

JEL Classification: Q14, Q18, G32, G28, O13, **DOI:** [https://doi.org/10.31521/modecon.V54\(2025\)-17C51](https://doi.org/10.31521/modecon.V54(2025)-17C51)

Nepochatenko Olena, Doctor of Economic Sciences, Professor, Professor of the Department of Finance, Banking and Insurance, Uman National University, Uman, Ukraine

ORCID: 0000-0002-1212-6335

e-mail: nepochatenko1@gmail.com

Trusova Natalia, Doctor of Economic Sciences, Professor, Professor of the Department of Finance, Accounting and Taxation, Dmytro Motornyi Tavria State Agrotechnological University, Zaporizhzhia, Ukraine

ORCID: 0000-0001-9773-4534

e-mail: trusova_natalya5@ukr.net

Determinants of Stabilization of Financial Stability of Agrarian Business Entities in the Face of Challenges and limitations of Industry Risks

Abstract. Introduction. The article provides a thorough analysis of the factors that contribute to the financial stability of Ukrainian agricultural businesses amid growing industry risks. These risks have intensified due to military operations, the destruction of logistics infrastructure, fluctuations in global agricultural markets, changes in climate, and the instability of the domestic financial environment.

Purpose. The study aims to identify the structural, economic, institutional, and market factors that influence the financial stability of agricultural businesses, as well as to develop a scientifically based model to minimize industry risks and evaluate their effect on the financial stability of agricultural enterprises during and after the war.

Results. A comprehensive study has been carried out on institutional instruments that ensure the financial stability of Ukrainian agrarian business entities in an unstable economic environment. This study also covers structural transformations of the agrarian market, as well as increased risks caused by changes in global supply chains and fluctuations in resource prices. A thorough analysis of the dynamics of key financial indicators of agrarian businesses in the pre-war and war periods was conducted. This analysis revealed patterns in the transformation of financial stability and identified critical points of decline during periods of peak industry risk. Particular attention was paid to studying the relationship between liquidity, solvency, capital turnover, operating profitability, and the overall risk exposure of agrarian entities.

Conclusions. The results of the analysis enabled the formation of an innovative model for minimizing agricultural risks. This model combines insurance tools, price fluctuation hedging, digital risk factor monitoring, financing source diversification, and intra-farm financial flow optimization. This model aims to increase the adaptive capabilities of agricultural businesses, reduce their financial vulnerability, and ensure they can function sustainably in uncertain conditions. The results obtained are significant for making strategic decisions regarding risk management and the financial stability of agricultural businesses in Ukraine.

Keywords: financial stability; agrarian business; industry risks; risk management; institutional factors; risk minimization model.

УДК 631.15:330.131.7:338.43

Непочатенко О. О., доктор економічних наук, професор, професор кафедри фінансів, банківської справи та страхування, Уманський національний університет, м. Умань, Україна

Трусова Н. В., доктор економічних наук, професор, професор кафедри фінансів, обліку та оподаткування, Таврійський державний агротехнологічний університет імені Дмитра Моторного, м. Запоріжжя, Україна

Детермінанти стабілізації фінансової стійкості суб'єктів аграрного бізнесу в умовах викликів та обмежень галузевих ризиків

Анотація. Стаття присвячена комплексному аналізу детермінант стабілізації фінансової стійкості суб'єктів аграрного бізнесу України в умовах зростання галузевих ризиків, що посилюються внаслідок воєнних дій, руйнування логістичної інфраструктури, коливань світових аграрних ринків, зміни кліматичних умов та нестабільності внутрішнього фінансового середовища. Поглиблено структурні, економічні, інституційні та ринкові фактори, що визначають фінансову стійкість суб'єктів аграрного бізнесу в нестабільному фінансовому середовищі за розробленою моделлю мінімізації галузевих ризиків. Здійснено комплексне дослідження інституційних інструментів забезпечення фінансової стійкості суб'єктів аграрного бізнесу України в умовах нестабільного економічного середовища, структурних трансформацій аграрного ринку та посилення ризиків, зумовлених змінами у світових ланцюгах

¹Стаття надійшла до редакції: 25.11.2025

Received: 25 November 2025

постачання, коливанням цін на ресурси. Проведено всебічний аналіз динаміки ключових фінансових індикаторів суб'єктів аграрного бізнесу в довоєнному та воєнному періоді, що дозволило виявити закономірності трансформації фінансової стійкості та визначити критичні точки її зниження у періоди пікових галузевих ризиків. Особливу увагу приділено дослідженню взаємозв'язку між рівнем ліквідності, платоспроможності, оборотністю капіталу, рентабельністю операційної діяльності та інтегральним ризиковим навантаженням аграрних суб'єктів. Результати аналізу дозволили сформувати інноваційну модель мінімізації аграрних ризиків, що поєднує інструменти страхування, хеджування цінових коливань, цифрового моніторингу ризикових факторів, диверсифікації джерел фінансування та оптимізації внутрішньогосподарських фінансових потоків. Запропонована модель спрямована на підвищення адаптивних можливостей суб'єктів аграрного бізнесу, зменшення фінансової вразливості та забезпечення стійкого функціонування в умовах невизначеності. Отримані результати мають практичне значення для формування стратегічних рішень у сфері управління ризиками та фінансовою стійкістю суб'єктів аграрного бізнесу України.

Ключові слова: фінансова стійкість; аграрний бізнес; галузеві ризики; ризик-менеджмент; інституційні чинники; модель мінімізації ризиків.

JEL Classification: Q14, Q18, G32, G28, O13, C51

Formulation of the problem. The modern development of Ukraine's agrarian sector creates new conditions for agrarian business entities due to market volatility, institutional transformations, technological changes, and increased exogenous risks. In conditions of growing instability in the global agri-food market and the effects of shocks and military issues, ensuring financial stability becomes increasingly important. It determines agricultural enterprises' ability to maintain profitability, investment activity, operational process efficiency, and long-term competitiveness.

The financial stability of agribusiness is increasingly considered not only the ability to generate positive financial results but also an integral indicator of adaptive potential formed by macroeconomic, institutional, market, resource, technological, and managerial determinants. In times of high uncertainty, industry risks manifest as price instability of products and resources, logistical constraints, seasonal production fluctuations, structural imbalances in land and credit markets, biosecurity threats, and climate risks. These factors create significant financial burdens that can reduce the effectiveness of economically viable business models.

Due to the urgent nature of the problem and the growing intensity of risk factors, this study aims to conduct an in-depth analysis of the determinants of financial stability for agrarian business entities in the pre-war and war periods. The study will identify dominant risk groups and develop a model to minimize their impact in light of modern challenges and the country's full-scale economic transformation, as evidenced by structural shifts in the financial behavior of agrarian entities.

Analysis of recent research and publications. The issue of determining the financial stability of agribusiness entities is the subject of active scientific discussion. Studies from both domestic and international sources prove that the structure of agrarian risks differs significantly from that of other types of entrepreneurial activity. This difference requires risk management models that are adapted to agribusiness and capable of ensuring the predictability of financial results and mitigating negative fluctuations. M. Kunitska Ilyash conducted an in-depth, empirical analysis of agribusiness financing during vulnerable and crisis periods. She formed a risk-minimization model by identifying specific financial

factors that weaken the activities of agricultural producers [12].

L. Demidenkot and Yu. Nakonechnaya focused on military challenges and their impact on the financial stability of agricultural enterprises, as well as the role of state policy in supporting agricultural exporters and ensuring their security. Using a logical-deductive approach, he identified factors that strengthen or weaken the financial stability of entities [4]. O. Tomilin and a group of authors studied the mechanisms of financial risk management in the agricultural sector. They formed a typology of financial risks, including currency, credit, and operational risks, which significantly impact the financial stability of agricultural enterprises. They also proposed new control mechanisms [10]. O. Polishchuk studied the investment component as a factor in changing agricultural enterprises' decisions regarding financial stability during martial law and preserving business entities' potential in crisis conditions [5]. D. Pylypenko, N. Shevchenko, and M. Pylypenko identified currency fluctuations, inflation, and changes in tax policy that threaten the financial stability of agricultural businesses that interact with foreign entities. They also identified strategies to minimize risk and diversify businesses, as well as state lending programs and investor support [14].

Additionally, O. Bazilinska, O. Panchenko, and V. Surovets employed approaches to optimize capital structure and liquidity by modeling the financial stability of agricultural enterprises. This allowed them to determine the volume of equity, sources of financing, operational factors, and structural features of businesses that ensure financial results and manage profitability risk [1]. K. Wang and J. Tsui created an evolutionary game model involving banks, enterprises, and small agricultural players to adopt fintech solutions (e.g., blockchain, AI, and big data). This model can reduce information asymmetry and credit risk while improving the stability of agricultural financing and providing innovative financing solutions to increase business entities' financial stability by modernizing the credit infrastructure [15].

Formulation of research goals. The study aims to identify the structural, economic, institutional, and market factors that determine the financial stability of agricultural businesses. Additionally, the study seeks to develop a scientifically based model that minimizes

industry risks and assesses their impact on the financial balance of agricultural enterprises in the post-war period.

Presentation of the main research material. The financial sustainability of agribusiness entities is defined as their ability to ensure continuity of production and economic activities, maintain liquidity and profitability, maintain a stable capital structure, and adapt to changes in the external environment, even during times of crisis [12; 10]. In the current conditions of the Ukrainian economy's transformation, which are accompanied by military and economic challenges, the financial sustainability of agribusiness entities takes on a multidimensional meaning. It includes not only traditional financial and economic indicators, but also institutional and risk factors [3; 2].

The classical approach to determining the determinants of financial stability reveals the dependence of agribusiness on the state's macro-productive policy. This policy acts as both a regulator and an active producer of economic conditions. In other words, it creates framework incentives, infrastructure opportunities, and financial channels that determine the behavior of economic agents and strengthen their ability to accumulate capital, invest, and adapt to crisis challenges. This policy also helps businesses withstand external and internal shocks without experiencing a systemic loss of solvency or productivity over a certain time horizon [3].

The financial stability of agrarian business entities is influenced by industry risks, such as rising prices for energy resources, raw materials, and logistics services; inflation; and currency fluctuations, all of which significantly impact enterprises' financial results. Agricultural enterprises must manage agricultural risks through systemic financial planning and risk hedging [5]. In Ukraine, meanwhile, the financial stability of agribusiness entities depends on credit resources, market price fluctuations, insurance support, technological modernization, and unpredictable military and political risks [11].

Under these conditions, it is crucial to develop a new macro-productive state policy for agribusiness. This policy should be a system of strategic, regulatory, and institutional mechanisms that create an environment in which agribusiness enterprises can ensure financial balance, risk resistance, and long-term economic stability.

After 2014, Ukraine began deeply reforming the macro-financial environment of agrarian business entities. This reform has the following components: budgetary and financial support instruments operating through preferential lending programs (e.g., the "5-7-9" program and loans at 0% interest during martial law), state guarantees on a portfolio basis, interest rate compensation, and direct subsidies for the livestock, horticulture, and processing industries. There are also special programs to support farmers in deoccupied territories, such as grants for restoring production and compensating for losses of equipment and crops. These mechanisms partially remove credit barriers, increase

enterprise solvency, and restart investment cycles. Based on these principles, the NBU establishes the macro-financial stability of agrarian business entities within the banking system, as well as the requirements for assessing credit risks and standardizing agricultural credit products. The NBU also develops financial services backed by agricultural collateral. Simultaneously, implementing risk-based supervision improves the quality of bank portfolios and reduces financing costs for agricultural producers.

At the same time, international institutional support for Ukrainian agribusiness entities is integrated into FAO programs (production capacity restoration), EBRD, and EIB programs for implementing large investment projects to restore agricultural raw material logistics. This creates institutional synergy between the state and international donors, affecting the restoration of enterprises' financial potential. The capitalization of agricultural enterprises through this international instrument allows financial resources to be directed toward the modernization of fixed assets (e.g., leasing equipment and providing grants for processing upgrades), activating investment programs (e.g., state guarantees, long-term loans, and equipment compensation), developing the institution of agricultural receipts as an alternative to collateral lending, and creating incentives for forming investment clusters that increase the consolidation of resources and the investment potential of agribusiness entities. This approach aims to overcome the "capital gaps," which have reached record proportions due to the war and instability.

In the agricultural sector, the macro-production factor is associated with the general macro-financial stabilization strategy, which uses levers to control inflation and reduce the cost of production factors, as well as levers to support a stable foreign exchange market. This is important for import-dependent and export-oriented agricultural industries, both of which require sufficient credit resources. Stable macroeconomic parameters strengthen investor confidence and stimulate investment activity among agricultural businesses.

Financial infrastructure as a macro-production factor creates and modernizes mechanisms for financing farmers through a system of financial guarantees provided by the Entrepreneurship Development Fund, which plays a key role in ensuring access to loans for small and medium-sized agricultural producers. State guarantees cover up to 80% of the loan, minimizing the risks associated with the agricultural sector's logistics and export infrastructure, thereby strengthening foreign exchange earnings and improving the liquidity of agricultural businesses.

After 2022, the state will implement a special macro-production policy regime that includes anti-crisis financial instruments, such as grants for microbusinesses ("Vlasna sprava" and "Erobota"), grants for greenhouses and berry cultivation and processing, programs that compensate for losses from military operations, and preferential loans for sowing; stimulating the relocation of agricultural enterprises by providing state support for production relocated from combat zones to maintain the economic

activity of agricultural businesses; rehabilitating land resources, including soil restoration, demining, and environmental rehabilitation, which are fundamental to the financial potential of agricultural businesses since land is a key asset of the agricultural sector.

Due to the prolonged military conflict, the macroeconomic indicators of the agricultural sector have fluctuated and have not exhibited stable dynamics since the beginning of the full-scale invasion of Ukraine (Table 1).

An analysis of the dynamics of the agricultural sector's macro indicators in Ukraine from 2021 to 2024 and the first two quarters of 2025 shows a combination of severe shocks and the sector's gradual adaptation to crisis conditions. During the studied period, the agricultural sector demonstrated significant sensitivity to industry risks, which affected production volumes and its role in the country's economy and foreign trade.

Table 1 Macroindicators of the agricultural sector of Ukraine for 2021–Q2 2025

Indicator	2021	2022	2023	2024	Q1 2025	Q2 2025
Agricultural production index	100	78*	92*	95*	98*	100*
Agricultural sector share in GDP, %	9.5	8.1	10.8	11.0	-	-
Agricultural export volume, billion USD**	23.5	17.0	20.4	≈22.0	5.2	6.1
Agricultural export routes share via "Solidarity Lanes", % of exports	-	-	~40-60	~60	-	-

Source: compiled from data [8; 7; 13; 11].

The agricultural production index fell to 78 points in 2022, reflecting the most acute phase of the shock caused by the full-scale war, including loss of capacity in the east and south, mining of territories, collapse of port infrastructure, and reduction of agribusiness entities' financial capabilities. The gradual recovery in 2023 (92 points) and 2024 (95 points), however, indicates the industry's high adaptability due to the diversification of export channels, optimization of sown areas, and changes in technological practices. Data from the first and second quarters of 2025 (98 and 100 points, respectively) confirm the stabilization trend and the industry's partial return to pre-war dynamics.

Changes in the agricultural sector's share of GDP demonstrate opposite processes. The decrease to 8.1% in 2022 from 9.5% pre-war is associated with the overall decline in gross value added in agriculture and the disruption of logistics chains. However, the subsequent increase to 10.8% in 2023 and 11.0% in 2024 not only indicates the industry's recovery but also its increased systemic importance to the national economy during the war. This growth is due to the restructuring of the state's economic sector, the decline in industrial production, and the increased importance of the agricultural sector as a source of foreign exchange earnings.

The dynamics of agricultural exports demonstrate the industry's adaptive capabilities. In 2022, the volume of exports decreased from 23.5 billion USD in 2021 to 17.0 billion USD due to the blockade of ports, limited access to global markets, and destroyed logistics. However, exports recovered to 20.4 billion USD in 2023 and approached the pre-war level (≈22.0 billion USD) in 2024. This confirms the importance of alternative logistics routes, particularly through EU countries. In the first and second quarters of

2025, exports amounted to 5.2 and 6.1 billion USD, respectively. This outlines a trend toward expanding export opportunities further.

The share of agro-export routes through the "Solidarity Lanes" is a particularly important indicator. While this indicator was not yet of systemic importance in 2022, 40–60% of exports passed through new land and river routes in 2023, and about 60% in 2024. This indicates the logistical adaptability of agribusiness and a shift in transport infrastructure towards Europe, which has structurally changed the entire Ukrainian agro-export model.

In general, the results of the table show that, despite significant shocks, the agricultural sector of Ukraine remained one of the most stable segments of the economy from 2021 to the second quarter of 2025. The sustainability of production, the sector's growing role in GDP, the gradual recovery of export positions, and institutional changes in logistics established a new model for agribusiness in the face of military risks. From 2024 to the second quarter of 2025, positive dynamics confirm the industry's ability to adapt through market diversification, innovation, government support, and integration into European trade and logistics systems.

Financial and credit indicators in Ukraine's agricultural sector reveal significant transformational shifts, driven by military risks and business entities' adaptation to new operating conditions. Overall, the indicators demonstrate the credit market's cyclical recovery after the deepest shocks in 2022 and the formation of prerequisites for increased investment activity in 2024–2025 (Table 2).

Table 2 Financial and credit indicators of the agricultural sector for 2021–Q2 2025

Indicator	2021	2022	2023	2024	Q1 2025	Q2 2025
Share of medium-sized agribusiness using bank loans, %	56	48	52	55	24	26
Share of large agribusiness using loans, %	85	78	82	84	37	39
Volume of bank loan portfolio in agriculture, UAH billion	78	65	72	88	90	95
NPL level in rural lending, %	6.8	12.5	9.0	7.2	6.8	6.4
Share of loans in foreign currency, % of agricultural loans	45	40	38	35	21	19

Source: compiled from data [8; 7; 13; 11].

Lending activity by agribusiness entities generally shows signs of partial recovery. The percentage of agricultural enterprises that obtained bank loans decreased from 56% in 2021 to 48% in 2022. This decline is a direct result of the industry's sharp deterioration in risk profile at the beginning of the war, decreased farm liquidity, damaged production capacities, and growing uncertainty about future income. In 2023-2024, credit participation has stabilized (52% in 2023 and 55% in 2024), indicating banks' adaptation to new risk assessment conditions, the expansion of state support programs (e.g., "5-7-9%" and portfolio guarantees of 80%), the restoration of export logistics, and increased cash flow predictability.

This reflects the gradual return of agribusiness entities to intensive production models that require leverage. Large agribusinesses demonstrate better credit integration; these indicators are traditionally higher: 85% in 2021, 78% in 2022, 82% in 2023, and 84% in 2024. This is explained by several systemic determinants of financial stability: the presence of corporate risk management and financial reporting systems that meet banks' requirements; stable relations with creditors and sufficient reputational capital; and diversified business models that reduce income volatility. However, the decrease in indicators in 2022 (78%) was an obvious reaction to the war-related force majeure, though large agribusinesses showed faster recovery than medium and small farms in 2023-2024.

From 2021 to 2022, the volume of bank loans in the agricultural sector decreased from UAH 78 billion to UAH 65 billion. This reflects banks' natural reaction to an increased risk of default. Meanwhile, the portfolio increased to UAH 72 billion in 2023 and to UAH 88 billion in 2024, surpassing the pre-war level. The positive trend persisted in 2025 with UAH 90 billion in the first quarter and UAH 95 billion in the second quarter. This increase can be interpreted as banks' structural return to the agricultural sector due to state compensation for some risks (80% portfolio guarantees), stabilization of export infrastructure (including "Solidarity Lanes"), increased domestic demand for working capital before the 2023–2025 sowing campaigns, gradual recovery of the land market, and increased collateral liquidity. The positive

trend from 2024 to 2025 indicates the agricultural sector's transition to the recovery phase of the economic cycle.

The decrease in nonperforming loans (NPLs) indicates the industry's dynamic growth and sustainability. This is a key indicator of financial stability for agribusiness entities and the agricultural sector as a whole. The NPL ratio was 6.8% in 2021, sharply increased to 12.5% in 2022, decreased to 9.0% in 2023, and decreased further in 2024, from 7.2% in Q1 to 6.4% in Q2.

This trend indicates the effectiveness of the NBU's restructuring measures introduced in 2022-2023, the stabilization of production and logistics chains, improved financial discipline among agribusiness entities, and increased profitability among exporters in 2024-2025 amid relative exchange rate stability. The NPL level in Q2 of 2025 is lower than the pre-war level, indicating a gradual cleansing of the industry of accumulated risks.

Additionally, the share of loans in currency is decreasing, which indicates dedollarization and a reduction in currency risk. The currency share of loans decreased from 45% in 2021 to 35% in 2024, and from 21% in the first quarter (first quarter) of 2025 to 19% in the second quarter (second quarter) of 2025. This decrease is due to farmers' desire to minimize currency imbalances amid exchange rate volatility, the NBU's increased requirements to limit currency risks in loan portfolios, the growth of the hryvnia loan market within state programs, and the reduction in short-term import financing for machinery and plant protection products (PPP) during the war. Therefore, the decrease in the currency share is a positive signal indicating an increase in the financial stability of agribusiness entities and a reduction in their currency burdens.

An analysis of industry risks shows that the financial stability of agricultural entities from 2021 to 2025 was influenced by a complex set of threats, most of which are systemic and continue to determine the industry's trajectory. Conventionally, all risks can be divided into three groups: critical military infrastructure, operational commercial, and financial market. Each group impacted the stability of income, the liquidity of enterprises, and the ability to raise capital differently (Table 3).

Next, a more detailed look at each subgroup of industry risks is in order.

In challenging conditions, military and infrastructure risks are the most influential factor in destabilizing the financial security of agribusinesses. From 2022 to 2024, military risks were the dominant driver of agribusiness entity instability. The loss or temporary occupation of

agricultural land, destruction of production warehouses, elevators, technical complexes, and energy supply systems significantly reduced the production capabilities of medium- and large-sized agricultural companies.

Table 3 Incidents of industry risks and their impact on the financial stability of agricultural business entities in Ukraine in 2021–Q2 2025

Risk type	Incidents / Trends	Assessment of the impact on the financial sustainability of agribusiness entities
Military-infrastructure	Loss/occupation of part of agricultural land; destruction of warehouses and elevators (2022+), periodic attacks on infrastructure.	High
Logistics	Closure of Black Sea ports in 2022; development of Solidarity Lanes from 2022-2024; increase in transportation costs.	High/medium
Price/market	High volatility of world grain and oil prices; fluctuations in domestic prices due to shortages of fertilizers, fuel.	Medium/high
Credit/financial	Currency volatility, inflation, limited access to long-term resources; fluctuations in NPL.	Medium

Source: compiled by the authors.

The main consequences include a reduction in sown areas and decreased yields in key regions (the south and east), increased costs due to the need to relocate logistics hubs and build new warehouses, increased credit risks that affected banks' policies regarding the agricultural sector in 2022, and limited opportunities to attract investments in long-term projects. These risks have caused fundamental structural changes that have affected the production potential of the industry, so the impact is assessed as high.

Depending on the period, the level of impact of logistics risks on the financial sustainability of agribusiness entities is also high/medium. The closure of Black Sea ports in 2022 was one of the most critical shocks since the war began. The loss of access to key sea routes caused a sharp increase in logistics costs, accumulation of commodity residues, and delays in crop sales. Export prices dropped due to longer routes. The development of "Solidarity Lanes" from 2022 to 2024 partially offset these losses. However, the new logistics system had a lower throughput capacity, incurred high transaction costs, and overloaded the EU transport infrastructure. From 2023 to 2024, the impact of logistics risks on the financial stability of agribusiness entities decreased to an average level, though it remained significant in shaping the profitability of export crops.

Price and market risks pose a medium to high threat to the financial stability of agribusiness entities due to global volatility. From 2021 to 2024, global grain and oilseed markets were characterized by sharp price fluctuations. Peak grain prices were observed at the beginning of the war in 2022, followed by a sharp decline in 2023 due to record harvests in other countries, as well as domestic price instability in Ukraine amid logistical constraints. Additional sources of volatility included the fertilizer

shortage in 2022 due to logistical crises and sanctions restrictions, as well as the increase in fuel costs, which affected production costs. Price risks have a medium to high impact on the financial stability of agribusiness entities because they affect cash flow, investment behavior, and loan servicing capabilities.

Credit and financial risks moderately impact the financial stability of agribusiness entities. Currency volatility, inflationary pressure, rising financial resource prices, and limited access to long-term loans created difficult conditions for agricultural producers. These risks were particularly acute in 2022 when the hryvnia's devaluation increased the debt burden on foreign currency loans. Banks also tightened their requirements for collateral and borrowers' credit ratings, and the level of non-performing loans (NPLs) temporarily increased to 12.5%. From 2023 to 2025, these risks decreased due to NBU policy, exchange rate stabilization, the state program "5-7-9%," and portfolio guarantees. Therefore, the impact is assessed as medium, though it was closer to high in some industries, such as livestock and processing.

Thus, the key determinants of the financial stability of agribusiness entities were identified based on empirical analysis. These determinants are listed in order of their decreasing impact on the indicator of industry risks. 1) Security/infrastructure context: destruction of assets and loss of area. This has the highest impact on solvency; 2) access to financing (bank loans and state/international support): determines crop restoration and logistics, an important channel for maintaining liquidity; 3) export logistics channels: route changes, additional costs, and time costs affect margins and turnover; 4) price volatility of world markets: affects exporters' income and solvency of obligations; 5) operational/production risks (including fertilizer and fuel supply): have a moderate but stable

impact on profitability; and 5) regulatory and trade risks (export restrictions, trade agreements with the EU, etc.): can quickly change the situation (e.g., events in 2025 negotiations with the EU).

A model has been developed to minimize agricultural risks and their impact on the financial stability of agribusiness entities. The model's conceptual idea is to reduce expected losses (the most critical negative impacts) on financial indicators, particularly cash flows and net income, in the presence of a set of risks. To this end, we propose a combined stochastic-optimization model with elements of a portfolio approach to risks, insurance instruments, and income hedging.

$$\min_{x \in X} E \sum_{i=1}^n l_i(x) + C(x), \quad (1).$$

where, $C(x)$ – total direct costs for the implementation of x measures (insurance premiums, forward cost, investments in storage of production stocks and infrastructure); X – permissible set (budgetary constraints, liquidity limits).

Tactical measures to stabilize the finances of an agribusiness entity include implementing a stochastic optimization model with a portfolio approach to minimize industry risks through insurance instruments and income hedging, such as: market diversification by concluding contracts with several buyers, use of alternative land routes, which will reduce logistics risk (r_{Log}); use of financial instruments (forwards, options on valuable agricultural products, currency hedges) to reduce price/currency risks (r_{price}, r_{fx}); crop/asset insurance – use of premium against loss (r_{prod}, r_{infra}); capital investment in storage – provide reduction of logistics and infrastructure risks; building up of liquid reserves – acts as a constraint on $C(x)$ and increases the ability to repay short-term liabilities (r_{credit}); government guarantees/project financing – reduce the cost of capital and increase access to long-term credit.

Thus, to increase the financial stability of agribusiness entities, it is recommended to: integrate the risk management at the board of directors level (regular stress tests, scenario planning); actively use of financial instruments (forwards, options, currency swaps to protect export margins); diversify logistics (investment in internal transshipment capacities and land routes, conclusion of long-term transportation contracts); reserves and insurance (form operational reserves and a reasonable crop/asset insurance program); develop of partnerships with banks and international donors (access to cheap and guaranteed loans, use of state loan guarantee programs); monitor and adapt (operative adjustment of market and procurement portfolios in relation to the global situation and logistical constraints).

The model is formalized under the assumption that an enterprise has n risk areas, (military, logistics, price, credit, production). Each risk is characterized by a random loss variable (monetary measurement, UAH). The enterprise can apply countermeasures, (insurance, market diversification, forward contracts, inventories, infrastructure modernization, financial reserves, state guarantees, etc.), each of which changes the distribution of losses.

The main emphasis in the model is on minimizing the total expected loss, taking into account the costs of measures:

Presentation of the main research material. The research revealed that the financial stability of Ukrainian agribusiness entities is influenced by an interconnected set of factors. These factors undergo significant transformations under conditions of military threats, logistical dysfunctions, volatile world markets, and limited access to financial resources. The strategic and operational decisions of agricultural enterprises increasingly depend on their ability to adapt to a multifactorial risk environment. This requires revising traditional approaches to managing financial stability. Based on this, military infrastructure risks necessitate rebooting strategic stability mechanisms to implement a model of territorial production diversification, invest in mobile and modular production and logistics solutions, and reduce dependence on stationary capacities. These approaches create a new determinant of stability: infrastructure resilience. Infrastructure resilience has become a basic condition for economic survival.

Logistic diversification stabilizes prices and exports, allowing for long-term contracts with carriers that offer fixed tariff corridors. It also enables the formation of logistics cooperation clusters that reduce costs for small and medium-sized producers and the use of digital logistics planning platforms to stabilize the profitability of agricultural exports. Financial and credit determinants require shifting the emphasis from "post-factum" lending to preventive risk financing since financial stability cannot be ensured solely through classic bank loans. Price risk management requires transitioning from passive responses to hedging. Due to the global volatility of grain and oilseed markets, Ukrainian agricultural producers must implement advanced market risk management tools, such as hedging through exchange-traded instruments (CBOT, Euronext) and concluding fixed-price contracts with traders for the medium term. This enhances profitability and cash flow stability. This integration creates a complex determinant: systemic resilience, which improves the financial stability of agribusiness entities at the macro, meso, and micro levels.

References:

1. Bazilinska, O., Panchenko, O., Surovets, V. (2025). Factors influencing the financial stability of agricultural enterprises. *Problems and prospects of economy and management*, 1(1), 45-60.
2. Vdovenko, L. (2022). Instruments of state financial support of the agricultural sector under martial law. *Economy and society*, 44, 82-99.
3. Vdovlyuk, S. A., Tykhovsky, M. I., Lebid, I. Yu., Zayarna, V. O. (2024). State financial support of the agricultural sector of Ukraine under martial law. *Collection of scientific papers of the Uman National University of Horticulture*, 104(2), 223-232.
4. Demydenko, L., Nakonechna, Yu. (2023). Financial Stability of the Agrarian Sector of the Economy of Ukraine under Martial Law. *Bulletin of the Taras Shevchenko National University of Kyiv. Economics*, 1(222), 48-55.
5. Polishchuk, O.A. (2024). Adaptation of Investment Strategies of Agrarian Business under Martial Law. *Business-Inform*, 11, 161-170.
6. Radchenko, O.D., Strichovsky, D.M., Leontovych, S.P. (2022). Impact of Martial Law on the Development of the Financial Mechanism of the Agrarian Sector of Ukraine. *Economics of the Agricultural Industry*, 29(5), 47-56.
7. Annual Report of the National Bank of Ukraine. (2024) <https://bank.gov.ua/ua/news/all/richniy-zvit-natsionalnogo-banku-ukrayini-za-2024-rik>.
8. State Statistics Service of Ukraine. (2023). Statistical collection "Agriculture of Ukraine" for 2022. Kyiv. https://ukrstat.gov.ua/druk/publicat/kat_u/2023/zb/09/S_gos_22.pdf.
9. Titov, D., Oleksiyenko, V. (2024). Financial support of the agricultural sector of Ukraine under martial law. *Economy and Society*, 63. <https://doi.org/10.32782/2524-0072/2024-63-125>.
10. Tomilin, O.O., Krasnikova, O.M., Gechbaia, B., Zorya, S.P., Drobotya, Ya.A., Synytsia, Yu.(2023). Risk management in the agricultural sector: financial aspect. *Risk management in the agricultural sector: financial aspect*, 4(51), 147-162.
11. Bogonos, M., Chmil, A., Nazarkina, R., Nykolyuk, O., Pyvovar, P., Stolnikovych, H. (2023). Agricultural Outlook Ukraine 2024-2033. Report-summary. Kyiv: Kyiv School of Economics. [in English].
12. Kunytska-Iliash, M. (2023). Assessment of the financial security of agriculture in Ukraine. *Agricultural and Resource Economics: International Scientific E-Journal*, 9(1), 5-27.
13. World Bank Group. (2024). Priorities for agricultural support in Ukraine. <https://documents1.worldbank.org/curated/en/099062524074615884/pdf/P1801981319afe091b8b71b33b7a901d4e.pdf>.
14. Pylypenko, D., Shevchenko, N., Pylypenko, M. (2025). Economic risks of agricultural enterprises in Ukraine: Analysis of threats and mitigation strategies to ensure financial security. *Economic Forum*, 15(1), 58-73.
15. Wan, Q., Cui, J. (2024). Dynamic Evolutionary Game Analysis of How Fintech in Banking Mitigates Risks in Agricultural Supply Chain Finance. *Economics*, 12. <https://arxiv.org/abs/2411.07604>.



Ця робота ліцензована Creative Commons Attribution 4.0 International License