

# Assessment of restraining factors in financing climate transition programs for agricultural organizations

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**Abstract.** Agriculture is fraught with numerous risks that can lead to bankruptcy for agricultural enterprises and hinder the climate transition. It is possible to increase the volume of financing for climate transition programs if you understand the level of financial stability of enterprises and correctly assess the risk factors that hinder sustainable development. This research focuses on evaluating the ability of agricultural enterprises to finance climate transition programs. The article examines quantitative indicators of the financial condition and performance efficiency of the agro-industrial complex industry and the largest agricultural enterprises for 2015 and 2023. By using comparative analysis methods and official statistics data, we arrive at a conclusion regarding the main problems associated with the risks of insolvency and reduced financial stability, the prerequisites for the financial insolvency of agricultural enterprises, and the increasing burden on the budget system due to the measures of state support. The livestock industry demonstrates poorer performance than the crop production industry. We propose to use economies of scale and form mixed farms, combining crop farming with livestock farming. This will help reduce negative risk factors and ensure financing for climate transition programs.

## 1 Introduction

Agriculture forms the fundamental basis of many economies, and its stable functioning is crucial for food security and socioeconomic well-being. However, agricultural enterprises often face financial difficulties that hinder the financing of climate transition programs and can even lead to bankruptcy.

Negative trends include a variety of factors, including volatility in agricultural prices, weather conditions, diseases and pests, and high production costs. All of this puts a significant burden on the budgets of agricultural enterprises, which subsequently contributes to financial difficulties, the emergence of signs of insolvency, and failure to achieve carbon neutrality goals. Therefore, it is crucial to understand which specific risk factors influence the insolvency of agricultural enterprises.

We share the perspective of Aleksanyan, & Huiban [2], Burja & Burja [5],

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Feizrakhmanova [8] who believe that there are two groups of factors influencing the financial stability of agricultural organizations - external and internal. Internal factors have the greatest significance. In his research, Rogachev [17] considers factors such as solvency, competitiveness, operational efficiency, as well as a number of political and general economic factors that can have an indirect influence. Thus, the fewer internal risk factors and the higher the level of financial stability of an agricultural organization, the better the protection from external risk factors and negative manifestations.

Other scientists emphasize external factors. According to Takhumova, Senchenko, Trubilin, Lomakina & Geibel [11] the stability of the economic situation may worsen due to external economic crises, which contributes to the growth of financially unstable enterprises and significantly reduces investment flows for financing development programs. According to the research of Akhmadeev, Gerasimova, Bagautdinova & Arzhantseva [3], Babanskaya, Chukalova, Zaitseva & Golubeva [4], Utibayeva [18], Rajin, Milenkovic & Radojevic [15], the key risk factors for sustainable development of agriculture in Russia are insufficient government funding for the agro-industrial complex and a decline in investments in the industry; technical equipment of agriculture; the innovative factor of development. This necessitates a more in-depth study of the influence of individual risk factors on the financial security of agricultural organizations and the possibility of financing climate transition, aiming to identify risk groups and develop recommendations. The noted facts demonstrate the relevance and demand for such research.

The research objective is to identify and analyze risk factors that hinder and limit the financing of climate transition programs for agricultural organizations.

The object of the research is agricultural organizations in Russia that are facing sanction-related constraints and require financing for climate transition programs.

## 2 Materials and Methods

The study employed general scientific research methods, such as observation, analysis and synthesis, deduction and induction, and specialized methods: comparative dynamic and structural analysis, inter-farm comparative analysis, and coefficient analysis.

We paid attention to industry specifics and differentiated agricultural organizations by crop production and livestock sectors, as research on the factors of insolvency [6, 12, 14] concluded that assessing the efficiency of an agricultural organization's operations is impossible without considering seasonality of production and industry specifics.

Babanskaya, Chukalova, Zaitseva & Golubeva [4], emphasize that common reasons for ineffective enterprise financing are not only internal factors, such as marketing, production, personnel, and finance, but also external macroeconomic factors that depend on the effectiveness of government financial support and economic reforms in the field of sustainable development. Therefore, we considered the need to evaluate financing conditions both with and without the factor of government support.

According to data from the agricultural department of the University of Serbia [9], profitability has a statistically significant positive impact on bankruptcy risk for micro and large agricultural companies, while for small agricultural companies the bankruptcy risk is statistically significant and positively influences productivity. Therefore, when selecting research objects, we focused on large agricultural enterprises striving for climate transition, such as JSC Firm "Agrokompleks" named after N.I. Tkachev, the Prodimex Group of Companies, the Agribusiness Holding "Miratorg", the Agroholding "Step", the Rusagro Group of Companies. We considered profit growth rates, assessed the factors of profitability and financial stability for 2019-2023.

It is important to note that authors primarily focus on external factors influencing the financial stability of organizations, without paying much attention to indicators of the

organization's financial security, such as profitability, solvency, and business activity, which are the main quantitative indicators for a more accurate assessment of internal problems in financing climate transition. The work Rogachev [17] discussed the possibility of using such indicators, and this approach formed the basis of our research.

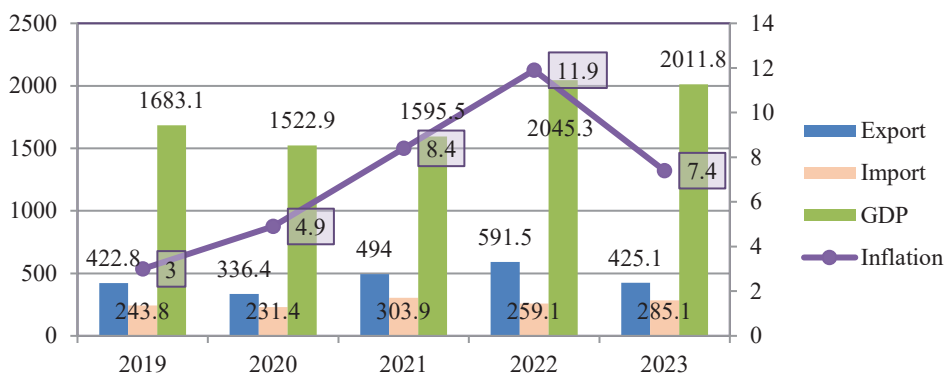
The sources of information were official data from Rosstat of Russia, materials from the Organika Foundation, and data from the State Information Resource of Accounting (Financial) Reporting. We reviewed global experience in financing climate transition programs for agricultural organizations and the risks they faced.

### 3 Results

Agriculture plays a significant role in the Russian economy, providing the population with food and creating jobs. However, the development of this industry faces a number of challenges, among which one of the most significant is financing sustainable development. According to a study by Sberbank, agriculture is the third-largest source of greenhouse gas emissions in Russia.

Losses from the impact of climate change on the country's agriculture by 2030 could reach 1-2% of GDP annually. On the other hand, financing climate change adaptation could bring significant benefits to the Russian economy.

The economy is experiencing an overall growth in macroeconomic indicators (fig. 1), an increase in exports with relatively moderate imports, and GDP growth. Among the key financial risks for the sustainable development of the agricultural sector, one can note high costs and changes in agricultural product prices due to rising inflation. For example, during 2021-2023, the inflation rate remained above 7%, which negatively affected the financial capabilities of agricultural organizations.



**Fig. 1.** Key macroeconomic indicators of Russia for 2019-2023, billion USD. *Source:* compiled by the authors based on Rosstat data [7].

According to Table 1, from 2015 to 2022, there has been an expansion of agricultural land by 4.6%, greenhouse gas emissions by 5.3%, and consumed capacity per employee (by 27.0%), posing a threat to biodiversity and global climate change. There is also a significant growth in agricultural areas where mineral fertilizers are applied as opposed to organic ones (150.0% versus 109.5%), this negatively affects the soil.

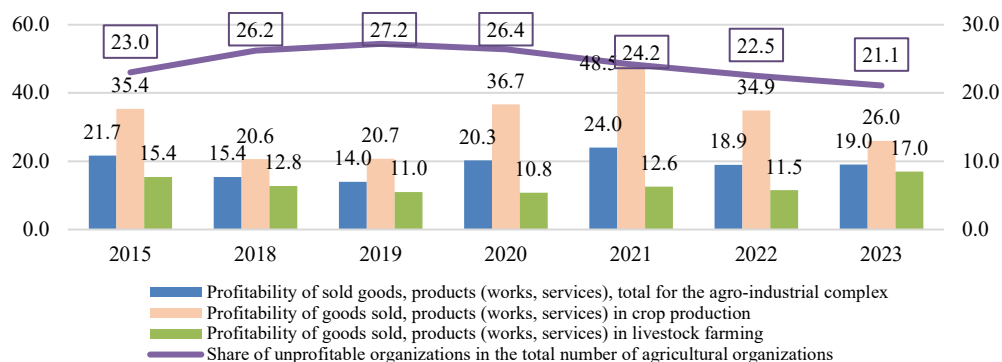
**Table 1.** Indicators of agricultural development in Russia for 2015-2022, %.

Indicators	2015	2018	2019	2020	2021	2022	Dynamic s 2015- 2022
Cultivated areas of agricultural crops in farms of all categories, thousand hectares	78 635	79 634	79 888	79 948	80 383	82 290	104.6
Amount of land certified for organic matter, thousand hectares	260	370	X	392	X	350	134.6
Load of arable land per tractor, hectares	308	337	345	349	363	372	120.8
Energy capacity per 1 worker, hp	74	80	83	90	92	94	127.0
Energy capacity per 100 hectares of sown area, million hp	197	200	199	201	200	198	100.5
Proportion of area fertilized with mineral fertilizers in the entire sown area, %	48	59	61	67	71	72	150.0
Proportion of area fertilized with organic fertilizers in the entire sown area, %	8.4	9.4	9.5	9.4	9.6	9.2	109.5
Greenhouse gas emissions from agriculture, million tons of CO <sub>2</sub> -eq.	-	115.2	116.4	118.8	121.3	-	105.3*

\* Dynamics for 2018-2022. *Source:* compiled by the authors based on Rosstat data, the Organika Foundation [10], and the Federal Service for Hydrometeorology and Environmental Monitoring (Roshydromet) [16].

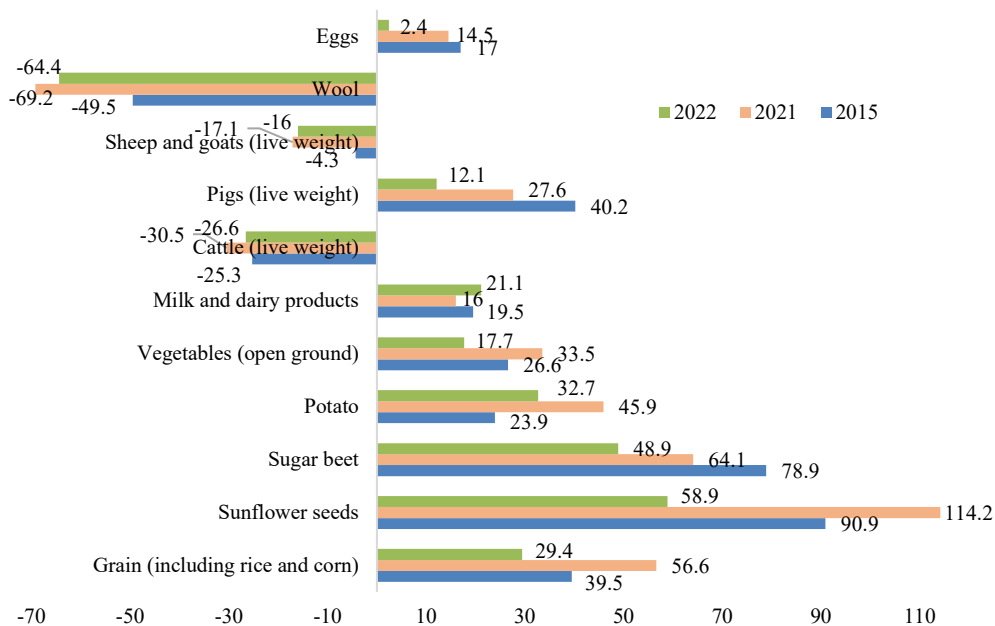
Among positive trends, we note the growth rate of organically certified land at 134.6%, indicating a willingness of Russian agricultural organizations to finance climate transition programs. However, the pace of these changes is extremely slow, which may indicate other negative factors: problems with the financial condition of agricultural organizations or insufficient government support.

According to statistical data, despite a slight rise in 2020 and 2021, there is a deterioration in financial performance, increased expenses, and a decline in the profitability of core agricultural operations (fig. 2). According to the Agroinvestor journal, the share of profitable farms in Russian agriculture by the end of 2023 could increase to 86.7%, compared to 80% in 2014. The profitability of agriculture in 2023 was 19.1%, and in 2022, 20.3%. This indicator includes subsidies; without them, profitability reaches only 15.8%.



**Fig. 2.** Profitability of core agricultural operations in Russia, including subsidies from the budget, for 2015-2023, %. *Source:* compiled by the authors based on the Statistical Collection "Agriculture in Russia. 2023" [1].

It is also worth noting the increasing burden on the Russian budget system due to the subsidization of agricultural sectors that are potentially unprofitable (fig. 3). Wool production, breeding of cattle, sheep, and goats in live weight without budget subsidies is a potentially unprofitable segment of agriculture and amounted to -64.4%, -26.6%, and -16.0%, respectively, in 2022. Meanwhile, the most profitable industry is the cultivation of sunflower seeds and sugar beets, where product profitability in 2022 was 58.9% and 48.9%, respectively. Beef and mutton production remains unprofitable without government support, with average profitability in recent years being 2.5% and 3.5%, respectively.



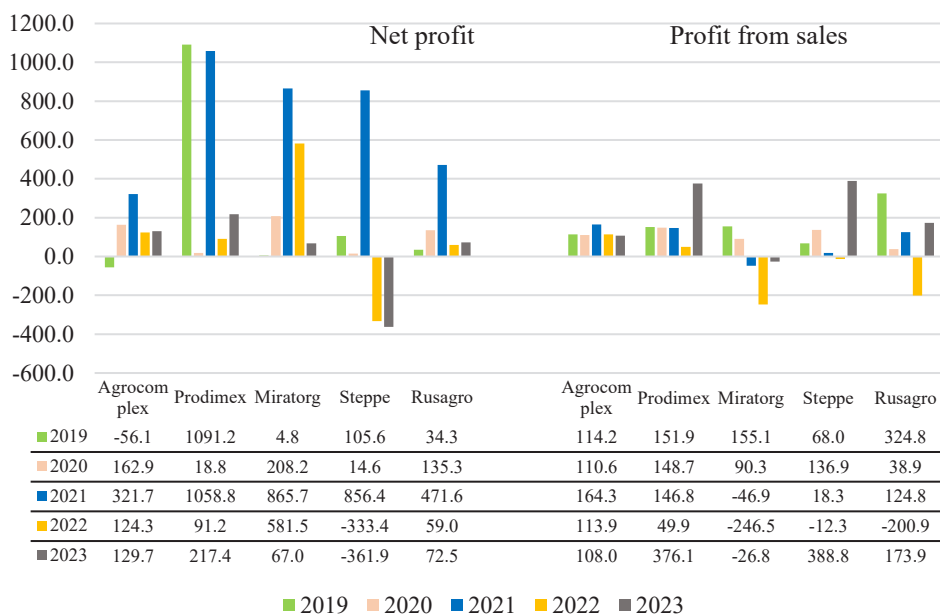
**Fig. 3.** Profitability of products sold by agricultural organizations excluding budget subsidies, for 2015, 2021, and 2022, %. *Source:* compiled by the authors based on the Statistical Collection "Agriculture in Russia. 2023" [1].

In 2022, despite a reduction in overall bank lending by more than 23%, increased government support allowed the agricultural sector to increase credit financing by 18.5%. In 2023, in defiance of anti-Russian sanctions, the government extended state support to many sectors of the economy, which ensured a 10% growth in bank lending to businesses in the first nine months.

However, agriculture and livestock farming currently account for 30% of greenhouse gas emissions released into the atmosphere. This means that even with government support, many sectors of agriculture are either potentially unprofitable or insufficiently efficient and therefore unable to fully finance climate transition programs. In many agricultural sectors, we annually observed untapped reserves for increasing the productivity of production resources, leading to inefficient spending and complicating the financing of sustainable development. Only the profitability of grain crops has been high in the last three years, reaching 41.8%. Therefore, to ensure the financial stability and efficiency of Russian agriculture, it is advisable to form mixed farms based on economies of scale, combining crop production with livestock farming.

We also observed similar trends for the largest agricultural organizations in Russia for 2019-2023 (fig. 4), such as JSC Firm "Agrokompleks" named after N.I. Tkachev, the Prodimex Group of Companies, the Agribusiness Holding "Miratorg", the Agroholding "Step", and the Rusagro Group of Companies. Significant drops in net profit and sales profit

growth rates are noticeable in 2022 and 2023, indicating a slowdown in activity and a risk of declining efficiency. The decline in net profit is associated with the COVID-19 pandemic in 2020 and sanctions against Russia, which significantly reduced revenue and profit growth rates for these major players in the agricultural market.



**Fig. 4.** Net profit and sales profit growth rates for the largest agricultural organizations from 2019 to 2023, %. *Source:* calculated by the authors based on data from the State Information Resource of Accounting (Financial) Reporting [13].

It is also worth noting the faster growth rates of net profit compared to operating profit, which, on the one hand, indicates compliance with the "golden rule of economics" but, on the other hand, suggests compensation for insufficient operating results through other income sources. However, the largest agricultural organizations, with state support, are striving to stabilize their financial results, and already in 2023, the growth rates of net profit and sales profit are increasing. This is a result of economic stabilization, the implementation of import substitution policies, and increased attention from agricultural organization management to effective management, the introduction of new technologies, the optimization of production processes, and marketing. However, these mechanisms are insufficient for actively financing sustainable development programs in agriculture, as the problems of financing climate transition are even more acute in the medium and small business segments.

To determine the effectiveness of resource utilization by the largest agricultural organizations in Russia, Table 2 calculates return on assets (ROA), return on equity (ROE), and Net Profit Margin. High profitability indicates that the company can generate enough profit to cover all its expenses and finance strategic climate transition projects. Low profitability may indicate business problems, such as inefficient resource use or an aggressive competitive environment, which could lead to bankruptcy and hinder the financing of sustainable development.

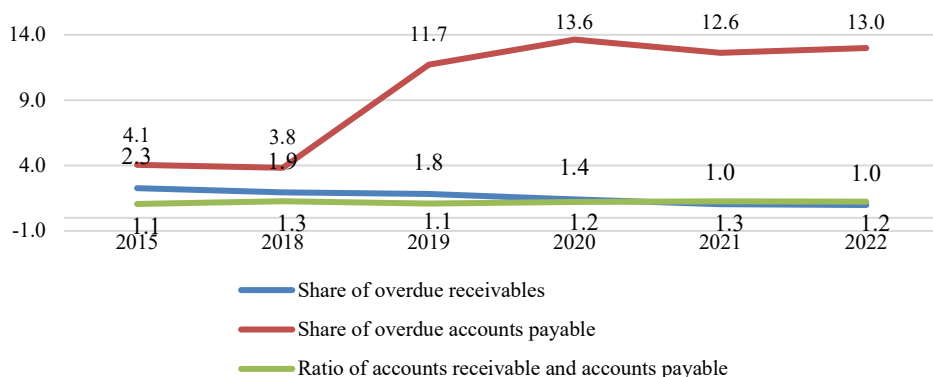
**Table 2.** Comparative analysis of the efficiency of the largest agricultural organizations from 2019 to 2023, %

№	Agricultural organization	Norm	2019	2020	2021	2022	2023	Dynamics 2019 – 2023
<b>Return on Assets (ROA)</b>								
1.1	Agrocomplex	> 5% - acceptable; > 20% - optimal	1.38	2.18	7.18	7.80	8.47	7.09
1.2	Prodimex		9.73	1.48	18.07	13.17	30.64	20.91
1.3	Miratorg		0.08	0.02	0.14	0.49	0.28	0.20
1.4	Steppe		3.19	0.26	3.04	8.44	31.80	28.61
1.5	Rusagro		3.95	4.61	19.40	8.21	7.04	3.09
<b>Return on Equity (ROE)</b>								
2.1	Agrocomplex	10-12%	6.46	9.34	24.27	25.75	26.40	19.94
2.2	Prodimex		41.26	92.30	5.83	41.44	91.7	50.44
2.3	Miratorg		0.39	0.80	6.46	27.06	15.35	14.96
2.4	Steppe		4.53	0.66	5.54	24.50	61.19	56.66
2.5	Rusagro		10.58	15.25	45.28	20.47	12.93	2.35
<b>Net Profit Margin</b>								
3.1	Agrocomplex	exceeds the inflation rate, > 5-15% is optimal	3.09	4.69	12.64	13.54	16.39	13.30
3.2	Prodimex		3.37	6.22	0.45	3.41	8.50	5.13
3.3	Miratorg		0.01	0.01	0.06	0.31	0.17	0.17
3.4	Steppe		56.22	6.66	32.71	62.69	96.26	40.04
3.5	Rusagro		64.55	155.62	142.16	39.28	21.33	-43.22

Source: calculated by the authors based on data from the State Information Resource of Accounting (Financial) Reporting [13].

We observe problems with operational efficiency at the agribusiness holding "Miratorg", where, according to ROA, ROE, and Net Profit Margin indicators, almost all values are below the threshold. The Prodimex group of companies also has a noticeable shortage of Net Profit Margin. These may be various factors, such as inefficient production and sales management, a weak marketing strategy, high production costs, low consumer solvency, and changes in market conditions. However, the good ROE in 2022 and 2023 for almost all of the largest agricultural organizations, and the positive dynamics of most financial indicators compared to 2019, indicate sufficient financial strength and potential for further development, giving hope for sustainable development.

Over the past few years, there has been a general deterioration in the financial stability of agricultural organizations. The share of overdue accounts payable in its total volume is increasing, from 4.1% in 2015 to 13.0% in 2023. At the same time, the ratio of accounts receivable to accounts payable has been relatively stable from 2015 to 2022, fluctuating between 1.1% and 1.3% (fig. 5). This indicates risk factors: inefficient cash flow management, worsening financial stability, and an increased likelihood of bankruptcy. Such a situation could significantly worsen the financing of the climate transition for small and medium-sized agricultural organizations.



**Fig. 5.** Quality of accounts receivable and accounts payable for agricultural organizations from 2015 to 2022, %. *Source:* compiled by the authors based on data from the Statistical Collection "Agriculture in Russia. 2023" [1].

In terms of the structure of accounts payable, a significant portion of overdue debt is formed by suppliers and contractors (15.8% of all overdue accounts payable in 2022), which significantly increases the likelihood of bankruptcy for agricultural organizations. Overdue debt on payments to the budget, state extra-budgetary funds, bank loans, and loans is minimal and does not exceed 1-5% in 2022.

The financial stability and liquidity of the largest agricultural organizations are also at a relatively low level and, in terms of dynamics from 2015 to 2023, are deteriorating in the short and medium term (tab. 3). Low liquidity could lead to organizations having to take out loans or sell assets to repay debts, which could lead to bankruptcy in the long term and increase the likelihood of risks associated with limited climate transition financing.

**Table 3.** Comparative analysis of liquidity and financial stability indicators for the largest agricultural organizations from 2019 to 2023, %

No	Agricultural organization	Norm	2019	2020	2021	2022	2023	Dynamics 2019 – 2023
<b>Current Ratio</b>								
1.1	Agrocomplex		1.01	1.04	1.32	1.25	1.21	0.20
1.2	Prodimex		1.47	1.44	1.25	1.33	1.36	-0.11
1.3	Miratorg	1.0 – 2.0	1.01	1.02	1.01	0.98	0.98	-0.03
1.4	Steppe		0.50	1.10	1.12	0.49	0.50	0.00
1.5	Rusagro		2.33	1.60	1.26	1.29	1.46	-0.87
<b>Quick Ratio</b>								
2.1	Agrocomplex		0.40	0.35	0.48	0.57	0.57	0.17
2.2	Prodimex		1.20	1.17	1.10	1.19	1.24	0.04
2.3	Miratorg	0.7 – 1.0	0.78	0.75	0.90	0.89	0.88	0.10
2.4	Steppe		0.50	1.10	1.11	0.49	0.50	0.00
2.5	Rusagro		2.03	1.47	1.06	1.12	1.27	-1.06
<b>Cash Ratio</b>								
3.1	Agrocomplex		0.05	0.11	0.07	0.10	0.13	0.08
3.2	Prodimex		0.59	0.75	0.61	0.61	0.41	-0.18
3.3	Miratorg	0.2 – 0.5	0.39	0.43	0.26	0.20	0.05	-0.34
3.4	Steppe		0.41	0.81	0.67	0.34	0.44	0.03
3.5	Rusagro		1.69	1.23	0.93	0.98	0.95	-0.74
<b>Financial stability Ratio</b>								
4.1	Agrocomplex		0.77	0.73	0.75	0.71	0.70	-0.07
4.2	Prodimex		0.38	0.31	0.23	0.26	0.27	-0.11
4.3	Miratorg	0.8 – 0.9	0.02	0.02	0.06	0.01	0.01	-0.01
4.4	Steppe		0.85	0.93	0.93	0.84	0.76	-0.09
4.5	Rusagro		0.83	0.78	0.65	0.58	0.70	-0.13

*Source:* calculated by the authors based on data from the State Information Resource of Accounting (Financial) Reporting [13].

In most agricultural organizations, the Quick Ratio is below the regulatory threshold. For



example, at JSC Firm "Agrokompleks" named after N.I. Tkachev, the quick ratio reached only 0.57 over a five-year period, with a lower norm of one. In the Agribusiness holding "Miratorg", the maximum value of Quick Ratio was reached only in 2021 and amounted to 0.90. In the Agroholding "Step", the Quick Ratio exceeded the lower threshold only twice in five years, in 2020 and 2021. Low Quick Ratio characterize risks of insolvency, as organizations are unable to cover their current liabilities with the liquid assets, such as cash and accounts receivable. It is worth noting the negative dynamics of liquidity indicators for 2023 compared to 2019. In most cases, they decline (dynamics range from 50% to 90%). This may indicate financial difficulties for the company and possible problems with solvency and climate transition financing.

The problems with the Current Ratio of the largest agricultural organizations lead to low indicators of turnover of their own working capital and problems finding additional financing sources. The indicators of financial stability for almost all major agricultural organizations are below the norm - 0.8. Companies with low financial stability are more vulnerable to financial crises, changes in market conditions, and other risks, which could increase the likelihood of bankruptcy. There is a strong dependence on borrowed capital, which reduces financial stability and opportunities for financing sustainable development.

## 4 Conclusion and Discussion

The results of our study complement the data Akhmadeev, Gerasimova, Bagautdinova & Arzhantseva [3], who identified the level of government funding for the agro-industrial complex as key risk factors for the sustainable development of agriculture in Russia. We also agree with Dadayan, Storozheva, Letyagina [6], Telegina et al. [12], Szafranec-Siluta et al. [14], who noted the strong level of differentiation between crop production and livestock farming in studies of insolvency factors.

Based on the results of the study, the following key factors we identified that constrain the financing of climate transition programs for agricultural organizations:

1. In Russian agriculture, a significant portion of climate transition financing comes from government support, which subsidizes a significant portion of the interest rate on loans. Without government support measures, most agricultural sectors are in a loss-making or low-efficiency state and are unable to adequately finance climate transition programs.

2. Within individual agricultural sectors (crop production and livestock farming), we observe strong differentiation in terms of economic efficiency, which is a major barrier to financing climate transition programs for agricultural organizations.

3. The structure of accounts receivable and accounts payable is deteriorating, meaning that there is a risk of insolvency and bankruptcy for some agricultural enterprises in the near future. This indicates a deterioration in solvency and an increased likelihood of bankruptcy risk throughout the supply chain, which will negatively affect the agricultural sector as a whole and slow down climate transition financing.

4. Economic stabilization processes are taking place. Due to anti-Russian sanctions, large agribusiness has strengthened its position in agriculture. This is noticeable in the growth of their performance indicators. It is logical to expect processes of conglomeration and vertical integration of agricultural organizations. It is the agro holdings and the largest agricultural companies that have sufficient financial resources to finance sustainable development and should be the drivers of climate transition financing.

It is interesting to consider the opinion [3, 15], who propose the following sustainability strategies diversification of agricultural products, innovation, financial risk management, establishing partnerships with other agricultural enterprises and organizations, and government financial support.

In our view, reducing the impact of these limiting factors is possible by developing

regulatory criteria for evaluating not only financial but also integral sustainability for agriculture. To more rationally use of finances and free them up to finance the climate transition, it is necessary to increase the productivity of production resources and finding reserves, reviewing the organizational structure, and implementing continuous financial monitoring.

The research results may be of interest to scientists, teachers, regulators, those developing climate transition programs, and those evaluating the risks of insufficient funding. Due to the limitations of this article, we did not focus on the quantitative assessment of the influence of the identified factors. This topic holds promise for future research. In further analysis, one could focus on the level of comprehensive effectiveness of climate transition programs, addressing not only economic but also environmental aspects, as well as the correlation between emissions and state influence through price factors.

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