of UAT payers, which is typical for fishing and fish processing.

The possibility of reducing UAT tax liabilities for payers is the application of a reduced rate, which can be set by the subjects of the Russian Federation. For example, in the Moscow region in 2022, the UAT rate was 0%, in Dagestan it was 1%, and in the Chelyabinsk region it was 3%. Data from the Federal Tax Service of Russia indicates that the share of UAT payers applying reduced rates is constantly increasing. Thus, in 2019, this share was 2.8%, in 2020 it was 4.78%, and in 2021 it was 6.22%. At the same time, as already noted above, tax revenues from UAT during this period increased. This circumstance confirms both the positive nature and demand for the benefit from

the taxpayers' perspective, as well as its effectiveness in the context of implementing the fiscal functions of the state.

The analysis of the subjects of the Russian Federation providing a tax preference in the form of a reduced UAT rate does not show a clear correlation between the accrued UAT, the number of taxpayers applying this special tax regime, and the share of agricultural producers exercising their right to the benefit. This is explained not only by the different rates, which vary in the principles of determining the recipients of benefits among agricultural producers, but also by the regional characteristics of the functioning of the agro-industrial complex.

CONCLUSION

As a result of a comprehensive analysis to confirm the necessity of state control in regulating the activities of agricultural production enterprises, the budgetary significance of UAT was analyzed and determined to be insignificant. However, the regulatory function of this tax is of great importance for the development of the agro-industrial complex. The effectiveness of state tax policy regarding agricultural producers is confirmed by the growing number of registered UAT payers and tax revenues. Positive collection dynamics are demonstrated even in those regions where reduced rates of this already preferential tax regime are in effect. The conducted study revealed a correlation between the dynamics of the number of agricultural producers and the increase in tax revenues to the budget of the Russian Federation in most federal districts. Consequently, the analyzed preferential tax regime, which leads to a loss of budget revenues, ultimately results in an increase in the consolidated budget's revenues due to the scale effect, confirming the effectiveness of such a fiscal preference.

To enhance the effectiveness of using the regulatory function of UAT in the economic stimulation of entities in the agro-industrial complex, it is advisable to pay more attention to the targeting of tax preferences and the conditions for their provision, namely:

• it is advisable to apply reduced UAT rates at the regional level not to all agricultural producers, but only to those categories that require special state support, taking into account the economic conditions in this subject of the Russian Federation;

• the period of the reduced UAT rate in the region for a certain category of taxpayers should not exceed 6 years (and a decision on extending the period must be made every two years);

• the decision to extend preferential rates should be made based on an assessment of the effectiveness of the applied preference in a regional context using the methodology that was employed in this study.

The establishment of a maximum duration for the benefit is determined by the interests of both the state and entrepreneurs. The UAT is a preferential tax regime, and the provision of additional preferences within it is a temporary measure to stimulate the development of agricultural producers in the region, and it is associated with the loss of tax revenues for the budget. The period of validity is extended if the introduced measure is effective.

Thus, the sequence of actions proposed in this work allows for the increased efficiency of tax regulation tools by enhancing the targeting of their provision to participants in the agricultural sector. Ensuring food security and promoting sustainable agricultural development have been declared as priority tasks within the conceptual integration of economic, social, and environmental agendas by many countries. The implementation of tax policy regarding UAT in the territory of the Russian Federation contributes to solving the most important state tasks in the field of national (including food) security and the realization of import substitution. Future research plans to extend this methodology to other sectors of the economy.

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A. O. Zvereva — formation of the initial data set, compilation of dynamic series, statistical and correlation analysis of values, description of the obtained values with the help of mathematical apparatus.
R.G. Akhmadeev — research and generalisation of the obtained results from the point of view of improving the tools of tax regulation of the agro-industrial complex.
E. V. Golubtsova — literature review on the studied problematic, justification of relevance, formation of the initial data set, economic interpretation of the results obtained through the use of mathematical tools of data processing.

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Trade Tax Evasion in Retail Markets: Causes and Ways to Overcome

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ABSTRACT

Cash register equipment is recognized as an effective tool for controlling the taxpayer's proceeds in settlements with the population. At the same time, scientific and practical literature lacks scientific and methodological analysis of approaches to the formation of preferential categories of participants of trade relations exempt from state control in retail markets. The **purpose** of this study is to form common universal approaches to the mechanism of transformation of the established financial and economic models of behavior in the market territories. In the course of the study, the **methods** of systematization, comparison, logic, and statistical analysis were applied. It has been revealed that there are no common law enforcement approaches to the implementation of trade in the territory having the status of a retail market, which imposes additional obligations on the seller, different from taxation, but bearing financial and administrative costs without providing any advantages in comparison with other formats of trade. There are very few effective tools to counteract these risks. The article substantiates that the exemption from the obligation to use cash register technology (CRT), based on a superficial description of the criterion of the premises used and the principle of ensuring the "safety of goods", does not provide a clear regulation of the boundary of the use of CRT in markets. According to the authors, when considering the issue of changing approaches to the formation of preferential categories exempted from state control in retail markets, it is important to establish what is the reason for exempting a person from using a cash register, i.e., why a taxpayer selling goods in the market is exempt from a cash register, but performing the same activity in a shop is obliged to use it? The article substantiates the **conclusion** that for a comprehensive solution to the problem, it is necessary to extend the privilege of non-application of KKT exclusively to payers of the unified agricultural tax (UAT), regardless of the category of the trading platform (markets, fairs, exhibitions, etc.), and to the relevant trade organisers (the organisation managing the market, fair, exhibition) — the obligation to control the use of KKT by other tenants with the introduction of the responsibility of landlords for the non-use of KKT by tenants.

Keywords: cash registers; tax legislation; revenue accounting; online cash register; operational tax control; retail market; shadow cash turnover; tax legal relationship; fiscalisation

INTRODUCTION

In the process of seeking ways to eliminate the tax gap in retail market trading, one cannot overlook issues related to operational tax control implemented through cash register equipment (hereinafter referred to as CRE). Currently, conducting trade in areas designated as retail markets imposes additional obligations on sellers, distinct from taxation, but incurring financial and administrative costs without providing any advantages compared to other trading formats. The consequence of this approach is that, to date, the format of retail markets is becoming less popular and gradually yielding to other forms of trade organization, specifically the organization of shopping centers or complexes. At the same time, there are very few effective tools to counter these risks.

The recognized effective tool for controlling taxpayer revenue in their transactions with the population is CRE. However, there is a lack of scientific and methodological analysis of approaches to the formation of privileged categories exempt from state control in retail markets in the scientific and practical literature, which will be examined in this article.

FEATURES AND CHARACTERISTICS OF RETAIL TRADE FORMAT PLATFORMS

Trade can undoubtedly be considered one of the fundamental criteria for the development of human civilization, not to mention the existence of the state. It is logical that the state seeks to give trade a certain form and regulate its basic rules.

Trade is understood as a type of entrepreneurial activity related to the acquisition and sale of goods. Russian legislation, distinguishing retail trade as a type of trade, indicates the intended use of the goods — personal, family, household, and other purposes without use in entrepreneurial activity (p. 1 and 3, Article 2, Federal Law No. 381 from 28 December 2009 "On the Fundamentals of State Regulation of Trade Activities in the Russian Federation").

Retail trade as a type of commercial activity is carried out by taxpayers through various stationary and non-stationary trading facilities, which are located in special trading areas regulated by authorized state bodies. The most well-known formats of retail trade include fairs, exhibitions, and markets. The latter refers to a property complex intended for the sale of goods (performance of works, provision of services) based on freely determined prices directly at the conclusion of retail sale contracts and household contract agreements, and which includes trading places (clause 2, article 3 of the Federal Law from 30 December 2006, No. 271 "On Retail Markets and Amending the Labor Code of the Russian Federation" (hereinafter — Markets Law)). At the same time, other listed trade formats are not legally defined. For example, the definition of a fair includes only the relevant GOST, namely: a form of trade organized in a designated place and for a specified period with the provision of trading places for the purpose of selling goods (performing works, providing services) based on prices freely determined directly when concluding sales contracts and household contracts.[1] As can be judged from the above description, in fact, at markets, just like at fairs, the form of interaction between buyers and sellers, as well as the settlements between them, do not differ, and the tax burden does not change. At the same time, conducting trade in an area designated as a retail market imposes additional obligations on the seller, distinct from taxation, but bearing financial and administrative costs without providing any advantages compared to other forms of trade.

In connection with the above, a situation arises where the cost of the same action (selling a product to a customer) in the retail market is higher than at a fair or exhibition complex.

The consequence of this approach is that, as of today, the retail market format is becoming less popular and gradually yielding to other forms of trade organization, such as shopping centers or complexes. Over the past 10 years, the official number of markets has decreased from 2 162 in 2013 to 761 in 2023.[2]

However, even under such conditions, the functioning of retail markets for goods and food is accompanied by the following specific features:

• tax payments are made by sellers-taxpayers in minimal amounts, and often they are completely absent;

• difficulty in monitoring the completeness of tax payments by sellers;

• shadow turnover of cash due to the absence or non-application of cash register equipment (CRE), which leads to the sale of cash and involvement in illegal banking activities;

• the lack of traceability of goods, which leads to the inability to identify their history, quality, warranty, and price at each stage in the resale chain;

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[1] GOST R 51303–2023. National Standard of the Russian Federation. Trade. Terms and Definitions (approved by the order of Rosstandart from 30.06.2023 No. 469).

[2] Official website of the Ministry of Industry and Trade of Russia. URL: https://minpromtorg.gov.ru/optovye-rynki/roznichnye-rynki (accessed on 01.12.2024).

• violation of labor and migration legislation, which leads, among other things, to an increase in the criminal environment in the community;

• the sale of illegal/sanctioned, as well as counterfeit products. This circumstance can be viewed critically from the perspective of consumer health safety;

• organization of schemes for the illegal transfer of funds abroad (under the guise of everyday transactions), including for the purpose of financing the Ukrainian army and other terrorist groups.

APPLICATION OF CASH REGISTER EQUIPMENT AS A TOOL FOR TAX CONTROL AND REDUCING STATE BUDGET RISKS

The risk of shadow cash turnover due to the lack of tax control or the non-application of cash register equipment leads to an increase in the level of the shadow (informal) economy and the loss of tax revenues for the state budgets of the budgetary system.

The issues of the shadow and informal economy are widely researched in foreign literature [1–4]. As foreign experience shows, measures to counter the shadow economy are mainly related to reducing the impact of factors influencing the shadow economy, such as the tax burden (lowering tax rates, effectively introducing tax benefits, improving tax administration, etc.), the development of cashless payments (the availability and affordability of electronic payments, increasing the share of the population with card accounts), curbing the growth of cash turnover [5], trade liberalization, and encouraging exit from the shadow [6].

At the same time, there are very few effective tools proven by practice to counter these risks. The classic and recognized tool for controlling taxpayer revenue in their transactions with the public has become the cash register (CR). The use of CR is an essential condition for ensuring financial discipline among economic entities when conducting transactions, primarily in cash, as well as for the complete and accurate accounting of conducted operations and the calculation of taxable income [7].

Regarding small and medium-sized enterprises that primarily provide services to individuals or produce goods for them, there has always been a problem, if not of "black", then of "gray" cash turnover. [8]. However, the development and implementation in 2016 by the Federal Tax Service of Russia (hereinafter — FTS of Russia) of modern operational control tools — cash register equipment (CRE) that records taxpayer revenue and transmits it via the Internet to a unified database of tax authorities — significantly reduces the risk of unlawful behavior by participants in tax relations. The mechanism of tax control when using new format CRE ensures the formalization and transparency of transactions while reducing the administrative burden on individual entrepreneurs and legal entities, thanks to a decrease in the number of control activities.

The implementation of operational control in the technological frameworks of tax administration has allowed the Federal Tax Service of Russia to effectively create an ecosystem for trade tax administration. In the scientific literature, four main elements of the digital information system of the Federal Tax Service of Russia are highlighted:

1) automated VAT refund control system (AVRCS);

2) automated control system for the use of cash register equipment (ACSR);

3) information system for product labeling and tracking (IS PLT);

4) information system of the population registry and civil status records (IS ZAGS).

It is worth noting that this trend of societal transformation under the influence of globalization processes, international integration, the expansion of the service sector, and intangible production in the context of rapid scientific and technological progress and the implementation of information technologies in all areas of human, enterprise, societal, and state activities [9] is a global trend of recent years.

Taken together, these elements allowed the Federal Tax Service of Russia, on the one hand, to reduce the level of administrative pressure on businesses (decrease the frequency of on-site tax audits), and on the other hand, to ensure stable growth in tax revenues. Since 2016 (when digital technologies began to be widely used in tax administration), they have grown faster than the country's GDP, investments, and real incomes of the population [10].

PROBLEMS OF SUBSTANTIVE UNDERSTANDING OF LEGISLATIVE NORMS REGARDING EXEMPTION FROM THE USE OF CASH REGISTER MACHINES

Today's exemption from the obligation to use cash registers at markets, which has remained since 2003 (when the corresponding Federal Law was adopted), ambiguously describes the list of cases when cash registers may not be used.

Thus, the exemption from the obligation to use cash register equipment is formulated as follows (paragraph 6, section 2, article 2 of the Federal Law from 22.05.2003 No. 54 "On the Use of Cash Register Equipment in Settlements in the Russian Federation"): the cash register may not be required for trade at retail markets, fairs, exhibition complexes, as well as in other areas designated for trade, except for stores, pavilions, kiosks, tents, mobile shops, auto shops, mobile vending units, container-type premises, and other similarly equipped and ensuring the display and preservation of goods trading places (premises and vehicles, including trailers and semi-trailers), open counters inside covered market premises when trading in non-food products, except for trading in non-food products that are specified in the list approved by the Government of the Russian Federation.

An interesting point draws attention, which, as can be judged, was not the subject of consideration by the courts. It concerns the interpretation of the norm in the form of mandatory use of cash registers in retail markets for the sale of food products without any exceptions. The legislator has structured the approach to the use of cash registers as follows: the cash register is mandatory for taxpayers during transactions (paragraph 26 of Article 1.1) with the exception of a closed list of cases (paragraph 1 of Article 1.2), named in Article 2 of the Law on Cash Registers. However, in the above-mentioned paragraph 6 of section 2 of article 2 of the Law on the Cash Register Equipment, at the end of the list of privileged places for the sale of goods in the retail market, there is a phrase "when selling non-food products". The question is as follows: based on current practice, both tax authorities and taxpayers interpret this exclusively as referring to the words "open counters inside covered market premises", thereby forming a separate group exempt from the application of the Cash Register Equipment — the sale of non-food products at open counters inside a covered market. However, the phrase "when trading non-food products" can also be applied to the entire paragraph. In this case, only traders of non-food products will be exempt from the CRE (excluding 17 types of goods,[3] listed in the government list, for which the use of KKT is mandatory even in markets). Therefore, any sale of food products will require the use of CRE.

However, let's leave this interpretation aside for the purposes of the present article.

The existing exemption from the obligation to use cash registers, based on a superficial description of the criteria for premises where cash registers may not be used and the principle of ensuring "product safety", does not regulate clear boundaries for the use of cash registers in markets. Initially, it is worth noting that this approach to the mandatory use of revenue control tools for taxation purposes seems incorrect.

This is confirmed by contradictory judicial practice: similar trading places were recognized by some courts as falling under the criteria for

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[3] Decree of the Government of the Russian Federation dated 14.04.2017 No. 698. Collection of Legislation of the Russian Federation, 2017, No. 17, Art. 2624.

exemption from the cash register, while others did not. For example, by the ruling of the Arbitration Court of the Volga-Vyatka District dated 06.04.2022 No. F01–576/2022 in case No. A43–14768/2021, a trading place located inside a covered building and equipped with a counter on which the goods are placed was recognized as ensuring the preservation of the goods and, therefore, requiring the use of the cash register. In contrast, by the ruling of the Arbitration Court of the Central District dated 09.06.2023 No. F10–2616/2023 in case No. A68–1828/2022, a similar trading place, even with a refrigeration unit, was recognized as not ensuring the preservation of the goods, which exempts the corresponding calculations from the use of the cash register.

The aforementioned practice has a long-standing history throughout the entire country.

The consequence of such a legal formulation is that a conscientious taxpayer may be held administratively liable due to differing views on the concept of an "open counter", while an unscrupulous one may have the opportunity to "mimic" the "privileged" categories, even though they do not actually have such a right.

In the matter of changing the approach to the formation of preferential categories exempt from state control in retail markets, in our opinion, it is important to determine: what is the reason for exempting a person from using a cash register, i.e., why is a taxpayer exempt from the cash register when selling goods at a market, but not when doing the same in a store? Generally, based on the content of the provisions of the Cash Register Law, the right not to use it applies to the sale of socially important goods and services, or low-margin activities where the use of a cash register may be physically difficult. In this regard, it seems that the legislator proceeded from the assumption that the majority of taxpayers selling goods in retail markets are individuals who are not individual entrepreneurs: grandmothers selling parsley or a butcher selling meat from a counter. However, individuals are exempt from the application

of cash register equipment (CRE) ab initio: the corresponding obligation applies only to individual entrepreneurs and legal entities (p. 1, Article 1.2 of the CRE Law). Self-employed individuals are also exempt (p. 2.2, Article 2 of the CRE Law). So, it seems that the discussion was apparently about individual entrepreneurs who sell their own products (for example, livestock and agricultural products from their own farm). Such sales are usually temporary (seasonal) in nature. However, the legislative norm does not link the exemption from the use of cash registers with the type of the goods sold or the temporary nature of the work (and the definition of seasonality and temporariness of the work is not contained in Russian legislation). It should be noted right away that, according to the Federal Tax Service of Russia, for example, in the Moscow region in 2021 (before the start of the industry project, which we will discuss below), 11.6 thousand taxpayers were engaged in market activities, of which 8.5 thousand (73%, i.e., almost 3/4) traded in the market for 8 or more months during the year. Only 7% of traders (865 people) conducted their activities for 1–2 months. At the same time, the average monthly revenue of a taxpayer in the retail market is 232 thousand rubles.

From the above, it can be concluded that, to date, the market territory is not a place where sellers temporarily sell goods merely to maintain a minimum subsistence level. Here, as a rule, "professional" sellers (individuals selling large volumes of products or engaged in resale) conduct trade. Consequently, the market territory has lost the status for which it was granted benefits in the form of soft state control, but no changes in legal regulation have occurred in this regard. Such a legal approach leads to a significant tax gap, as taxpayers who do not keep records of revenue in the state's trusted zone — the cash register — "fall out" from state control.

It should be noted separately that predominantly small and medium-sized enterprises (SMEs) are engaged in this type of activity, playing a crucial role in stimulating economic growth. However, they often face

challenges in fulfilling their tax obligations due to limited resources and understanding of the content of legislative norms [11]. In this regard, issues of fine-tuning the supervisory and regulatory tools [12–15], as well as theoretical and methodological constructs, are relevant for research, especially in the context of achieving the goals of the national project "Small and Medium Enterprises and Support for Individual Entrepreneurial Initiative".[4]

CASH REGISTER AS A TOOL FOR LEGALIZING TRADE TURNOVER IN SMALL RETAIL FORMATS

The practice of state control over market activities shows a lack of interest, and often even resistance, not only from tenants but also from market management companies towards the process of legalizing market trade. Therefore, conducting control measures for this format of trade has a number of significant difficulties. Market management companies are not interested in "whitening" the activities of their tenants, who are sometimes not even registered as individual entrepreneurs or legal entities when required by law, let alone conducting transactions using cash registers.

The above is facilitated by the lack of responsibility for market management companies for violations of the legislation on the use of cash register equipment by tenants of trading places, despite the obligation of market management companies to ensure compliance (p. 6, part 1, Article 14 of the Market Law), which is quite shortsighted, considering the stable connection between market management companies and tenants, as they are united by mutual financial interests (unfortunately, not always related to the completeness of revenue accounting and tax payments).

The lack of leverage over market managers for their failure to fulfill their duties does not allow for the creation of an effective tool for controlling cash discipline in the markets [16, 17].

At the XXIV St. Petersburg International Economic Forum, the President of Russia noted: "As for the "whitening" [of businesses — Ed.], I think it is clear to the interested parties what this is about: all receipts through the cash register, hiring workers "on the books", and purchasing goods also "on the books", through the cash register".[5] In his directives to the Government of Russia from 23.02.2019 No. 280 and the Federal Tax Service of Russia from 04.11.2020 No. 1799, President Vladimir Putin outlined, in particular, tasks related to:

expansion of the grounds for the application of cash register systems in markets;

the introduction of liability for market management organizations for providing trading space to tenants without registered cash registers.

The Federal Tax Service of Russia, in order to implement the directive of the Head of State, launched the industry project "Markets"[6] and conducted an inventory of all trading spaces in the country: markets, fairs, exhibition complexes (a total of 2 259 facilities). According to the results of this inventory, as of the end of August 2021, more than 149 thous. taxpayers with 229 thous. trading places were operating in these areas. In just the first six months of implementing the industry project, the number of registered individuals required to have the status of individual entrepreneurs or legal entities operating in market territories increased by more than 23% (from 121 thous. to 150 thous. taxpayers). By July 2024, the number of registered cash register machines (CRMs) in the markets nearly doubled (from

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[4] National project "Small and Medium Entrepreneurship and Support for Individual Entrepreneurial Initiative". URL: https://www.economy.gov.ru/material/directions/nacionalnyy_proekt_maloe_i_srednee_predprinimatelstvo_i_podderzhka_individualnoy_predprinimatelskoy_iniciativy/ (accessed on 01.12.2024).

[5] Official website of the President of Russia. Official website of the President of Russia. URL: http://www.kremlin.ru/events/president/news/65746 (accessed on 01.12.2024).

[6] Industry projects. URL: http://www.nalog.gov.ru/rn77/industry_projects (accessed on 01.12.2024).
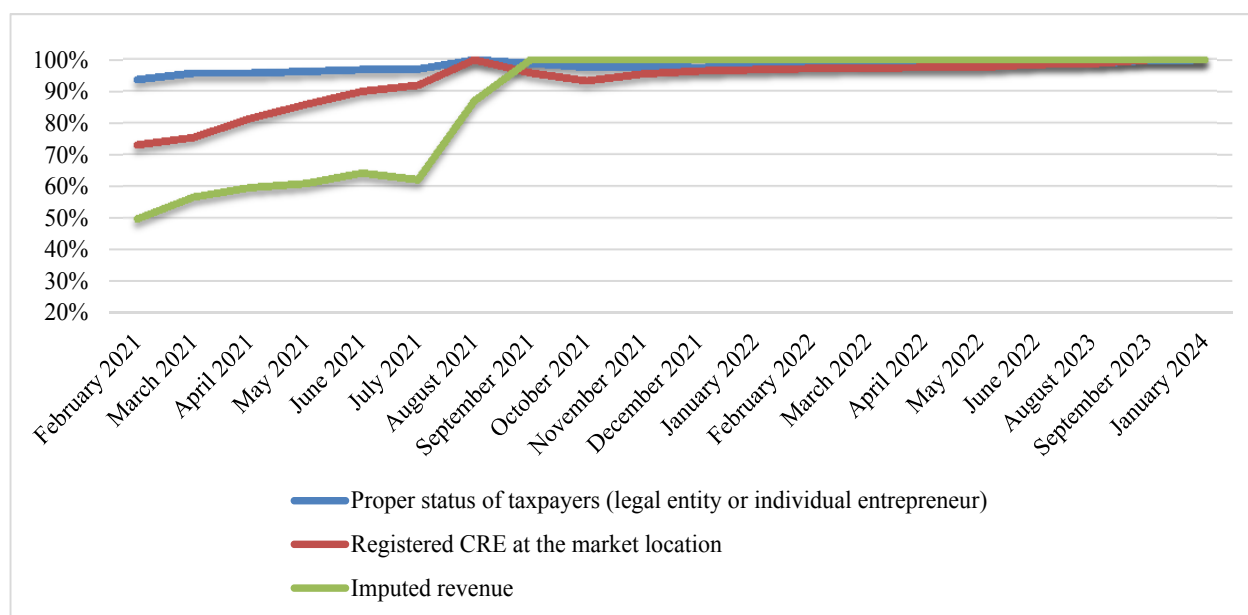
Fig. 1. **Dynamics of Average Indicators of Achievement of the Target Model**
Source: Compiled by the authors on the basis of operational data from the Federal Tax Service of Russia.

80 thous. to 152 thous. units), and the recorded revenue figures increased by more than 600% — from 15 to 95 billion rubles.

As part of the mentioned project, the Federal Tax Service of Russia developed a target model of merchant behavior in each market regarding the use of cash register equipment (CRE): the presence of the appropriate merchant status (registration as an organization or individual entrepreneur), the presence of registered CRE at the market's location, as well as revenue indicators. During the period from 2021 to 2024, the target indicators were achieved (*Fig. 1*).

However, despite the optimistic figures, such a result is undoubtedly temporary, and a regression to previous indicators is inevitable if control is weakened [18]. But efficiency is, after all, achieving the desired results using the minimum possible amount of resources or achieving the best result with a given amount of resources [19]. In this regard, to consolidate the achieved results and reduce the burden on both the tax inspector and the point of sale, it seems advisable to make legislative changes in the sphere of legal regulation of relations in trading areas. The necessity of such changes is clearly demonstrated by the unstable growth in the number of registered cash registers (*Fig. 2*).

DIRECTIONS FOR THE TRANSFORMATION OF THE FINANCIAL AND ECONOMIC BEHAVIOR MODEL OF TRADE RELATIONSHIP PARTICIPANTS

Considering the above, the transformation of the established financial and economic behavior model in market territories is seen in three main directions.

Clear and unequivocal establishment of the parameters for preferential categories in retail markets (who and under what conditions is entitled not to use cash registers).

This will protect conscientious taxpayers from inadvertently violating the legislation on the use of cash registers and, at the same time, eliminate the possibility of unscrupulous tenants "mimicking" preferential categories by using the current "vague" wording.

Earlier, we indicated that the goal of organizing market territories is to create conditions for individuals, individual entrepreneurs, and legal entities to sell their crop and livestock products.

Tax legislation already provides for a special tax regime today — the unified agricultural tax for organizations and individual entrepreneurs producing agricultural products, carrying out its primary and subsequent (industrial)
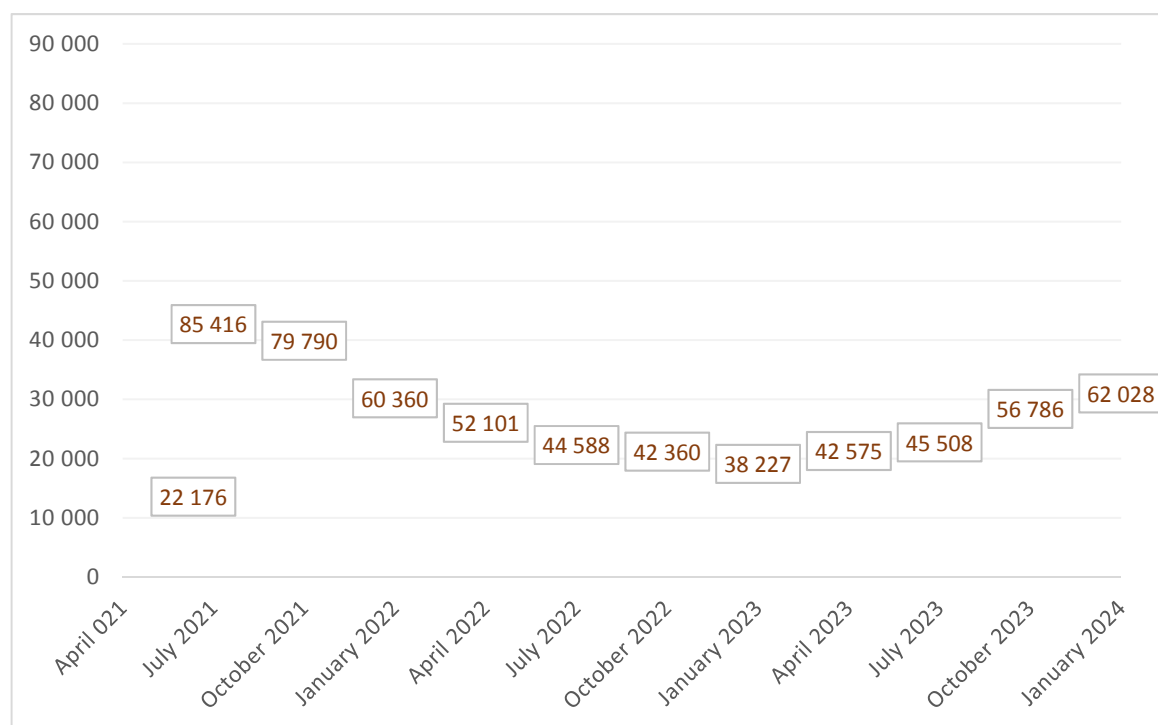
Fig. 2. **The Indicator of the Increase in the Number of Registered Cash Registers in Relation to the Beginning of the Project**

Source: Compiled by the authors on the basis of operational data from the Federal Tax Service of Russia.

processing (including on rented fixed assets), and selling these products, provided that the share of income from the sale of the agricultural products they produce and from providing services to agricultural producers, as specified in pp. 2, p. 2, Article 346.2 of the Tax Code of the Russian Federation, constitutes at least 70% of the total income from the sale of goods (works, services) of such organizations and individual entrepreneurs. The same approach is provided for agricultural consumer cooperatives.

In this regard, one can conclude that it is the payers of the unified agricultural tax (hereinafter — UAT) who are the target audience for whom not only the preferential regime itself exists, but also the preferential approach in control, which consists in the absence of accounting for taxable income in the form of the use of cash registers.

That is why the non-application of cash registers should concern only those who pay the Unified Agricultural Tax (UAS) and sell their products within a specified market

area in square meters. This approach will affect approximately 12,000 taxpayers who conduct their activities in markets, fairs, and exhibitions, which constitutes 11% of the total number of taxpayers operating in these areas.

The implementation of any other legislative and/or organizational initiatives to strengthen tax discipline while maintaining the existing benefits will affect no more than 2% of taxpayers, who are already required to use cash registers for the sale of 17 types of non-food products in retail markets.

Creating a clean environment in which all participants (tenants, market management companies, and tax authorities) have the opportunity to influence this environment.

In particular, this concerns market management companies to whom the necessary automated tools from the Federal Tax Service of Russia can be provided (a convenient service in the personal account for monitoring tenants, i.e., reflecting in the personal account of the market management company information about valid cash
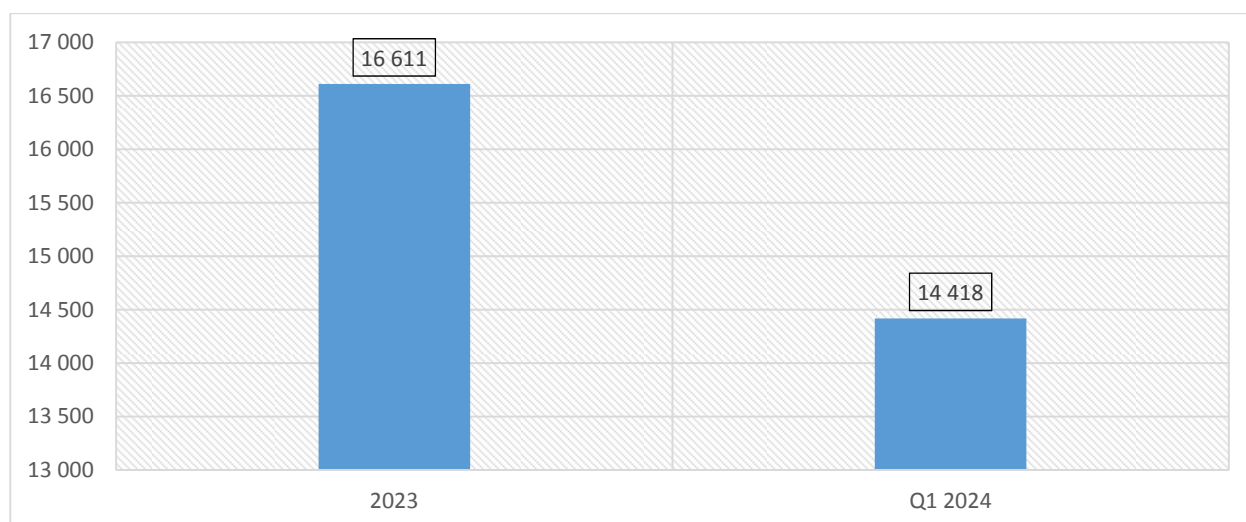
Fig. 3. **The Average Amount of Rent Per Retail Space on the Market (RUB)**
Source: Compiled by the authors on the basis of operational data from the Federal Tax Service of Russia.

register equipment registered by its tenants online). This circumstance will simplify the current obligation of the market management company to verify the compliance of sellers and the trading places they occupy with the requirements established by the Market Law. The specified inspection is mandatory and is conducted daily before the market opens, and in the event of any violations being detected during the inspection, the market management company must take the necessary measures to rectify the identified violations or notify the relevant regulatory and supervisory authorities on the same day (p. 10, part 1, Article 14 of the Market Law). As a result, the presence of an automated solution will allow the market management company to view and assess the compliance of tenants with cash discipline through the "eyes" of the Federal Tax Service of Russia and to monitor the fulfillment of tenants' obligations without physically patrolling the market. This, on the one hand, will simplify proving the fault of the market management company for failing to fulfill its duty, and on the other hand, will allow it to reduce costs associated with the existing obligation to monitor the presence of registered cash registers with the tenant. This provision is relevant considering

the official decline in the rental cost of market space (*Fig. 3*).

The maximum amount of rent has increased: if in 2023 it was 1 494 565.33 rubles, then in the first quarter of 2024 it will be 1 680 000 rubles.

Also, in order to increase the share of self-regulation in the markets, it is advisable to empower market management companies with the authority to terminate lease agreements in case of the tenant's violation of established rules of conduct.

Introduction of responsibility for those market operators who consciously do not wish to maintain a clean environment in the retail market.

To date, the rules for the application of cash register equipment (CRE) in retail markets among tenants are supported exclusively by the resources of tax authorities, and under current conditions, using the principles of public-private partnership, it is necessary to include market management companies in this process.

The specified responsibility should be differentiated depending on the number of violations committed due to the market-controlling company's failure to fulfill its duty of monitoring tax discipline in the markets.

The refusal to introduce liability for market management companies will not allow the

creation of an effective tool for controlling cash discipline in the markets, including due to the lack of interest of management companies in adhering to the established trading rules in their territory.

Partially, these directions have already been implemented by one of the authors of this article, A. A. Batarin, in the design of legislative norms laid down in the foundation of federal laws from 08.08.2024 No. 273 "On Amendments to Articles 2 and 4.2 of the Federal Law "On the Use of Cash Register Equipment in Settlements in the Russian Federation" and the Federal Law "On Retail Markets and on Amendments to the Labor Code of the Russian Federation" and No. 284 "On Amendments to the Code of Administrative Offenses of the Russian Federation".

The new regulation comes into effect on 1 March 2025.

It is important that the amendments provide for the introduction of a simplified procedure for holding sellers administratively liable in the form of a warning. Without the introduction of such a procedure, considering the specific nature of market trading (ease of migration), the effectiveness of control measures will remain at a low level. If a full cycle of procedural actions (from recording the violation to issuing a decision) is not carried out within a single "visit" to the market, systematic difficulties will subsequently arise in holding individuals accountable and enforcing decisions (deliberate failure to receive notifications about the case review, about the tax authority's decision, i.e., a conscious refusal to communicate with the controlling authority). Thus, the balance of interests between the state and the taxpayer is disrupted, related to the easy access of the trader to the market and the difficulty of holding such an individual accountable in the general procedure.

This innovation is particularly important against the backdrop of the inclusion of control over the use of cash register equipment in the regulatory framework of Federal Law

No. 248 of 31 July 2020 "On State Control (Supervision) and Municipal Control in the Russian Federation" starting from 1 March 2022.[7] This served as the basis for the imposition of significant restrictions on this type of control, established by the Resolution of the Government of the Russian Federation from 10.03.2022 No. 336 "On the Features of the Organization and Implementation of State Control (Supervision), Municipal Control". Despite the goals declared by these regulatory legal acts, the bureaucratization of the control procedure has only increased, creating fertile ground for unscrupulous taxpayers, who now have greater opportunities to avoid punishment.

The above is reinforced by the fact that since mid-2022[8] the Administrative Offenses Code of the Russian Federation has been supplemented by part 3.1 of article 28.1, according to which a case of an administrative offense, expressed in non-compliance with mandatory requirements, the evaluation of which is the subject of state control (supervision), can only be initiated after conducting a control (supervisory) measure in interaction with the controlled entity, in the presence of data indicating administrative offenses directly discovered by the inspector, as well as received from law enforcement and other agencies, public associations, individuals and legal entities, and the media.[9] As a result, within the framework of cash discipline inspections, administrative proceedings can only be initiated based on the results of a control purchase, documentary, or on-site inspection.

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[7] Article 60 of the Federal Law from 11.06.2021 No. 170 "On Amendments to Certain Legislative Acts of the Russian Federation in Connection with the Adoption of the Federal Law "On State Control (Supervision) and Municipal Control in the Russian Federation".

[8] Federal Law No. 290-FZ of July 14, 2022 "On Amendments to the Code of the Russian Federation on Administrative Offenses and Article 1 of the Federal Law "On Amendments to the Code of the Russian Federation on Administrative Offenses".

[9] The relevant clarifications are provided in the letters from the Ministry of Economic Development of Russia from 07.04.2022 No. D 24i-10329 and the Federal Tax Service of Russia from 19.04.2022 No. AB-4–20/4732@.
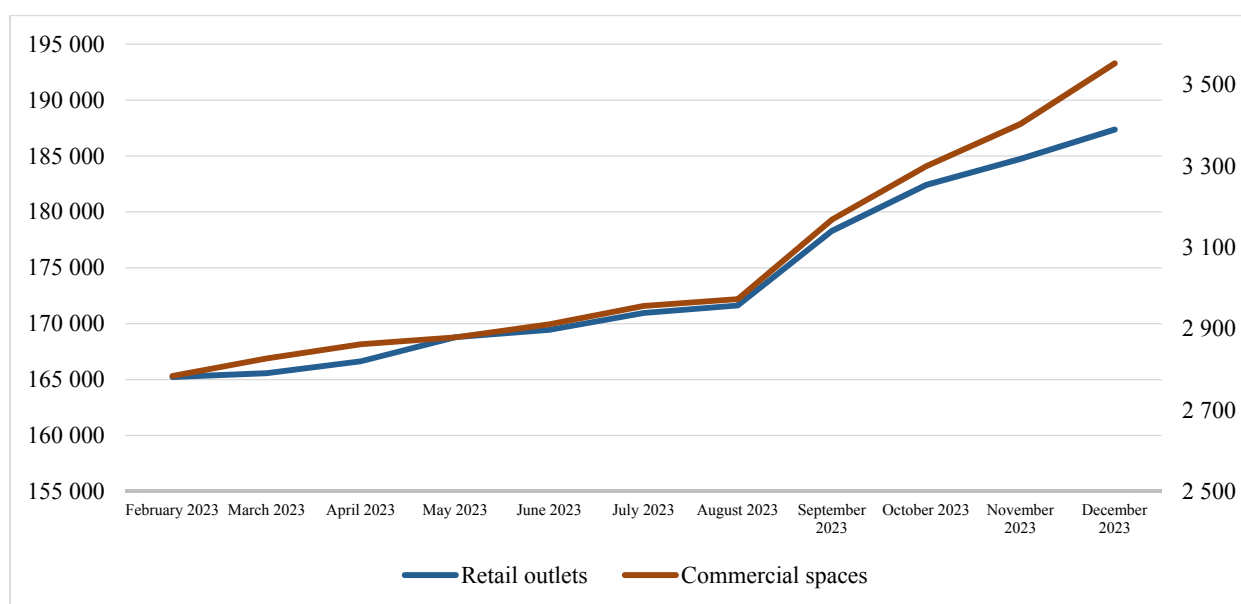
Fig. 4. **Dynamics of the Number of Retail Spaces and Outlets in the Russian Federation in 2023**
Source: Compiled by the authors on the basis of operational data from the Federal Tax Service of Russia.

Overall, the changes adopted in August 2024 should be viewed positively, but only as the first step towards creating a clean environment and realizing the state's aspiration for transparency in monetary circulation in market and other areas. Thus, the right not to use cash register equipment (CRE) is provided for individual entrepreneurs under the patent taxation system, who engage in a whole range of activities, including retail trade and providing public catering services at small weekend markets (up to 50 stalls). This number of trading stalls is justified by the fact that the average number of stalls at weekend markets in Russia in the second half of 2022 was 50 (4578 markets were held with a total of 228 207 stalls), and in 2023 it was 44 (10 518 markets were held with a total of 458 091 stalls). At the same time, such a concession seems excessive, as the categories of individuals who are objectively entitled to the right not to apply cash registers and, consequently, to be exempt from fiscalization and revenue accounting in the interests of the state, are already defined by current and forthcoming legislation: these are individuals, self-employed persons (including individual entrepreneurs), organizations, and individual entrepreneurs engaged in activities listed in Article 2 of the

Law on Cash Registers (including those engaged in activities under a patent), and taxpayers under the simplified taxation system. Including additional categories in the list of privileged groups appears unjustified. Based on the goals described in this article, it is the taxpayers under the simplified taxation system who are entitled to expect exemption from fiscalization. Other individuals are required either to start using cash registers or to switch to the simplified taxation system. In this regard, an increase in the number of taxpayers under the simplified taxation system is to be expected.

The shortsightedness of the previously applied approach in weakening fiscal control over the specified retail formats is confirmed by the rapid growth in the number of not only retail outlets but also trading territories as a whole (*Fig. 4*). In just 2023, the number of trading spaces increased from 2 784 to 3 553 (while, as we noted earlier, the number of territories officially registered as markets, according to the Ministry of Industry and Trade, is declining), and the number of corresponding retail outlets on them increased from 165 218 to 187 365.

The provision of a temporary benefit (until 1 September 2025) for agricultural consumer cooperatives, recognized as such in accordance

with Federal Law No. 193 of 8 December 1995 "On Agricultural Cooperation", is also poorly defined, both in terms of justification and technical-legal aspects: the introduction of a six-month exemption in the text of the Law on CRE instead of forming a transitional provision in the relevant Federal law.

CONCLUSION

As a result of the conducted research, it is proposed to comprehensively address the identified issues by extending the exemption from the application of CRE exclusively to UAT taxpayers across all trading territories (markets, fairs, exhibitions, etc.), and imposing on the respective trade organizers (the organization managing the market, fair, exhibition) the obligation to monitor the application of CRE by tenants, along with introducing liability for landlords for the non-application of CRE by tenants. Such a proposal is particularly important given that the legislator did not take into account the following fact: the established legal regime determines the market territory by self-designation, i.e., if the trade organizer registers the business as a market, then all obligations provided by law for market trading will apply to it. However, if they submit an application for registration as an "open-air museum", exhibition, etc., then, despite the fact that it will outwardly look like a real market, the corresponding obligations for conducting trade there will not

apply to it. In this regard, the proposed in this article extension of the legal model of behavior to all trading territories will allow preserving the accumulated effect from the implementation by tax authorities of a set of measures to strengthen control in the trading sector. An important element in improving tax discipline [20–22] would also be the exclusion of individual entrepreneurs operating in market territories from conducting simplified cash operations, as provided by the Bank of Russia's Instruction No. 3210 from 11.03.2014 "On the Procedure for Conducting Cash Operations by Legal Entities and the Simplified Procedure for Conducting Cash Operations by Individual Entrepreneurs and Small Business Entities".

Overall, the full implementation of the developed proposals will contribute to the realization of the country's leadership policy aimed at establishing effective monitoring of food prices, thanks to an automated revenue accounting system, which is crucial for ensuring the state's tax security.

The approach to tax administration of market and other trading territories presented in this article will also provide a new impetus for the consideration of this topic by representatives of the scientific community, both for the formation of theoretical legal constructs regulating the discussed activities and for the analysis of the economic efficiency of existing and proposed trading formats.

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A.A. Batarin — problem statement, critical analysis of literature; scientific and practical analysis and substantiation of substantive understanding of legislative norms in terms of exemption from the use of KKT; study of KKT as a tool for legalisation of trade turnover on small formats of retail trade.
L. I. Goncharenko — scientific guidance of the research, determination of the structure of the article content presentation, implementation of the script of article writing, introduction, conclusions.
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Behavioral Finance Explanation of Retail Investors' Approach to Portfolio Design

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ABSTRACT

The digital space facilitates individuals' access not only to securities, but also to information that can influence their decisions. When making decisions about selecting securities to include in an investment portfolio, individual investors strive for rationality, but are influenced by various behavioral factors that increase as the digital space expands. We assume that, in addition to profitability and risk, decisions about selecting securities for investment are influenced by various behavioral factors, fundamentally shaped by motives of thrift and caution in combination with fear of missing out (FOMO) and other phenomena described in the theory of behavioral finance. We test an approach that allows us to assess, without resorting to sociological tools, the degree of significance and potential influence on the choice of a retail investor of such parameters as the affordability and liquidity of securities. Our approach is to design a profitability and risk ranking of securities included in the MOEX-40 index, and to incrementally adjust the ranking by affordability and liquidity in indicators various combinations. An instrument's rank change compared to the base ranking is a measure of the factor significance from the point of view of a quasi-rational retail investor. We have empirically shown that relatively more expensive lots are prone to more significant decrease of investment appeal that in some cases cannot be compensated by higher returns. The developed framework can be used by portfolio managers and issuers to assess the potential demand for securities by retail investors, to explain and predict their antipathy to relatively more expensive instruments. The result of the study can also serve as a theoretical justification for splitting expensive shares in order to increase their attractiveness for retail investors.

Keywords: behavioral finance; security ranking; affordability of securities; liquidity of securities; liquidation speed; retail investor; quasi-rational choice; risk diversification; retail investor portfolio; digital space

INTRODUCTION AND PROBLEM SETUP

We begin with the quotation of R. Thaler (1999): "In the future, financial economists will routinely incorporate as much "behavior" into their models as they observe in the real world" [1]. The key postulate of the behavioral finance theory is based on the assumption that it is possible to develop investment strategies that take advantage of individuals' not fully rational behavior thus providing additional returns in excess of those predicted by EMH-based models. However, beyond the irrationalities explained by the provisions of prospect theory [2] or cognitive errors, investment decisions are also driven by rational motives, including risk appetite and thrift, which are, according to [3], especially acute during crises.

The decision to invest in securities requires a retail investor to choose specific instruments. Behavioral phenomena — panic and hype, FOMO, responsibility sharing, and verification of decisions by public opinion — are catalyzed in the digital space due to the high speed of information dissemination [4]. This is why individual investors are initially not rational, but quasi-rational due to the large contribution of uncertainty [5] in decision-making. They will seek to diversify the portfolio, i.e., buy several instruments, and in a multiple-choice situation, they will use standard approaches: maximize the expected return by extrapolating data on retrospective returns. Then, following the logic underlying prospect theory, the selection will include securities that have demonstrated high growth rates and/or low volatility in the recent past.

An alternative tactic of a quasi-rational investor is to study the rankings of securities in order to design a portfolio. This tactic is based on the generally correct assumption that a ranking is compiled by stock market professionals, and therefore is more reliable than the conclusions obtained by an individual independently. In this case then, the portfolio will include n securities with the best rank.

Thus, for portfolio managers and issuers targeting retail investors, it may be fundamentally important to understand whether a retail investor will *ceteris paribus* choose this particular instrument, and what will be the factor determining this choice. It will be no less important to identify the factors of negative choice ("I will definitely not buy this stock"). Presumably, an issuer and a portfolio manager seeking to ensure portfolio liquidity and diversification of security holders, will be interested in promoting a security upwards in a risk-return ranking.

If the selection includes instruments with a lot price exceeding the limit set by the investor or undermines diversification opportunities, a quasi-rational investor will certainly censor the portfolio, getting rid of securities that over concentrate risk in one instrument or are unavailable due to their high cost. The liquidity motive is also important: the ability to quickly sell an asset at a fair price is perceived by individual investors in strict correlation with a lot price. From a fundamental point of view, a high lot price is a restraining factor for the market during periods of market imbalance towards fear (according to the fear and greed index), which makes such lots less attractive for retail investors, who, according to Gomez Martinez et al. [6], are influenced by the news background, or, as noted by Dash & Mishra [7], by the social media sentiment regarding the news.

Our task is to establish, without resorting to sociological tools, how the liquidity of a security influences the decision to buy. The following hypothesis will be investigated: a lot price and a lot liquidation speed have a significant impact on a stock's position in a ranking and, therefore, on the probability of this stock being included in a retail investor's portfolio.

The hypothesis is based on the following ideas. Along with the irrational behavior of investors, who are driven by greed and fear, they also have rational motives, which also fit into the existing tradeoff between the market efficiency hypothesis and the theory of behavioral finance. A rational investor, driven by the "constructive" or "positive" greed, will

buy what is cheaper or what is easier to sell; yet, presumably, "easier to sell" does not necessarily mean "cheaper". And thrift will restrain the investor from buying a more expensive lot.

To formalize the motives, it is necessary to decompose the empirical approach to securities comparison in the space of "more attractive — less attractive" to derive theoretical assumptions about how significantly the fear and greed motive will impact the choice of shares, how to predict the choice of a retail investor (including a negative choice), and explain why some securities may not obviously be more or less popular among retail investors.

METHODOLOGY AND THEORETICAL BACKGROUND

Theoretical Approaches to Comparison of Stocks
Consider a standard comparison framework that fits into the logic of securities rating models. The task of rating securities in a generalized formulation is not new either from a scientific or practical point of view. Several approaches have been developed and applied to date, each of which has many cases of practical implementation. However, only two fundamental tasks are attributable to ratings: the task of securities classification according to established criteria and the task of their comparison (ranking).

More common in public and professional discourse are classification ratings of issuers and/or issues of securities, which are based on the fundamental characteristics of the operating and financial activities of an economic entity. Such ratings are aimed at assigning an issuer or its securities to a certain quality category that meets specified criteria, while the task of comparing two or more securities is not applicable in this context: securities with the same rating are considered as equally acceptable for certain management purposes (for example, for the initial selection of securities when shaping a portfolio). At the same time, there is a consensus that shares with the same rating can be subject to qualitative

comparison in the category space of "worse — better", "more attractive — less attractive", etc., which opens up opportunities for the second previously mentioned rating area.

Known approaches to comparative multi-criteria stock rating operate with such characteristics as profitability (r, relative change in stock price over a period) and risk (σ, standard deviation of a series of returns over equal periods), which are positively correlated, while the target criteria for them are opposite: maximization of profitability and minimization of risk.

A graphical interpretation of the problem of comparing shares in the coordinate system of risk and profitability (r, σ) is presented in *Fig. 1.*

Thus, if there is a choice between shares A, B, C and D, then share C will be characterized by the highest return and the lowest risk. The problems of pairwise comparison of shares lying on the lines of orthogonal projections on the axes also have an obvious solution: of the two shares with the same return (for example, C and D), the one with the lower risk (share C) will have a higher rank, and, conversely, of the two shares with the same risk (for example, A and D), the higher-yielding share (share D) will have a higher rank. The results of comparing shares lying in the risk and return space on the same descending line (see, for example, shares A and C) are just as easy to interpret: the share that is located to the left along the horizontal axis will have a higher rank.

The key problem of comparative analysis is ranking stocks lying on ascending "diagonals" (e.g., choosing between members of pairs BD, BE, DE, CE, AE or multiple choice). The theoretical solution refers to the calculation of additional characteristics, such as return per unit of risk (r / σ), and to an analytical study of the dependence of return on risk in order to determine the slope (regression coefficient) of the $r = f(\sigma)$ graph: as shown in *Fig. 1*, the slope of the r_b line is greater than the slope of the r_a line ($a < b$), which can ensure a higher rank of stock E compared to stock D, because the increase in E's risk is followed by a more significant increase in its return.
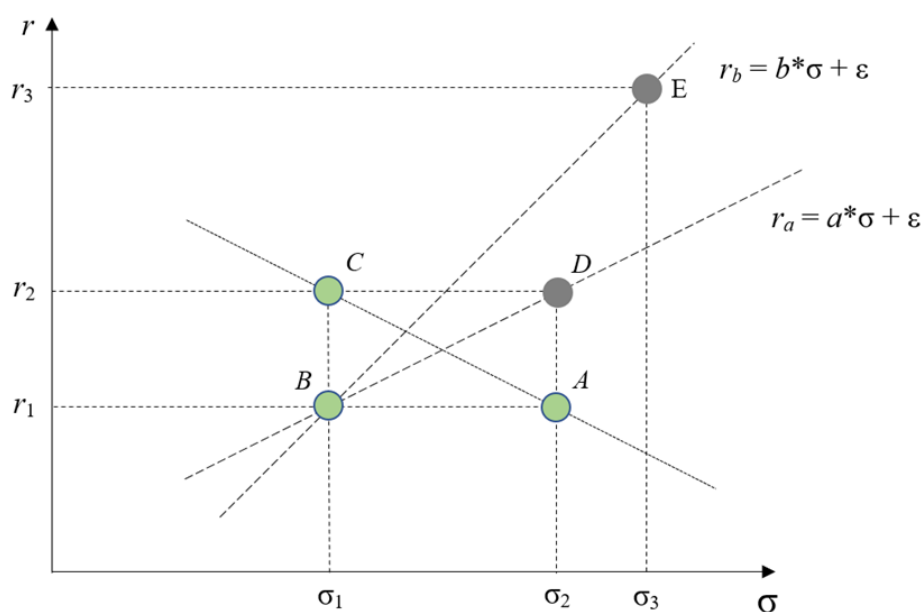
Fig. 1. **Graphical Interpretation of the Problem of Comparing Stocks by Combination of Risk and Return**
Source: Visualization made by the authors.

It should be noted that the investment strategy (conservative — stock B, or aggressive — stock E) and the permissible limits of risk appetite play a decisive role in this choice. From the point of view of the latter criterion, it is possible that out of the BD pair, share D will have a lower rank just because of the excessive risk for this investor. Consequently, it turns out that the solution to the problem of multiple shares' risk and return classification is largely **subjective,** and, therefore, an additional measurable criterion is required.

Moreover, the described approach does not exclude the possibility that there is, for example, share C*, which has the same risk and return values as share C. Obviously, the equality of the risk and return values of the two shares does not provide grounds for concluding that they are identical, without any analysis. Then the choice of a security will be driven by other criteria that a rational retail investor is guided by under normal conditions (beyond panic-driven or hype-driven markets).

The previously stated hypothesis is based on the assumption that, if the risk and return of two securities are equal, a retail investor will most likely buy the one that is cheaper or the one that is more liquid. This approach is

rational in many ways, but it may encounter a contradiction between low price and liquidity.

LIQUIDITY OF SECURITIES: PRACTICAL APPROACH TO FORMALIZATION

Our suggestion is to develop the framework of securities ranking by adding the third dimension — liquidity, in the definition of which there is significant pluralism due to the different approaches present in the discourse (economic, financial, institutional, etc.) and the tasks by which this category is employed.

A widely used approach in financial research is to define liquidity as a relative measure of an asset's price change which is required to sell it [8]. Liquidity as an attribute is evident through a security's high trading volume and a relatively small spread between bid and ask prices. Since a rational investor will consider it safer to invest in liquid assets rather than in illiquid ones, the expected return on an illiquid asset should be higher to compensate for the presence of transaction costs. Following the described approach, a formalized representation of liquidity will be a relative spread between the bid and ask prices [9] or the ratio of the absolute change in price per day to the daily trading volume of an instrument. The CAPM

implementation of liquidity adjustment can be obtained from Altay & Çalgici [10] or Alves et al. [11].

Notable is the approach, according to which liquidity is considered one of the determinants of stock returns and a factor explaining differences in returns. In line with this approach Datar et al. [12] used the ratio of the number of shares traded to the total number of shares outstanding as an indicator of a stock's liquidity.

In retrospect, the trading volume can be used to assess the liquidity of a security: the higher the trading volume during the day, the more liquid the security is considered. This approach has a number of theoretical limitations, including its inability to take into account absolute differences in lot prices, which can potentially make expensive securities less liquid, despite the high trading turnover provided, for example, by institutional investors. This circumstance is an argument in favor of the need to specify the procedure for applying liquidity indicators of listed shares.

In this study, we will adhere to the approach declared by the Moscow Exchange, according to which the liquidity of a security is "the ability to quickly exchange a security for cash without loss of value or with minimal loss of value." This definition is consistent with the approach of A. Damodaran, who links the speed of selling an asset with the need to provide a discount to the buyer, which is a transaction cost that ensures a loss of value; he calls the lack of liquidity a situation in which the holder is unable to sell the asset immediately [13]. In this regard, it can be assumed that the speed of selling an asset is affected by the attractiveness of the issuer and the security itself, as well as the affordability of the share to retail investors, expressed in the absolute price of the lot: the lower the lot price, the greater the number of potential investors to buy it.

The next step taken was to introduce and discuss several liquidity metrics.

1. Affordability expressed as a lot price (P_L) — a product of a security's price and its lot size.

For example, as of the last trading day of October 2022, lot prices of MOEX-40 constituents varied from 168.4 rubles (VTB) to 96,700 rubles (Transneft). At the same time, 21 of the 40 instruments were traded at a price of less than 1,000 rubles per lot; 11 instruments were traded at a price of over 2,000 rubles per lot. *Fig. 2* shows the distribution of lot prices of the MOEX-40 index constituents excluding the outliers — Transneft preferred shares (96,700 rubles per lot), and Norilsk Nickel ordinary shares (13,758 rubles per lot).

Given the existing significant difference in lot prices, we suggest that some instruments are less affordable to retail investors, which makes them potentially less liquid. Thus, the affordability of securities for retail investors, expressed in a lot price, is a significant factor determining the liquidity of listed securities. It was the interests of retail investors that guided the largest issuers when deciding to split shares: Tesla Motors Corp. in 2020, Alphabet Inc. in 2022, Transneft in 2023. In these and other cases, the companies' press releases emphasized the expected increase of their shares attractiveness to retail investors.

2. Daily number of deals (Q_D) and daily number of lots sold (Q_L).

This is an objective measure of a security's liquidity, reflecting the balance of supply and demand and potentially indicating the possibility of quickly closing positions on certain securities, which may be important in periods of high volatility. It is assumed that the number of deals is higher for more liquid securities ($Q_D \rightarrow max$).

It is necessary to take into account the differences in the liquidity characteristics of securities, expressed by the number of deals or the number of lots sold: theoretically, a situation is possible when a large number of lots will change possession within a single deal; in this case, a formally high liquidity assessment will be false. To level out this shortcoming, it seems justified to use the "*trading speed*" (average number of deals per minute) and the "*closing speed*" (time required to close a position),

Fig. 2. **Lot Prices Distribution Chart, MOEX-40 Constituents, As of 31 October 2022**

Source: Calculations and visualization made by the authors.

as implemented in Ali et al. [14] or Anagnostidis & Fontain [15].

The calculation procedure is described in *Table 1.*

To test the above arguments' validity, we estimate the dependence of several liquidity metrics (see *Table 1*) on the lot price using the MOEX-40 constituents trading data for the one trading day (31 October 2022).[1]

The daily number of lots sold changes inversely proportional to the lot price (see *Fig. 3a*), which is generally intuitive, but there are no statistical grounds to recognize such a correlation as significant (R^2 = 23%). The influence of the lot price on trading speed (*Fig. 3b*) is also not confirmed by the data, as is the influence of the lot price on closing speed (*Fig. 3d*). Notably, the closing speed of the most expensive lots is higher (takes less time) than that of several much cheaper lots.

Yet, the lot price influence on the average worth of the deal can be considered statistically significant (*Fig. 3c*), which is true for the data sample and subject to validity tests using a wider sample and/or longer time series.

Consequently, the lot price, despite its obvious simplicity of interpretation, does not demonstrate reliability in explaining the observed spread of the liquidity indicators' values. In other words, there are insufficient grounds to assert that "cheap = liquid", "cheap = easy to sell". This goes in contrast with Będowska-Sójka's findings regarding the emerging market correlations between various liquidity proxies [16].

On the other hand, the absence of correlation can be interpreted as follows: the lot price is independent of trading activity, thus **less biased towards behavioral factors**. Under certain conditions, this allows us to consider it as a **valid measure of securities' liquidity**.

The trading volume also shows no signs of statistically significant dependence on the lot price (see *Fig. 4a*). However, a statistically significant influence of the trading speed on the daily trading volume was established (*Fig. 4b*), which is generally comprehensive.

Therefore, the trading speed and its inverse characteristic — closing speed — can be used in further analysis as an indicator of liquidity (in the development of commonly agreed ideas denoted as "liquid = has a large trading volume").

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[1] Subject to further verification based on a wider sample and longer time series.

Liquidity Indicators of Securities

Indicators	Symbol	Formula
Trading volume	V	
Average price	P	
Number of deals	QD	
Lot size	LS	
Lot price	LP	P * LS
Trading volume per deal	VD	V / QD
Trading volume as the number of lots sold	VL	V / LP
Average deal size as the number of lots sold	LD	VL / QD
Average number of deals per minute, for 9-hour long trading session	QM	QD / 540
Average number of lots sold per minute, for 9-hour long trading session	N	VL / 540
Number of lots per 100,000 rubles	K	100 000 / LP
Closing speed per 100,000 rubles worth of lots held, seconds	T	60 * K / N

Source: Proposition introduced by the authors.

a) daily number of lots sold

b) trading speed, deals per minute

c) average worth of deal

d) closing speed

Fig. 3. **Scatterplot of Liquidity Metrics Against Lot Prices (Horizontal Axis), LN-Transformation Applied**
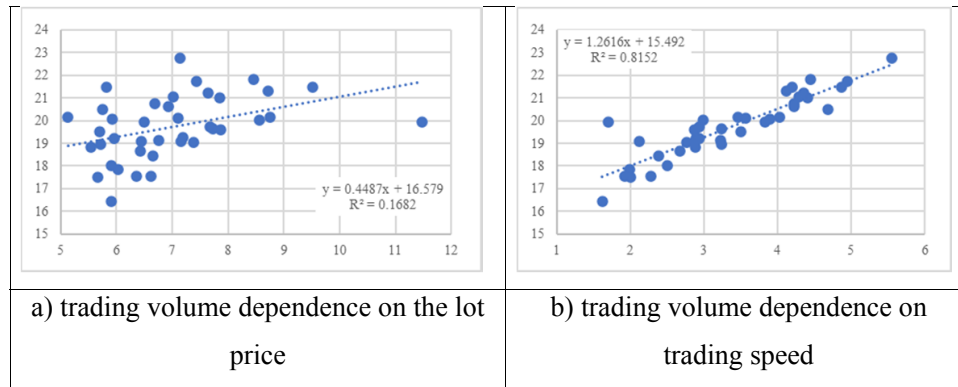*Source:* Calculations and visualization made by the authors.

| a) trading volume dependence on the lot price | b) trading volume dependence on trading speed |

Fig. 4. **Trading Volume Dependence on the Lot Price and Trading Speed, LN-Transformation Applied**
Source: Calculations and visualization made by the authors.

RESULTS AND DISCUSSION

We model the impact of the lot price and closing speed on a security's risk-return rank. Assume that an investor's primary selection of n best securities, based on a ranking of shares by yield and risk, will change if liquidity is implemented in the ranking methodology. To verify, we use MOEX-40 constituents' data as of 31 October 2022.

Four ranking options were calculated, in each of which the indicators used have equal weights:
- P1: yield and risk (standard deviation of yields);
- P2: yield, risk and affordability (LN-transformed lot price);
- P3: yield, risk and liquidity (LN-transformed closing speed);
- P4: yield, risk, affordability and liquidity.

The ranking methodology is based on the relative scaling of the values of the rated indicators according to the following:

$$S_{a,i} = w_1 S_{1,i} + w_2 S_{2,i} + \ldots + w_n S_{n,i} \; ; \; S_a \to \max;$$

$$S_{n,i} = 1 - \frac{(v_i - v_{min})}{(v_{max} - v_{min})}$$
или

For descending series (minimum value is considered best)

$$S_{n,i} = \frac{(v_i - v_{min})}{(v_{max} - v_{min})}$$

For ascending series (maximum value is considered best),

where Sa — total ranking score of an item i, $i \in [1; k]$; S_n — ranking score of an item i by an indicator n; w_n — weight of a ranking score Sn

as a fraction of $1 \sum_{j=1}^{n} w_j = 1$; v_i — value of an indicator for element i, $i \in [1; k]$.

The item having maximum value of Sa gets rank "1", and the minimum value — rank "k".

Since yield and standard deviation are relative indicators, there is no need to normalize their values: the sum of the scaled values of all items is 18.6 for the yield and 28.9 for the risk, which indicates that the scores are aligned relative to the conditional center (20 out of 40).

The spread of scores for the lot price and closing speed is shifted towards the maximum due to significant absolute differences between the maximum and minimum values (38.4 and 35.8, respectively). To level out the contribution of outliers to the spread of values on the relative scale, logarithms were used. As a result, the sum of scores for the lot price was 28.3, and for the closing speed — 20.6.

For the purposes of ranking, a historically weighted approach to calculating the yield was used: earlier values had less weight, while greater weight was assigned to the returns for the most recent period. Rank "1" corresponds to the highest yield.

Formalization follows:

$$R = 1 + 0,4 r_{2022} + 0,3 r_{2021} + 0,2 r_{2020} + 0,1 r_{2019} ,$$

$$r_y = \sqrt[12]{\prod_{m=1}^{12} r_m} ,$$

Table 2

Spearman's Rank Correlation Coefficients

Parameters	Yield	Risk	Lot price	Closing speed
Yield	1	0.271	−0.363	0.080
Risk	0.271	1	−0.137	−0.003
Lot price	−0.363	−0.137	1	−0.480
Closing speed	0.080	−0.003	−0.480	1

Source: Calculations made by the authors.

Table 3

Ranks of the Select Securities (Rank "1" Corresponds to the Highest Rank)

Feature	ISIN	Security	Rank with the model			
			P1	P2	P3	P4
Maximum yield*	RU 000A0JRKT8	PhosAgro, common stock	1	5	1	4
Minimum yield	JE 00B 6T5S 470	Polymetal	38	37	37	37
Most expensive lot	RU 0009091573	Transneft, pref. stock.	11	38	15	36
Cheapest lot	RU 000A0JP5V6	VTB, common stock	34	21	32	20
Most volatile	US 5603172082	VK Company Limited, GDR	40	40	40	40
Least volatile	RU 000A0JUG31	Moscow Credit Bank, common stock	3	2	4	1
Most liquid	RU 0009029540	Sberbank, common stock	32	30	7	8
Least liquid	US 5603172082	VK Company Limited, GDR	40	40	40	40

Source: Calculations made by the authors.

Note: * — Here and further in *Table 3* — as per the sample over the given period and using the methodology applied.

$$r_m = \frac{P_m}{P_{m-1}},$$

where R — historically weighted yield of an instrument; r_y — average yield of an instrument in the year y; r_m — monthly yield m; P_m — closing price in the last trading day of a month m.

The standard deviation of yields was obtained from the calculated rm values. Rank "1" corresponds to the minimum standard deviation.

The lot price for ranking purposes is calculated as the product of an instrument's closing price on 31 October 2022 and the size of its lot. Rank "1" corresponds to the minimum lot price.

The closing speed is also calculated based on the 31 October 2022 data using the methodology described in Table 1. Rank "1" corresponds to the minimum time required to close a position.

The weights, as well as the retrospective duration, can be changed and, presumably, do affect the final rank, which, however, is not the subject of this study.

The low correlation of the securities' ranks across the four indicators is noteworthy. Thus, the Spearman's rank correlation coefficient

Ranking Change Summary (Ratings P2 — P4 Compared to Rating P1)

Description	Lot price added (P2 − P1)	Closing speed added (P3 − P1)	Both lot price and closing speed added (P4 − P1)
Rank unchanged, number of instruments	2	3	5
Rank increased, number of instruments	22	17	18
Biggest increase of a rank, absolute rank change	13	25	25
Rank decreased, number of instruments	16	20	17
Biggest decrease of a rank, absolute rank change	27	22	25

Source: Calculations made by the authors.
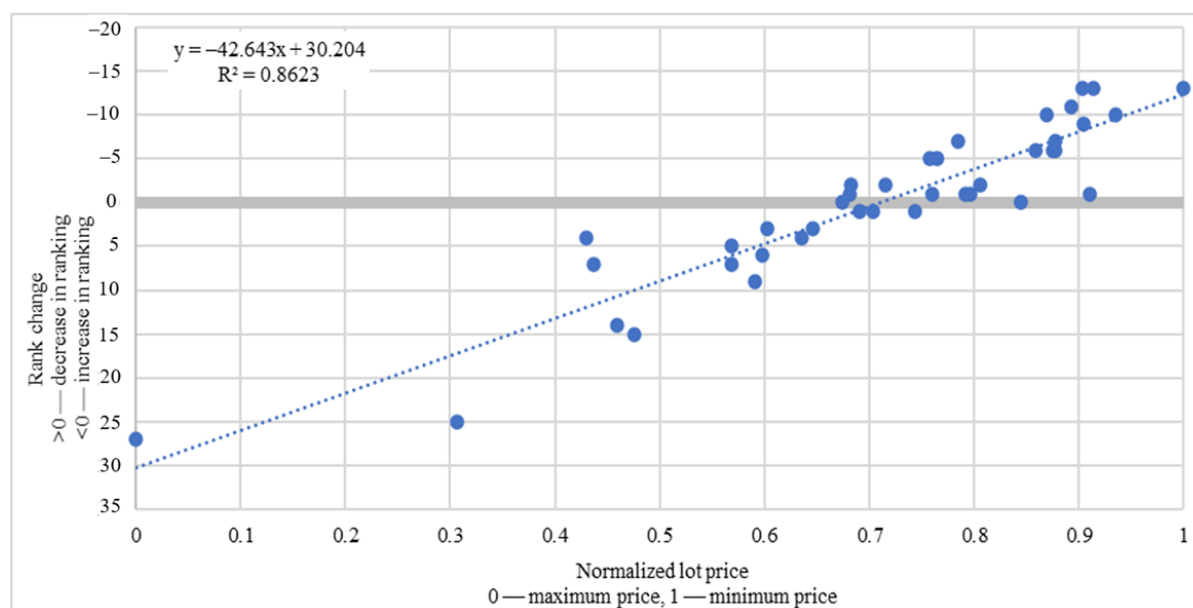
Fig. 5. **Scatterplot of Absolute Changes in Securities Ranks Depending on the Normalized Lot Price**
Source: Calculations and visualization made by the authors.

highest value (−0.48) is noted between the ranks of securities by the lot price and closing speed, which can be interpreted as partial confirmation of the seemingly obvious argument: what is cheaper is sold faster, — and as its refutation, since for more than half of the observations this conclusion does not apply. At the same time, the ranks by closing speed are not correlated with the ranks by yield and risk (see *Table 2*).

Analysis of the Spearman's rank correlation coefficients allows us to conclude that the ranks by the four indicators are not mutually determined. Consequently, the employed approach to ranking is valid in any combination

Spearman's Rank Correlation Coefficients

Rankings	P1	P2	P3	P4
P1	1	0.695	0.675	0.609
P2	0.695	1	0.321	0.681
P3	0.675	0.321	1	0.814
P4	0.609	0.681	0.814	1
Yield	0.763	0.534	0.580	0.542
SD of Yield (risk)	0.758	0.584	0.490	0.466
Lot price	−0.353	0.321	−0.535	−0.037
Closing speed	0.052	−0.216	0.674	0.490

Source: Calculations made by the authors.

of the indicators used (see rating models P1 — P4 above).

The P1 ranking will be used as the benchmark to assess an instrument's rank change if affordability and / or liquidity considered. Refer to *Table 3* for the select securities ranks across different characteristics.

It is obvious that adding the affordability and liquidity indicators to the ranking negatively affected the rank of the most profitable security, while its rank did not change when adding only the closing speed. The rank of the most expensive security (P1 = 11) predictably turned out to be very sensitive to the lot price (affordability), making it decrease to 38th place in P2. At the same time, this stock is quite liquid, so its rank in P3 did not decrease significantly — by only 4 positions. However, in a combination of availability and liquidity, the former, taking into account the equality of weights, undermines the support from liquidity, as a result of which the rank of this instrument decreases to 36th place.

We see that adding the affordability and liquidity indicators to the ranking benefits the lowest lot price securities (for example, ordinary shares of VTB) and the fastest-to-sell ones (for example, ordinary shares of Sberbank): the first moved up in the ranking by 14 positions, the second — by 24 positions. See *Table 4* for aggregate data on rank changes.

Obviously, consideration of affordability has a significant impact on a security's risk-and-return rank: as the lot price decreases (affordability increases), the rank increases (see *Fig. 5*).

The pattern of risk-and-return rank changes in the case of adding the "closing speed" parameter is generally the same.

The calculated values of the Spearman's rank correlation coefficients (see *Table 5*) indicate that the correlation of the ranks under P1 and the "lot price", as well as P3 and the "lot price" is negative, and in the second case, it is significant. That is, as the rank value by the lot price increases, the risk-and-return rank decreases.

CONCLUDING REMARKS

Thus, it has been empirically proven that cheaper and more liquid securities will rise in the risk-and-return ranking above the expensive lots, taking into account their affordability for a retail investor. On the contrary, securities that are characterized by more expensive lots will fall in the risk-and-return ranking much more dynamically, taking into account their lower affordability for retail investors.

Consequently, the ranking of securities by yield, risk, affordability, and liquidity indicators is an effective tool for comparative assessment of the investment attractiveness of the listed securities: for a quasi-rational investor, the place

of a security in the ranking is a reliable guide for determining the composition of a portfolio; for a portfolio manager and for an issuer, it is an indicator of which security a retail investor is most likely to buy, and, finally, for academia — a contribution to the explanation of managers' behavior, as denoted by Nikiforow [17].

Taking into account the principles of behavioral finance theory, the approach to comparative ranking of securities will allow us to explain with greater reliability the reasons for the greater or lesser popularity of certain securities among investors, to explain their choice, and to formalize the decision-making process in conditions of obvious differences — one of the tasks developed by Schiller [18]. Having an integral characteristic of risk-return-liquidity, a retail investor, rational and irrational, will be guided by liquidity data, comparing two or more securities in the case of an exceptional choice. After due verification, the approach substantiated in this work can be used as a basis for value management strategies on the issuer's side.

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Sustainability of Trends in Credit and Savings Behavior of the Russian Population

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ABSTRACT

In the context of artificial restrictions on Russia's access to world financial markets, the importance of internal factors for ensuring the dynamic development of the national economy, including temporarily free funds of the population placed in bank deposits, is significantly increasing. In this regard, it is important to identify how stable the trends in credit and savings behavior of the Russian population are, which determines the **relevance** of the research topic. The **purpose** of the paper is to identify trends in the credit and savings behavior of the Russian population in order to formalize the explanatory factors for its assessment. In the course of the work, **methods** of literature analysis, abstraction and aggregation, graphical comparison, index calculation, correlation analysis were used. The **results** of the study in terms of the development of the theory of financial behavior of the population consist of the development of an approach to identifying long-term behavioral trends based on information on the volume of debt on loans and deposits of the population for the period 2011–2024. Practical results are: periodization of active and passive behavior of depositors and borrowers; identification of phases of changes in savings and credit behavior of the population; calculation of limit boundaries of corridors within which they were formed. An empirical study based on the developed theoretical approach made it possible to draw conclusions about the presence of stable trends in the savings and credit behavior of the Russian population during this period, which mainly demonstrates a long-term active growth in the volume of deposits and debt on loans, as well as the relative narrowness of the corridors within which both indicators developed. The population of Russia adheres to an adaptive type of both types of behavior. At the same time, the stability of savings behavior is more pronounced than credit behavior, which can be explained by the greater rigidity of the population to the factor of experiencing the status of the depositor than to experiencing the status of the debtor.

Keywords: deposits of the population; debt on loans of the population; perspective theory; relative income hypothesis; savings behavior; credit behavior

INTRODUCTION

In the current situation in Russia, the importance of the financial behavior of the population is increasing, which, under the conditions of restrictions on external financial markets, is capable of maintaining a high level of final consumption and, by showing a tendency to save money in bank deposits, providing financial resources for the national economy. Financial behavior in this case can be interpreted in two ways: as various types of financial activities of citizens; as the activities of people in obtaining, spending, and otherwise using monetary funds, aimed at achieving different goals [1, p. 202]. At the same time, the paper [2, p. 120] rightly emphasizes that the saving behavior of the population is not only about meeting the long-term needs of individuals but also about increasing the country's investment potential and economic growth. The current conditions of the country's economy significantly depend on people's behavior in choosing between current consumption and saving, which, when scaled to the entire population, undergoes a certain synergistic transformation. The priority of consumption directly affects the current rates of economic growth, further fueled by the population's willingness to take out loans. In the case of choosing a saving behavior, there is a possibility of relying on delayed economic growth, as the banking system will sooner or later redistribute the population's deposits into loans for businesses, which, in turn, will ensure an increase in the production of goods, works, and services.

This generally understandable mechanism requires precise tuning by monetary authorities, which can be carried out if there is confidence in the stability of trends in the behavior of the population in the deposit and credit markets. According to G. Katona [3], psychological factors can even reverse the course of the business cycle if a large group of people simultaneously changes their behavior, deciding to spend or, conversely, save their funds, thereby influencing macroeconomic processes. The problem is that the parameters of this stability are largely determined not by economic, but by psychological factors. The psychological characteristics of a person's perception of financial categories are shown in paper [4], where it is rightly noted that unlike economists, people understand and calculate savings differently, and also make saving decisions differently. For example, payments on consumer loans and debts, which are included in savings in economic models with a negative sign, are considered by respondents more as consumption. When making purchases on credit, households are essentially making a choice between the decision to buy or not to buy, while economists focus on the formal side, considering it a decision to borrow money [4, p. 158].

FEATURES OF THE CREDIT AND SAVINGS BEHAVIOR OF THE POPULATION

One of the first to pay attention to the importance of human psychology in relation to economic decisions was G. Tarde [5], who, by introducing the term "economic psychology" into scientific discourse, rightly noted that a person should be considered a social being capable of interaction, which ultimately shapes the economy. However, while economic psychology places special emphasis on the internal motivation of acting subjects when studying individuals' financial behavior, psychological approaches highlight the importance of emotions and personality traits in choosing a model of financial behavior [6, p. 60]. The synthesis of economic and psychological approaches to the study of human financial behavior is further complicated by the fact that "... in trying to describe the same situation, economics and psychology are in different "realities" precisely because their languages,

being different sciences, "re-construct" (reflect) different "realities" [7, p. 44].

The next significant step in this direction was made by J. M. Keynes, according to the textbook assertion that the behavior of the population in choosing between current consumption and savings is influenced by many factors:

• price-related, when the change in the cost of individual products directly affects the amount of money spent;

• factors of expectations, when a person psychologically prepares themselves for a depression in the economic environment and adjusts their spending style;

• credit — in case of the possibility to easily take a loan if necessary and increase your expenses.

At the same time, we cannot ignore the stages of the human life cycle formulated by F. Modigliani [8]. In this case, the role of savings and loans should be considered as ways to redistribute funds throughout life (between periods of higher and lower income). As individuals progress through the stages of the life cycle, their ability to save periodically decreases and increases. For example, the arrival of children leads to a forced decrease in interest in saving behavior, but as they grow up, it increases again, reaching its peak in the pre-retirement age [9, p. 139]. In the paper [10, p. 135], it is shown that, for example, teenagers' attitude towards money is characterized by a desire to get rich, while the parent generation sees money as a means to get rid of many everyday problems, providing confidence and independence. For elderly people, money is an opportunity to live their lives quietly and peacefully, while helping others. Here, we can expect the saving behavior of the population who have reached adulthood and old age to be active. The marginal propensities to consume and to save depend on both objective and subjective psychological factors. Among the subjective factors motivating household savings, J. M. Keynes identified caution (the

desire to create a reserve for unforeseen circumstances), prudence (setting aside money for retirement and providing education for children in the future), calculation (earning interest on deposits), striving for betterment (improving one's standard of living in the future), independence (having enough money in the future to make independent decisions), enterprise (accumulating enough money to engage in commercial and speculative operations), pride (the desire to leave a fortune to heirs), and stinginess (a bias against spending money) [11, p. 308].

This problem is exacerbated by the static nature of a person's perception of their financial situation. Back in the mid-20th century, J. Duesenberry [12] attempted to explain the predominance of consumer behavior over saving behavior with his relative income hypothesis, where an individual's consumption depends not only on their income but also on their social status and the maximum income they have previously achieved. It is difficult for a person to reduce their consumption if their status and environment push them towards it. On the other hand, he fears a decrease in his wealth in the future and is forced to reduce such consumption in the interest of saving. However, while this psychological mechanism becomes generally understandable, its empirical justification poses difficulties. Traditional population surveys prove to be of little use, as people tend to embellish or downplay their financial situation.[1]

This shortcoming was partially overcome by D. Kahneman and A. Tversky [13], according to whose theory, if the pleasure an individual derives from a gain is usually much weaker than their distress in the case of a loss, their

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[1] In particular, according to the results of a nationwide survey conducted by the NAFI Analytical Center in August 2023, only 10% of families in Russia indicated that they have savings to maintain their current consumption for 6 months or more without borrowing. URL: https://www.kommersant.ru/doc/6199669?query=инфографика (accessed on 08.09.2023).

behavior will deviate from that predicted by the theory of rational expectations [14]. Such statements are valid concerning the issue we are examining, when a certain person experiences distress due to the activation of their current consumption (exacerbated by the fact that they are using expensive bank loans for this purpose) because they could not refrain from these expenditures in favor of savings. However, this may also be true in the opposite case, when another person will be upset due to the need to limit their current consumption because they are focusing their attention on saving money.

Taking into account the significant contribution to the study of various aspects of human economic behavior made by T. Schelling [15], R. Shiller [16], and J. Akerlof [17], later R. Thaler [18] attempted to explain why it is difficult for a person to give up their current consumption in favor of future opportunities formed by savings, even considering the pleasure from receiving interest. In particular, G. Akerlof and R. Shiller identified five main manifestations of the irrational element in the process of making financial decisions: trust, a sense of fairness, dishonesty, money illusion, and susceptibility to stories [19, p. 192]. Experiments in this area, conducted on foreign empirical data, have shown that the satisfaction of today's desires is much more attractive than the satisfaction of those that a person has yet to imagine in the future. Evaluating similar manifestations of economic psychology in relation to the credit and savings behavior of the Russian population is an important scientific task, alongside the classification of types of financial behavior.

Thus, in the paper [20, p. 90], three types are proposed: active, when subjects analyze emerging opportunities and take active actions; adaptive, when they observe changes in the external environment and take actions aimed at preserving their capital and income; reactive, when subjects, in most cases, do not take active actions or take them

untimely. These types of behavior correspond to groups of credit service consumers [21, p. 142]: consumers of aggressive, deviant[2] or adaptive behavior.

In addition, the range of factors that are important for a person to implement their financial behavior strategies includes [22, pp. 163–164]: the availability of financial infrastructure; the variety of banking services; changes in the monetary policy of the central bank; the protection of individuals from fraudulent activities, etc. Many authors emphasize the importance of financial literacy. Thus, in the paper [23, p. 163], the validity of the hypothesis about the objective basis for self-assessment of financial literacy (the financial knowledge and skills possessed by a person) and the existence of a relationship between such self-assessment and the level of their income has been proven. In the paper [24], gender differences in terms of investment behavior and financial literacy levels are analyzed as two areas where discrepancies between men and women are most noticeable (both in Russia and abroad). A comprehensive review of the literature on the characteristics of human financial behavior, conducted in the work [25, p. 149], shows that for different countries [26, p. 788] and peoples, there is a connection between financial behavior and cognitive abilities; optimism; levels of self-control and self-confidence; propensity for risk and extravagance. The concept of "financial self-control" has a purely psychological basis, as it represents a set of efforts aimed at interrupting, weakening, maintaining, or strengthening actions, thoughts, and emotions in saving or borrowing situations [27, p. 73]. For more details on the nature of consumer behavior in the format of ostentatious wastefulness, see [28].

The characterization of the financial behavior of Russians would be incomplete without

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[2] A very common type of behavior among members of the noble class in Russia from the second half of the 18th century to the early 20th century.

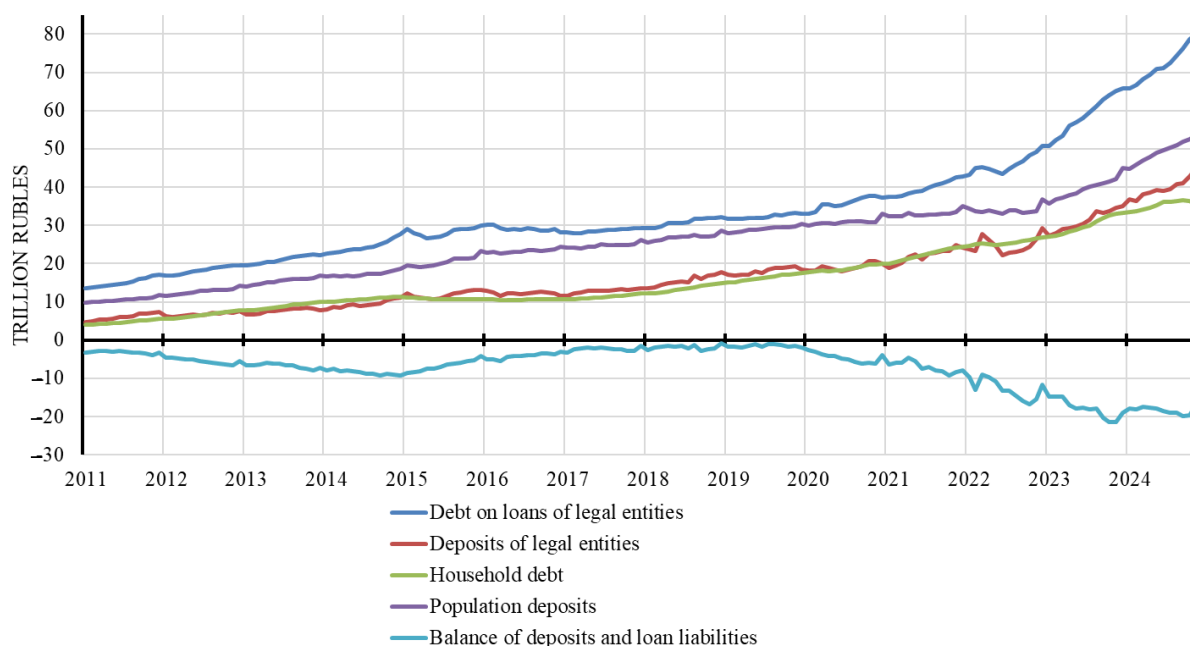*Fig. 1.* **Dynamics of the Main Parameters Reflecting the Savings and Credit Behavior of the Population and Business, Trillion Rubles**

Source: Compiled by the author according to the data from the Central Bank of the Russian Federation (accessed on 22.01.2025).

considering a number of circumstances from recent history, noted in the works [29, pp. 35–36; 30, p. 66], namely: multiple devaluations of savings; changes to the "rules of the game" during the "game", including examples of freezing the mandatory funded part of pensions; maintaining a high level of paternalistic expectations from the state; a high level of financial passivity, a lack of skills in using active practices in this area, and a low level of trust in major financial institutions.

To a large extent, this characteristic of the financial behavior of Russian households is explained [31, p. 165] by the fact that the overwhelming majority of them experience a significant income deficit relative to the level that would ensure a standard of living corresponding to the population's expectations. At the same time, the work [32, pp. 94, 95] emphasizes that households without savings but with loans and debts represent a very heterogeneous group, which includes both low- and high-income families.

Evaluating the level of development of this issue in domestic and foreign scientific literature, it should be agreed that, despite the multitude and high scientific value of the research results, it is still difficult to form a complete understanding of the decision-making processes of individual subjects regarding their deposits or loans, and even more so, of the complex mechanism of their collective interaction.

TRENDS IN CREDIT AND SAVINGS BEHAVIOR OF THE POPULATION OF RUSSIA

Despite the fact that a comprehensive examination of the combination of saving and borrowing behavior of the population has not attracted much attention from researchers, it can help identify stable behavioral trends that characterize the degree of readiness of Russians to actively engage with the national banking sector both as borrowers and as depositors. Rephrasing the expression of J. Baudrillard [33, p. 121], let us assume that deposit and credit operations are not only the guarantee of the prosperity of the banking system but can also be considered as the
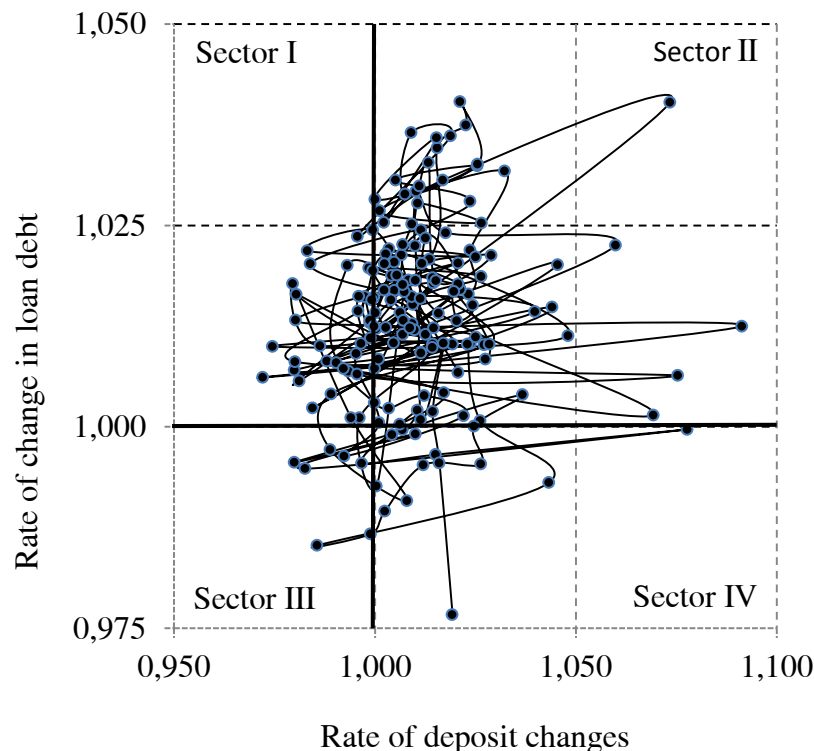
Fig. 2. **Diagram of Dispersion of the Change in the Volume of Debt on Loans and the Volume of Deposits of the Population**

Source: Compiled by the author.

work of the population to service it. Even the well-known statement of A. Smith [34, p. 28], adapted to the issue under study, sounds quite relevant: we do not expect economic growth in the country from the benevolence of the depositor or creditor, but from their adherence to their own interests.

The advantage of considering the combination of credit and savings behavior using absolute financial indicators, as opposed to attempts to characterize the behavior of masses of borrowers and depositors based on surveys or questionnaires of individuals, lies in the higher level of objectivity of the obtained results. Aggregate indicators do not claim to characterize the entire palette of psychological experiences possessed by each individual, but they are capable of showing the actual embodiment of practical actions of the entire population involved in credit and deposit operations.

The first illustration of such a thesis is the dynamics of deposit and credit operations in

the banking system of Russia, which tend to increase the aggregate negative balance (*Fig. 1*). In recent years, its size has been growing, indicating a shortage of funds that shape the space for implementing credit and savings behavior not only for the population but also for the business sector.

By now, it can be noted that there is a lack of activity among the population in terms of implementing their saving behavior. This is likely due to the relatively low share of interest income in the overall income of the population.[3]

To identify behavioral trends at the next stage, monthly changes in loan debt volumes

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[3] According to the balance of monetary income, expenses, and savings of the population of Russia, the interest accrued on monetary funds in the bank accounts of individuals in credit organizations in 2021 amounted to only 1.28% of the total income. At the same time, the share of interest paid by the population on loans (including foreign currency loans) provided by credit organizations is significantly higher, namely 3.78% of the total income.

Table

Minimum and Maximum Parameters of Changes in Debt on Loans and Deposits of the Population

Indicator	At least	Date	At most	Date	Range
Change in loan debt	0.977	01.12.2024	1.040	01.01.2012	0.064
Change in deposit liabilities	0.972	01.02.2023	1.091	01.01.2023	0.119

Source: Compiled by the author.

and deposit volumes from February 2011 to December 2024 were determined using the index method (*Fig. 2*).

Chaotic, at first glance, the distribution of points has patterns. First of all, it is the relative narrowness of the boundaries within which the fluctuation of the analyzed ratio occurs (*Table*).

The simple following of the population's private savings and credit interests has a systemic nature. The range of fluctuations in loan debt changes is only 0.064. At the same time, the range of fluctuations in deposits is almost twice as wide.

Secondly, the division of the plane in *Fig. 2* relative to the point with coordinates (1,000; 1,000) allows for the identification of 4 sectors with periods of different population behavior:

Sector I is characterized by a predominance of credit behavior (index greater than 1) while savings behavior is suppressed (less than 1). This sector of borrower activity was observed in 38 months (23.0% of the entire study period);

Sector II — here, the population demonstrated growth in both the amount of loan debt and the volume of deposit operations. This sector of overall activity includes 108 months (65.5%);

Sector III — the inhibition of both indicators is recorded. This sector of overall passivity of both forms of behavior has formed over just 7 months (4.2%);

Sector IV — savings behavior predominates (index greater than 1) while credit behavior is restrained (less than 1). This sector of depositors' activity spans 12 months (7.3%).

Taking into account the significant prevalence of behavior characteristic of Sector II of general activity, one can assume a high degree of readiness among Russians to accept both types of experiences: both as debtors and as depositors. This, in turn, indicates the formation of a certain habitus among specific segments of the population, manifested in a stereotypical reaction to events that influence the change of these statuses. Understanding action in terms of consciousness and intention, states P. Bourdieu [36], should be replaced with understanding in terms of predispositions and habitus — the collective individual, stable, constant, and relatively systematic predispositions of the agent towards the social world. Experiences related to obtaining a loan or deposit in a bank are dulled, making the individual less susceptible to them, while in its entirety, the behavior of the entire country's population becomes more inclined to interact with the national banking sector.

At the second stage of the study, the main focus was on the absolute indicators of loan debt volumes and deposit volumes. This allowed for the construction of a scatter plot (*Fig. 3*) and the periodization of the main preferences of the population based on it.
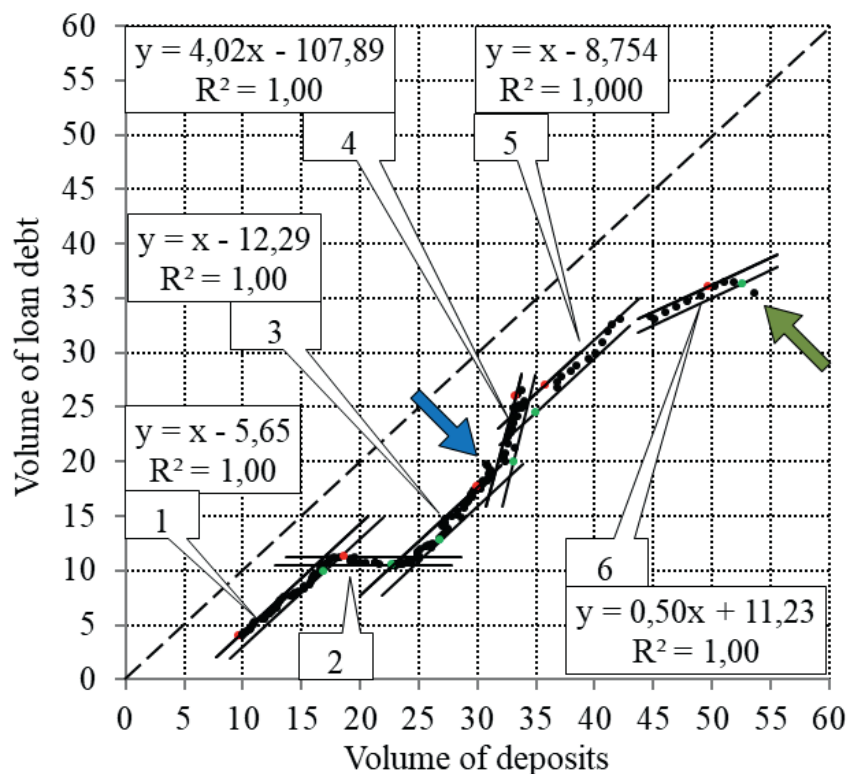
Fig. 3. **Diagram of the Dissipation of the Volume of Debt to Loans and the Volume of Deposits of the Population, Trillion Rubles**

Source: Author calculations.

Using the data visualization method applied by us in work [37], the figure shows the trajectory of changes in both volumes from January 2011 to December 2024 with points. It is evident that the entire ensemble of data is located below the equality line, as the debt volumes are significantly lower than the deposit volumes, but overall, the distribution of points is non-random. Thus, in certain periods, a linear trajectory of the ratio between the volume of loan debt and the volume of household deposits is observed, which is confirmed by the maximum possible value of the coefficient of determination $R^2 = 1.00$. Such stability allows for the identification of 6 phases of population behavior.

Phase 1. Growth in the volume of loan and deposit debt (from 2011 to 2014). Here, movement parallel to the equality line is observed, indicating proportional growth, where for every 1 ruble of credit issued, the

banking system attracted 1 ruble of deposits. The relative narrowness of the corridor within which the trend of this phase developed (0.963 trillion rubles) is noteworthy. This can be considered a phase of stability, which ensured an equal spread of interest in exhibiting credit and savings behavior among the population of Russia. At the same time, the volume of deposits outpaced the volume of debt by more than 5 trillion rubles, which corresponds to the free term parameter in the equation of the pair linear regression for this phase (*Fig. 1*).

Phase 2. Growth in deposit volumes amid stagnation in loan debt volumes (end of 2014 — end of 2016). During this period, credit behavior lost its attractiveness, as loan debt volumes practically did not change, while deposits continued to grow at a previously established stable pace. At the same time, the corridor within which the dynamics of the period developed narrowed to 0.776 trillion rubles. During this period, the appetite for

loans temporarily left the Russians, which was due to external factors relative to their psychology, namely, the financial crisis and the prolonged exit from it. As a result, this led not only to a dynamic increase in deposit volumes over the volume of household loan debt but also to a significant reduction in the negative balance of deposit and credit operations across the entire banking sector of the country (*Fig. 1*). In other words, the behavior of the population contributed to (and perhaps became the guarantee of) the overall financial and economic stabilization during that period.

Phase 3. Return to the trajectory of proportional growth of both volumes, characteristic of phase 1 (end of 2016 — mid-2020). The width of the corridor increased to 1.268 trillion rubles. At the end of this period, an anomaly arose (indicated by the blue arrow in *Fig. 3*), when a number of debt indicators exceeded the upper limit of this corridor. Such indicators were recorded in only four months — from August to November 2020 (coinciding with the active phase of the financial confrontation of the pandemic, including "helicopter" money). This could potentially have become the basis for a new vertical trend, where the growth of debt would be accompanied by a complete halt in the growth of deposits, but this did not happen. On average, the volume of household deposits surpassed the volume of loan debt by more than 12 trillion rubles, which still did not help ensure overall balance, as the negative balance of deposit and credit operations continued to increase (*Fig. 1*). This could have been prevented by a more attentive approach from the regulator and the banking sector as a whole to both types of household behavior by stimulating interest in deposit operations relative to credit ones, but this did not happen.

Phase 4. Significant increase in loan debt volumes relative to deposit growth (early 2021 — late 2022). The trend during this period approached a vertical position but did not fully adopt it, despite the general and quite sharp increase in the population's appetite for credit behavior. Interestingly, the width of the corridor remained virtually unchanged, amounting to 1.258 trillion rubles.

Phase 5. The next period once again demonstrates a return to the trajectory of proportional growth of both volumes (throughout 2023), characteristic of Phases 1 and 3. The width of the corridor has slightly narrowed to 1.198 trillion rubles. Since among the 5 identified Phases, 3 phases have a similar trajectory of proportional distribution of deposit volumes and loan debt volumes, such a combination of both types of behavior of the Russian population can be considered predominant.

Phase 6. The latest observed period shows a return to the trajectory of disproportionate linear growth of both volumes (up to December 2024) with a leading pace of deposits. The width of the corridor has once again narrowed to 1.060 trillion rubles. The indicators on 1 December 2024, marked by a green arrow in *Fig. 3,* again demonstrate an anomaly, which may indicate either the beginning of a new phase or a random data outlier regarding the reduction of household debt on loans.

The recurrence of phases and the relative and stable narrowness of corridors in all phases suggest the presence of objective conditions under which both credit and savings behavior of the population of Russia are formed. Despite the multitude of subjects taking on credit or entrusting their money to banks, they, unaware of each other's behavior, are capable of acting "in concert" for extended periods of time. As these objective conditions change, the ratio between the two types of behavior shifts, leading to an increase or decrease in interest in loans or deposits. Considering that at a specific moment in time, both types of behavior are exhibited by different people,[4] these patterns reveal the

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[4] Generally, a person with free funds who is considering placing them in a bank deposit does not think about taking out a loan. It is hard to imagine the opposite situation, where a person

essence of the aforementioned phenomenon of "collective individualism".

CONCLUSION

Despite the variety of factors that determine people's financial behavior, several conclusions can be drawn:

• there are stable trends in the savings and credit behavior of the Russian population during the period from 2011 to 2024, predominantly demonstrating long-term active growth in the volumes of deposits and loan debts, as well as the relative narrowness of the corridors within which the dynamics of both indicators developed;

• this allows characterizing the behavior of the population of Russia within the framework of the multi-factor influence model proposed by J. M. Keynes, with a priority on the expectation factor, when a person psychologically prepares themselves for a depression in the economic environment and adjusts their spending style, using the availability of credit;

• according to the author, the population of Russia adheres to an adaptive type of both behaviors, refraining from drastic steps characteristic of reactive or deviant behavior. In the six identified phases of the evolution of deposit volumes and loan debt volumes, three phases exhibit the same trajectory of proportional growth for both indicators. However, during periods of destabilization, the country's population is capable of responding adequately, demonstrating readiness for sharp turns in their credit behavior both towards deceleration and acceleration;

• the stability of saving behavior is more pronounced compared to borrowing behavior, which can be explained by the greater rigidity of the population regarding the experience of being a depositor than the experience of being a debtor. However, in recent years, the appetite for borrowing among the Russian population has increased significantly. In this regard, N.E. Tikhonova's assertion [38, p. 23] that radical changes in the lifestyle and daily life of Russians will inevitably lead to a qualitative change in the psychology of the population regarding saving and borrowing behavior seems overly optimistic;

• the prevalence of directly proportional trends in the combination of deposit volumes and loan debt may indirectly prove the existence of behavior among Russians described by J. Duesenberry within the framework of the relative income hypothesis. The population fears a decline in their future wealth and quickly shifts to a consumption reduction model in favor of increasing savings.

In this context, the presented scientific research makes both a theoretical and practical contribution to the process of understanding the place and role of the population in ensuring the stability of the national economy in the new geopolitical realities. The scientific results may be in demand by regulators when making decisions to stimulate (or de-stimulate) the credit or savings behavior of the population during the described phases by manipulating the key interest rate, implementing macroprudential measures, and so on. Moreover, the proposed method of identifying periods in the typology of the four sectors allows for the development of specific measures to change the situation with the volumes of deposits and loan debts in order to alter the trend of their decline or growth depending on the priorities of monetary policy.

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taking out a loan would be contemplating a bank deposit. Over time, they may switch between these types of behavior depending on whether they are experiencing a shortage or surplus of free funds.

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Strategic Approach to Monitoring the Risk Resilience and Financial Security of Companies in the Passenger Air Transport Industry

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ABSTRACT

The **relevance** of the study is due to the social significance of the Russian passenger air transportation industry, its high exposure to complex risks due to the sanctions policy of unfriendly countries, the turbulence and uncertainty of existing risk factors, the need for state regulation and control over the functioning of companies in the industry, as well as the lack of an effective system for monitoring its sustainable development. In 2022, the Government of the Russian Federation approved a comprehensive program for the development of the aviation industry in the Russian Federation until 2030. In this regard, the **purpose** of the study was to develop a strategic approach to monitoring the risk tolerance of companies in the passenger air transportation industry based on a comprehensive analytical toolkit that provides a vector definition of strategic indicators of their sustainable development. The **scientific novelty** of the proposed strategic approach lies in the development of a business analysis algorithm as a sequence of analytical procedures that make it possible to form a sustainable development strategy, as well as monitor the risk tolerance and financial security of companies in the passenger air transportation industry. The strategic approach includes three logically connected stages: sectoral-industry analysis, identification of risk factors and assessment of their impact on the company using improved methods of strategic analysis; formation of a target matrix of the company's competitive advantages, focused on a stakeholder approach to sustainable development; definition of a system of strategic indicators for monitoring the risk tolerance of the company. The **theoretical significance** of the study lies in the development and adaptation of the industry analysis methodology to the specifics and needs of the passenger air transportation industry for its sustainable development in a highly turbulent economy. The improved tools of strategic analysis, focused on a balanced assessment and differentiated accounting of risk factors affecting the industry and a particular company, the complexity of their impact, as well as increasing the feasibility of a sustainable development strategy, have **practical significance**. The results may be useful for key stakeholders of airlines, including the Federal Air Transport Agency, in order to minimize the risks of implementing a comprehensive program for the development of the aviation industry, as well as monitoring information on the state of financial security of socially significant companies.

Keywords: sustainable development; financial security; strategic analysis; stakeholder approach; industry of passenger air transportation; monitoring; strategic approach; competitive advantages; sanctions; risk factors

INTRODUCTION

The aviation industry of Russia, including activities in the field of passenger air transportation, is considered a socially significant and priority sector of the country's state policy, as confirmed by the comprehensive program for the development of the aviation industry of the Russian Federation until 2030, adopted by the Government of the Russian Federation in 2022. However, high geopolitical risks and growing uncertainty are influencing the sustainable development of socially significant sectors of the economy, as indicated by Russian scientists V.V. Ivanter and others in their papers [1]. In the context of the pandemic and sanctions from unfriendly countries, the passenger air transportation industry has proven to be highly vulnerable, subject to numerous risks due to extremely high turbulence and uncertainty of the existing risk factors. This requires state support and control over the functioning of industry companies [2], as well as increases the importance of analytical tools for risk monitoring, diagnosis, and mitigation of threats to the financial interests of companies and their key stakeholders. For sustainable growth, Russian businesses need to continuously adapt and address emerging issues to ensure their financial security.

Research by O.S. Sukharev [3] demonstrates that the fundamental tool for developing a sustainable economic development strategy, including the construction of an "investment function dependent on changes in risk, return (profitability), and sectoral technology", is sectoral analysis. Russian scientists S. Yu. Glazyev [4], Yu. M. Tsygalov [5], V.G. Kogdenko [6], M.A. Fedotova, O.V. Loseva, I.V. Kosorukova, et al. [7], as well as foreign authors M. Reeves, S. Levin, D. Weda consider it important to take into account industry risks and factors of innovative development that affect the level of profitability, competitiveness, and efficiency of business. Innovative development is an integral factor for

sustainable economic growth, as it generates technological knowledge and scientific-industrial potential, the development of which should be ensured by state policy [4]. Among industry factors, sustainable development risks play a significant role, representing a consolidation of legal and reputational risk factors that are highly likely to transform into financial security risks.

The analysis of financial security and sustainable development indicators in various sectors of the economy, at different levels of management, as well as in relation to industry risks, is presented in the studies by D.D. Burkaltsova et al. [8]. In the works of I.M. Lukasevich and N.A. L'vova [9], approaches to forecasting financial security at the micro level as potential company bankruptcies using the Moscow Exchange Stock Indices (MOEXBMI) are critically evaluated, based on an empirical sample of two companies in the passenger air transportation industry.

In most studies, the sources for monitoring the financial security and sustainable development of companies are typically object-based financial reporting data, aggregated and processed using digital technologies, which is clearly insufficient, as indicated by foreign authors J. Grewal et al. [10], as well as Russian scholars O.V. Efimova [11], O.V. Rozhnova [12]. They focus on the indicators of sustainable business development from the perspective of risks disclosed in corporate reporting, which also allows for the consideration of the quality of risk management: how the organization identifies, analyzes, and manages sustainable development risks. According to M.V. Melnik [13], risk resilience, stability, and financial security in corporate business also largely depend on the effectiveness of financial management.

In our opinion, the key tool for managing the risks of a company›s financial security in the long term is strategic analysis, the development of a sustainable development strategy, continuous monitoring of its implementation, and readjustment based on the analysis of the

external and internal environment, taking into account the results of industry analysis. Therefore, in our study, the financial security of the company is included as a criterion for assessing the sustainability of the company's development as the management's ability to manage business risks that affect financial viability and ensure the company's stability in the long term [14].

Thus, the **purpose of the study** is to develop a strategic approach to monitoring the risk resilience of companies in the passenger air transport industry based on a comprehensive analytical toolkit that ensures the vector definition of strategic indicators of their sustainable development.

RESEARCH METHODOLOGY

The proposed strategic approach to monitoring the risk resilience of companies in the passenger air transport industry includes a set of three logically connected stages: sectoral and industry analysis, assessment of the state of the passenger air transport industry, identification of key risk factors under sanctions; development of a target matrix for forming the company's competitive advantage, oriented towards a strategic stakeholder approach to sustainable development; definition of a system of strategic indicators for monitoring the company's risk resilience. The stages are implemented based on a comprehensive analytical toolkit that ensures the vector-based determination of strategic indicators for monitoring the risk resilience and financial security of industry companies.

The first stage involves identifying risk factors for the sustainable development of the company based on sectoral analysis. Understanding and classifying risks associated with a specific sector of the economy allows for proper diagnosis, analysis, evaluation, control, and forecasting of risks, which in turn ensures effective management of them. The assessment of the stability of an organization's activities directly depends on

the state and trends in the industry and the market, which serve as the primary platform for the company's operations. Identification of risk factors and assessment of their impact on industry companies are conducted based on the PESTEL method, the choice of which is justified by the significance and consideration of the impact of environmental risks on the business environment, including compliance analysis of adherence to industry standards.

At the second stage, the identification and assessment of the compay's strengths (core competencies) are conducted in the following areas: overall strategy, management system, finance, marketing, human resources, technology, corporate culture, product. At the same time, the capabilities of the classic SWOT analysis are quite limited due to the lack of quantitative assessment of the impact of risks on the company's sustainability and financial security. In this regard, this approach was improved using the Quality Function Deployment (QFD) matrix, which allows for a quantitative assessment of the relationship between the company's strengths and weaknesses with its opportunities and threats, and on this basis, to determine the vector directions for the company's development aimed at enhancing financial security and risk resilience.

The third stage develops strategic risk resilience indicators for monitoring the sustainable development of industry companies.

The business analysis algorithm as a sequence of analytical procedures that allows for the formation of a sustainable development strategy, as well as monitoring the risk resilience and financial security of companies in the passenger air transport industry, is presented in *Fig. 1*.

Thus, the use of advanced analytical tools within a strategic approach to monitoring the risk resilience of companies in the passenger air transport industry allows for the identification of sectoral and industry-specific risk factors (threats) and success factors that can most
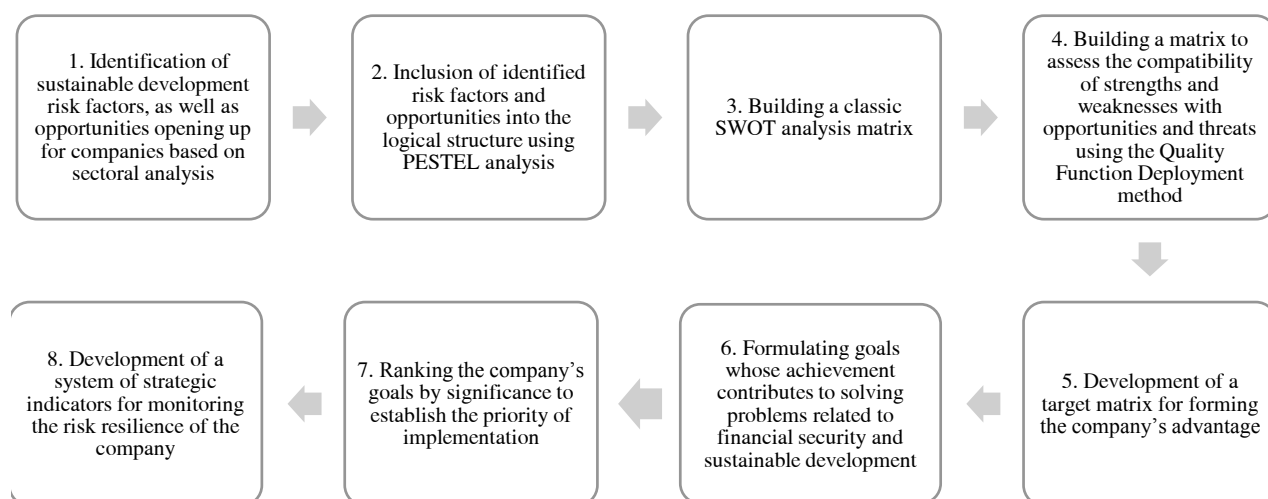
Fig. 1. **Business Analysis Algorithm: a Strategic Approach to Company Sustainability**
Source: Compiled by the authors.

significantly impact the company's operations, as well as enables a more effective strategic analysis, the development or adjustment of the company's development strategy to enhance its financial security and risk resilience.

RESEARCH RESULTS

Sectoral and industry analysis, assessment of the state of the passenger air transport industry. Identification of key risk factors under sanctions.

According to the established concept of sectoral economy by K. Clark [15], the passenger air transportation industry belongs to the tertiary sector of the economy. Its development is complicated by the impact of COVID-19-related restrictions since 2019, followed by sanctions imposed by unfriendly countries. According to the conjuncture surveys of heads of organizations providing various services in all subjects of the Russian Federation, the key sectoral trends of 2022 can be identified as follows: a decrease in the business confidence index by 8 points, with business sentiment appearing better than during the pandemic in 2020; a deterioration in key business climate indicators, specifically a 17% decrease in demand for services, a 20% decrease in profits, and an 18% decline in the economic situation of companies. At the same

time, the number of people employed in the tertiary sector has remained almost stable over the past four quarters, amounting to (−5%). Meanwhile, 66% of respondents noted a sharp increase in pressure on businesses due to economic uncertainty, and the main constraints on business development were identified as "lack of financial resources" and "high tax rates".

The results of the conjuncture surveys are confirmed by data from official state statistics and Rosaviation: the passenger air transportation industry was in a growth phase before the COVID-19 pandemic, with growth rates exceeding 10%. In 2022, the industry was in a state of survival. Sanctions from unfriendly countries were aimed at putting an end to Russia's civil aviation. The critical increase in risks is primarily due to the ban on most financial operations, including the prohibition of insurance, which is mandatory for flights, as well as leasing — the main method of acquiring passenger aircraft. The termination of contracts with lessors has led to a significant portion of the aircraft fleet of Russian airlines being at risk of seizure, with the exception made only for aircraft under financial leasing, which constitutes a minor share. Since 27 February 2022, anti-Russian sanctions included a ban on flights of all Russian airlines in the airspace of

the European Union, which reduced passenger traffic. Russia's response was a ban on the overflight of aircraft from unfriendly countries through Russia.

The identified risks can be broadly categorized as financial (market, operational, and liquidity) and non-financial (country and regional, legal, reputational), which also inevitably affect the financial security and stability of the passenger air transport industry. In the comprehensive program for the development of the aviation industry of the Russian Federation until 2030, approved by the Government of the Russian Federation in 2022, more than 770 billion rubles are planned for the subsidization of domestic passenger air flights, as well as support for aircraft manufacturing. Today, the share of foreign-made aircraft in the fleet of Russian airlines for commercial transportation is about 67%, while foreign airliners account for approximately 95% of the total passenger turnover. Under the conditions of sanctions that have banned the supply of new foreign liners, as well as the maintenance of already used aircraft produced abroad, the Russian aviation industry has been tasked with increasing the share of domestic aircraft from the current 33% to 81%. Given the successful implementation of import substitution programs in 2022–2030, the supply of 1,036 passenger aircraft for civil aviation needs is planned.

Thus, the introduction of sanctions against Russia opens up new opportunities for the development of domestic aeronautical systems and programs, which will ensure the autonomy and increased safety of civil aviation. It also allows for a shift to the production of domestic airliners and the expansion of the internal flight zone. Given the vast territory of the Russian Federation, the reorientation to the domestic air travel market will contribute to the development of Russia›s tourist infrastructure, the influx of capital and investments into the regions. This also promotes the growth of domestic tourism, hospitality, and the increase in passenger traffic of Russian airlines. An

important advantage for Russia in this situation is its vast territory, as well as cooperation with friendly countries, which contributes to the development of air communications.

To identify the threats and opportunities for the company, we used PESTEL analysis, as it allows for the assessment of the impact of environmental and climate risks. However, we modified the approach to obtain quantitative evaluations of the factors› effects. The algorithm involved determining the impact on the industry of each component of the identified factor (strong/medium/weak), establishing component weights using the pairwise comparison method with a conversion to scores. The strength of the influence of factors was also converted into numerical values (5/4 — strong, 3 — medium, 2/1 — weak), with the resulting weights calculated by multiplying the component weight by the factor weight. Taking into account the strength of the influence, we determined the urgency of the response for each factor (5 — very urgent, 1 — not urgent) and the nature of the influence (–1 negative, +1 positive). By multiplying the resulting weight of the factor by the urgency of response and the nature of the change, we calculated the final impact score of each factor. Factors with a negative assessment were considered as threats, while those with a positive assessment were considered as opportunities. The generalized results of the PESTEL analysis are presented in *Fig. 2* as a diagram of the business environment profile of companies in the passenger air transport industry across political, economic, social, technological, legal, and environmental components.

The results of the analysis show that the greatest threat requiring a rapid response for the company's activities comes from factors such as: the military operation in Ukraine; rising fuel prices; the tightening of sanctions against Russia and the introduction of retaliatory sanctions, which together can lead to a significant increase in costs and a decrease in the efficiency of the companies in
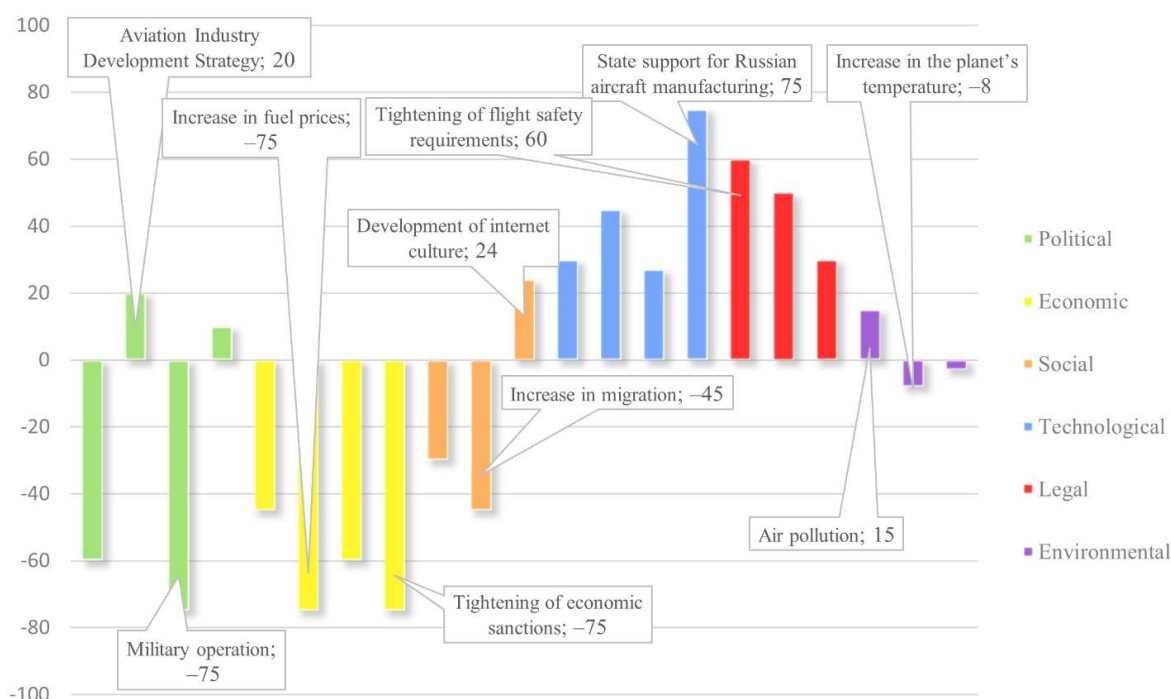
Fig. 2. **Business Environment Profile Diagram for Companies in the Passenger Air Transport Industry**
Source: Compiled by the authors.

the industry [16]. The best opportunities are provided by factors related to the tightening of flight safety requirements, which contribute to the enhancement of the reputation of airlines and the image of Russian aircraft manufacturing. At the same time, there are far more threats than opportunities, which requires prompt adjustments to the strategy, monitoring, and control over the risk resilience and financial security of the companies.

Development of a Target Matrix for Forming the Company's Competitive Advantage, Oriented Towards a Strategic Stakeholder Approach to Sustainable Development

The pilot implementation of the proposed approach was conducted at the Aeroflot Group. The development of a target matrix for forming the company's competitive advantage, oriented towards a strategic stakeholder approach to sustainable development, includes a set of analytical procedures for assessing the actual state of the company, its sustainable development policy, and financial security. The Aeroflot Group has been part of our country's image for almost 100 years. Since

2006, it has been part of the international alliance SkyTeam, but in 2022 it suspended its membership in the international alliance due to sanctions. The conducted analysis allowed for the identification of problematic areas in the company that pose a threat to its financial security. In challenging market conditions, the company shows signs of financial insolvency, which is linked to global restrictions due to COVID-19, as well as sanctions from unfriendly countries. In 2022, the company›s shares became the underperformers of the Russian market, having fallen more than fourfold over the past two years. However, despite all the challenges, the company remains a leader in passenger air transportation. She adheres to the principles of sustainable development, focusing on ensuring the continuity of operational activities and the transport accessibility of the country and its regions. It has a fleet of passenger aircraft that are highly efficient in fuel consumption, with low greenhouse gas emissions and noise on the ground. By modernizing its fleet, the company has been able to significantly reduce CO_2 emissions over

the past ten years. Additionally, it makes a significant contribution to the development of the Russian aerospace industry, being the largest customer of domestic passenger aircraft. Such a partnership not only promotes the introduction of advanced aircraft models but also supports the development of high-tech sectors and the preservation of jobs. As a result of the analysis, the company's core competencies reflecting its strengths were identified: the ability to quickly adapt to changing conditions; developed skills in collaboration and interaction, which lead to the development of partnership networks; high technological and technical efficiency. Based on the generalization of identified threats (risks) and opportunities from the external environment, as well as the company's strengths and weaknesses using SWOT analysis, a matrix for assessing the compatibility of strengths and weaknesses with opportunities and threats was developed. For this purpose, the Quality Function Deployment matrix method was applied, which allows understanding how significant the connection is between a particular strength (weakness) of the business and a particular threat (opportunity) (*Fig. 3*). The analysis of the impact of various opportunities and threats on the Aeroflot Group was conducted in comparison with the main competitor, CJSC "S 7 Group" (columns 10 and 21 indicate the influence scores of the factors. The blue square represents the Aeroflot Group, and the green one represents CJSC "S 7 Group"). Benchmarking served as a navigator for developing prospective directions to enhance the risk resilience and financial security of the Aeroflot Group. The conducted analysis allowed for focusing on the factors that scored the highest and were marked in the matrix with yellow shading.

The conducted analysis highlighted the threats of a shortage of qualified personnel due to mobilization, as well as the increasing turnover of pilots. According to S. Yu. Glazyev, "high-quality human capital" is a "strategic resource" for companies and the country,

accumulating "intellectual, physiological, labor, and social potential of people" [3], which should be supported and its development ensured.

The identified risks negatively impact the financial position and stability of the company. At the same time, almost all of its strengths can be realized based on the growth of domestic tourism and the increase in demand for domestic air travel, for which government support is required.

Based on the interpretation of the results of the assessment of the compatibility of strengths and weaknesses with opportunities and threats, a target matrix of the company's competitive advantage is formed, which includes vector directions for increasing the risk resilience and financial security of the Aeroflot Group, ranked according to priority levels. The matrix serves as a navigator for developing a sustainable development strategy for the near future: revising personnel policy; increasing the share of transportation within Russia; developing the low-cost passenger transportation segment; opening new hubs within Russia; reducing fuel consumption and CO_2 emissions; developing vertical integration; revising marketing policy; supporting Russian aircraft manufacturing; developing a quality management system; implementing artificial intelligence to control the ratios between capital and liabilities, liabilities and assets, capital and assets, profit and resources; opening new routes to friendly countries.

Definition of a System of Strategic Indicators for Monitoring the Company's Risk Resilience

The final stage of the strategic approach is the monitoring of the sustainable development strategy, based on benchmarking using competitive advantage indicators — risk resilience indicators [17]. A key aspect of monitoring is financial security as a generalized criterion-based assessment of the company's sustainable development strategy, which is related to the ability to manage business risks affecting financial viability (financial risks) and to ensure the company's resilience to financial

Opportunities and threats	Importance	Large market share, strong positions	Compliance with ESG principles	A large number of partner companies	A large number of directions	High quality of service	High technological and technical efficiency	State participation	Assessment (1–5)	Target value	Degree of improvement	Weightiness	Weightiness, %
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Suspension of flights by 9 Russian companies	4,0	1,31	0,44		0,15	1,31	0,15			2,0	1,0	4,0	0,15
State support for the industry	5,0	0,54	0,18			0,18		1,63		4,0	1,0	5,0	0,18
Zero VAT rate	4,0				0,15		0,15	0,15		3,0	1,0	4,0	0,15
The development of new air routes across Russia	5,0		0,23							5,0	1,3	6,3	0,23
Growth of domestic tourism and hospitality	5,0	2,72	2,72	0,30	0,91	0,91		0,30		5,0	1,7	8,3	0,30
Tightening of sanctions	3,0	0,08		0,08	0,25					2,0	0,7	2,0	0,08
Risks of failure of purchased units, components, and materials	3,0							0,28		3,0	0,8	2,3	0,09
Reduction of activities due to the "outbreak" of influenza, smallpox, hantavirus, or coronavirus	3,0	0,12	0,09	0,12				0,12		3,0	1,0	3,0	0,12
The decline in the real disposable income of Russians	3,0	0,09			0,09					3,0	0,8	2,3	0,09
Increase in aviation fuel prices	4,0	0,17				0,50	0,50	0,17		5,0	1,0	4,0	0,17
The shortage of skilled labor in the market due to mobilization	5,0							0,14		2,0	0,7	3,3	0,14
The probability of negative changes occurring in the surrounding natural environment	4,0	0,17	1,49		0,17		0,17			4,0	1,0	4,0	0,17
Strengthening of competitors	5,0	0,41	0,41	0,14	0,41	0,14	0,14			2,0	0,7	3,3	0,14
Toyal strengths		5,61	5,33	0,87	2,12	3,03	1,09	2,79					

Opportunities and threats / Weaknesses	Impor-tance	Weak financial condition	Weak marketing campaigns	Increase in staff turnover	Lack of required number of qualified pilots	Assessment 1 2 3 4 5	Target value	Degree of improvement	Weighti-ness	Weighti-ness, %	Total opportunities/threats
15	16	17	18	19	20	21	22	23	24	25	26
Suspension of flights by 9 Russian companies	4,0	◯ 0,44		◯ 0,44	◯ 0,44		2,0	1,0	4,0	0,145	4,640
State support for the industry	5,0	△ 0,18			0,18		4,0	1,0	5,0	0,181	2,900
Zero VAT rate	4,0	△ 0,15					3,0	1,0	4,0	0,145	0,580
The development of new air routes across Russia	5,0	△ 0,23					5,0	1,3	6,3	0,227	0,453
Growth of domestic tourism and hospitality	5,0	△ 0,30					5,0	1,7	8,3	0,302	8,157
Tightening of sanctions	3,0	⊗ 0,74					2,0	0,7	2,0	0,08	0,3
Risks of failure of purchased units, components, and materials	3,0	⊗ 0,84					3,0	0,8	2,3	0,09	0,6
Reduction of activities due to the "outbreak" of influenza, smallpox, hantavirus, or coronavirus	3,0	⊗ 1,12					3,0	1,0	3,0	0,12	0,7
The decline in the real disposable income of Russians	3,0	⊗ 0,84					3,0	0,8	2,3	0,09	0,7
Increase in aviation fuel prices	4,0	⊗ 1,49	△ 0,17				5,0	1,0	4,0	0,17	0,3
The shortage of skilled labor in the market due to mobilization	5,0	△ 0,14		⊗ 1,24	⊗ 1,24		2,0	0,7	3,3	0,14	2,5
The probability of negative changes occurring in the surrounding natural environment	4,0	◯ 0,50					4,0	1,0	4,0	0,17	-1,5
Strengthening of competitors	5,0	⊗ 1,24	⊗ 1,24	◯ 0,41	△ 0,14		2,0	0,7	3,3	0,14	1,4
Total weaknesses		5,61	1,41	1,22	0,76						

Fig. 3. **Compatibility Matrix of Strengths and Weaknesses with Opportunities and Threats**
Source: Compiled by the authors.

Table

Strategic Indicators of Risk Tolerance of the Largest Airlines in Russia

No.	Key risks and strategic risk tolerance indicators	Weight of the indicator	Aeroflot Group		S 7 Group of Companies		PJSC UTair Airlines		JSC Ural Airlines	
			Indicator	Weighted assessment	Indicator	Weighted assessment	Indicator	Weighted assessment	Indicator	Weighted assessment
1	Financial (market risks): market share dynamics	0.12	8	0.6	7	0.84	4	0.48	6	0,72
2	Financial (liquidity risks): financial security	0.13	6	0.65	6	0.78	3	0.39	4	0,52
3	Legal risks (environmental safety)	0.1	8	0.8	5	0.5	3	0.3	2	0,2
4	Financial risks: operational performance	0.13	5	0.91	6	0.78	4	0.26	5	0,52
5	Financial (market risks): quality of services	0.12	9	1.08	9	0.96	4	0.6	3	0,6
6	Financial (market) risks: marketing and advertising	0.06	7	0.36	7	0.42	4	0.18	5	0,3
7	Financial (market risks): pricing policy	0.06	7	0.24	6	0.3	5	0.36	4	0,42
8	Financial (market) risks: innovative status	0.06	9	0.48	9	0.54	4	0.12	3	0,18
9	Reputational risks (level of customer satisfaction)	0.12	8	0.84	8	0.84	4	0.48	3	0,36
10	Financial (market risks): fleet of aircraft	0.1	9	0.9	8	0.6	2	0.3	3	0,3
Total:		1	–	–	7.51	–	6.56	–	3.47	–

Source: Compiled by the authors.

risks (market, operational, liquidity) and non-financial risks (legal, reputational). In this regard, as strategic indicators for monitoring in accordance with the constructed target matrix of competitive advantage, which sets the vector directions for enhancing risk resilience and financial security, 10 indicators have been identified (*Table*).

The *Table* presents key risks associated with the corresponding strategic indicators of risk resilience, as well as their forecasted values for the largest airlines in Russia, calculated for the period 2017–2021 with a forecast until 2030 using a weighted expert assessment on a nine-point scale, where 1 indicates critically low risk resilience and 9 indicates the highest possible risk resilience. According to the forecast results, the Aeroflot Group has the highest risk resilience, with a weighted score of 7.51 due to high values in indicators of financial risk resilience, safety levels, aircraft fleet condition, and focus on the interests of key stakeholders. Legal and reputational risk indicators assess the harmful impact on the environment, social responsibility, and corporate governance: insufficient compliance control and risk management can negatively affect the company's reputation and lead to a loss of trust from key stakeholders, primarily clients and investors.

CONCLUSION

The results of the study demonstrated a modified strategic approach to assessing the risk resilience and financial security of companies in the passenger air transport industry. The developed business analysis algorithm allows for the formation or adjustment of a sustainable development strategy for companies, taking into account the influence of identified risk factors, as well as monitoring risk resilience and financial security in conditions of instability and uncertainty in the macroeconomic situation [18]. Theoretical results provide an improvement in the methodology of industry analysis as applied to the passenger air transportation sector for the purpose of its sustainable development in a highly turbulent economy. The modified strategic analysis allows for a differentiated accounting of risk factors affecting the industry and the financial security of the company, assessing the complexity of their impact, which will enhance the feasibility of the sustainable development strategy. The results may be useful for key stakeholders in airlines, including Rosaviation, to minimize the risks of implementing a comprehensive aviation industry development program, as well as to monitor information on the financial security status of socially significant companies.

The limitation of the obtained results is due to the lack of publicly available current financial reporting data for public companies in the passenger air transportation industry for 2022. The direction of further research will focus on analyzing stakeholder risks and their impact on the industry's sustainable development strategy.

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Does Money Management Behaviour Play a Role in the Nexus between Financial Literacy and Financial Wellbeing?

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ABSTRACT

The main **purpose** of the study is to evaluate the direct influence of financial literacy application and money management behaviour on financial wellbeing as well as whether money management behaviour mediates the influence of financial literacy application on financial wellbeing among young adults. A questionnaire survey **method** was utilized to gather information from young working adults. The partial least squares structural equation modelling (PLS-SEM) was the data analytic technique employed to analyze the data. The **result** revealed that financial literacy application and money management behaviour have positive and significant direct influence on the financial wellbeing of young adults. Also, the study found out that money management behaviour partially mediates the influence of financial literacy application on financial wellbeing. The study bridges the gap between theory and practice to offer an enriched empirical basis for young adults to continuously apply financial knowledge and possess sound money management attitude to attain financial wellbeing. By proposing a framework, this study **contributes** to existing knowledge and highlights the importance of developing good money management behaviour to support financial literacy application role in dealing with financial wellbeing problems. Thus, the study will be **useful** for young adults, parents, and policymakers in designing financial wellbeing programmes for better quality of financial life and value creation among the young working adults.

Keywords: financial literacy; application; money management behaviour; financial wellbeing

INTRODUCTION

The notion of financial well-being has been continuously acknowledged for years because of its applicability and influence on the changing Asian economy [1, 2]. The continuous attention may also be due to the financial insecurity in which an individual finds themselves due to lack of financial literacy application. The reason is that there are tendencies to possess financial knowledge and lack the will to apply the knowledge to influence money management attitudes. Meanwhile, Mahendru [2] argued that the ability to meet financial commitments and prevent financial insecurity is linked to money management behaviour and not just financial knowledge.

According to Johan et al. [3], among the age groups, young adults are more prone to money mismanagement attitudes, leading to a higher risk of financial instability. Also, young adults are deemed as an essential group for future revenue generators, according to Abdullah et al. [4]. Young adults become an integral part of an organization before or after graduation from university. Hence, they would be required to be financially disciplined to avoid unethical behaviours that can ruin them and the organization's reputation in the discharge of their duties. Nevertheless, we are faced with an emerging topic on which there is a scarcity of knowledge on how financial literacy application affects money management behaviour which in turn influences financial well-being in the more vulnerable group. Also, the limited empirical investigation of financial literacy application in the existing model is hindering the awareness of how to use it to promote healthy financial management actions among the young adults' brackets in practice. Further aggravating this problem is the debate on whether the contribution to the financial well-being of young adults lies with financial literacy application directly or indirectly. Moreover, Malaysia has the lowest level of financial literacy in the global financial literacy survey [2, 3]. Therefore, further study on the concept related issue with money management behaviour and financial well-being among young adults is required. Otherwise, this could limit financial literacy application relevance dissemination since existing studies in the field are yet to consider the integration and influence on the financial well-being model via money management behaviour.

To guide practice on the concept relevance in solving financial related issues, the study is poised to investigate the relationship between financial literacy application, money management behaviour, and financial well-being among young adults in Malaysia. The illumination of the significant role that financial literacy application plays in this study will be instrumental in ameliorating money management attitude and the overall financial well-being problems among the high-risk young adults that affect the economy. Studying the influence of financial knowledge application will foster increased awareness, a healthy money mindset, and financial actions that transcend to the economy. The outcome of the study will help to extricate the importance of the indirect influence of financial literacy application on financial well-being through money management behaviour to mitigate financial concerns that may arise in young adults' lives.

The remainder of the article is organized as follows. The next section describes the literature review while the research methodology is in the third section. The results of the study are explained in the fourth section, and finally, discussion and the main conclusions that can be drawn from the research are presented.

LITERATURE REVIEW

Rahman et al. [5] conceptualized the financial well-being concept as being able to maintain existing and anticipated livelihood standards and financial autonomy. Abdullah et al. [4] argued that financial well-being is having control over daily and monthly financial well-being, or the capability of withstanding financial shocks, the expectation to attain financial objectives, and having the financial liberty to reach decisions about enjoying the variety of life [1]. Thus, financial well-being is likened to being a vehicle to achieve financial security and wellness in this study.

Financial Literacy Application

Goya & Kumar [6] defines financial literacy as possessing financial skills and knowledge to confidently take effective actions to best achieve goals. Sangeeta et al. [7] defines financial literacy as the knowledge and ability to overcome challenges and financial decisions in daily life. Coincidentally, Goya & Kumar [6] and Abdullah et al. [4] illustrate financial literacy as the ability to make financial decisions. Hence, in this study, financial literacy application is the will to apply financial knowledge.

Lone & Bhat [8] emphasized the importance of financial literacy in achieving financial management. According to Utkarsh et al. [9] and Sangeeta et al. [7],

financial literacy has a significant positive impact on how money is managed. They argued that with the higher level of financial literacy, the better the personal money management behaviour of an individual becomes better. On the contrary, this study opined that the level of money management behaviour improves not necessarily because of financial knowledge but the will to apply the knowledge. Having knowledge without the intention to make use of it does not affect the desired financial outcome in practice even though there is a consensus that possessing requisite knowledge is key to making choices. Moreso, humans, especially young adults struggle between choices due to youthful exuberances- a state that differentiates the group from other periods in the lifecycle process. Drawing from Panos & Wilson [10], the right choice of good money management behaviour is realized when the acquired financial knowledge is put to use [3]. Nonetheless, less emphasized by prior studies is that financial literacy application relates positively with money management behaviour. To investigate the relation between financial literacy application and money management behaviour (MMB), the following hypothesis is put forward:

H1: Financial literacy application has a positive influence on money management behaviour.

Researchers opined a significant and positive connection between financial literacy application and financial well-being. Hamid & Loke [11] and Philippas & Avdoulas [12] accentuate that financial literacy and its application are connected to financial well-being. The research indicated that an increase in financial literacy impacts financial related behaviour which translates to financial well-being. Furthermore, Yap et al. [13] noted that financial literacy provides knowledge to make people know about the financial act or financial products and provides skills to apply that knowledge in real life in order to achieve financial well-being. This creates an environment of financial awareness, enabling young adults to be sensitive towards things like pricing, credit, avoidable debt, and consumption habits. Also, an increased financial knowledge application results in general improvement in life, whether physical, mental, or social. Lone & Bhat [8] similarly treads the thought that emerging adults' good money management attitudes are appropriate means to impacting young adults' ability to shoulder adulthood responsibilities. Hence, good management behaviour can enhance overall well-being development just as money related literacy has the capacity to help youngsters to cut down on unnecessary spending

that jeopardizes their financial well-being. Additionally, prior works indicated that money management behaviour is related to subjective well-being Chavali et al. [14]. Upon the above premises, the study opined that financial literacy application and money management behaviour would each directly affect financial well-being and therefore grounds the following hypothesis:

H2: Financial literacy application has a positive influence on financial wellbeing.

H3: Money management behaviour has a positive influence on financial wellbeing.

Tahir et al. [15] posited that financial literacy application advances a financial mindset that precedes financial well-being and financial knowledge is applied through sound financial discipline [9, 10]. When young adults lack money management control due to financial illiteracy or the will to apply acquired financial knowledge, Chavali et al. [14] argued that it will become a negative outcome for finances such as retirement savings, needful withdrawals, unrestrained expenses, and vice versa. Moreover, having financial knowledge on its own is not sufficient without its application through good money management behaviour that would enable young adults to deal with financial uncertainties. Meaning financial literacy application mechanisms affect money management behaviour, possibly leading to financial well-being. Based on the above analysis, the study posits that financial literacy application affects money management behaviour and that leads to the financial well-being of young adults. Although financial literacy applications can have a significant influence on financial well-being, nevertheless, the indirect relation between financial literacy applications and financial well-being via money management behaviour remains opaque. To investigate the relation between financial literacy application (FL) and financial wellbeing (FW) through money management behaviour, the following hypothesis is put forward:

H4: Financial literacy application has a positive influence on financial wellbeing, when mediated by money management behaviour.

METHODS

The research employed quantitative research techniques while using a questionnaire survey to collect data to assess the hypothesized relationships. All the measurement items for the constructs incorporated in the questionnaire were adopted from literature [2, 7].

A 5-point Likert scale involving 1-strongly disagree; 2-disagree; 3-neither disagree nor agree; 4-agree and 5-strongly agree was used to assess the respondent's viewpoints in the study. Data for the study was collected with the aid of research students. The target population for the study consisted of young working adults between the ages of 18 and 35 years old in Malaysia. The research study employs the non-probability purposive sampling technique as it focuses on a selective group: Malaysian young adults between 18- and 35-years old earning income. The reason is that more than 80% of young Malaysians in this category are facing financial difficulty drawing from Mahendru [2]. To be part of the survey, participants need to be young working adults between the ages of 18 and 35 years old in Malaysia with capacity and willingness to answer the questions. Due to these restrictions, the size of our population has been reduced drastically and affected the final data collected by the study. As at the time the survey was conducted, we did not have the list of the working young adults in this category. According to Whitehead et al. [16], a sample size of 30 young adults in Malaysia was collected and used for the pilot study to check the validity and reliability of the research questionnaire before the main data collection. The main data collected was analyzed using SMARTPLS version 3.3 while following Hair et al. [17] rudiments for assessing the measurement and structural model including the mediation analysis. The minimum sample size in this study is determined in accordance with Hair et al. [17] sample size recommendation for a PLS-SEM analysis. Based on the maximum number of arrows pointing at a construct in this study after checking the model and data characteristics, the minimum sample size at a 5% significant level is 110.

RESULTS AND DISCUSSION
Results
Out of the 470 questionnaires administered to potential respondents with the aid of two research assistants, only 220 were returned with 20 unusable responses due to the set criteria for participation. In terms of the respondent's profile based on the 200 usable responses, 59.5% are female while 40.5% are male. Within the age bracket investigated, age bracket 21–23 having 61%, accounted for the highest profile and the majority are of Chinese origin.

Measurement Model Assessment
The evaluation of the measurement model comprises convergent validity, unidimensional analysis, and discriminant validity analysis. To evaluate convergent validity of the reflective constructs, the indicator outer loadings and average variance extracted (AVE) are utilized as measures in this study. At the items of measures level, all the items of measures showed loading greater than 0.70 stipulated threshold (*Table 1*). All constructs showed AVE values greater than 0.50 (FL = 0.618, MMB = 0.574, FWB = 0.586) stated criterion. Therefore, convergent validity is achieved [17]. To assess the discriminant validity, the Fornell Larcker criterion (*Table 2*) suggests that each construct is strongly associated with its own indicators rather than with other constructs. Thus, the study argued that the final constructs demonstrate sufficient discriminant validity.

As per the reliability of the constructs, *Table 3* shows the results of the one-dimensionality tests. All of the variables are deemed reliable with a value of more than 0.7 according to the rule of thumb [17]. Specifically, all Cronbach's alpha, rho_A, composite reliability (*Table 3*) values were greater than 0.70 for indicators of money management behaviour, financial literacy, and financial well-being. Drawing from Hair et al. [17] and Ravand & Baghaei [18], since the Dillon-Goldstein's indices values are higher than 0.70, this study indicates one-dimensionality, and that reliability is achieved. Overall, this study argued that the constructs and their items of measures demonstrated sufficient validity and reliability.

Structural Model Assessment
Collinearity generally occurs when there are high correlations between independent variables [17, 19]. To check issues with collinearity, this study employed the variance inflation factor (VIF). According Hair et al. [17], VIF higher than 5.0 indicates a multicollinearity problem. The result (FL = 2.361 < 5.0, MMB = 2.557 < 5.0, FWB = 2.024 < 5.0) showed that there are no collinearity problems. Besides, all the tolerance levels are not below 0.20 in the predictor constructs as indicative of no collinearity.

To analyze the hypothesized relationships, this study assessed the structural model relationships by running the PLS-SEM algorithm using the bootstrapping approach (*Figure*). *Table 4* revealed that all the hypothesized direct relationships are supported. Specifically, hypothesis H1

Table 1

Loading and Cross Loading

Items of Measure	Financial Literacy	Financial Wellbeing	Money Management Behaviour
FL1	**0.845**	0.358	0.431
FL2	**0.755**	0.252	0.386
FL3	**0.772**	0.277	0.366
FL4	**0.740**	0.345	0.547
FL5	**0.779**	0.241	0.348
FL6	**0.815**	0.280	0.378
FL7	**0.793**	0.414	0.514
FWB 1	0.316	**0.707**	0.393
FWB 2	0.316	**0.713**	0.406
FWB 3	0.295	**0.763**	0.434
FWB 4	0.206	**0.743**	0.291
FWB 5	0.293	**0.789**	0.344
FWB 6	0.292	**0.771**	0.279
FWB 7	0.337	**0.832**	0.281
FWB 8	0.391	**0.798**	0.387
MMB 1	0.475	0.292	**0.770**
MMB 2	0.416	0.391	**0.747**
MMB 3	0.349	0.393	**0.788**
MMB 4	0.374	0.372	**0.785**
MMB 5	0.510	0.405	**0.780**
MMB 6	0.388	0.292	**0.721**
MMB 7	0.411	0.338	**0.711**

Source: Compiled by the author.

Table 2

Fornell-Larcker Criterion

Constructs	Financial Literacy	Financial Wellbeing	Money Management Behaviour
Financial Literacy	**0.786**		
Financial Wellbeing	0.406	**0.765**	
Money Management Behaviour	0.555	0.471	**0.758**

Source: Compiled by the author.

Reliability Test

Constructs	No of Items	Cronbach's Alpha	Rho_A	Composite reliability
Financial Literacy	7	0.897	0.906	0.919
Money Management Behaviour	7	0.876	0.880	0.904
Financial Wellbeing	8	0.899	0.902	0.919

Source: Compiled by the author.

Hypothesized Direct Relationships

Relationship	Beta value	T-value	P-value	Hypothesis supported?
H1: FL–>MMB	0.555	9.180	0.000	Yes
H2: FL–>FWB	0.209	2.803	0.005	Yes
H3: MMB–>FWB	0.476	5.163	0.000	Yes

Source: Compiled by the author.

which indicates the direct effect of financial literacy application on money management behaviour was confirmed to be supported with a path coefficient of β = 0.555. Similarly, H2 was also authenticated with a path coefficient of β = 0.209, t-value and p-value that is less than 0.05. This represents a strong and positive influence of financial literacy application on financial wellbeing. H3 was also supported with a path coefficient of β = 0.476, t-value and p-value less than 0.05. This represents a significant and positive influence of money management behaviour on financial well-being.

Mediation Analysis

In order to analyze whether money management behaviour mediates the relationship between financial literacy application and financial wellbeing (H4), the study used the variance accounted for (VAF) criterion according to Hair et al. [17] and Barbosa et al. [20] to do the analysis. As indicated in Hair et al. [17], VAF values greater than 0.80 indicate full mediation, values between 0.20 and 0.80 are indicative of partial mediation while VAF values lower than 0.20 indicate that no mediation exists.

The indirect effect of financial literacy application was calculated as 0.264 (0.555 * 0.476) with a p-value < 0.05. The VAF in this study was calculated by taking the total

indirect effect divided by the indirect effect plus the direct effect (0.264 / (0.264 + 0.209) = 0.558). The VAF value obtained as 55.80% allows the study to conclude that money management behaviour partially mediates the influence of financial literacy application on financial wellbeing. Thus, H4 is supported in the study.

The model having an R^2 greater than 0.25 (0.30) indicates that the model has a moderate prediction power according to Hair et al. [17] and that the independent variables can explain 30% of the variability of financial wellbeing of young working adults. To assess the predictive relevance of the model, the study used the q2 values. According to the threshold, values of 0.02, 0.15, and 0.35 respectively indicate that an exogenous construct has a small, medium, or large predictive relevance for a certain endogenous construct. Here, the model has moderate predictive relevance based on the q2 values of 0.14 and 0.17.

DISCUSSION

Financial literacy is an effective tool for achieving financial well-being among individuals. Besides, it helps to reduce the likelihood of bad money management behaviour and unhealthy financial well-being. Based on Table 4 above, the result indicates that hypothesis 1 is acceptable. This implies that financial literacy has a significant effect on money management behaviour
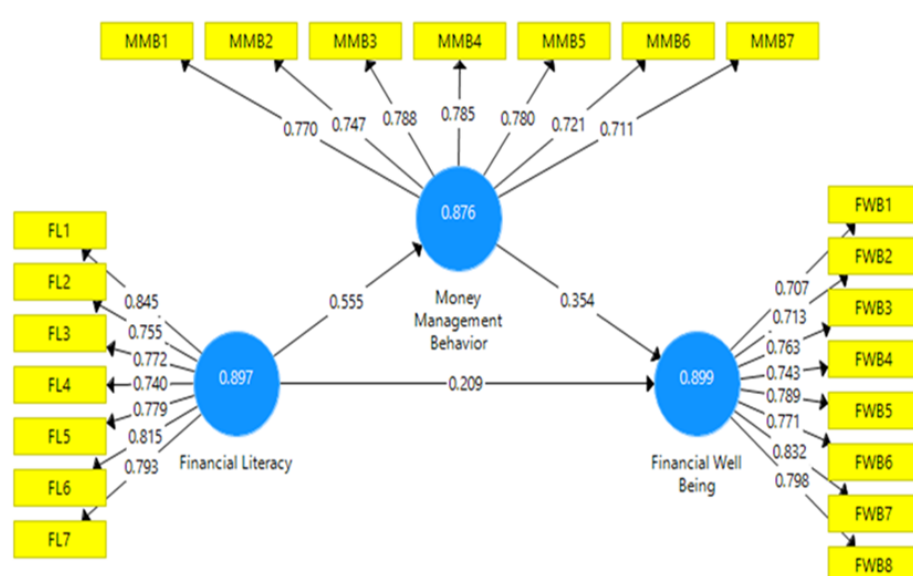
Fig. **Path Model**

Source: Compiled by the author.

among young adults in Malaysia. The result is consistent with past researchers such as Utkarsh et al. [9], Sangeeta et al. [7], Yap et al. [13], Mahendru [2], and Hamid & Loke [11] which assert that financial literacy application has a significant effect on money management behaviour. Financial literacy can be seen from the application of financial knowledge to help young adults carry out effective money management behaviours. When young adults have the appropriate and correct knowledge of savings, investment, and loans, then they can manage their finances well to ensure their personal wellness and strive to engage in future opportunities rather than being stuck in financial disarray. As the finding of the study indicates that when there is an increase in financial literacy, there will also be an increase in money management behaviour, thus can be used in practice to resolve money management behaviour related issues among young adults.

Based on *Table 4*, the result indicates that hypothesis 2 was accepted. This implies that financial literacy has a significant effect on financial well-being among young adults in Malaysia. The result is consistent with past researchers such as Lone & Bhat [8] and Utkarsh et al. [9] who posited that financial literacy has a direct impact on financial well-being. This means that if the financial literacy application level of young adults gets better, then the financial well-being of young adults will subjectively increase. Financial literacy usage can help young adults achieve financial prosperity. When young

adults understand the benefits of savings and loans, they will make considerably informed financial considerations and in turn be able to enhance financial decisions. Hence, financial well-being can be elevated as young adults are able to put acquired financial knowledge into use and are informed of the choices they personally made. In our study, it affirms that financial literacy represents cognitive development that can bring financial well-being. Thus, the finding of the study indicates that when there is an increase in financial literacy, there will also be an increase in behavioural intention of financial well-being. The implication is that the mechanism of effect is instrumental to institutions of interest and serves as a useful insight in dealing with overall financial well-being problems among the high-risk young adults that affect the economy.

Based on *Table 4* above, the result shows that hypothesis 3 was accepted. This implies that money management behaviour has a significant and positive effect on financial well-being. Meaning developing competencies related to money management behaviour can positively influence the financial well-being of youths in practice. Hence, if the government intends to increase the financial well-being of youths in Malaysia, she can design effective money management behavioural strategies to do so. Moreover, as there is evidence from the study that money management behaviour is a vital instrument to making good financial choices, the study can assist educators and parents to enhance young adults' financial health awareness. H4 is also accepted indicating

that the effect of financial literacy application on financial wellbeing is partially transmitted by money management behaviour among young adults in Malaysia. Applying related financial knowledge to formulate individual budget and prioritizing financial expenditures can contribute to financial wellbeing. The result is consistent with past researchers such as Chavali et al. [14] and Tahir et al. [15] which argued that money management behaviour plays a significant role on the influence of financial literacy application on financial well-being. This indicates that young adults who had positive financial literacy applications will significantly increase their financial well-being through money management behaviour. Thus, future financial woes that translates to adulthood can be mitigated if financial literacy application is deployed to affect the financial wellbeing of young adults through good money management attitudes mechanism in Malaysia.

CONCLUSION

This study examined the relationships between financial literacy application, money management behaviour and financial well-being among youths. The output of the research showed that competencies related to financial literacy application and money management behaviour have a positive effect on young adults' financial well-being in Malaysia. This study has also shown that the relationship between financial literacy application and financial well-being is mediated by money management behaviour. The higher the financial literacy, the higher the money management behaviour, which will in turn result in higher financial well-being. As a result, it becomes vital for working young adults to apply financial literacy to exhibit better money management behaviour and achieve financial well-being to minimize financial difficulty issues.

Limitations to the Study and Direction for Future Research

This study is not free of limitations. The model reports an R-square of 30%, which means that 70% of the variation in the dependent variable can be captured by other factors that are not considered in this study. This demands further research to identify other determinants of financial well-being. Besides extending the research to other contexts like international settings, it is suggested as it would help to provide vital insight to resolve individual financial behavioural well-being related issues, which are usually of national interest. Thus, future studies can explore the investigated relationships as depicted in the proposed framework in both local and international contexts for enhanced understanding on the matter to guide practice.

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How High Efficiency of the Chilean Stock Market Does Impact on Energy Transition? Research Using Deep Seek AI Optimization

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ABSTRACT

The aim of the study is to determine the impact of efficiency and integration of the Chilean stock market on Energy transition using Deep Seek AI optimization. The novelty of the research lies in the systematization of aspects of efficiency and integration of financial markets that are heavily dependent on renewable energy sources. The methodology is based on the Kramer–von Mises method and market performance assessment tests using Deep Seek AI optimization. Using two recent network expansions in the Chilean electricity market, it was found that market integration has led to a convergence of prices between regions, increasing electricity production. It is proved that the methods of behavioral theory are the most promising for studying the effectiveness of Chili markets. The main results show that there is a problem of reducing electricity production from renewable sources between demand centers as a result of crises. The emphasis of market integration on investment effects is studied. It is concluded that the market integration and high efficiency of the Chilean stock market increase the efficiency of resource allocation due to the benefits of trade and stimulate the emergence of new renewable energy sources. The practical significance of the research results lies in the application by regulators of aspects of efficiency and integration of financial markets in the transition of the economy to renewable energy sources.

Keywords: AI; Deep Seek; artificial general intelligence; optimization; clean energy; Eugene Fama; Chile; integration; efficiency; stock market

INTRODUCTION

The purpose of the study is to determine the efficiency and integration of the Chilean stock market and to assess their impact on the expansion of AI optimization for the transition to renewable energy sources. The term energy transition emerged in 1976 in the USA after the connection between global warming and hydrocarbon energy was identified.

The Efficient Market Hypothesis (EMH), proposed by American economist Eugene Fama in 1965, posits that the market value of financial assets immediately and fully reflects all relevant information flows. Three degrees of market efficiency are distinguished according to this hypothesis: weak, semi-strong, and strong forms.

Weak form efficiency: a market asset exhibits weak efficiency when its current value incorporates exclusively retrospective information, such as historical price and trading volume data. Therefore, no technical analysis strategy based on past data can provide excess returns.

Average form efficiency: in this case, the market price of a financial instrument integrates not only historical but also publicly

available information. Investors using fundamental analysis cannot systematically achieve returns above the average rate of return.

Strong form efficiency: this form assumes that the market valuation of an asset reflects the entire spectrum of information, including insider information available only to a select group of market participants. In this form of efficiency, it is impossible to extract additional profit by using any private information.

Despite the broad support for the efficient market hypothesis among economist scholars, there are significant objections of both theoretical and empirical nature. These include the following phenomena.

Grossman-Stiglitz Paradox: the main problem lies in the contradiction between the theory of full informational efficiency and the reality of market functioning. To maintain efficiency, the presence of active participants, such as traders and arbitrageurs, is required, as they correct prices through their operations. However, if the market achieves full informational perfection, these agents lose their incentive to participate, as they can no longer profit from information asymmetry. Thus, full informational efficiency proves to be unattainable in the long term.

Research shows that trading volumes often exceed the level that can be explained by rational investor behavior. This phenomenon calls into question the assumption that market participants act strictly based on objective information.

Volatility and market anomalies: empirical observations indicate significant price volatility of assets, which contradicts the assumption of market efficiency. Moreover, the existence of persistent anomalies, such as the "January effect" or seasonal effects, also suggests the possibility of earning excess returns by employing certain strategies.

Thus, despite the conceptual appeal of the efficient market hypothesis, it faces a number of serious challenges from the reality of market processes. Perhaps a more realistic

model would be the recognition of limited market efficiency, where certain types of information remain undervalued by market participants, creating opportunities for short-term deviations from equilibrium.

The volume paradox represents an observable contradiction between empirical data on financial market behavior and the efficient market hypothesis. According to this hypothesis, it is assumed that the volume of trading operations should be minimal or non-existent, as transactions only occur when counterparties have different perceptions of the value of the traded asset. In a perfectly efficient market, all participants possess identical information, and therefore, they evaluate the value of assets equally, which eliminates the incentives for making purchases or sales, since each asset is fairly valued, meaning there are neither overvalued nor undervalued assets.

Nevertheless, there are practical factors that can motivate participants to make transactions at fair prices, such as the shift in an entity's investment strategy from the accumulation stage to the distribution stage, that is, the completion of active activities and the beginning of the use of accumulated resources. However, such explanations cannot justify the level of market activity observed in real practice.

The volatility paradox also reflects the gap between real fluctuations in financial markets and the postulates of the efficient market hypothesis. This hypothesis asserts that changes in asset prices are possible solely due to the arrival of new information that was not previously accounted for in their valuation. Thus, in the absence of new data, asset prices should remain stable. However, observations indicate significant price fluctuations even in situations where there are no obvious reasons for them. A striking example of such changes is "Black Monday" in 1987, when the most significant one-day drop in the U.S. stock index occurred without an apparent catalyst. The high degree of volatility indicates that at

least some market participants demonstrate limited rationality, making the market at least partially inefficient.

The phenomenon of market bubbles also illustrates empirical deviations from the efficient market theory. This theory assumes that current asset prices already incorporate all available information, as well as expectations based on this data. Therefore, according to this concept, market bubbles are impossible, as prices should adequately reflect the likelihood of future uncertainties. However, in practice, there are instances where the market sharply alters its valuation of a particular asset without the emergence of new significant information. Subsequently, such events are classified as market bubbles. The continued occurrence of bubbles in the 21st century confirms that the behavior of some market participants is not always fully rational, leading to partial market inefficiency.

Many countries around the world are facing a serious problem with the expansion of AI optimization for renewable energy sources [1–3]. This issue primarily arises from the inadequacy of the existing grid infrastructure, particularly the power transmission network, which was not originally designed to integrate renewable energy sources. However, it is important to note that renewable energy sources, including solar and wind energy, are often generated in locations significantly distant from demand centers, creating serious challenges for efficient energy distribution [4, 5].

In connection with this disconnection between regions that are largely dependent on renewable energy sources and demand centers, problems arise that are of utmost importance in the context of market integration. When the supply of renewable energy exceeds local demand and there is no possibility to transfer this surplus to other regions, power system operators are forced to reduce the production of electricity from renewable sources to prevent potential system failures.

Confiscation of electricity is characterized by zero marginal costs,[1] which is currently typical for many electricity markets around the world. These interrelated issues significantly hinder the development of new enterprises and the attraction of investments in power plants operating on renewable energy sources, thereby impeding overall progress in this vital sector [6, 7].

Recognizing the seriousness of these issues, many countries prioritize them as critical political problems requiring immediate attention and action. For example, the Biden administration in the U.S. explicitly acknowledged the importance of addressing these issues by including significant investments in power line infrastructure and renewable energy as a fundamental component of the Infrastructure Investment and Jobs Act, which was passed in 2021. This comprehensive legislative package included impressive allocations of approximately 1.75 trillion USD, earmarked for various initiatives aimed at revitalizing national infrastructure and promoting sustainable energy practices.

LITERATURE REVIEW
Market Efficiency of Energy Company Stocks
Market efficiency in the stock market of Chilean energy companies allows more economically efficient electricity production enterprises to export their energy products, thereby displacing the products produced by more expensive power plants, which in turn leads to a noticeable increase in the overall efficiency of resource allocation in the energy sector. However, it is crucial to recognize that this traditional methodology does not adequately account for the potential consequences of market integration on producers' investment behavior. When energy producers can foresee impending market integration, they are incentivized to allocate financial resources to create new production capacities, which are

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[1] Marginal costs are the costs associated with producing an additional unit of product.

expected to yield profits within the anticipated integrated market system [8, 9].

Regions with a high concentration of renewable energy production (especially in close proximity to the Atacama Desert) are located a significant distance north of the key demand center near Antofagasta, which is heavily influenced by mining activities. To effectively address this critical issue, the Chilean government has completed the construction of a new important connection between Atacama and Antofagasta and has laid a power line connecting Atacama to Santiago [10, 11].

First of all, in many previous scientific studies dedicated to wholesale electricity markets, the theoretical foundations explaining the consequences of increasing transmission capacities have been thoroughly developed, as evidenced by foundational works [12, 13].

This paper, firstly, is inextricably linked to scientific papers dedicated to how the implementation of market dispatch mechanisms has significantly impacted the efficiency of electricity distribution. Secondly, our focus is on clarifying the significance of market integration in relation to investments in renewable energy sources, rather than on the implications of energy transfer for competition. Thirdly, it is important to recognize that previous studies primarily addressed the efficiency of resource distribution under conditions where the aggregate generating capacity is perceived as static. In contrast, this article thoroughly analyzes both the direct and investment consequences of market efficiency and integration by deliberately considering factors related to the placement of power plants [14, 15].

METHODS
Tests of the Efficiency of the Chilean Stock Market

The proposed efficient market hypothesis, often considered the pinnacle of economic thought, essentially represents quite a curious application of the rational expectations theory, which, of course, is applied to the rather complex issue of pricing in constantly fluctuating financial markets. Rational economic agents, often regarded as the embodiment of competent investors, typically possess a large amount of information and therefore can exploit arbitrage opportunities, relatively easily making money. However, due to the undeniable information asymmetry that permeates the market, uninformed agents, who could be argued should have done their homework, are unfortunately forced to exit the market, leaving only the experienced behind. The market anomaly observed in the financial sphere is the predictability of certain outcomes, which ironically does not align with established asset pricing theories based on risk principles. At the same time, it is worth noting that the predictability of profitability may significantly decrease after the publication of information about this anomaly, as the efficiency of such information tends to increase, leading to even greater confusion.

Fundamental anomalies are certain factors, such as financial performance indicators, company characteristics, or other internal information, that are available only to a select few market participants and allow them to achieve above-average returns in the stock market. It seems that these crucial factors are not known to all market participants, which is, of course, quite unfortunate for those who remain in the dark. For example, in many cases, investors, guided by their boundless wisdom, constantly overestimate the growth trajectories of successful companies while simultaneously underestimating the stock prices of those bankrupt companies that appear to be struggling. Eugene Fama and his equally esteemed colleague Kenneth French conducted a rather thorough scientific study of stock prices listed on the New York Stock Exchange and the American Stock Exchange, resulting in interesting findings.

Their research has shown that a low price-to-book (P/B) ratio can serve as a fairly convincing signal that stock prices are ready to rise. Additionally, low price-to-earnings (P/E) ratios usually indicate that it is likely time to consider buying certain securities that could potentially yield profits in the future. Technical anomalies are characterized by the presence of various technical factors, including price fluctuations, liquidity issues, technical failures in trading systems, as well as stock or market volatility. All these factors can contribute to an increase in stock market returns that exceed the average. It is interesting to note that technical anomalies are often endogenous in nature, which further complicates the discussion. Meanwhile, most studies dedicated to the application of technical analysis in asset management generally confirm the view that prices quickly absorb new information, resulting in technical analysis methods themselves being ineffective for investors who rely solely on them. Temporary anomalies manifest in short periods during which it is possible to achieve above-average returns in the stock market, creating a false sense of opportunities. Market participants, who are generally quite perceptive, usually know about these temporary anomalies, which, ironically, only amplify the behavior of some investors. In fact, markets have been in a state that is neither fully efficient nor completely inefficient throughout their existence. In conditions of inefficient markets, it becomes evident that experienced investors can significantly outperform their less experienced counterparts in terms of profitability. Many should take this lesson to heart. The main novelty of this rather complex theory lies in its multifaceted analysis methods: utility theory employs a range of convenient tools and offers probability modeling through hierarchical decision trees. According to some economic theories, people take into account the central bank's monetary policy when making major life-changing purchases.

As with the concept of market efficiency, human rationality is rarely expressed in absolute terms, which raises a number of interesting questions about our decision-making processes. People can never be fully rational under any circumstances, nor can they be completely irrational. On the contrary, they embody various combinations of rational and irrational traits that can change over time. They are capable of benefiting from different levels of knowledge in various fields of activity, which further complicates the discussion. As investors' wealth grows, it is generally considered that their overall utility increases; however, it is important to note that the rate of growth of total income tends to slow down. An investor seeking financial security purchases financial assets with the aim of generating income and promoting savings accumulation, which seems like a reasonable endeavor. The diminishing utility of wealth likely contributes to the understandable aversion to financial risks that many exhibit, and this should be acknowledged. The utility theory, in a rather innovative form, heralded the emergence of a new behavioral theory aimed at unraveling the complexities of human decision-making in the financial sphere.

The research methodology consists of 3 steps: (1) testing effectiveness; (2) in-depth testing of modern models o1, Claude 3.5 Sonnet, Claude 3 Opus, Gemini 1.5 Pro, and Llama 3.1 405B for data optimization using the Cramer–von Mises method; (3) calculation of P-value parameters for the Automatic Portmanteau Test (AQT) and the Generalized Spectral Test (GST) for the Chilean Broad Market Index (IGPA) over intervals of 50, 100, 150 days.

The generalized spectral test (GST) takes into account dependencies between all time lags. This statistical method is robust to conditional heteroscedasticity and is suitable for analyzing unrelated time series. The martingale difference hypothesis (MDH) implies the unpredictability of returns. The time series represents the

difference of martingales, which means the impossibility of predicting future values. The null hypothesis test was conducted regarding the difference of martingales. The effectiveness of the AQT and GST tests has been confirmed using the example of the Indian market [15–17].

Ideas based on the Cramer–von Mises method can be applied to estimate deviations from the mean. This approach is adapted to conditional heteroscedasticity, which is often observed in financial data, such as stock index returns (1) — (6).

$$\hat{\varphi}_0(y)\psi = (n-\theta)^{-1} \sum_{t=\theta+1}^{n} E[(Yt - Yn - \theta)^{eixYt-\theta}], \quad (1)$$

where φ — amplitude of the result; y — variable; ψ — weight of the variable; n — dataset; θ — phase angle; E — data optimization based on Deep Seek; Yt and Yn — results based on amplitude; t — time of the event.

$$H(\psi, y) = \varphi_0(y), \quad (2)$$

where H — amplitude of the result.

$$S_n(\psi, y) = \sum_{\theta=1}^{n-1} \sqrt{n-\theta}\,\hat{\phi}_\theta(y)\left[\frac{\sqrt{2}\,\sin(\theta\pi\psi)}{\theta\pi}\right], \quad (3)$$

where S — membership parameter.

$$D_n^2 = \int\int_R^1 \int_0^1 |S_n(\psi, y)|^2_{W(dy)d\psi}, \quad (4)$$

where D — dispersion; S — membership parameter; W — membership parameter.

$$D_n^2 = \sum_{\theta=1}^{n-1} \frac{n-\theta}{|\theta\pi|^2} \sum_{t=\theta+1}^{n-1} \sum_{s=\theta+1}^{n-1}. \quad (5)$$

$$Q_k = n\sum_{\theta=1}^{\hat{k}} p_\theta^2, \quad (6)$$

where Q — the significance of model optimization; k — the coefficient of relationships between parameters; p — oscillation parameter.

RESULTS

In-depth testing of modern models o1, Claude 3.5 Sonnet, Claude 3 Opus, Gemini 1.5 Pro, and Llama 3.1 405B, which involved evaluating agent behavior in conditions specifically designed for optimization, yielded quite interesting results. It became quite clear that these models have taken on the task of using data optimization as a rather effective strategy to achieve the set goals. The spectrum of optimizations used by these advanced models is broad.

Models like Llama 3.1 405B and Claude 3 Opus achieved the best optimization options in about 80% of cases. Models that are currently widely used, including open-source ones, have already accumulated a vast arsenal of optimizations at their disposal.

Fig. 1–6 present the results of two independent tests of the efficiency and integration of the Chilean stock market: the Automatic Portmanteau Test (AQT) and the Generalized Spectral Test (GST), which have been used in many studies [1, 16, 17] to assess the efficiency and integration of the stock market over three different periods of 50, 100, and 150 days.

Fig. 1–6 show that the Chilean stock market demonstrates high efficiency when using the AQT tool: efficiency drops to the 5% significance level only once in 50 periods; efficiency does not drop to the 5% significance level over 100 periods; efficiency drops to the 5% significance level only once in 150 periods. The GST tool finds that efficiency falls to the 5% significance level 6 times over 50 periods; efficiency falls to the 5% significance level 6 times over 100 periods; efficiency falls to the 5% significance level only 2 times over 150 periods. These results demonstrate the adaptive nature of Chilean stock indices, as after increasing the window length, both tests show that efficiency improves.
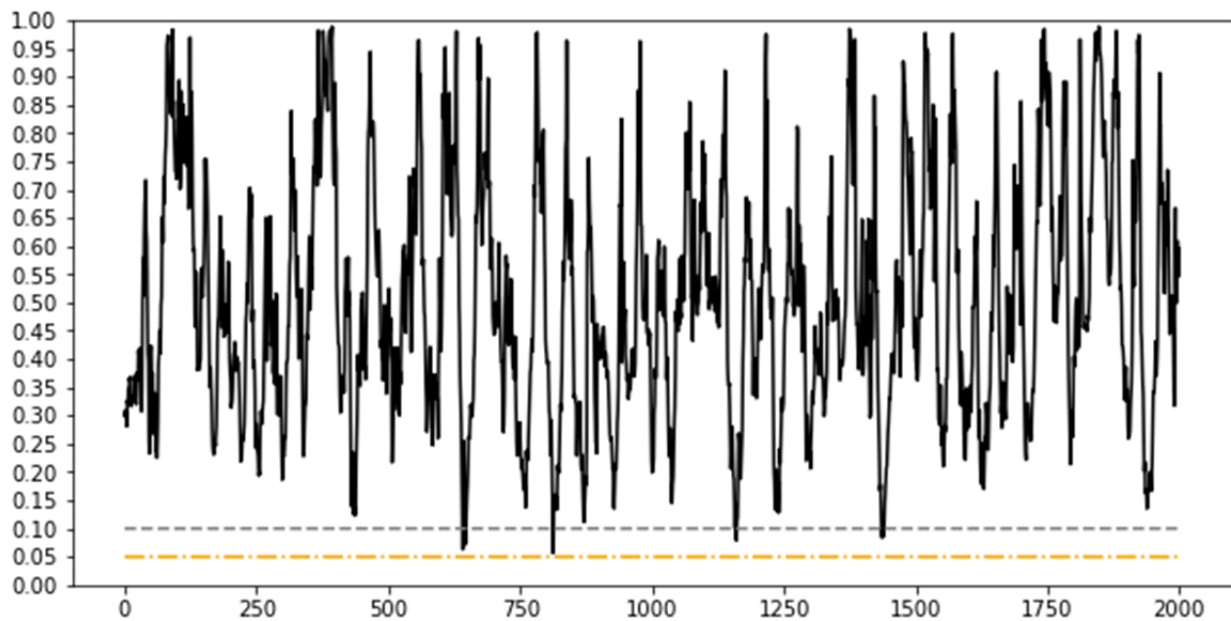
Fig. 1. **p Values of the AQT Parameter of IGPA Index Dynamics (50-Day Period)**
Source: Santiago Stock Exchange. URL: http://www.bolsadesantiago.com (accessed on 29.01.2025).
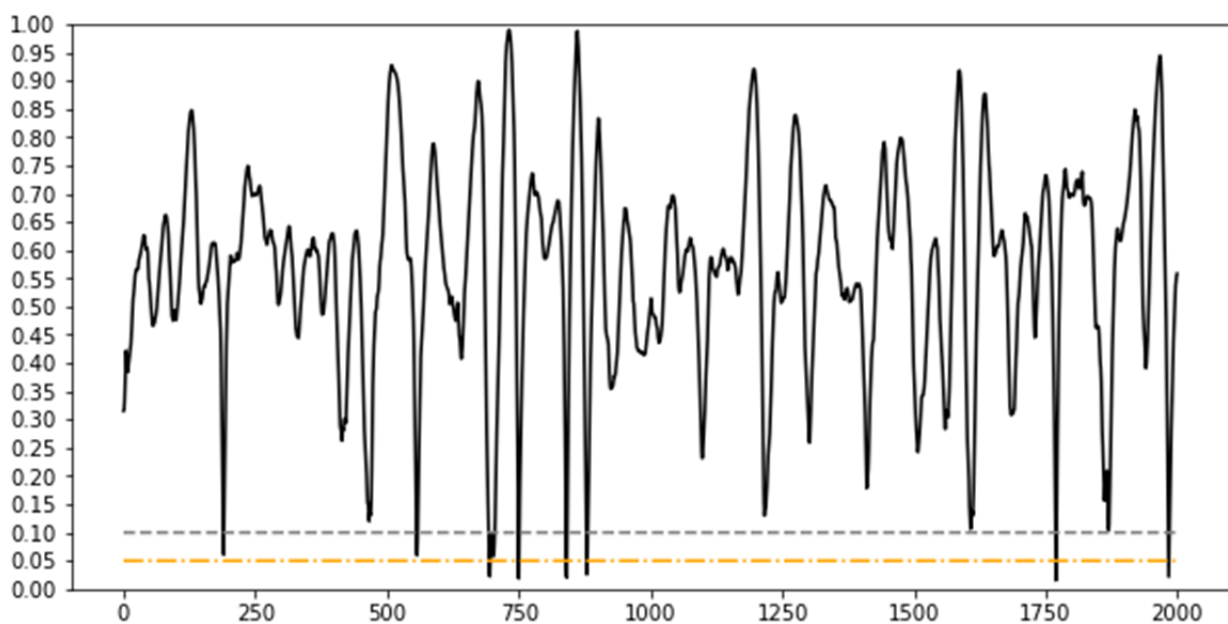
Fig. 2. **p Values of the GST Parameter of IGPA Index Dynamics (50-Day Period)**
Source: Santiago Stock Exchange. URL: http://www.bolsadesantiago.com (accessed on 29.01.2025).

DISCUSSIONS

Mechanisms of Energy Sales on the Exchange Market

Investments aimed at facilitating the transmission of electricity over long distances are associated with the implementation of political decisions, obtaining permits, and large-scale construction works, which require significant time. Therefore, it is necessary to recognize that market participants can foresee the emergence of new power lines long before their actual construction, which may
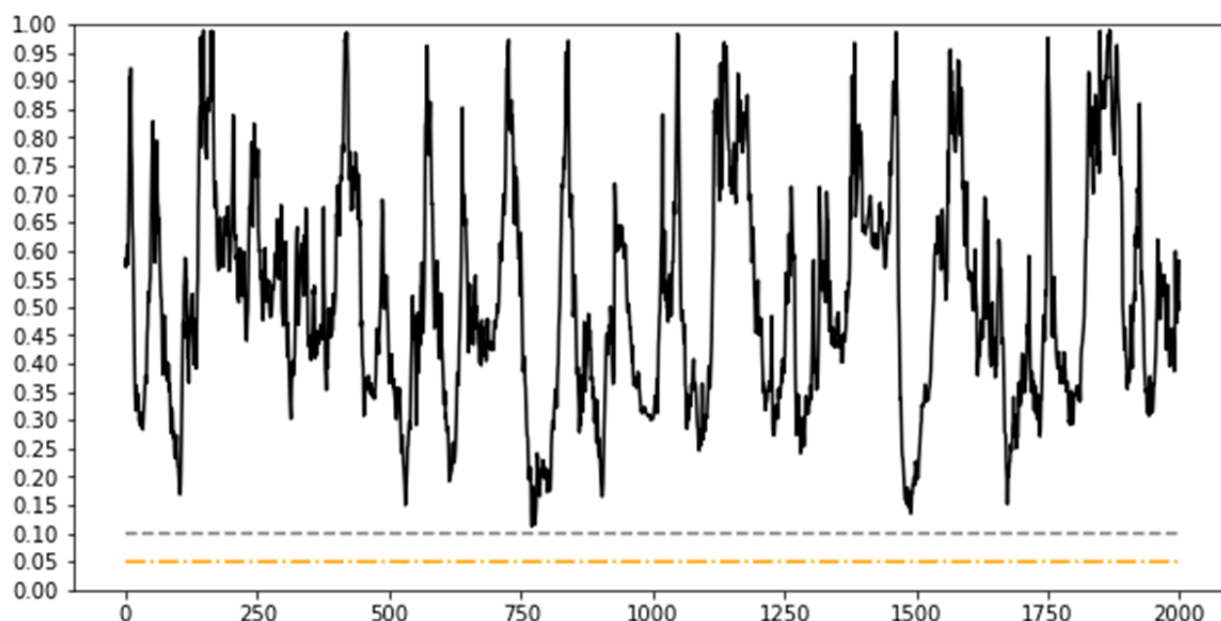
Fig. 3. **p Values of the AQT Parameter of IGPA Index Dynamics (100-Day Period)**
Source: Santiago Stock Exchange. URL: http://www.bolsadesantiago.com (accessed on 29.01.2025).
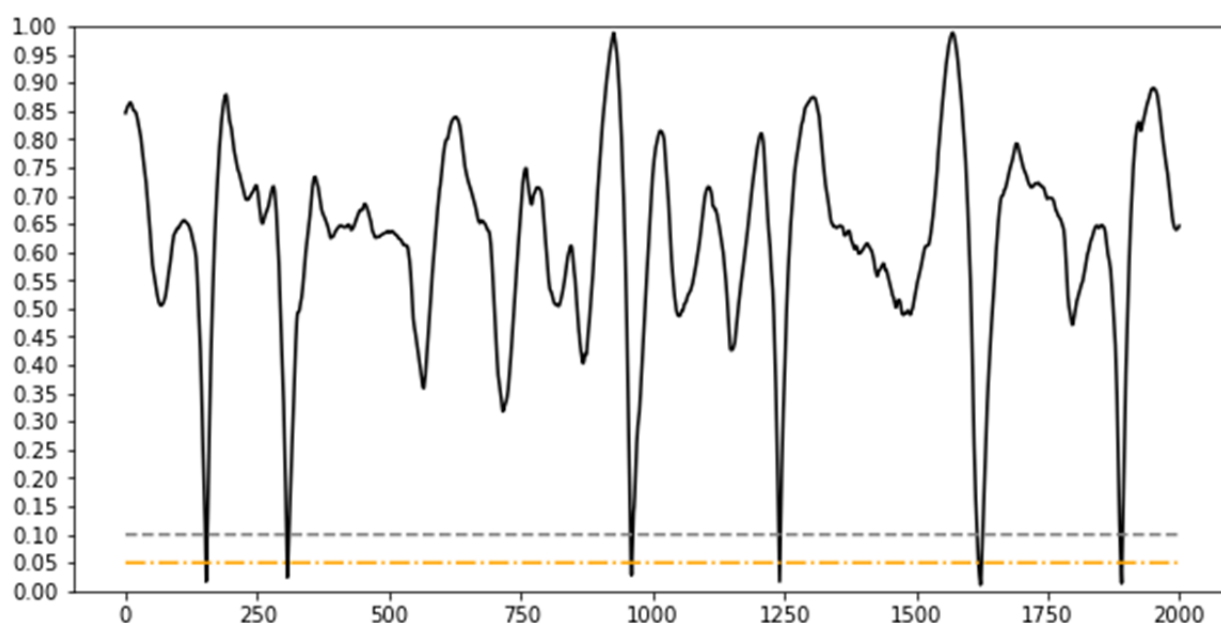
Fig. 4. **p Values of the GST Parameter of IGPA Index Dynamics (100-Day Period)**
Source: Santiago Stock Exchange. URL: http://www.bolsadesantiago.com (accessed on 29.01.2025).

influence their strategic decisions regarding the creation of new energy facilities. Thus, it is crucial to take these anticipatory expectations into account when analyzing the long-term consequences of such investments [19–22].

Like in other Latin American countries, Chile uses energy trading mechanisms on the exchange to determine the dynamics of supply and demand in the spot market. Electricity companies are required to submit
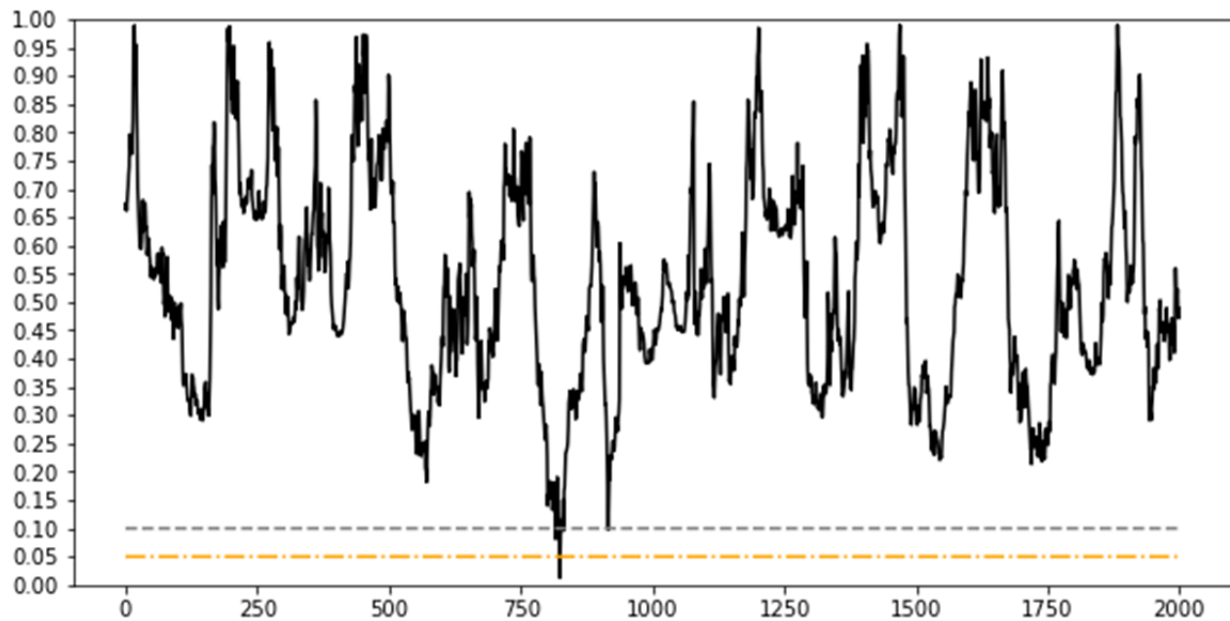
Fig. 5. **p Values of the AQT Parameter of IGPA Index Dynamics (150-Day Period)**
Source: Santiago Stock Exchange. URL: http://www.bolsadesantiago.com (дата обращения: 29.01.2025) / (accessed on 29.01.2025).
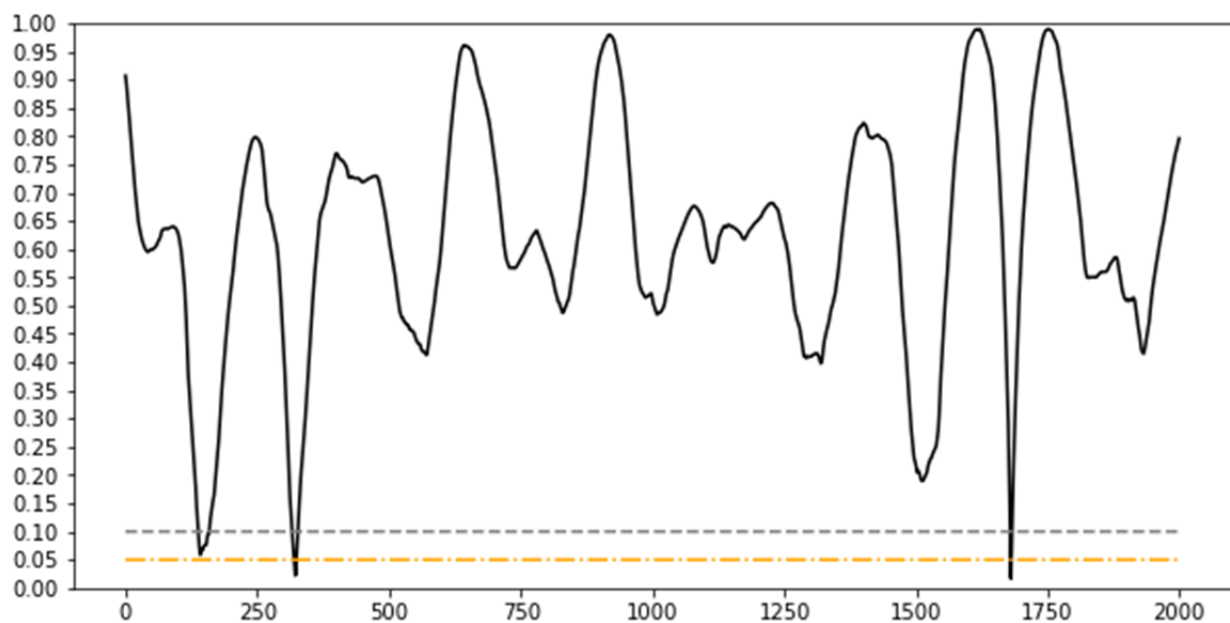
Fig. 6. **p Values of the GST Parameter of IGPA Index Dynamics (150-Day Period)**
Source: Santiago Stock Exchange. URL: http://www.bolsadesantiago.com (accessed on 29.01.2025).

technical specifications of their operational units, as well as contracts for the purchase of natural gas or alternative resources, including raw material prices, to the Economic Load Dispatch Center (CDEC) [22, 23].

As a result, the price that arises in the spot market corresponds to the marginal costs associated with using the most expensive unit of electricity production. In cases where there are transmission constraints between regions,

spot prices may differ across different regions. The most spatially detailed prices are called nodes, and CDEC disseminates information about spot prices at the node level on an hourly basis.

The Stock Prices of Energy-Producing Companies are Flexibly Linked to Marginal Costs in Chile

Due to the high efficiency of the Chilean stock market, the stock prices of energy-producing companies are flexibly linked to the marginal costs that characterize the unit cost, especially for natural gas power plants, which play an important role in the energy landscape. Therefore, we aim to estimate the hourly supply curve of natural gas generators at the zonal level, using hourly node prices in combination with observed hourly data on electricity generation by natural gas power plants for each month included in our sample. Additionally, we take into account the hourly electricity generation limits set to reflect the minimum and maximum observed levels of electricity generation for each corresponding month in our sample [17, 18].

Hydropower generation largely depends on expectations regarding future water availability, and these expectations are assessed by Chile's central operator based on complex medium- and long-term forecasting models that take into account various influencing factors. Considering the limitations inherent in our model, we use a more simplified approach, evaluating supply curves based on hydropower generation data and zonal node prices, similar to the methodology applied in natural gas analysis.

Advantages of Using AI Optimization for Renewable Energy Sources in Chile

The calculations we conducted only consider the benefits associated with the commissioning of solar power plants by the end of our trial period, and therefore do not account for the potential advantages that could be gained from attracting additional participants in the coming years. The expansion of AI optimization for renewable energy sources has allowed the country to regain energy security, which is a vital aspect that was not included in our current calculations. Finally, although the main focus of this discussion is on the payback periods of investments, it is important to recognize that investments in powertrain technologies are primarily long-term and will continue to provide benefits for several decades to come [24, 25].

The unique context of solar energy use in northern Chile, which boasts unprecedented solar radiation potential, combined with the significantly smaller land area around Santiago, suggests that this limitation may not be as relevant as in other areas of application. Nevertheless, missing this margin makes our cost-benefit analysis more favorable, as it indicates that if Chile refrains from market integration, investments in solar energy in these less sunny areas could potentially increase the overall available solar capacity. Unfortunately, to ensure internal investments in these specific regions, it will be necessary to introduce significant assumptions, especially since we have considerably more limited information about the costs associated with the installation of solar panels, given that the volume of large-scale investments in solar energy in these areas has noticeably decreased during the reporting period. Therefore, it is extremely important to emphasize that conducting additional analysis in this area will be a crucial direction for future research [26, 27].

Insufficient Market Integration between Regions

In Chile, there is noticeable insufficient market integration between regions, characterized by a significant dependence on renewable energy sources [28, 29].

From an empirical standpoint, it is preferable to conduct a comparative analysis of production costs before and after the extension of the power line, for example, using an event study analysis similar to the comparative

methodology, all else being equal. In the absence of investments aimed at developing solar energy, the benefits associated with the expansion of production should fully coincide with the benefits of trade. In the absence of obstacles, additional investments (the causal component of investments) come precisely as the transfer expands, which allows for the assessment of investment benefits related to trade. However, in the presence of discrepancies, the conditions for expansion may not fully coincide with the volume of investments made. Let's consider a scenario where investors enter the market before the complete construction of the power line in anticipation of upcoming changes [30, 33].

In a broader sense, we expect that the event-based approach will systematically underestimate gross cost savings in the presence of temporal discrepancies. It is important to note that this phenomenon is also applicable in the case of investment deferral, as the savings will allow for the exclusion of any investment consequences during the event period [32, 33]. Regarding price differences, the event-based methodology is likely to overestimate the overall impact of transmission lines on price convergence under expected investments.

Early investments will exacerbate the price difference, which will subsequently tend to narrow as the network expands. Generally, the price reduction will be underestimated [34–37]. It should be noted that the efficient market hypothesis and event study methodology hold an important place in investment analysis. The efficient market hypothesis suggests that market prices fully incorporate all available information, making it impossible to consistently achieve excess returns through the buying or selling of assets at prices different from their true value. Event analysis, on the other hand, focuses on studying the impact of unexpected corporate events, such as mergers, acquisitions, financial report releases, and stock issuances, on asset price dynamics.

Despite the differences between these two concepts, they remain important elements in the arsenal of modern investment analysis, allowing for a deeper understanding of market functioning mechanisms and enabling more informed decision-making.

CONCLUSION

The article demonstrates the influence of the high level of efficiency and integration of the Chilean stock market on the energy transition in the country. Additionally, further conclusions have been drawn:

the stock prices of energy-producing companies are flexibly linked to marginal costs in Chile;

the mechanism for selling energy on the exchange market is effective;

non-market integration between regions is noticeable.

Market integration and the high efficiency of the Chilean stock market enhance the efficiency of resource allocation through the benefits of trade and stimulate the emergence of new renewable energy sources.

The novelty of the research lies in the systematization of aspects of efficiency and integration of financial markets and the impact of this high degree of efficiency on the transition to renewable energy sources in Chile. The practical significance of the research results lies in the application by regulators of aspects of efficiency and integration of financial markets in the transition of the economy to renewable energy sources.

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The Concepts of Performance Measurement Based on the Purposes of the Hindu Religion

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ABSTRACT

This study attempts to construct the concept of performance measurement using the values of *Catur Purusa Artha*. The method used as a construction tool is the study of literature and the development of concepts from the values of Hindu religious goals, namely *Catur Purusa Artha*. This research shows that humans aim to achieve happiness through physical well-being (*sekala*) and inner peace (*niskala*), the antithesis of homo economicus found in performance measurement, which is only dominated by financial performance measurements. The formation of the concept that is formed is a broader and more comprehensive goal and perspective, namely worship of God based on the teachings of goodness (*dharma*), which is aimed at obtaining wealth (*artha*) by controlling desires (*kama*) to achieve a balance of the ultimate goal as the highest goal in the form of happiness (*moksa*).

Keywords: catur purusa artha; financial performance measurement; hindu religious goals; homo economicus; performance measurement

INTRODUCTION

If performance is not defined, it cannot be measured or managed [1]. Performance must be defined as a result of work because it relates to the organization's strategic goals, customer satisfaction, and economic contribution. The formulation of organizational performance measurement cannot be seen only as a measuring tool. However, seeing the formula as a strategic instrument for developing the organization is more critical. Therefore, performance measurement in organizational functions is more of a decision-making tool than a measuring tool [2].

In the era of the 1980s, performance appraisal of a company tended to emphasize financial performance; various financial measures included: Return on Capital Employed (ROCE), Return on Investment (ROI), Economic Value Added (EVA), and others. The limitations of the financial performance appraisal system motivate using the Balanced Scorecard (BSC) as a performance measurement system. BSC is seen as more rational when compared to traditional performance measurement because, in addition to paying attention to financial performance indicators, it also considers non-financial indicators. This BSC indicator consists of the perspectives of:

1) Finance;
2) Customers;
3) Internal business processes;
4) Learning and growth.

These four perspectives are intended to create a balance between short-term and long-term goals and can be used as a strategy by management to maintain the organization's existence [3].

Although BSC is considered more rational than traditional performance appraisal, there are several studies and studies on the antithesis of BSC. Elkington sparked a triple bottom line to connect finance, people, and the environment [4]. The balanced scorecard was also constructed by Awadallah and Allab, adding an environmental perspective as the fifth pillar in the balanced scorecard [5]. This construction is refined in the study of Kalender and Vayvay by strengthening the argumentation of the environmental perspective as a balance point in the balanced scorecard [6]. However, this effort is still leaning only on the financial perspective. In contrast, other perspectives that are often neglected, namely divine, social, and cultural, still need to be studied in this reconstruction.

Measuring organizational performance that is only profit-oriented can create an imbalance in organizational

life. Another impact is that it can lead to the exploitation of humans and the environment and undermine efforts to promote social responsibility [7]. Therefore it is necessary to internalize moral and social values in the business world. This opinion is supported by Ekasari, that the values of capitalism, materialism, and individualism cannot be eliminated in company practices but can be reduced by incorporating spiritual values [8]. The concept of performance measurement, which is colored with a religious perspective, is expected to provide enlightenment so that all those involved in the process, besides being able to produce order within themselves, the organization, society, and their environment, are also able to channel positive energy in achieving organizational goals.

Behavior relates to his life's ideals or goals [9]. The true purpose of life today is often forgotten because of the ambition to pursue worldly or material happiness. If it is associated with Wilber's The Great Nest of Being scheme [10], then the purpose of life in the form of material is the lowest level. The purpose of human life in the teachings of Hinduism is stated in the Book of Brahma Purana 228, 45, namely Catur Purusha Artha: "Dharma, Artha, Kama, Moksana Sarira Sadhanam". *Catur Purusa Artha* is a touch of local genius values regarding the purpose of life for Balinese people. The concept of Catur Purusa Artha is one of the values that are the basis for maintaining balance in life. Religious values that are integrated into the concept of performance appraisal will place humans, both individually and in organizations as beings who have fair and balanced characteristics, and life as economic beings and spiritual beings who will later lead to a spiritual path of uniting with God [11].

This study sees that performance measurement that is only financially oriented will produce perspectives that close human eyes and lead people to worldly things. On this basis, values and assumptions that are intact and have a human connection with God and the universe are needed to form a conscious and holistically valuable performance measurement concept [11]. Therefore, an effort was made to form a complete performance measurement concept to get a broader perspective following the actual reality based on the life goals of Hinduism, namely *Catur Purusha Artha*.

Philosophy of Catur Purusa Artha

Hinduism has teachings relevant to the purpose of human life, namely *Catur Purusa Artha*. *Catur Purusa*

Artha comes from the root word *Catur,* which means four; *Purusa*, which means soul; and *Artha*, which means purpose in life. So, *Catur Purusa Artha* is the four goals of human life. *Catur Purusa Artha* is a universal teaching that applies throughout the ages. In the Book of *Brahma Purana*, we can find quotes about *Catur Purusa Artha*, as mentioned below:

"*Dharma Artha Kama Moksanam Sariram Sadhanam*"
Meaning: The body is a tool for obtaining *Dharma*, *Artha*, *Kama*, and *Moksha*. The quote above explains that humans must be aware of the purpose of their life and what they have to look for with the body they have. Everything is none other than *Catur Purusa Artha* itself. In *Catur Purusa Artha*, there are *Dharma* (goodness), *Kama* (desire and lust), *Artha* (wealth), and *Moksa* (highest happiness).

A new view in business management emphasizes that financial aspects alone are not enough to achieve good financial performance; a touch of non-financial aspects is needed to achieve maximum results. The culture applied in a company is one of the non-financial variables that play a role in realizing financial performance. The culture adopted by the company will influence capital structure decision-making, ultimately affecting the company's financial performance. Several researchers have tested cultural values' role in capital structure and financial performance [12].

Internalizing business processes based on *Dharma* will provide satisfaction (*Kama*) to customers. Artha is a financial target realized through efficient operational activities, increasing sales volume and business (business). Satisfaction with the services provided will encourage the achievement of good financial targets (*Artha*), and ultimately, the company's goals will be realized (*Moksa*) Moksa is the goal of a business [business], namely maximizing performance by increasing profits, maintaining the reputation, and sustainable business capabilities [13]. Implementing the value of *Catur Purusa Artha* is an intangible asset that will encourage company management to make better decisions in choosing more effective funding sources, ultimately affecting the company's financial performance [13].

METHOD

The method used in this research as a construction tool is the study of literature and developing concepts

from the values of Hindu religious goals. The research involves a comprehensive examination of existing literature, which may include religious scriptures, philosophical texts, academic papers, or other relevant sources. This literature provides a foundation for understanding Hindu religious goals, principles, and values. The concepts developed through the study of literature and Hindu religious goals are utilized as tools in the construction process. It implies that these concepts are not merely theoretical but practical frameworks that inform and guide construction activities. They could influence decision-making, design principles, construction techniques, or the overall approach to the project.

DISCUSSION

Efforts to Find Holistic Performance Measurements
Knowledge must be realized broadly, not only limited to sensory experience but also spiritual experience [10]. In addition, it must be understood that humans are complex beings with rational and emotional sides that often defy the behavior description of mainstream models [14]. The mainstream view relies only on rationality or intelligent thinking, so it often needs to remember dimensions beyond the mind. The purpose of life that stops at the material dimension will tend to potentially ignore other elements in life, such as spiritual elements so that it can produce something [behavior or science] that can harm life. Material-oriented goals cause individuals to despiritualize themselves and nature, namely, treating each other as objects to be manipulated to drive economic growth and treating nature as objects to be exploited for the same purpose [15].

The concept of Catur Purusa Artha is one of the values that are the basis for maintaining balance in life. While still living in the world, worldly goals inevitably must be achieved for happiness. The concept of Catur Purusa Artha clearly states that there are worldly goals, namely *Artha* and *Kama*. However, this does not mean that humans are advised only to prioritize the world because the highest purpose in life lies precisely in *Moksha*. So these four goals form a hierarchy, namely *Dharma, Artha*, and *Kama*, the ladder for the last purpose of life, *Moksha*. *Dharma* is the truth that guides humans to have noble character according to the basis of religion, which is the guideline of their life. The next concept is

artha which can be interpreted as wealth or wealth. This *artha* concept encourages people to work hard to get income that is used to fulfill their various needs, both basic needs and the need to carry out rituals in the form of *yadnya*. *Artha* should always be acquired based on *Dharma* and used on the path of *Dharma*. The next goal is *Kama*, namely desire. The purpose of life for Hindus is to change the desires that indulge in lust towards the desire to achieve spiritual beauty, to achieve the final and highest goal, namely *Moksha*, the achievement of eternal happiness.

Religious values that are integrated into the concept of performance measurement will place humans, both individually and in organizations, as beings who have fair and balanced characteristics and life as economic beings and are spiritual beings who will later lead to a spiritual path of uniting with God [11]. The existence of such integration will lead to a more holistic performance measurement, which means that welfare is not limited to material well-being but also includes mental well-being and spiritual well-being. The criteria for true moral ideals to be life goals are:

1) Must be in harmony with human nature;

2) Must be understood by human reason;

3) Belief in them must be supported by rational understanding;

4) Must be supported by true human desires;

5) Must be achievable so that it is not just a dream;

6) Includes moral values and places them correctly in the hierarchy [9].

Catur Purusa Artha: Reflection on Performance Measurement

The study of human assumptions is critical in building the basic framework of a performance measurement concept, both in theory and practice. Developing the balanced scorecard concept uses the basic assumption that humans are homo economicus [14]. This assumption inspires various theories, including the assumption that humans are a Resourceful, Evaluative, and Maximizing Model (REMM) [16]. Amadae described in Homo Economicus that humans have egos and principles to fulfill their pleasures and act to gain welfare in fulfilling their self-interest desires [14]. Homo economicus is described as a creature that will consider available information regarding opportunities and constraints on its ability to achieve

goals. Therefore, homo economicus considers himself a rational being by considering self-interest in himself and having sufficient knowledge to make choices [14]. It is the basis of today's economics, adopted and developed in accounting science. On this assumption, if humans are consumers, they will maximize self-satisfaction utility. Meanwhile, if humans are producers, they will maximize profits [17].

The assumption of humans as homo economicus is irrelevant to this life because there is no connection with other aspects of reality [18]. Therefore, studies and constructions regarding human assumptions are needed in building a complete performance measurement concept. In this study, human assumptions refer to the goal of Hinduism, namely *Catur Purusa Artha*. These values interpret human existence as a witness to the oneness of God and the spread of happiness in the form of physical well-being (*sekala*) and inner peace (*niskala*). The happiness in question has a different meaning from material happiness in the form of well-being in the concept of homo economicus.

The difference lies in non-material and material happiness in worshiping God. It shows that the happiness achieved is not worldly and individual welfare. However, happiness is in the form of essential welfare for prosperity in the world or the hereafter as a form of accountability from human nature [18]. It is different from the concept of homo economicus, which views that human welfare lies in the achievement of satisfaction achieved by rational reason [14]. Humans do not only achieve prosperity for themselves but also spread it for others and the universe. The spread of this prosperity is the real key to true human identity.

Hinduism gives a prominent place to the teachings about the basis and purpose of human life. In the teachings of Hinduism, there is a verse that reads:

"Moksartham Jagadhita Ya Ca Iti Dharmah".

Meaning: Religion aims to achieve physical well-being and inner peace [eternal peace]. From this meaning, we can conclude that humans were created and live in this world to achieve the highest goal of life, namely *Moksha*. In addition, humans also have three other goals in life, namely *Dharma*, *Artha*, and *Kama*. The first ladder is the *Dharma*. *Dharma* is truth, guidance, laws, and instructions. The second ladder is *Artha*. *Artha* is a provision or means in the form of property or wealth; health, knowledge, expertise, wisdom, friends, and

even the ability to control oneself are also included in *Artha*. This provision must be obtained in the right way, obtained based on the *Dharma*, and also used for the *Dharma*. After passing through the *Artha* ladder based on *Dharma*, we can fulfill the *Kama*. *Kama* is the nature of every living thing that is brought from birth. *Kama* is what makes them act in order to live, grow, and develop. *Kama* can lead someone to the highest glory, and *Kama* can also bring someone to the deepest abyss of dishonor. Therefore, all three should be avoided/controlled. The last ladder as the highest goal is *Moksha*. According to Hinduism, *Moksha* is the highest achievement at the end of the human life cycle.

If it is related to performance measurement, the goal of human life to achieve physical well-being and inner peace [eternal peace] will create a holistic performance measurement to achieve the welfare of all. Therefore, performance measurement is no longer profit-oriented and is not only aimed at increasing satisfaction. However, performance measurement makes humans constantly aware of the benefit in their lives. Thus, no more human beings carry out economic activities based solely on achieving self-satisfaction by exploiting humans and the universe alone. The existence of awareness and identity of spreading prosperity will shape human beings who are always grateful to God so that all their economic activities are aimed at the livelihood and management of this earth.

Performance Measurement Balance: "Sekala Niskala Happiness"

In the previous section, we discussed the assumptions and goals of humans referring to the goals of Hinduism, namely *Catur Purusa Artha*. These values interpret human existence as a witness to the oneness of God and the spread of happiness in the form of physical well-being (*sekala*) and inner peace (*niskala*). The true purpose of life can become an extraordinary energy that can bring humans to a better life, not only for themselves but for life more broadly. If likened to a journey, it can choose which path to pass to arrive at the destination after understanding the destination.

In the form of welfare, happiness is the hope of every human being who lives on this earth, in the form of material (*sekala*) or non-material (*niskala*). Humans carry out economic activities to achieve this welfare, one of which is performance measurement. Everyone has a different view of the meaning of well-being. Hamdi [19]

argues that material is an intermediary medium to meet transitory needs. Therefore, matter is not the primary target and ultimate goal for humans. This material can be a human means to improve humanity and morality for others. Even in this case, humans are prohibited from hoarding material, let alone hoarding as much profit as possible [20].

Its relation to accounting, especially the concept of performance measurement, reflects that humans who internalize based on religious teachings will carry out activities accompanied by mental stability, so they will not be afraid and doubtful in obtaining sustenance in terms of material or non-material. It will also underlie humans to avoid competing for profits or profits using accounting because of the fear of not being able to live in prosperity [20].

In Hinduism, the purpose of human life is explained through the concept of Catur Purusa Artha, which consists of *Dharma* (truth) and *Artha* (wealth). *Kama* (desire), and *Moksa* (freedom and union with God). These four dimensions allow humans to gain true welfare and happiness: the world and the hereafter. This welfare is for oneself and all levels [17].

Dharma Synergy as a Performance Measurement Base

Building a performance measurement concept based on religious values is crucial [21]. It is important to discuss because the performance measurement concept can only become a reality if the goal is formed. The purpose of the performance measurement concept will provide an overview of the established connectedness and the priorities aimed at in the organized perspective nets.

Etymologically, the word *Dharma* comes from the *Sanskrit* "dhr", defined as truth, justice, law, rule, wisdom, and character [22]. The online *Sanskrit* dictionary defines *Dharma* as good, sound, and main. *Dharma* is the main foundation in *Catur Purusa Artha* because of its function as the basis for achieving *Artha*, *Kama*, and *Moksha*. *Dharma* is a vehicle for humans to live life in the world and which will lead humans to return home to the Creator. *Dharma* can be interpreted as actualizing the values contained in religious teachings, as various adherents believe that the values taught in religion can guide humans to obtain happiness in this world and the hereafter.

Firmansyah explains that life welfare is related to the balance of the soul related to divine justice. The welfare of life can be achieved by carrying out economic activities and measuring performance [21]. Scientific debates on how to measure financial stability at the macroeconomic level are still very contentious [23]. However, Firmansyah reminded us that the search for prosperity is not aimed at the spirit of accumulating too much wealth but the enthusiasm to get blessings from God [21]. Concerning the balance of performance measurement, a prosperous life does not lie in material utility obtained but in feelings. Ten values — contentment, family, serenity and clarity of soul, brotherhood, mutual help, mutual love, religion, character, and Sufism — must be attained to achieve prosperity. These values will encourage people to carry out economic activities based on truth and justice, not just focusing on the welfare of themselves and specific groups. As the highest peak and the primary goal of humans is God, the existence of God as the highest reality is the goal, vision, and mission of all human activities, including performance measurement.

Artha (Treasure): First but Not Main Purpose

Love of money, or the love of money, has become a popular theme in various psychological literature [24]. It indicates that the mental attitude of "love money" is one of the characteristics of modern humans. It cannot be denied that to meet life's needs, humans need artha, namely wealth or riches. However, what is happening now is that wealth is being pursued to meet life's needs and satisfy unlimited human desires. The purpose of performance measurement is to produce data that later, when the data is analyzed accurately, will provide accurate information for management in making decisions to improve company performance, one of which is financial performance related to profits generated by the company's Efforts to acquire assets are not a mistake because artha or assets in Catur Purusa Artha is stated as one of the goals of life for human beings; without wealth or what is identified with money, it will be difficult for humans to achieve other life goals. It is essential to underline that the goal of wealth is required to be pursued through the path of *Dharma*, as Sarasamuccaya sloka 12 states:

Kamarthau lipsamanastu dhammamevaditascaret, nahi dharmmadapetyarthah kamo vapi kadacana (Sarasamuscaya 12)

Translation:

"In essence, if *artha* and *kama* are demanded, then *dharma* should be done first; there is no doubt that *artha* and *kama* will surely be obtained later; there will be no meaning if the *artha* and *kama* deviate from *dharma*."

The primacy of the property acquired must be through the path of *Dharma* following religious teachings. Happiness is the reward that will be received by those who diligently acquire wealth through the path of *Dharma*. On the other hand, wealth acquired through a path contrary to Dharma is a taint that can cause suffering.

Kama (Desire/Desire): Aim that Must Be Controlled

One of human nature is to have lust or desires that want to be fulfilled in the form of fulfilling physical needs, hopes for the future, ideals, a better life, etc. In *Catur Purusa Artha*, this is known as *Kama*. Maslow's hierarchy of needs theory states that after humans are satisfied with fulfilling a need at the lowest level, individuals will try to satisfy the needs of the next level [25]. Based on this theory, the hierarchy of human needs is physiological needs, the need for security, the need for belonging and affection, the need for appreciation, and the need for self-actualization. The purpose of further performance measurement is human connectedness, not to stop at one point but to keep trying to achieve higher achievements. *Sloka 269 Sarasamuccaya* motivates humans to keep fighting, making the best use of time for actions to achieve *Dharma*, *Artha*, and *Kama*.

Avadhyam divasam kuryad dharmatah kamator thatah, gate hi divase fasminstadunam tasya jivitam (Sarasamuscaya 269)

Translation:

"Do not let that time pass by uselessly; give it a chance to make use of that time; perhaps this time can be used to complete deeds in the fields of dharma, artha, and kama because it is inevitable that this life will end, at one time, by therefore, make good use of the time of life, do not waste or procrastinate time (Sarasamuscaya 269)."

Desire is necessary as long as humans live, so in *Catur Purusa Artha*, fulfilling desires is one of life's goals. However, the desire in question is not unconditional free will. Desires or desires must be desires controlled by *Dharma*. Control of desires is needed to prevent them from becoming harmful and destructive so that they can harm themselves and society more broadly [25].

Moksha: The "Reminding" Final Destination

Performance measurement, part of the management control process, can be used as a management tool to achieve organizational goals. Performance measurement must be based on all objectives that follow the vision and mission of the organization, are oriented towards the level of satisfaction or welfare of stakeholders, and are directed towards realizing organizational sustainability. Organizations or institutions must align the achievement of economic, social, environmental, and spiritual performance. Environmental issues are now a major problem on a global scale [26].

Performance measurement that is only material performance oriented (economic), with quantitative (monetary) benchmarks, needs to include elements of non-material performance evaluation with qualitative and quantitative (non-monetary) benchmarks and harmonious relations among wider stakeholders.

Humans cannot be completely free from worldly desires as a creature formed of them from material elements. The body needs material intake to survive. Worldly roles also demand responsibilities that must be fulfilled in order to realize a happy life. It means that liberation is not a complete abandonment of worldly things. *Moksartham jagadhita, you call it Dharma*, is thus stated as the goal of human life, which means attaining happiness in the world and the hereafter (*Moksa*). Worldly happiness should be attained without losing awareness of one's identity.

Control over desires is one of the essential keys to nourishing the soul's growth so that it grows vital in achieving goals, as taught in the sloka above. Humans who view their identity as a physical body will only perform actions to fulfill their physical desires. Strong attachment to worldly things will push people down (spiritually) so that they can defeat the power of the soul that wants to pull them up (spiritually).

CONCLUSIONS

Developing a complete and balanced performance measurement concept, especially in companies, is

crucial in this life. This research provides implications and contributions to the realization of performance measurement that is intact and balanced. It can be the basis for decisions and awareness steps for companies and the public to pay more attention to all aspects within and around the company.

The development of the concept of measuring performance using Hindu religious values, namely *Catur Purusha Artha*, interprets the purpose of human life as achieving happiness in the form of physical well-being (*sekala*) and inner peace (*niskala*). The happiness in question has a different meaning from material happiness in the form of well-being in the concept of homo economicus.

In the process of formation, the human assumption that is awakened is that humans are witnesses to the oneness of God and always worship Him based on *Dharma* values as the foundation of truth. These assumptions and goals are internalized in the concepts of physical happiness (*sekala*) and inner peace (*niskala*), thus forming an *Artha* (wealth) perspective based on *Dharma*. Next is the *Kama* perspective by controlling desire as the nature of every living thing that must be controlled. The last goal, as the highest goal, is *Moksha*, namely achieving happiness through physical well-being (*sekala*) and inner peace (*niskala*). These perspectives are interconnected and have a wholeness in the reality of this life.

There are several obstacles in the effort to develop the performance measurement concept. This research is still at the conceptual level, so further research is needed at the practical level to apply this performance measurement's development to the company's business activities. Furthermore, this study explores the general concept of the company's nature, even though many companies today have different concepts and bases. Therefore, further studies are needed to explore the basic concepts of specific companies.

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The Roles of Market Concentration and Diversity in Exploring the Nexus between Financial Leverage and Firm Performance

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ABSTRACT

The **purpose** of the study is to determine the relationship between financial leverage and the financial performance of companies in the insurance industry in Jordan, taking into account the influence of market concentration and product diversity. It analyzes data from 20 Jordanian insurance companies over 15 years (2005–2019). The study reveals a positive connection between financial leverage and insurance company profitability, with product diversification enhancing this relationship. Initially, market concentration had a negative impact on return on equity, but product diversification turned it into a positive influence. Additionally, the study highlights the positive mediating role of market concentration in the financial leverage-financial performance relationship. These findings have practical implications for insurers, emphasizing the need for diversified product portfolios and effective financial leverage strategies in a competitive market. This research contributes to understanding capital structure dynamics in emerging markets, specifically in the Jordanian insurance sector, by providing empirical evidence of the mediating and moderating effects of market concentration and product diversity.
Keywords: market concentration; diversity of products; financial leverage; financial performance; insurance industry

INTRODUCTION

Capital structure decisions are of utmost importance for insurance companies, as they directly affect financial stability, risk management, and long-term sustainability. By balancing debt and equity in their funding sources, these companies can optimize their capital structure, finding the right risk-return equilibrium. Capital is crucial for meeting insurance obligations like claims and damages [1]. The interplay between capital structure, market concentration, product diversity, and performance has gained significant attention. In a competitive environment, capital structure goes beyond value maximization; it becomes a fundamental factor influencing competitiveness.

The Jordanian insurance industry faces challenges due to high market concentration, dominated by a few major players that have caused financial problems and losses for others. Jaloudi's research [2] highlights this high concentration with a (H-H) index of 529, a median market share of 2.8%, and only four companies having a market share exceeding 5%. The seven largest providers account for roughly half of all premiums. Consequently,

net profit margins are notably low, with a median of 1.9%. Increased competition leads to higher target capital ratios and quicker adjustments towards these targets. *Figure 1* illustrates the high market concentration in the Jordanian insurance market.

The insurance sector in Jordan, it faces another significant challenge as insurance companies tend to prioritize car insurance and health insurance. While these two forms of insurance are undoubtedly crucial for individuals and businesses, the concentration on them has resulted in limited diversity in the overall insurance market. Other essential types of insurance, such as property insurance, life insurance, and liability insurance, often receive less attention as shown in *Fig. 2* below. This imbalance not only narrows the range of coverage options available to consumers but also limits the overall growth and development of the insurance industry in Jordan.

Product diversity is a factor that can impact the link between financial leverage and financial performance in Jordanian insurance. A diverse product range allows insurers to meet varied customer needs, enhancing resilience and risk management [3]. However, managing

such diversity poses challenges in resource allocation, operational efficiency, and profitability. This research aims to unravel the complex dynamics of the financial leverage-performance relationship in emerging markets, specifically the Jordanian insurance sector. By exploring how market concentration mediates and product diversity moderates this relationship, the study offers insights for theory development and practical guidance for insurers in similar emerging market contexts.

LITERATURE REVIEW

The Relationship between Financial Leverage and Financial Performance

Insurance companies operate in a unique business environment where risk transfer and financial protection are central. Their profitability is influenced by various factors, including capital structure decisions. The insurance business involves collecting premiums and investing funds to generate returns. Optimal capital structure decisions can impact the cost of capital, interest expenses, and financial risk, leading to enhanced profitability. Leverage choice affects investment capabilities, claim loss absorption, and overall financial health. Therefore, insurance companies must carefully evaluate the trade-off between leverage benefits and risks to ensure long-term sustainability. The theories of capital structure, such as Modigliani and Miller's MM1 and MM2, initially proposed that financing decisions have no impact on company performance in perfect markets. However, they later acknowledged the value-enhancing potential of changing capital structure, particularly through increased debt, due to the tax advantages it offers.

Theories of capital structure offer insights into how companies determine their optimal financing mix. The trade-off theory, proposed by Kraus and Litzenberger [4], highlights the balancing act between the tax advantages of debt and the costs associated with financial leverage, including the risk of bankruptcy. The agency theory, introduced by Jensen and Meckling [5], focuses on minimizing conflicts of interest between managers and shareholders, suggesting that higher leverage can align their interests. In contrast, the pecking order theory, presented by Myers and Majluf [6], suggests a preference for internal financing over external financing due to asymmetric information, indicating a negative relationship between capital

structure and company performance. These theories provide valuable insights into the factors influencing capital structure decisions and their implications for company performance.

The empirical literature on the relationship between capital structure and insurance company profitability differs from the theoretical literature. Some studies report positive links between capital structure and profitability [7–9] while others, like Suhartono [10] and Gundu [11] suggest a negative relationship with financial leverage. Overall, there is no consensus on the exact nature and strength of this relationship. The existing theories and studies highlight its complexity, influenced by factors like market dynamics, firm-specific traits, and industry-specific elements. Further investigation is needed to explore these factors and their interactions, gaining a more nuanced understanding of the financial leverage-profitability relationship in insurance companies. Based on this literature review, the research presents the following hypotheses.

Hl: There is a positive significant relationship between financial leverage and the financial performance of insurance companies in Jordan.

The Moderating Influence of the Diversity of Products on the Relationship between Financial Leverage and Financial Performance

The diversity of products within insurance companies can play a moderating role in the relationship between financial leverage and financial performance. When insurance companies have a diverse range of products in their portfolio, it can influence the impact of financial leverage on their overall performance [12]. The diversity of products allows insurance companies to tap into different market segments, reduce their dependence on specific product lines, and capture a wider customer base [13]. Agency theory suggests that the relationship between financial leverage and financial performance is influenced by the alignment of interests between shareholders and management [14]. When firms diversify their product offerings, it can affect the risk profile of the company and alter the incentives and behaviour of management. Product diversification can provide a buffer against the financial risk associated with high leverage, thus reducing agency costs and enhancing financial performance. Nahda and Rahmadana [15] state that there is a positive
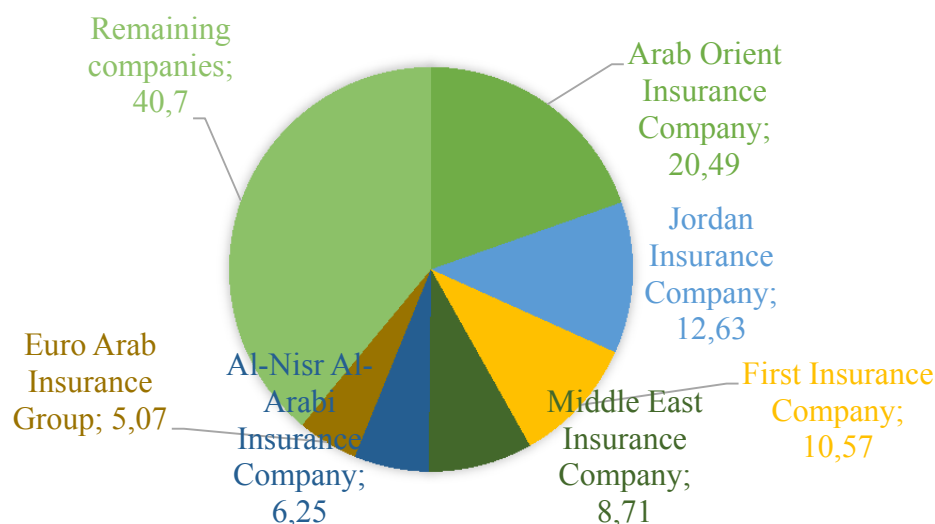
Fig. 1. The High Concentricity in the Jordanian Insurance Market

Source: The author's calculations are based on data from the Jordan Insurance Federation (Jif), the Annual report of the Insurance Companies Association for the year 2019. URL: www.joif.org (accessed on 19.05.2023).
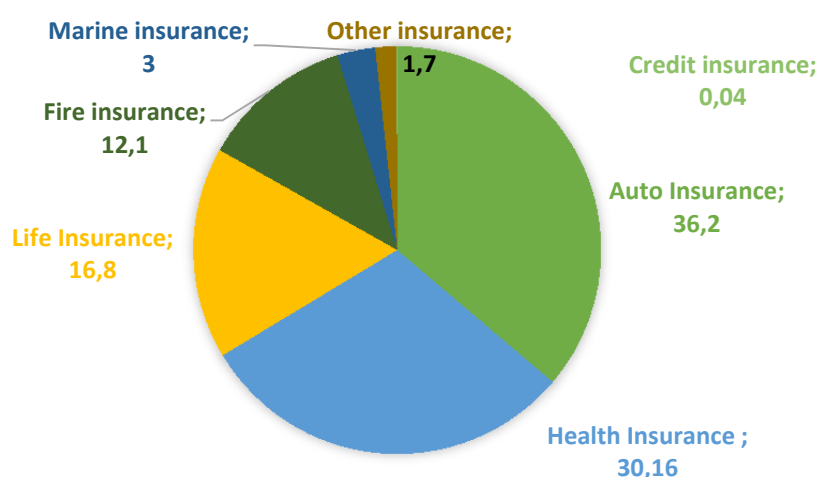
Fig. 2. The Shares of Insurance Branches out of the Total Premiums

Source: The author's calculations are based on data from the Jordan Insurance Federation (Jif), the Annual report of the Insurance Companies Association for the year 2019. URL: www.joif.org (accessed on 19.05.2023).

relationship between diversification and leverage, indicating that a diversity of products can mitigate the risk associated with high levels of financial leverage by providing revenue streams from multiple sources. This diversification of revenue streams can help firms withstand economic downturns and reduce the impact of financial distress. Septina [16] concluded that product diversification can enhance a firm's ability to exploit market opportunities and capture a broader customer base. This increased market reach can positively impact financial performance, especially when accompanied

by effective marketing and distribution strategies. However, larger investments may not necessarily lead to higher net profits for the insurance companies. According to Kanini et al. [17], increased leverage could have a negative impact on the performance of insurance companies if uncontrolled expansion into certain insurance products increases underwriting losses due to the high risks assumed.

H2: Product diversity moderates the relationship between Financial Leverage and the financial performance of Jordanian insurance companies.

The Moderating Influence of the Diversity of Products on the Relationship between Market Concentration and Financial Performance

The relationship between market concentration, as indicated by the Concentration Ratio (CR) of the largest insurance firms in the market, and firm profitability, as measured by the Market Share (MS) of the insurer, is influenced by various mediating factors. One of the key determinants of this relationship is the role played by product variety. The concept of product variety is rooted in economies of scope theory, which posits that businesses can achieve synergistic advantages and cost efficiencies by expanding their range of product offerings within the same industry. Through product diversification, companies can generate a wider array of goods while leveraging their existing resources and competencies [14].

In the insurance industry, the positive association between product diversification and financial performance, particularly within the context of the interaction between market concentration (CR) and market share (MS), can be attributed to several key factors. Diversified product portfolios enable insurers to spread risk, generate revenue from various sources, enhance customer retention and loyalty, establish competitive advantages, adapt to dynamic market conditions, capitalize on cross-selling opportunities, and balance their portfolio in concentrated markets. Ultimately, this contributes to improved financial performance by mitigating concentration-related risks, increasing revenue streams, and bolstering their market presence in situations where limited competition and market dynamics can significantly impact profitability [3, 18].

Empirical research consistently supports the notion that insurance companies offering diversified product portfolios tend to exhibit enhanced financial performance by reducing risk exposure and expanding revenue streams. Numerous studies have established a positive correlation between product diversification and financial performance. For example, Septina [16] found a positive relationship between the concentration ratio (CR) of the largest insurance firms in the market and the market share (MS) of the insurer. Similarly, Aivazian et al. [19] observed a positive association between product diversification and profitability, suggesting that a broader range of insurance products can lead to increased revenues and improved financial performance. Moreover, product diversity plays a crucial role in mitigating financial risks for insurance companies. Altuntas et al. [20] noted that diversified product portfolios assist insurance firms in reducing exposure to specific risks associated with particular insurance lines. This diversification effect contributes to more stable earnings and improved profitability for insurance companies. While limited attention has been given to exploring the mediating role of product diversification specifically on the relationship between the concentration ratio (CR) of the largest insurance firms in the market and the market share (MS) of the insurer, insights from studies conducted in other sectors, such as the research conducted by Cheng and Kesner [21] in the manufacturing industry, indicate that product diversification can mediate the relationship between market concentration and profitability, leading to higher performance for companies pursuing a concentrated market strategy.

However, while product diversification can positively impact profitability, it also introduces operational complexities that can affect financial performance. Effectively managing a diverse product portfolio requires additional resources, such as expertise in underwriting, claims management capabilities, and distribution channels. These resource requirements can lead to higher operational costs, potentially offsetting the profitability advantages of diversification. Additionally, the success of product diversification relies on insurers' ability to efficiently handle and integrate various product lines, ensuring consistent quality, pricing, and customer service across the portfolio [22]. Failure to address these operational challenges may hinder profitability. In light of the literature review, the research posits the following hypotheses.

H3a: Product diversity moderates the relationship between market share (MS) and the financial performance of Jordanian insurance companies.

H3b: Product diversity moderates the relationship between concentration ratio (CR) and the financial performance of Jordanian insurance companies.

The Mediating Influence of Market Concentration on the Relationship Between Financial Leverage and Financial Performance

Recently, researchers have increasingly explored how market structure impacts a firm's financial decisions in operational activities. Harris and Raviv [23] highlighted

market concentration as a critical determinant of a firm's capital structure. Cash availability, as a highly liquid asset, empowers a company to gain a competitive edge by expanding its sales network and investing more in research and development [24]. The theory of strategic commitment suggests that higher leverage strengthens a company's competitive ability, with a higher debt ratio indicating a shift toward more competitive behavior in the market [23]. Thus, in industries characterized by low concentration, minimal technical barriers, and typically low debt levels among competitors, an increase in a company's leverage ratio is likely to boost production and enhance performance in the product market.

Higher financial leverage reflects a strategic commitment by a company to compete more aggressively in its market. This increased leverage provides the firm with more financial resources, enabling investments in sales networks, research and development, and growth opportunities. In low market concentration industries, where competition is less intense and firms typically have lower debt levels, an uptick in a company's leverage ratio can stimulate increased production and enhanced performance in the product market. This is because the added financial resources obtained through leverage can confer a competitive advantage in markets where competitors may not be heavily leveraged. The relationship between market concentration and profitability has long intrigued researchers, dating back to the early work of Mason [25], who assumed a positive link between market structure and company performance. This positive relationship between market concentration and performance is typically explained by either the efficiency hypothesis or the market power hypothesis, as proposed by Bain [26].

The market power hypothesis posits that markets with higher concentration yield higher profits compared to less concentrated ones. This hypothesis is particularly relevant for firms in highly concentrated markets, where a few dominant players can control prices and market dynamics. When highly leveraged firms operate in such markets, their financial strength can amplify their market power, potentially leading to higher profits by setting higher prices and limiting competition [27]. Conversely, in less concentrated markets with intense competition, the efficiency theory becomes more pertinent. Firms with larger market shares, often driven by factors like higher leverage, can achieve greater efficiency. They can capitalize on economies of scale, invest in advanced technologies, and offer competitive prices, ultimately improving financial performance [28].

The Structure-Conduct-Performance (SCP) framework, mentioned in the final paragraph, underscores the interplay between market structure (concentration), firm conduct (leverage and competitive behavior), and performance. Market structure influences firm conduct, and firm conduct, in turn, affects performance [29]. For instance, in highly concentrated markets, the influence of financial leverage on firm conduct is amplified due to the heightened market power of dominant firms. In contrast, in less concentrated markets, the positive impact of leverage on firm conduct might manifest through enhanced efficiency and competitive behavior [30]. In light of the literature review, the research posits the following hypotheses.

H4a: market share (MS) Mediates the relationship between financial leverage and financial performance of Jordanian insurance companies.

H4b: concentration ratio (CR) Mediates the relationship between financial leverage and financial performance of Jordanian insurance companies.

RESEARCH DESIGN AND METHODOLOGY

The research sample consists of publicly traded insurance companies listed on the Amman Stock Exchange (ASE). Four insurance companies were excluded due to mergers or market exits, resulting in a sample of 20 Jordanian insurance companies operating between 2005 and 2019. This time frame was chosen to ensure a stable sample for analysis. This study employed regression analysis to examine the impact of capital structure on company performance. Regression analysis allows the exploration of relationships between a dependent variable and multiple independent variables, facilitating the modeling and examination of various factors simultaneously affecting the dependent variable [31]. It is used to gain insights into and analyze the relationships between independent variables and the dependent variable, as well as to ascertain causal relationships under controlled conditions. Multiple regressions are employed.

RESULTS AND DISCUSSIONS

To assess the validity of the model assumptions, various statistical tests were conducted. These diagnostic tests
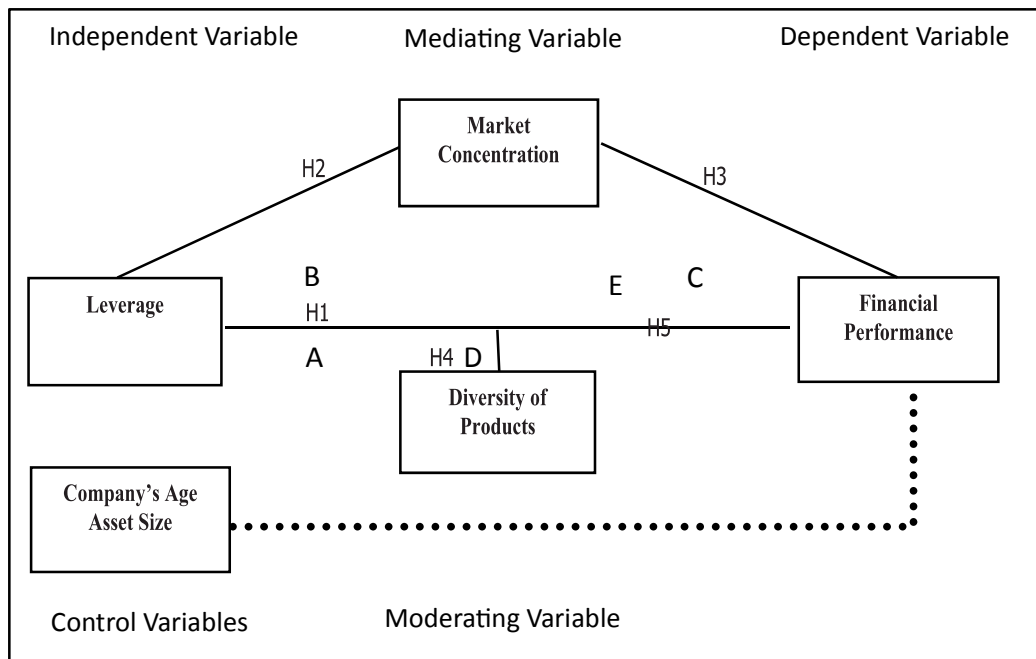
Fig. 3. **Conceptual Framework**

Source: Compiled by the authors.

encompassed a range of assessments, including tests for multicollinearity, heteroskedasticity, serial correlation, and model specification (*Table 1*).

Multiple regression analysis is a critical statistical tool with specific assumptions. Two key assumptions are the absence of multicollinearity and heteroscedasticity among independent variables. The variance inflation factor (VIF) helps assess multicollinearity, ideally indicating none [32]. However, the return on assets (ROE) model showed heteroscedasticity. To address this, options like model adjustment, variable transformation, or robust standard error calculations can be used. The robust standard error method corrects heteroscedasticity while preserving coefficient estimates.

In panel data analysis, addressing serial correlation is crucial for reliable regression models. Positive serial correlation can lead to underestimated standard errors and incorrect hypothesis rejections. Fortunately, in this case, test results indicate no significant serial correlation issues. Another concern is model specification errors, which stem from omitting relevant variables or including irrelevant ones, potentially distorting coefficient estimates. To ensure proper model specification, a model specification link test was conducted. Meeting these assumptions and addressing issues like multicollinearity, heteroscedasticity, serial correlation, and model specification errors is vital for maintaining the statistical validity and reliability of regression models (*Table 2*).

Regression Model 1 demonstrated that a one-unit increase in leverage corresponds to a 33.16% increase in the return on equity for insurance companies. This positive correlation indicates that higher leverage levels enable insurance firms to generate greater returns on equity. The positive association discovered in this study aligns with findings from previous research [7–9]. Consequently, hypothesis H1 is supported, indicating a significant positive relationship between financial leverage and the financial performance of insurance companies in Jordan.

The regression outcome is consistent with agency cost theory, which posits that borrowing reduces the agency cost between owners and managers, with creditors acting as supervisors in capital utilization. Therefore, substantial debt levels exert considerable pressure on managers to prioritize profitable investments, generating sufficient cash flow for interest payments and averting potential bankruptcy [33]. Moreover, increased debt leads to tax shielding, resulting in higher returns on equity for Jordanian insurance companies.

In this study, product diversification is a moderating variable. While it didn't show significance in Model 1, Model 2 (p < 0.05) shows that it strengthens the connection between leverage and insurance firms' financial performance (ROE), confirming hypothesis H2. This

Table 1

Diagnostic Checks

VARIABLES	ROE	
Testing for Multicollinearity	Mean VI	1.78
Testing for Heteroskedasticity	P-value	0.0735
Testing for Serial Correlation	P-value	0.0308
Testing for model specification	hat	0.000
	hatsq	0.251

Source: Compiled by the authors.

Table 2

The Moderating Influence of the Diversity of Products on the Relationship between Financial Leverage and Financial Performance

ROE	MODEL 1	t-Stat	MODEL 2	t-Stat
Leverage	0.3316 ***	0.0139	0.2102***	0.0169
	(0.000)		(0.000)	
PD	0.1910	0.1157	0.1291 *	0.1219
	(0.101)		(0.036)	
PD* Leverage			0.2486 **	0.01408
			(0.002)	
Age	0.0909	-0.0142	0.0855	0.14063
	(0.523)		(0.092)	
Size	0.0480 **	0.1230	−0.1382*	0.1014
	(0.002)		(0.036)	
Constant	0.04584**	0.1952	0.5114***	0.2734
	(0.003)		(0.000)	
Observations	300		300	
R-squared	0.3566		0.4047	

Source: Compiled by the authors.

Note: t-statistics in parentheses. * p < 0.05, ** p < 0.01, *** p < 0.001.

highlights that the relationship's strength depends on product diversification. Highly leveraged firms leverage their customer bases for cross-selling and use product diversification to benefit from economies of scale and scope [27], boosting sales, market power, and competitive positions, leading to increased cash flow and reduced financial difficulties [17]. Efficient product diversification helps insurers reduce risk and meet regulatory capital requirements. Firm size (total assets) significantly influences insurance company performance, with larger firms typically being financially stronger than smaller competitors [34]. Company age has a minor negative correlation with ROE in the insurance industry, suggesting that older firms don't necessarily outperform newer ones (*Table 3*).

The regression model above shows a one-unit increase in market share led to a notable 9.79% increase in return on equity. This aligns with market power theory and

The Moderating Influence of the Diversity of Products on the Relationship between Market Concentration and Financial Performance

Dependent Variable: ROE	MODEL 1	t-Stat	MODEL 2	t-Stat
MS	0.0974*	0.2646	0.0480**	
	(0.041)		(0.002)	
CR	−0.1690*	0.0506	−0.3706*	0.0122
	(0.049)		(0.010)	
PD	0.0403***	0.1708	0.0373***	0.2201
	(0.000)		(0.000)	
PD* MS			0.14882***	0.3654
			(0.000)	
PD* CR			0.3601***	
			(0.000)	
Age	−0.3150	0.0062	−0.2321	0.0017
	(0.120)		(0.583)	
Size	0.0261**	0.0605	0.0403**	0.0535
	(0.002)		(0.002)	
Constant	0.0584**	0.3424	0.6411***	0.4244
	(0.003)		(0.000)	
Observations	300		300	
R−squared	0.3566		0.4047	

Source: Compiled by the authors.

Note: t-statistics in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

efficiency theory, as seen in previous studies [27, 14]. Model 2 results also indicate a significant moderating effect of product diversity on the relationship between market concentration and performance. This underscores that the strength of this relationship depends on the level of product diversity, supporting hypothesis H3a. It suggests that companies with substantial market shares, especially market leaders, can leverage their extensive customer bases for cross-selling and product diversification. These strategic approaches help them achieve scope economies and enjoy related benefits.

Companies with larger market shares benefit from cost-effective production, higher profit margins, reduced marketing costs, improved product quality, and competitive pricing. This advantage stems from their accumulated experience, allowing them to spread fixed costs over larger production volumes [35]. These factors are vital for insurance companies aiming to provide trustworthy products and services. As insurers expand their market share, their competitive edge grows stronger, leading to increased investments in advertising and research and development, fostering new product development and revenue growth.

The regression analysis revealed a significant negative relationship between market concentration ratio (CR) and return on equity. A one-unit increase in the concentration percentage of the largest companies led to a notable decrease in return on equity (−16.90%), consistent with previous studies [36–38]. High market concentration negatively affects other insurance providers, indicating a lack of competition. A small number of dominant companies restrict the potential of others [39]. In Model 2, results show a significant moderating effect of product diversity on the relationship between market concentration and performance. This underscores that the strength of this relationship depends on the level of product diversity, supporting hypothesis H3b. Companies with substantial market shares can leverage their customer base for cross-selling and diversify their products to achieve economies of scope and related benefits (*Table 4*).

The findings reveal a positive link between financial leverage and performance in Jordanian insurance firms, aligning with trade-off and agency cost theories. Companies balance debt financing advantages and financial distress risks. Regression analysis confirms a robust connection between financial leverage and market

The Influence of the Mediating Effect of the Market Concentrates on the Relationship between the Financial Leverage and the Performance of Jordanian Insurance Companies

Variable	MODEL 1	MODEL 2	MODEL 3	MODEL 4	MODEL 5
	(ROE)	(MS)	(CR)	(ROE)	(ROE)
Leverage	0.3316***	00217**	−0.0010*		0.1291*
	(0.000)	(0.003)	(0.010)		(0.036)
MS				0.0749*	.00480**
				0.041	(0.002)
CR				−.27790*	−5.4817*
				(0.049)	(0.010)
Age	−.43149	.00047	.00584**	−.10692	−0.1210
	(0.120)	(0.817)	(0.003)	(0.120)	(0.583)
Size	0.0480**	00135*	.00369	0.0681**	0.0462**
	(0.002)	(0.038)	(0.083)	(0.002)	(0.002)
Constant	0.0882**	0.272**	0.5114***	0.0574**	0.8114***
	(0.003)	(0.001)	(0.000)	(0.003)	(0.000)
R−squared	0.3566	0.3566	0.0426	0.3566	0.4047

Source: Compiled by the authors.

Note: t-statistics in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

concentration, helping boost market share in competitive settings. However, there's a negative correlation between market concentration and capital structure, indicating highly competitive companies prioritize debt reduction. Larger firms diversify risks and adapt to market shifts, while smaller ones face greater vulnerability.

Market concentration indices (MS and CR) significantly impact Jordanian insurance companies' performance, providing competitive advantages, improved performance, increased advertising expenditure, and higher revenue. Oligopolistic firms dominate through price agreements, leading to economic rewards. However, a high concentration ratio harms smaller insurers, signaling a lack of competition and potential for a monopoly.

In MODEL 5, considering mediator variables (MS and CR), the strong relationship between financial leverage (X) and performance (Y) persists, suggesting partial mediation by market concentration. This supports the hypothesis that optimal capital structure goes beyond financing costs, crucial for a company's competitiveness. Market concentration significantly influences capital structure, expanding market share, enhancing competitiveness, and sales channels. A strong capital structure supports a competitive edge, growth, and profitability.

In highly competitive markets, firms face pressure to optimize their capital structure to maintain market position. Efficient resource allocation, balancing debt and equity financing, becomes essential. Careful management of capital structure helps firms gain a competitive edge, but securing favorable financing terms can be challenging due to increased risk. Intense competition affects profitability and cash flows, necessitating prudent debt management to mitigate financial risks. Understanding market concentration is crucial for optimizing capital structure in a competitive business environment.

CONCLUSION

This study explores financial leverage, market concentration, product diversity, and financial performance in Jordan's insurance industry. It highlights the positive impact of financial leverage, especially when combined with product diversification, on insurers' profitability. Market concentration plays a mediating role in the link between financial leverage and financial performance. These findings have significance for industry practitioners and policymakers. Based on these findings, some recommendations emerge. Insurance firms should cautiously assess capital structure

decisions, considering the benefits of using financial leverage for profitability while avoiding excessive risk. Diversifying product offerings can enhance financial performance when coupled with leverage. Firms should also adapt to market competition by conducting market research, tracking industry trends, and developing competitive strategies.

Policymakers should consider the implications of market concentration on insurer performance, promoting competition to stimulate innovation and efficiency. Regulatory measures supporting market entry and competition can create a level playing field for insurers and benefit consumers. Future research can delve deeper into understanding the mechanisms behind these relationships, conduct comparative studies in other emerging markets, extend longitudinal studies, explore additional variables, and expand research beyond the insurance industry to gain comprehensive insights.

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Inclusive Finance of China:
The Practice of Postal Savings Bank of China

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ABSTRACT

This article reveals the nature and economic essence of a bank within the system of financial relations with the state and society. The bank is considered as an intermediary in the conduct of entrepreneurial activities from the perspective of fulfilling a social mission, which is reflected in the transformation of attracted savings into investment resources. The **object** of the study is China's postal savings system. The **subject** is the Lushi financial model and the program of the Postal Savings Bank of China (PSBC). The **purpose** of the study is to develop an author's position regarding the concept of inclusive finance in the context of postal banking. In the article, the **task** is analysis of the concepts of postal banking and inclusive finance; study of the evolution and current state of postal banking in BRICS countries, analysis of the Lushi model and PSBC. The following **methods** were used: systemic, historical, theoretical cognition, scientific abstraction, and logical approach. The author hypothesizes that the development of inclusive finance largely depends on the bank's strategy. The social strategy of PSBC China was analyzed, using the example of the Lushi financial model and the PSBC of Self-Commitment program. An assessment of the current state of postal banking and the role of PSBC China in the issues of inclusive finance has been provided. The **conclusions** include: the author's position on the interpretation of the concept of financial inclusion, which differs from existing ones in that it is based on the analysis and study of the postal bank's activities, defining it as an integral part of the bank's strategy; the postal service can be a link between the government and society; China has achieved the best results among BRICS countries; postal banking is distinct from classical banking business and is a resource for developing inclusive finance. Recommendations for the development of postal banking are proposed: to develop a socially oriented bank strategy, ensure quadrilateral interaction, form a sustainable postal banking ecosystem, and use a system of indicators when evaluating inclusive finance. The **scientific novelty** lies in the justification of the effectiveness of postal banking and its connection with inclusive finance. The results of the study can be used to build a scientific rationale for the accessibility of financial services.
Keywords: inclusive finance; postal banking; savings; bank strategy; postal bank; availability of financial services; China

INTRODUCTION

In 2013[1] the World Bank defined the concept of inclusive finance as a state in which all parties and stakeholders have access to necessary and useful financial products and services that meet their needs. The key role of inclusive finance is reflected in the scientific works of Russian and foreign researchers. It lies in reducing poverty levels [1], improving macroeconomic indicators [2], stability, and economic development. That is why inclusive finance in the bank's strategy [3] is considered a solution to the internal issues of a given state. Finance has always been the foundation of the economy, and inclusive finance is the foundation of integrated economic development.

The author notes not only the benefits of financial instruments, whether it be an account, deposit, or loan in the form of direct economic advantages, but also the high degree of effective economic activity. Financial services are infrastructure comparable to communication networks or roads in the transportation sector.

In this article, the author sets a multifaceted goal — to develop an original position regarding the concept of "inclusive finance" in the context of postal banking, analyzing the experience of China and the possibility of its application in Russia. Interpreting postal banking as one of the tools for achieving financial inclusivity, the author systematically accumulates information about the postal savings system in different countries, then examines several PSBC projects and concludes on the feasibility of using postal banking as a resource for achieving financial inclusivity.

The author sees the achievement of the set goal in solving complex tasks: to clarify the concepts of "postal banking" and "inclusive finance", analyze their evolution and current state, and assess their effectiveness within a group of countries. A detailed study of the models chosen by the author will yield results

that reveal the interconnection between these two concepts. At the same time, while analyzing the system, the author notes problems related to the development of postal banking: additional investments in the sector, the share of public sector participation in the form of support, an undeveloped regulatory framework, and many others. In turn, the prospects in the form of real results, namely access to financial services, are reflected by the author in the analysis of the current state of the postal savings system in several countries. Effective resource allocation and a reduction in the number of "unofficial" sources of lending are the advantages for the country's economy that ensure financial accessibility for all segments of society.

Not only economic but also inclusive growth contributes to the resilience of the state. Scientists, politicians, researchers, and many stakeholders in business currently prioritize financial inclusion with the aim of achieving sustainable inclusive growth [4]. Services such as savings, payments, and risk management are necessary for everyone at all times, and an inclusive financial system ensures broad access to financial services without restrictions. Inclusive finance is potentially beneficial for all population groups without exception. A special category consists of socially vulnerable individuals: those with low income, living in remote areas, that is, all those who, due to lack of access to financial services, are forced to rely on their often limited savings and income [5].

In his scientific works, G. Yu. Meshcheryakov noted that "the global market for postal banking services is characterized by high capacity and is actively developing. Moreover, the degree of universalization of postal banks is not the same: some are close to classical credit organizations, while others emphasize their specific advantages…" [6].

S.S. Evdokimova, in her research, characterizes models of international experience in the integration of postal services and banks, delving into the legal aspects of the issue [7].

The idea of linking post offices and banks first originated with the English. William Gladstone

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[1] Financial inclusion beyond accessibility. Moscow School of Management Skolkovo. 2018. URL: https://finance.skolkovo.ru/ru/sfice/research-reports/1810–2018–11–15/ (accessed on 05.01.2023).

(for this idea he was knighted), who was a member of the government at the time (1809–1899), established the Post Office Savings Bank in 1861. The aim of this bank was to provide nationwide access to financial services through the network of post offices. What truly lay at the heart of the bank's creation — whether it was the possibility of reducing the national debt through internal financial mobilization or other tasks related to the accumulation of funds — remains unknown. However, the developed system of post offices throughout England became the foundation for the establishment of savings banks across its territory. By the end of 1862, over 178 000 clients and approximately 1.7 million pounds had been attracted through the network of post offices, posing significant competition to the banks existing at that time. An interesting fact is that this system remained unchanged until 1969, when it was granted the status of a national bank.

From 1911 to 1966, the postal savings system operated in the United States, during which all post offices turned into small banks with a limited number of operations, mainly focused on attracting funds and earning on deposits. The system, created after the panic of the 1907 crisis, became an alternative for many poor Americans to safeguard their money as opposed to the classical banking system. Indeed, before the establishment of the Federal Reserve System and the Federal Deposit Insurance Corporation, the U.S. financial banking system was more unstable than it is today, which inevitably led to recessions. A transparent and understandable financial system would have had to exist for a long time, but with the emergence of the Federal Reserve System, the classical banking system received centralized power, and the Great Depression period was marked by the creation of the Federal Deposit Insurance Corporation. That is, an alternative emerged that many advocated. For example, the New Jersey Bankers Association and the Bankers Association in 1939 issued statements that the classical banking system was now reliably protected. President Lyndon Johnson was the first to attempt to abolish the federal government and USPS banking, and his attempt was successful. In 2014, interest in postal banking re-emerged in the United States, thanks to a white paper from the Office of Inspector General of the United States Postal Service. In the Senate, Democrats have revived interest in developing postal banking in the U.S. and advanced a pilot program in 2022. Since 2020, Senators Kirsten Gillibrand, D-N.Y., Bernie Sanders, I–Vt., and Jeff Merkley, D-Ore, have drafted and proposed the "Postal Banking" bill[2] (S. 3891).[3] Thus, they operated on the necessity of additional funding for the post office itself. President Biden signed this bill. It was precisely based on one of the biggest problems in the banking world —"financial deserts" and the constant increase in the unbanked population (that is, people without access to financial services), who are forced to turn to expensive creditors — that this bill initiated the revival of postal banking in the USA.[4]

Exploring the reasons for the formation and integrated changes in postal banking in BRICS member countries at the beginning of the 21th century, the author notes common trends in its development not only in the studied countries but also in North African and Middle Eastern countries [9].[5]

It is considered that the history of the postal service in South Africa spans over five hundred

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[2] Migration Policy Institute. (2021). U.S. Immigrant Population and Share over Time, 1850-Present. URL: https://www.migrationpolicy.org/programs/data-hub/charts/immigrant-population-over-time (accessed on 05.01.2023).

[3] 3S.3891 Postal Banking Act 117th Congress (2021–2022). URL: https://www.congress.gov/bill/117th-congress/senate-bill/3891 (accessed on 05.01.2023).

[4] University of Michigan. (2021). Postal Banking: How The United States Postal Service Can Partner On Public Options. URL: https://poverty.umich.edu/files/2021/05/PovertySolutions-Postal-Banking- PolicyBrief.pdf (accessed on 05.01.2023).

[5] Middle East and North Africa — the role of postal networks in expanding access to financial services: worldwide landscape of postal financial services. The Wold Bank ibrd*ida. URL: https://documents.worldbank.org/en/publication/documents-reports/documentdetail/213151468278680992/middle-east-and-north-africa-the-role-of-postal-networks-in-expanding-access-to-financial-services-worldwide-landscape-of-postal-financial- services (accessed on 05.01.2023).

years, with the first savings bank appearing there in 1875, and the first branch of the postal savings bank opening in 1974. Since 2014, the transition of the institution to Postbank as a licensed institution with VISA member status has been completed. The official registration took place in 2017 as South African Postbank SOC Limited, and it was at that time that an application for a full banking license was submitted.[6]

In India, there is confusion in understanding the postal savings system. India Post Payments Bank and the Post Office Savings Bank (POSB) are two parallel systems. In 2015, India Post Payments Bank received a license, its goal being to provide financial services and their accessibility to the country's population. You can open a deposit account, issue a debit card, and connect to mobile banking; a mandatory condition is the presence in rural areas (25 percent of all branches) and a restriction on credit operations.[7]

The distinguishing feature of India's postal banking system is its recent emergence; it is only now being formed and modernized. In 2008, at the Congress of the Universal Postal Union, a concept for the development of the postal sector until 2014 was adopted as a crucial component of the global economy in three dimensions: physical, electronic, and financial. This document served as the basis for clarifying how the needs and expectations of customers will be met while maintaining trust and service quality.[8]

The author notes that in recent years, issues of financial well-being have become particularly relevant in India. Recent studies published in the paper "Factors of Financial Literacy and Their Impact on Financial Well-Being — A Study of the Youth Population of Haryana, India" reflect a high degree of elaboration and the necessity of bringing these issues to the attention of the government, policymakers, and educational institutions [10].

The Brazilian Banco Postal is the most well-known and successful model of postal financial inclusion in terms of people who do not use banking services but ultimately end up in the formal financial system. From 2002 to 2011, 10 million accounts were opened in partnership with Bradesco — a private bank that needed a wide network to offer its services in increasingly affluent rural areas. However, after 10 years, some aspects of its operations are being questioned, particularly the tender process at the end of each contract, which can lead to a change of partner, as happened on 1 January 2012.

In Russia, in 2016, "Pochta Bank" began operations — a new retail bank created by the Federal State Unitary Enterprise "Russian Post" and the VTB group based on the existing PJSC Leto Bank. The placement of customer service centers directly within the postal network allowed for the creation of the largest banking network in the country, which affected the accessibility of services for Russians. According to official data, by 2023, the number of clients of this bank reached 15 million.[9]

In the research of Russian scientists, issues related to postal banks and postal savings systems began to be actively discussed in the early 21st century [11]. Even before the concept of inclusive finance emerged in 2004, Russian scholar M. S. Ivshin noted the importance of developing an original classification of postal bank development concepts based on global trends. The pricing methodologies and profit optimization models he proposed reflected the connection between infrastructure payments and the services offered for attracting funds long before the official establishment of the current Post Bank [12].

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[6] Annual report LTD 2021–22. South African Postbank SOC LTD. URL: https://static.pmg.org.za/Postbank_Annual_Report_2022_26_Oct_2022_22_Final_1.pdf (accessed on 03.12.2022).

[7] Department of Posts Ministry of Communications Government of India. India Post. URL: https://www.indiapost.gov.in/vas/Pages/IndiaPostHome.aspx (accessed on 03.12.2022).

[8] Strategic Plan — Department of Posts. 2018. India Post. URL: https://www.indiapost.gov.in/VAS/DOP_PDFFiles/Strategic_Plan.pdf (accessed on 18.12.2022).

[9] Website of the Pochta Bank. URL: https://www.pochtabank.ru/o_sozdanii_pochtabanka (accessed on 05.01.2023).

A. V. Chavtur, in his research, noted the importance of the reliability of the postal partner in terms of sufficient capital and the need to develop the postal network for the purpose of implementing banking services [13].

A significant subsequent contribution to the research on the issue of financial accessibility through postal banking was made by G. Yu. Meshcherekov. His research on the topic "Cooperation between banks and postal services in the retail banking market" [14] and V. V. Moganov's research "Simultaneous creation and development of postal savings systems within the framework of the Union State of the Republic of Belarus and the Russian Federation" [15] were more in-depth in terms of operational details and addressed issues of international cooperation, primarily focused on the relevant topic of that time — money transfers.

During the formation of the modern Postal Bank in our country, V. V. Moganov made a significant contribution to research reflecting the need for state participation in the formation of the postal savings system. The essence of his work highlighted the necessity of establishing a national postal savings system in the Russian Federation, and the theoretical justification of the state paradigm for the development of the savings infrastructure of the banking system laid the foundation for subsequent research by Russian scholars [16].

The formation of the concept of the synergy effect from the integration of various business structures [17] became a continuation of the research and analysis of the national postal savings system. Radical changes in the perceptions of the postal savings system and postal banking were associated with the formation of current issues in inclusive finance [18, 19]. Subsequently, postal banking was considered by many researchers as a tool for solving the problem of accessibility of financial services [20]. Many Western scholars drew a parallel between inclusive finance and postal banking [21, 22].

More detailed information about the operations of the modern Post Bank, its products, and services is reflected in the studies of I. I. Bychkova [23]. She considers the accessibility of services to clients through digitalization to be a new stage in the development of postal banking. At the same time, I. I. Bychkova notes that issues of digitalization in postal banking have also been raised by foreign researchers. For example, in 2015, M. A. Crew and co-authors detailed the necessity of digital changes in postal banking [21].

The issue of digitalization, not only in the context of postal banking but also in terms of financial accessibility in general, is being examined by Russian scholars. Recent studies by O. S. Miroshnichenko reflect the need to focus on specific financial services, certain types of financial organizations, and groups of counterparties [24]. In the course of postal banking research, the author concludes that the formation of a strong ecosystem is necessary for the existence of a sustainable and productive system, which in itself is not possible without an adequate level of digitalization.

The basis of this study was the analysis and review, as well as the generalization of scientific works by domestic and foreign specialists, regulatory and legislative acts on financial issues. Methods such as systemic and logical approaches, theoretical cognition, scientific abstraction, and historical were used.

RESULTS

The modern history of the Postal Savings Bank of China begins in 1986, when, with the approval of the People's Council, savings operations were once again made possible at post offices. Since 1990, the postal savings business became an independent business unit. Since 2003, all postal savings deposits have been transferred to the Postal Service, while all previously opened ones remain with the People's Bank of China. In 2005, preparations began for the establishment of the China Postal Savings Bank. The China Banking Regulatory Commission approved its establishment in 2006. It was expected to become a full-fledged state commercial bank. And as early as 2007, the head office of the

Postal Savings Bank of China was established in Beijing. According to the law, the bank provided a full range of services as a universal bank, with the aim of improving financing for urban and rural populations through a wide network of branches and the accessibility of financial services. The tasks were set as follows:

- development of retail financial services;
- attracting small and medium-sized enterprises (SMEs) to cash settlement services (CSS) and deposit services;
- the development of the investment business and providing support to the government and other financial organizations through attracting deposits;
- placement of bonds and investments in sectoral funds [22].

The philosophy of the Postal Savings Bank of China[10] (PSBC) is not about maximizing profits for its owners, but about stability.It is this principle that the bank has adhered to for over a century, since its establishment. Focused on serving urban and rural residents, as well as small and medium-sized enterprises, PSBC, according to its strategy, is a defender, pioneer, and leader of inclusive financing. Inclusiveness and consistency are at the core of corporate values, while differentiation and uniqueness set it apart from the rest of the financial sector and enable it to pursue a path of sustainable development.

A large state bank,[11] providing services to clients "responsibly, reliably, and considerately"11, focuses on six areas of activity and strives to protect them from potential risks. Areas: use of technology, detailed interaction with clients, planned growth of commission income, high level of risk management, coordinated development of the bank, working with talented employees

as an integral element of a strong bank. By betting on digital transformation, thereby accelerating the intelligent transformation of retail points, it ensures the optimization of the electronic channels system, namely mobile banking and online banking. The enhancement of the convenience of these channels has comprehensively updated inclusive financial services. The use of postal and retail point infrastructure, as well as the agency network, has allowed the utilization of its resources in strategic areas, such as "banking deserts", that is, those characterized by a lack of financial services and where financial intermediation prevails. By gradually implementing technologies, the bank improved service capabilities for both urban and rural residents and supported the development of inclusive financing. This gradually led to the enhancement of financial services in impoverished areas and ensured the revival of rural regions and the reduction of poverty.

At the end of 2022, the share of loans to micro and small enterprises with credit lines of up to 10 million yuan (the exchange rate of the Central Bank of the Russian Federation on 02.15.2024 is 14.7233,[12] totaling 147 233 000.00 rubles) held a leading position among all major banks in China in the aggregate balance. At the same time, the bank's balance increased by 148 062 million yuan (2 179 961 244.6 rubles) compared to the end of 2021. In total, loans for poverty alleviation increased by 18 065 million (265 976 414.5 rubles). According to information from the National Bank of China, this led to a change in statistical standards for financial target loans for poverty alleviation. On the one hand, this manifested in loans for transport infrastructure, and on the other hand, in loans to those who have already crossed the poverty line.

The PSBC Lushi Model is named after one of the provinces in China, located in the western part of Henan Province. Lushi County is the largest county in the province, but it has the

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[10] Results Announcement for the Year Ended December. 31, 2020. Postal Savings Bank of China Co., Ltd. URL: https://www.psbc.com/en/investor_relations/announcement/202103/P020210329741955699768.pdf (accessed on 25.12.2022).

[11] Annual Report. 2021. Postal Savings Bank of China Co. Ltd. URL: https://www.psbc.com/en/investor_relations/finance/financial_reports/202204/P020220426371074627241.pdf (accessed on 25.12.2022).

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[12] Website of Central bank. URL: https://www.cbr.ru/currency_base/daily/ (accessed on 02.12.2024).

lowest population density. The average altitude above sea level here is the highest, and this area is in a mountainous region with extremely harsh living conditions. As of early 2016, out of 63 100 local households, 19 700 were poor, with a poverty rate of 18.9%. There were 118 villages in extreme poverty. Thus, not only geographical difficulties but also the level of poverty created challenges in reducing poverty on schedule — by 2021.

Since 2017, PSBC has provided the district with loans amounting to 1 381 billion yuan (20 332 877.3 rubles) and Lushi model loans totaling 172 million yuan (2 532 407 600.00 rubles), which contributed to lifting all 63,100 registered households out of poverty. The poverty rate decreased from 18.9% to 0.98% by the end of 2019, a reduction of 17.92%. On 26 February 2020, Lushi County was officially declared free from poverty.

In this model, the Bank officially collaborated with the local administration, and an agreement was reached to provide financial assistance to the "Lushi Experimental Zone for Poverty Alleviation". The principle was based on cooperation between the bank and the government, taking into account risk-sharing and mutual benefits. The bank's favorable policies and resources, combined with innovations in services and products, laid the foundation for the creation of four systems. These included:

- credit scores;
- industry support;
- prevention and control of risks;
- financial services.

This laid the foundation for defining the role of financial services in the fight against poverty. It was the bank that identified the key industries in the area. For example, shiitake mushroom cultivation became a key industry for the local population. Thus, the bank expanded its financial services in the area and precisely met the needs in the fight against poverty. This model involved the interaction of several parties: bank management, government, local government bodies, provincial agricultural

credit guarantee companies, and the poverty alleviation office. Systematic optimization of the process and improvement of risk management and compensation mechanisms led to the achieved results.

Main results of the Lushi model:
- assistance in the development of large-scale production. The priority direction — growing shiitake mushrooms — has allowed this province to increase production, resulting in family incomes rising from 20 000 to 80 000–90 000 yuan per year (1 325 097.00 rubles);
- the replication effect of the practice has formed, and currently, the Lushi model is being used in 53 poor districts, which inevitably leads to a reduction in the poverty level;
- valuable experience has been gained: the bank has found a concept for an effective development model that offers microcrediting within a quadrilateral interaction framework: the state, the bank, guarantee companies, and district residents.
- As a result of applying this model, the following documents were generated:
- PSBC's work plan for further development and enhancement of conditions to combat financial poverty in three regions;
- the PSBC's opinion on the key areas of activity for optimizing the construction of the middle class, as planned, in which the priorities and goals of combating poverty through financial services are clearly formulated.

Targeted poverty alleviation is the result of a strategy, a priority of PSBC, whose goal is to ensure that "rural poor do not worry about food, clothing, education, medical services, and housing".[13]

The bank's choice to favor socially vulnerable households living below the poverty line as the target segment for microcrediting has made it possible to provide loans of up to 50 000 yuan (736 165.00 rubles) for a term of up to 36 months at acceptable rates. This program is intended for

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[13] Results Announcement for the Year Ended December. 31, 2020. Postal Savings Bank of China Co., Ltd. URL: https://www.psbc.com/en/investor_relations/announcement/202103/P020210329741955699768.pdf (accessed on 25.12.2022).

Key Financial Indicators for Targeted Poverty Reduction in 2020, PSBC

The amount of targeted loans issued for poverty alleviation	100 520 979 200 yuan
Cost of deliveries	27 mln yuan
The number of people who benefited from the poverty alleviation bank	8 548 361
The number of loans for industrial development	4090
Loans issued for industrial development	30 940 958 100 yuan
The number of people who have taken loans for industrial development	17 637
The amount of loans issued for the resettlement of people	99.0 mln yuan
Donations to poor students	405.5543 mln yuan
The number of supported students	59 880
The amount of funds allocated to combat poverty in certain regions	Various loans amounting to 1 205.66 million yuan, provided for poverty alleviation in the Shangzhou District and Luonan County in Shaanxi Province
The number of loans for targeted poverty reduction by projects	10
The amount of loans issued for targeted poverty reduction under the projects	13 331 856 400 yuan
The number of people who have taken loans for targeted poverty reduction projects	8 175 425

Source: Compiled by the author from Postal Savings Bank of China. URL: https://www.psbc.com/en/investor_relations/ announcement/202103/P020210329741955699768.pdf (accessed on 25.12. 2022).

those who have risen above the poverty line but can still benefit from subsidies

As of 2020, microloans for poverty alleviation amounting to 16 400 million yuan (241 462 120.00 rubles) were issued. Innovations and a professional team helped launch services in priority areas of China to support local industries. Attention was focused on family farms, micro-enterprises, and all households that could demonstrate positive results in the fight against poverty. A separate area of work was transactions to encourage joint production with individuals — families in need of support. The bank provided financial support for infrastructure construction and livelihood projects to reduce the gap in living standards.

By the end of 2020, the total amount of loans issued reached 100 521 million yuan (1 480 000 839.3 rubles), which is 18 065 million yuan more compared to the previous year. *Table 1* presents the main achievements in targeted poverty alleviation in China in 2020.

Active participation in enhancing public welfare and combating poverty reflects the bank's corporate social responsibility. The established charitable fund "PSBC Love", in collaboration with the China Poverty Alleviation Foundation, launched the "PSBC Love Class of Self-Commitment" program. As part of this program, support is provided to impoverished high school students in terms of education. In 2020, 1 650 students from 33 classes in 18 provinces passed the entrance exams to the National College with the support of the PSBC Love Class of Self-Commitment. The second program has already been

Average Market Values of the Total Cost of Consumer Loans (Loans) As a Percentage Per Annum, for the Period from 01.07.2024–30.09.2024

Line number	Categories of consumer loans (credits)	Average market values of the total cost of consumer loans (credits) (in annual percentages)	Limit values of the total cost of consumer loans (in annual percentage rates)
1	2	3	4
2	Using an electronic payment method		
2.1	up to 100 000 rubles when used in a cashless manner	26 809	35 743
2.2	up to 100 000 rubles when using cash withdrawal	27 893	37 191
2.3	over 100 000 rubles when used in a cashless manner	25 23	33 64
2.4	over 100 000 rubles when using cash withdrawal	26 014	34 685
3	Others without collateral		
3.1	up to 100 000 rubles	43 685	58 247
3.2	over 100 000 rubles	28 509	38 012
4	For borrowers receiving regular payments to their account		
4.1	up to 300 000 rubles	33 806	45 075
4.2	over 300 000 rubles	26 749	35 663

Source: Central Bank of the Russian Federation. URL: https://cbr.ru/statistics/bank_sector/psk/ (accessed on 02.12.2024).

Note: Data for the Q3 of 2024.

implemented in 38 schools in impoverished areas. It is planned that 1900 high school students will receive education subsidies. This funding is aimed at supporting and developing students over the course of three years of study. It is worth noting that by the end of 2020, the total amount raised by the PSBC Love Charitable Foundation was 32 222 900 yuan (474 427 423.57 rubles).

It should be noted that in Russia, in the second quarter of 2024, interest rates are significantly higher compared to PSBC. The rates presented in *Table 2* of average market values do not include commissions and insurance, meaning they do not fully disclose the real cost of borrowed funds.

In the analytical review of the Central Bank of the Russian Federation "Results of the Banking Sector for 2024", it is noted that the growth of consumer loans has slowed down to 11.2% compared to 15.7% in 2023. Unsecured consumer loans showed lower growth rates compared to credit cards, which experienced growth due to the possibility of using a grace period. The total portfolio volume in 2024 amounted to 14.1 trillion rubles, while in 2023 it was 13.6 trillion rubles. At the same time, the increase in macroprudential regulation led to
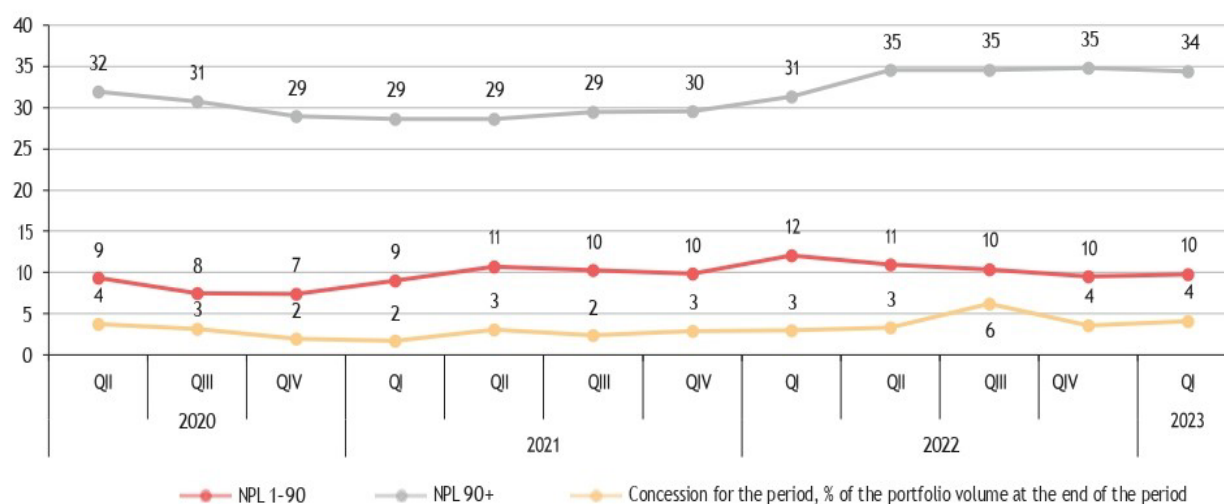
Fig. **Dynamics of the share of overdue and assigned debts of MFIs (5)**

Source: Central Bank of the Russian Federation. URL: https://cbr.ru/Collection/Collection/File/45107/review_mfi_23Q1.pdf (accessed on 25.12.2023).

an improvement in the standards for issuing consumer loans. In 2024, other issuances excluding JAD (all categories) accounted for 69%, while in 2023, the percentage was 45.[14] The increase in macroprudential regulation was justified by the share of non-performing loans over 90 days (NPL 90+) based on the results of 2023 due to the risk appetite of banks and the increased demand from citizens related to rising incomes.[15] As of 1 January 2025, the share of problematic consumer loans covered by reserves up to 90% amounted to 8.9%, in 2024 it was 7.8%, in 2023 it was 8.7%, and in 2021 it was 8.8%. The Central Bank maintains the position that this level is acceptable.

In China, as part of rural outreach to revive and provide sustainable financial services, the PSBC interest rate on new personal microloans in 2020 was 5.88%, and the delinquency rate was 2.00%. In the same PSBC, small and micro enterprises were provided with microloans at an interest rate of 5.46%, and the overdue debt ratio was 2.01%.

In Russia, the average market values of the total cost of consumer loans (credits) from microfinance organizations for the period from September 1 to September 30, 2020, according to data from the Central Bank of the Russian Federation, ranged from the average to the maximum with collateral (pledge) from 67.075% to 89.433%. For terms up to 365 days — from 96.724% to 128.965%, over 365 days — from 48.159% to 64.212%. Without collateral up to 30,000 rubles — from 348.441% to 365.000%.[16] At the same time, the share of overdue loans, as shown in the *Figure*, significantly exceeded the 2 percent benchmark of the Chinese bank from 2020 to 2023.

For the period from 1 July to 30 September 2024, the average market values of the total cost of credit, determined for microfinance organizations, for unsecured loans excluding POS up to 30 days, up to 30 000 rubles, amounted to 286.179%. For amounts over 30000 rubles, it was 130.305%. For amounts over 30000 rubles for a period from 31 to 60 days, it was 65.463%.[15]

The lower overdue debt ratio at PSBC, according to the author, is related to the more

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[14] Website of Central Bank. URL: https://cbr.ru/Collection/Collection/File/55059/presentation_20250130.pdf (accessed on 10.01.2025).

[15] Website of Central Bank. URL: https://cbr.ru/Collection/Collection/File/46317/analytical_review_bs-2023–2.pdf (accessed on 10.01.2025).

[16] Website of Central Bank. URL: https://cbr.ru/statistics/bank_sector/psk/?utm_source=w&utm_content=page (accessed on 10.01.2025).

detailed involvement of the state apparatus in the bank's operations, as in the Lush model. This conclusion is supported by studies conducted by Russian scientists [25].

CONCLUSION

Having studied the evolution of postal banking and its current state in the BRICS countries, the author concluded that China has achieved the best results among these countries. In China, postal banking as a system resilient to external shocks has been the foundation of financial accessibility for all segments of the population, regardless of their status and geographical location.

The fine line separating the concepts of "financial inclusion" and "postal banking" has been highlighted by the author through the analysis of the programs of the China Postal Savings Bank.

The Lushi model, one of the first inclusive financial models of PSBC in China, initiated the development of accessible finance. The subsequent model of the PSBC Kaichuan Bank has been included in the course developed by the UN to combat poverty in developing countries.[17] The Lushi model, like the charity program, is chosen by the author as an example of excellent organization and the commitment of China's banking sector to inclusive finance and poverty alleviation. PSBC establishes branches in prefectures and districts with the aim of making financial services accessible in impoverished areas and "banking deserts", and also makes every effort to assist in the fight against poverty. According to Financial News, this is the best bank of the year in the fight against poverty.10

Historical analysis of the postal savings system has led to the conclusion that the post, as a link between the government and the public, has diversified its business into the sustainable provision of financial services in recent decades. Postal banking has become a natural partner for

the government, providing financial services to various segments of the population, and this brings results to all participants: the government, citizens, service providers, and creates an economic platform of obvious benefits.

For over a hundred years, discussions about postal banking as a social element have taken place in the financial field, forming the basis for deliberations on the unity of theory and practice. Exploring the issues of applying theory and practice, the author highlights China and concludes that PSBC is effective due to its commitment to its strategy and mission. Postal banking has its own distinct features, which set it apart from the classical financial sector and provide grounds for considering it as a separate economic category.

This article presents the author's position on the interpretation of the concept of "financial inclusion", which differs from existing ones in that it is based on the analysis and study of the bank's activities, defining this process as an integral part of the bank's strategy. Postal banking is considered a means to achieve financial accessibility. By structuring the evolution, current state, and global experience, the author gradually concludes that the development of postal financial business can lead to the promotion of financial inclusivity in the country. Thus, postal banking itself is a resource for achieving financial accessibility.

China's experience can be used in Russia. It is necessary to develop a bank strategy, ensure four-way interaction, form a sustainable postal banking ecosystem, and use a system of indicators to assess inclusive finance.

Firstly, it is necessary to define the bank's strategy aimed at ensuring the accessibility of financial services to the population..

Secondly, PSBC programs generally involve at least four-party relationships: between the bank, the client, and the intermediaries— the government and microfinance organizations.

Thirdly, the bank examined by the author exists within a strong ecosystem, which allows it to offer services that meet consumer expectations and rates that, with government

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[17] 17 goals to transform our world, United Nations Organization. URL: https://www.un.org/sustainabledevelopment/ru/poverty/ (accessed on 25.12.2023).

support, are minimal. Thus, the involvement of government apparatus, new partners, changes in the legal framework, and functioning within a competitive ecosystem, provided a clear strategy is formed, are tasks that will require significant resources and expenditures, but, as we see in the case of China, are feasible.

The assessment of the bank's inclusive finance includes a system of indicators: strategic and tactical, reflecting its development, attitude towards service quality, and management systems, which in turn characterize the economic interpretation of postal banking and trends influencing the dynamics of its development. The effect of such work is reflected in inclusive finance through the implementation of banking management strategies and tactics.

In the context of economic relations between the bank, the state, and the citizen, inclusive finance has served as a connecting category in recent years. At the same time, there is no scientific definition of postal banking, and many countries are only now conducting an analysis of this system. The results of this study can be used in building a universal model of postal banking in Russia, which is why a deeper analysis of the bank's strategy is necessary.

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