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## **FINANCIAL AND ECONOMIC SECURITY OF AGRICULTURAL BUSINESS: SPECIFICS, ANALYSIS METHODOLOGY, AND MEASURES OF STABILIZATION**

**Purpose.** *The article aims to improve the methodology and analysis of the financial and economic security of agricultural business in Ukraine for the identification of problematic aspects and the substantiation of policy measures needed to strengthen it.*

**Methodology / approach.** *The article offers the methodological approach for the comprehensive analysis of the financial and economic security of agricultural business in a region. The conceptual task of the approach is to calculate the empirical indicator of security (composite method) and its structural components (resources, investment, money and credit, debt, finance-economy, and insurance components) based on the identification of the weight of indicators (Principal Components Analysis).*

**Results.** *The article reveals that the appropriate level of all components of financial and economic security correlates with the financial independence of agricultural entities. In 2018, the index of insurance security (0.798) and money and credit (0.737), debt (0.724), and resources (0.720) components of agricultural business security in Lvivska oblast were above the moderate level. The period of 2018–2022 faced a significant weakening in the resources (by 16.2 p.p.), investment (16.9 p.p.), money and credit (20.6 p.p.), debt (19.0 p.p.), finance-economy (18.0 p.p.), and insurance (5.3 p.p.) components of the sector’s financial and economic security. The average level of financial and economic security in the period under review was 65.0 %, and the average annual rate of decrease was 4.1 p.p.*

**Originality / scientific novelty.** *The article improves the methodological approach to the complementary assessment of financial and economic security of agricultural business in a region, contributing to the identification of the degree of financial resilience of business entities in the agricultural sector of the regional economy in conditions of war and instability, in order to develop the mechanism for increasing the investment and economic capacity of business.*

**Practical value / implications.** *The article offers and substantiates an applied approach to assessing the degree of regional financial resilience of agricultural business. Its implementation will allow carrying out a sectoral cut of the state of financial and economic security of the region’s industry and build architectonics of determinants of financial and economic security of business entities.*

**Key words:** *security, business, agriculture, parameters, compositional approach, uncertainty, Lvivska oblast.*

**Introduction and review of literature.** The business environment in Ukraine is

determined by macroeconomic and socio-political instability, market turbulence, and social and legal uncertainty, which significantly complicates the management of business entities. Their inability to respond to economic changes in a timely manner triggers the maximisation of risks, the emergence of new threats, and the weakening of financial and economic security of the business sector in general.

The complexity of creating a system of tools for strengthening the financial and economic security of business in the region is stipulated not only by unpredictability of changes in the business environment but, first of all, by the existential value of the financial component of the economic security of each economic entity. Improvement of mechanisms for strengthening the financial and economic security of business entities requires, first, rapid identification of transformations in the functioning environment of agricultural business, in particular, identification of the degree of influence of external threats; second, prompt detection of changes in internal business processes; third, development of information and analytical support for monitoring the financial resilience of business entities. Therefore, the difficulty of developing a universal methodological approach to assessing the financial and economic security of business, especially in the sectoral context, is stipulated by its focus on the development and increase of resource capacity without the implementation of mechanisms to counteract threats in financial and investment activities, as well as limited intellectual-personnel capacity in the field of identifying risks to the financial and economic sustainability of business entities.

Prior to the full-scale Russian-Ukrainian war, despite the hostilities on the territory of Ukraine and the socio-political and economic instability, there were positive developments in the domestic agricultural business related to the significant contribution of enterprises in this industry to the country's GDP (the annual growth rate of agricultural production was 15–20 %), gross value added (over 10 %), exports (over 40 %), and foreign trade turnover (about 25 % in the overall structure of foreign trade in goods).

However, the current conditions, in particular the full-scale war, have made it more difficult to maintain economic activity and fully utilize agricultural capacity, given the risk of loss of agricultural land, equipment, property, crops, and soil quality due to direct shelling, complicated logistics and export opportunities, the decline in domestic demand due to the recession of the national economy, loss of many enterprises, including industrial processing of agricultural products, and increasing cost intensity of production due to inflationary processes and rising costs of fuel and lubricants.

Therefore, if the development issues were relevant in the pre-war period, in the war environment, the emphasis shifted to ensuring the financial and economic security of agricultural entities in Ukraine. This actualises the task of improving the theoretical, methodological, and practical foundations for the assessment of financial and economic security, including the creation of an appropriate information and analytical base for the management of the parameters of business sustainability and viability in a much more complex business environment.

The problem of security, especially economic security, became more urgent at the end of the last century and grew more acute at the beginning of this one. Paradoxically, it was mainly caused by globalisation and digitalisation, which have critically interconnected the impact of economic agents' activities (regardless of the physical distance between them) and made some economies dependent on others. In fact, it was these factors that led to the aggravation of global financial, economic, and socio-political crises and, ultimately, to hybrid and then classical wars. Already now, in a few publications on economic security system management issues, the composition of management functions is headed by the function of ensuring security when further development is already planned (Lepers & Serrano, 2020). Researchers ground the vast majority of studies specializing in economic security issues, at all levels of the management hierarchy, on the principle that the state of security is the ability of an entity to prevent the realisation of risks and threats that can cause critical negative consequences to the system and prevent the realisation of the economic interests of its stakeholders. And among the entire spectrum of challenges, traditionally, it is the financial ones that most often lead to bankruptcy and, accordingly, high-quality financial rehabilitation of business. Today, this problem is clearly reflected in the research results of Blajer-Gołębiewska et al., 2018; Nguyen & Nguyen, 2020; Tursunov, 2020).

As rightly emphasised in a few studies on state and local finance and business financial management, the impact of financial factors of the business environment on the financial and economic security of business entities is not only reverse but also obverse. That is, the environment impacts business and creates new challenges and threats to its financial and economic system and security (Rushchyshyn et al., 2021; Voznyak et al., 2022), but the business itself generates changes in the sectoral and/or economic system as a whole (Bondarenko et al., 2021; Voznyak et al., 2019; Valaskova et al., 2020).

When defining the conceptual prerequisites and the basis of the methodology for analysing the financial and economic security of enterprises, it is necessary to point out the fact of a sufficiently thorough study of its etymology and decomposition. Thus, it is the state of business protection against risks and threats associated with financial and economic relations of business entities both within (business processes) and among themselves (external business communication) (Delas et al., 2015), quality of planning and ability to implement scenarios and tactics of functioning and development related to financial and economic aspects of business (Zwolak, 2017), ability to realize financial and economic interests of the business structure's stakeholders, which include shareholders, owners, top management, staff, investors, and other interested parties, including, and rightly so, the state (Ganushchak, 2017), which, as a management entity, is interested in an adequate level of financial and economic sustainability of strategic enterprises, industries, and entire sectors of the national economy.

Based on the latter, it is important to understand that this aspect must be considered when assessing the financial and economic security of business entities. Otherwise, a conflict of interest between business and society may arise and even

develop, when black, gray, and/or semi-legal investment and tax management schemes may be implemented for security purposes or capital may be used unproductively, which is bad for the industry, regional or national economy. That is why the key factors, as well as tools and means of strengthening the financial sustainability of business entities in the projection to strengthen the financial and economic security of sectoral economic systems (Koleda & Lāce, 2008; Kozachenko, 2020; Safargaliev et al., 2019; Shpak et al., 2021) and even the systems of budget security of territories (Voznyak et al., 2021), which is especially relevant in terms of agricultural business, have become the subject of scientific discourse.

The issues of structural decomposition are of paramount importance in improving the methodology for monitoring, analysis, evaluation, and diagnosis of such a complex system as security. At the same time, it is important both to understand the classical structure reflecting the security status of a business entity and to consider sectoral (as for the agricultural sector of the economy, such features are thoroughly disclosed by Davydenko et al., 2020; Ivaniuk, 2014) and, possibly, territorial specifics.

Financial and economic security is traditionally formed by the following components: budget and taxes, investment, money and credit, debt, bank, stock, insurance, currency, etc. (Pera, 2017). However, in our opinion, this practice is not complete, and the main argument here is the fact that the financial and economic security of an enterprise is practically identified exclusively with financial aspects, while economic ones, especially production, are not fully disclosed. This proves the expediency of supplementing the composition of the components of the financial and economic security of agricultural enterprises with resources and financial and economic components.

Moreover, this method makes it possible to simultaneously strengthen and link the issues of financial and economic security at the micro and higher levels of management. Furthermore, there are also initiatives in this direction. These include, for example, the analysis of the impact of financial and economic resilience on sustainable development (Rahi et al., 2021), the consequences of the improvement of the financial and economic situation in the context of the competitiveness of industries and their ability to displace imported products (Lupak et al., 2021), and the links between the financial sustainability of enterprises and the resource security of the national economy (Gholz et al., 2017).

It should be recognized that the methodological apparatus for the analysis and assessment of financial and economic security of business entities has developed quite a lot, both without taking into account sectoral specifics (Sylkin et al., 2020; Kvasnytska et al., 2019; Samorodov et al., 2020; Kosaynova et al., 2019), and taking into account the peculiarities of agricultural business in general (Kunytyska-Iliash, 2023), and with details for the oil and fat subcomplex of agriculture (Dokiienko et al., 2021), food sector of agriculture (Zabolotnyy & Wasilewski, 2019), etc. In a few publications, the issue of analysing financial and economic security has been further developed in the area of forecasting and modeling (Ilyash et al., 2021; Halkiv et al., 2020) the impact of its state on the parameters of the economy and business

development. At the same time, the existing methodological support for the analysis of the financial and economic security of agricultural enterprises is still not complete and, first of all, requires determining the configuration of parameters of the empirical indicator of financial and economic security in the projection of six components: resources, investment, money and credit, debt, finance and economy, and insurance. Such decomposition will reflect the conceptual essence of the financial and economic security of agricultural entities and will allow building a set of empirical indicators based on the principles of universality, reproducibility, and comparability of data. Moreover, a more qualitative methodological approach includes building a set of weighting coefficients of indicators and components based on a temporal approach, identifying the dynamic weighting influence and lagged structural relationship between indicators, as well as calculating the integral level of financial and economic security of agricultural enterprises.

The ability to form sufficient information and analytical framework for making management decisions in the field of stabilisation and sustainable planned financial and economic development of business entities is another important criterion for the quality of regulatory and methodological framework for the analysis of the financial and economic security of agricultural enterprises. Today, there are enough developments in the management of the financial and economic security of enterprises. These include the introduction of technological innovations (Florek-Paszkowska et al., 2021), digitalisation (Kotkovskiy et al., 2020), the spread of financial and economic incentives (Goel et al., 2021), and the adoption and implementation of anti-crisis rehabilitation programs (Korepanov et al., 2020) and doctrines (Poltorak et al., 2021). However, they do not fully correlate and directly derive from the data obtained during the security analysis and audit, and this methodological gap should also be eliminated when improving the methodology of assessment and development of methodological and applied principles for strengthening the financial and economic security of agricultural enterprises of Ukraine in the conditions of war.

The hypothesis of the research: the tendency towards the weakening of the financial and economic security of the agricultural business is caused by the complication of the external business environment parameters, the deterioration of the endogenous capacity of business entities, especially in terms of resource availability, capital-labor ratio, and working capital, as well as a decrease in income and deterioration of the financial and economic efficiency of business entities.

**The purpose of the article** – to improve the methodology and analysis of the financial and economic security of agricultural business in Ukraine for the identification of problematic aspects and the substantiation of policy measures needed to strengthen it.

*Methodology.* In the scientific discourse, there is a lack of comprehensive methods for assessing the financial and economic security of business entities that would be of applied value for business entities themselves. The existing methodological approaches to the assessment of the financial and economic security of business do not allow to create a universal scale of levels and critical ranges of indicators, and also make it

impossible to conduct a comprehensive analysis of the financial and economic security of enterprises, considering sectoral and spatial specifics. The lack of a valid and multi-level comparative methodology for the assessment of the financial and economic security of business is a limiting factor in the development and implementation of an efficient financial and economic policy to support business in the regions of Ukraine.

The calculation of the empirical indicator of financial and economic security of business by the composite method is conditioned by the formation of a system of multidimensional indicators grouped by functional parameters. This method allows to integrate multi-vector indicators into a single empirical indicator, considering their weight and different impact on the resulting variable, and the temporal approach allows to identify dynamic systemic and structural relationships between variables.

Understanding the financial security of business entities as the ability of the financial system of business entities to ensure the realisation of their own financial interests (goals) and to counteract threats from the endogenous and exogenous environment with a sufficient amount of investment and financial resources, the article offers the configuration of parameters of the empirical indicator of financial and economic security in the projection of six components: resources, investment, money and credit, debt, economy, and insurance. Such a decomposition reflects the conceptual essence of the financial and economic security of business entities and allows to build a series of empirical indicators based on the principles of universality, reproducibility, and comparability of data (Table 1).

The construction of a series of empirical indicators of financial and economic security of business entities involves their normalisation within each component according to formula (1) for indicators-stimulators and formula (2) for indicators-destimulators:

$$z_{ijk}^{st} = a_{ijk}^t / a_{ik}^{limt}, \quad a^{lim} \geq a^{max} \quad (1)$$

$$z_{ijk}^{dt} = a_{ik}^{limt} / a_{ijk}^t, \quad a^{lim} \leq a^{min} \quad (2)$$

where  $z_{ij}^s$  is the standardised value of indicator-stimulator  $i$  of component  $k$  of enterprise  $j$  in period  $t$ ;  $z_{ij}^d$  is the standardised value of indicator-destimulator  $i$  of component  $k$  of enterprise  $j$  in period  $t$ ;  $a_{ijk}^t$  is the statistical value of indicator  $i$  of component  $k$  of enterprise  $j$  in period  $t$ ;  $a_{ik}^{limt}$  is the threshold value of indicator-destimulator  $i$  of component  $k$  in time period  $t$ .

The thresholds for indicators-stimulators are the maximum value of the indicators in the data series for all studied enterprises within a certain type of economic activity, and for indicators-destimulators are the minimum value.

The principal components analysis was used to determine the weighting coefficients of the indicators (Formula 3):

$$w_{ik}^t = |F_{ik}^t| / \sum |F_{ik}^t|, \quad \sum w_{ik}^t = 1 \quad (3)$$

where  $w_{ik}^t$  is the weighting coefficient of indicator  $i$  of component  $k$  in period  $t$ ;  $F_{ik}^t$  is the value of the principal component of indicator  $i$  of component  $k$  in period  $t$ .

The proposed approach allows to build a series of weighting coefficients of indicators and components based on the temporal approach and identify the dynamic weighting influence and lagged structural relationships between indicators, as well as the level of financial and economic security of enterprises of different economic activities.

*Table 1*

**Configuration of components and indicators for the assessment of the financial and economic security of business entities in the region**

Components	Indicators	Measurement indicators	Impact on FS	Symbol
Resources	1. Value of assets <i>per employee</i>	<i>thsd UAH</i>	+	$a_{1,1}$
	2. Capital-labor ratio	<i>thsd UAH</i>	+	$a_{1,2}$
	3. Working capital availability rate	<i>coef.*</i>	+	$a_{1,3}$
	4. Fixed assets renewal rate	<i>coef.</i>	+	$a_{1,4}$
	5. Innovation and technology development rate	<i>coef.*</i>	+	$a_{1,5}$
Investment	1. Share of capital investments in assets	%	+	$a_{2,1}$
	2. Capital investment efficiency rate	<i>coef.</i>	+	$a_{2,2}$
	3. Reinvested profit rate	<i>coef.</i>	+	$a_{2,3}$
	4. Net present value of investments	<i>thsd UAH</i>	+	$a_{2,4}$
	5. Cash flow profitability rate	<i>coef.</i>	+	$a_{2,5}$
Money and credit	1. Cash flow liquidity ratio	<i>coef.</i>	+	$a_{3,1}$
	2. Cash turnover duration	<i>days</i>	-	$a_{3,2}$
	3. Short-term debt coverage ratio	<i>coef.</i>	+	$a_{3,3}$
	4. Receivables turnover ratio	<i>coef.</i>	+	$a_{3,4}$
	5. Ratio of equity growth to balance sheet total growth	<i>coef.</i>	+	$a_{3,5}$
Debt	1. Share of debt obligations in sales	%	-	$a_{4,1}$
	2. Assets to equity ratio	<i>coef.</i>	-	$a_{4,2}$
	3. Share of debt payments in assets	%	-	$a_{4,3}$
	4. Share of short-term bank loans in cost of sales	%	-	$a_{4,4}$
	5. Share of overdue debt obligations in assets	%	-	$a_{4,5}$
Economy	1. Return on equity ratio	<i>coef.</i>	+	$a_{5,1}$
	2. Return on invested capital	<i>coef.</i>	+	$a_{5,2}$
	3. Labor productivity, per employee	<i>thsd UAH</i>	+	$a_{5,3}$
	4. Solvency ratio	<i>coef.</i>	+	$a_{5,4}$
	5. Financial autonomy ratio	<i>coef.</i>	+	$a_{5,5}$
Insurance	1. Share of insurance payable in current liabilities	%	-	$a_{6,1}$
	2. Supplier reliability rate	<i>coef.*</i>	+	$a_{6,2}$
	3. Customer reliability rate	<i>coef.*</i>	+	$a_{6,3}$
	4. Business self-insurance rate	<i>coef.*</i>	+	$a_{6,4}$
	5. Risk management quality	<i>coef.*</i>	+	$a_{6,5}$

*Note.* \*Coefficient – calculated based on expert assessments; FS – financial security; “+” – positive impact on the outcome variable (stimulator); “-” – negative impact on the outcome variable (destimulator).

*Source:* authors’ interpretation.



The weighted indicators of the financial and economic security of business are calculated because of formula (4):

$$IAC_{ikj}^t = z_{ijk}^t w_{ik}^t, \quad (4)$$

where  $IAC_{ikj}^t$  is the weighted indicator  $i$  of component  $k$  of enterprise  $j$  in period  $t$ .

The component (group) and composite indicators of financial and economic security of business entities are calculated by the multiplicative method using formulas (5–6):

$$CFC_k^t = \prod IAC_{ikj}^t, \quad (5)$$

$$IFC_t = \prod CFC_k^t w_k^t, \quad (6)$$

where  $CFC_k^t$  is the empirical indicator of the financial-economic security component  $k$  in period  $t$ ;  $w_k^t$  is the weighting coefficient of the financial-economic security component  $k$  in period  $t$ ;  $IFC_t$  is the composite indicator of the financial-economic security in period  $t$ .

The author's methodology for constructing a series of empirical indicators of financial and economic security of business based on the multiplicative method allows to level the statistical error of the linear method of calculation of weighted indicators and increase its applied significance by considering the industry specifics and dynamic relationships.

The calculation of the level of financial and economic security of business has informational and analytical limitations related to the incompleteness and lack of formalized information on the financial, economic, resource, and investment indicators of business entities in the region, as well as the lack of such studies in domestic scientific practice. To compensate for the lack of formalized statistical data, an expert survey was conducted to form a dynamic series of indicators (insurance component). The methodological algorithm for conducting the expert survey by the Delphi method included the creation of a group of experts (6 people) and the survey itself. The experts were selected based on the following criteria: (1) awareness of the specifics of agricultural enterprises, (2) expertise in financial security, financial management, and sustainability, and (3) high qualifications (all experts have a higher economic education and experience in finance).

To form a series of indicators, the experts assigned scores ranging from 0 to 5, where 0 was the lowest score and 5 was the highest. The algorithm for processing the expert opinions included two stages:

1. Creating a matrix of indicators within the relevant component (method of averages) using formula (7).

$$EC_{ijk}^t = \frac{\sum Ex_{ijk}^t * Q_{ijk}^t}{\sum Q_{ijk}^t}, \quad (7)$$

where  $EC_{ijk}^t$  is the empirical indicator  $i$  of component  $k$  of enterprise  $j$  in period  $t$ ;  $Ex_{ijk}^t$  is the expert assessment of indicator  $i$  of component  $k$  of enterprise  $j$  in period  $t$ ;  $Q_{ijk}^t$  is the number of expert assessments of indicator  $i$  of component  $k$  of enterprise  $j$

in period  $t$ .

2. Forming the standardized series of indicators within each component by the method of expert opinion logarithmisation (Formula 8).

$$\begin{pmatrix} z_{11}^t \\ \dots \\ z_{ijk}^t \end{pmatrix} = \log(EC_{ijk}^t) \quad (8)$$

Based on expert assessment, we build the dynamic series of empirical parameters of such indicators as working capital availability rate and innovation and technology development rate (resources component); supplier reliability rate, customer reliability rate, business self-insurance rate, and risk management quality (insurance component).

The authors' methodological approach to the study of the financial and economic security of business was tested because of financial statements and expert assessment of ten agricultural enterprises in Lvivska oblast (limited liability companies, private enterprises, family farms, and individuals) for 2018–2022.

**Results and discussion.** The current organizational, economic, institutional, and legal instruments used to improve the efficiency of agriculture in the regions of Ukraine are primarily aimed at its market adaptation and structural reorganisation. However, the problem of profitability and productivity of the Ukrainian agricultural industry has become particularly acute in the context of the unstable economic system due to the shortage of current assets and fixed assets of enterprises and the low level of financial and economic security of business. Despite the increase in agricultural production, the industry's enterprises are characterized by a high degree of unprofitability, and the problem of overdue payments and losses of agricultural enterprises in the region has led to an increase in the shortage of current assets, a significant part of which are receivables or commodity loans, including to debtors. This situation makes it impossible to develop the production capacity of agricultural enterprises, expand markets for agricultural products, generate stable income and high profitability, and ensure financial resilience.

The studied agricultural enterprises in 2018–2022 are characterized by positive economic developments against the background of financial disruptions. In particular, positive trends include an increase in their revenues (by an average of 5–22 % in 2017–2022 to UAH 34.4–120.2 million); relatively low cost intensity of products (51–64 %); positive financial result of economic activity, which is also increasing (in 2022, the total net profit of the enterprises analysed in the study amounted to UAH 152.2 million); high level of profitability of individual enterprises' revenues (14.1–24.2%); sufficiently stable financial resilience of business entities (financial resilience ratio of most enterprises exceeds 0.5) and certain production efficiency indicators (labor productivity at the level of UAH 2.2–3.0 million per employee, capital efficiency of UAH 2.9–34, current assets turnover of 2.2–3.6 times, return on equity of UAH 1.8–6.4).

However, further improvement of the financial and economic results and strengthening of the financial and economic security of the analysed agricultural enterprises is hampered by their unstable profitability; a small share of operating and

other income, and, consequently, dependence on one type of activity; high production costs; low rate of return, especially of small businesses; low liquidity and solvency; low return on capital, turnover of current assets and return on equity. The empirical study of the weight of the financial and economic security indicators of agricultural business in Lvivska oblast for 2018–2022 confirms the thesis of their differential impact on the financial stability and formation of the investment attractiveness of the business sector.

During the study period, agricultural enterprises in the region were highly dependent on the resources component, especially capital and financial investments. The lack of mechanisms for reinvesting profits and building up financial assets by business entities has led to a weakening of their financial resilience. Thus, in 2018, the indicators “value of assets”, “working capital availability rate”, and “fixed assets renewal rate” had the highest weight in the resources component of financial and economic security of business entities in the region (20.4 % each), which indicates an excessive role of the resources component in ensuring financial and economic security (Table 2). Interestingly, in 2019–2022, the most important role in ensuring the resources component of the financial and economic security of the agricultural business in the region was played by the indicator of innovation and technology development (from 20.1 % to 23.3 %). This situation can be explained by the intensification of economic and legal support for innovation in the business sector and the creation of an institutional and organizational environment that has allowed business entities in Lvivska oblast to achieve significant innovative progress.

The Covid-19 pandemic had a significant impact on the agricultural business in the region. While the weighting coefficient of the “value of assets per employee” indicator was 20.4 % and 19.9 % in 2018–2019, respectively, it decreased by 4.6 p.p. in 2021 and by 9.7 p.p. in 2022 compared to 2018. Similarly, the weight of the capital-labor ratio decreased from 19.9 % (2019) to 12.7 % (2021). The high flexibility of agricultural enterprises to changes in the external environment contributed to rapid adaptation to new business conditions, which led to an increase in the weight of the indicators “working capital availability rate” (from 19.9 % in 2020 to 24.5 % in 2021) and “fixed assets renewal rate” (from 20.1 % in 2019 to 23.7 % and 22.7 % in 2021–2022).

The formation of the investment component of the financial and economic security of the region’s agricultural business in 2018–2022 was most influenced by the indicators “capital investment efficiency rate” and “cash flow profitability rate” (the average value of the weighting coefficients was 20.7 % and 20.6 %, respectively). Interestingly, due to the spread of the Covid-19 pandemic, the structure of the impact of indicators on the investment component of the financial and economic security of business has undergone a significant transformation. Namely, there was a decrease in the weight of the “reinvested profit rate” indicator by 0.7 p.p. in 2019 and by 3.5 p.p. in 2020. In 2021, the weight of the “reinvested profit rate” indicator in ensuring the financial and economic security of business increased to 20.3 %, and during the war (2022) decreased to 19.3 %. The full-scale war of the Russian Federation against Ukraine has weakened the financial and economic security of the agricultural business

in general, and especially its investment component. Thus, the empirical results of the weight of capital investment (a significant decrease in the weight from 20.2 % in 2018–2019 to 18.0 % in 2022) confirm the industry-wide trend in which agricultural entities in the region had to replace the vector of increasing investment capacity as a driver of development with the direction of ensuring economic sustainability.

Table 2

**Weighting coefficients of indicators of financial and economic security of agricultural business in the region, 2018–2022, %**

Indicators	Years/weighting coefficients, %				
	2018	2019	2020	2021	2022
<i>I. Resources component</i>					
1. Value of assets per employee	20.4	19.9	20.2	15.8	10.7
2. Capital-labor ratio	20.3	19.9	19.2	12.7	22.1
3. Working capital availability rate	20.4	20.1	19.9	24.5	21.9
4. Fixed assets renewal rate	20.4	20.1	20.3	23.7	22.7
5. Innovation and technology development rate	18.4	20.1	20.3	23.3	22.6
<i>II. Investment component</i>					
1. Share of capital investments in assets	20.2	20.2	21.2	19.4	18.0
2. Capital investment efficiency rate	20.9	20.0	20.9	20.4	21.2
3. Reinvested profit rate	20.5	19.8	17.0	20.3	19.3
4. Net present value of investments	18.2	20.0	20.1	19.5	20.2
5. Cash flow profitability rate	20.3	20.0	20.9	20.4	21.2
<i>III. Money and credit component</i>					
1. Cash flow liquidity ratio	19.3	20.4	20.5	20.4	20.4
2. Cash turnover duration	17.4	18.6	18.7	18.6	18.6
3. Short-term debt coverage ratio	21.6	20.4	20.5	20.4	20.4
4. Receivables turnover ratio	20.6	20.4	20.5	20.4	20.3
5. Ratio of equity growth to balance sheet total growth	21.1	20.4	19.8	20.4	20.4
<i>IV. Debt component</i>					
1. Share of debt obligations in sales	13.5	21.1	20.6	22.2	21.1
2. Assets to equity ratio	26.2	21.1	20.3	22.1	21.1
3. Share of debt payments in assets	11.4	21.1	22.4	22.1	21.1
4. Share of short-term bank loans in cost of sales	22.7	15.5	16.4	12.4	15.6
5. Share of overdue debt obligations in assets	26.2	21.1	20.3	21.3	21.1
<i>V. Economy component</i>					
1. Return on equity ratio	19.7	19.8	18.9	20.0	19.7
2. Return on invested capital	20.2	20.1	21.0	20.2	20.1
3. Labor productivity, per employee	19.9	19.9	19.2	19.5	20.0
4. Solvency ratio	20.2	20.1	21.3	20.2	20.1
5. Financial autonomy ratio	20.0	20.1	19.6	20.2	20.1
<i>VI. Insurance component</i>					
1. Share of insurance payable in current liabilities	7,3	11,4	14,7	7,4	10,8
2. Supplier reliability rate	23.4	23.0	21.7	23.4	22.5
3. Customer reliability rate	23.0	21.9	20.9	22.9	22.1
4. Business self-insurance rate	23.2	22.8	22.4	23.4	22.4
5. Risk management quality	23.1	20.9	20.3	22.9	22.3

Source: calculated by authors using formula (3).

The situation with the weighting coefficients of the indicators of the money and credit component of the financial and economic security of agricultural business in Lvivska oblast is controversial, as each of them had high rates, except for cash turnover duration (the average value for the study period was 18.4 %). This situation indicates a high impact of the size of the cash assets of agricultural enterprises in the region on ensuring financial stability, despite the low volumes of products sold, especially in 2020 and 2022. Interestingly, during the period of financial and economic stability (2018–2019), the indicators “short-term debt coverage ratio” (21.6 %) and “ratio of equity growth to balance sheet total growth” (21.1 %) had the greatest weight in ensuring the financial and economic security of agricultural enterprises in the region. In the context of socioeconomic uncertainty and economic regression, the weight of the “cash flow liquidity ratio” indicator increased by 0.8 p.p. (from 19.3 % in 2018 to 20.4 % in 2021–2022). This trend is explained by the decline in economic activity of enterprises due to the weakening (suppression) of consumer demand, interruptions in electricity supply, broken logistics chains, etc., which ultimately led to insignificant lending to agricultural enterprises and their reliance on their own cash resources.

In the debt component of the financial and economic security of the region’s agricultural business, the weight of the “share of debt obligations in sales” indicator increased by 7.6 p.p. in 2018–2022 (from 13.5 % in 2018 to 21.1 % in 2022). A particularly significant increase in the weight of this indicator was observed in 2021–2022 – the period characterized by market instability, a significant increase in agricultural enterprises’ debts to creditors, and a significant shortage of financial and investment funds for both development and ensuring the economic security of business entities. Meanwhile, the weight of the assets to equity ratio decreased by 5.9 p.p. during the period of uncertainty (from 26.2 % in 2018 to 20.3 % in 2020), and the weight of the “share of overdue debt obligations in assets” indicator increased by 11.0 p.p. in 2020 and by 9.7 p.p. in 2022. The dynamic weighting coefficients of the “share of short-term bank loans in cost of sales” indicator are interesting. Thus, in 2018, the weight of this indicator was 22.7 %, which is 6.3 p.p. higher than in 2020, while in 2021, there was a decrease in the weight of the indicator by 10.3 p.p.

The efficiency of production and economic activities of agricultural enterprises in the region is determined by the state in which the most efficient use of existing production capacities of business entities, their modernisation, and the optimal ratio of debt to sales, equity, and profit are ensured. Economic entities of the agricultural sector in Lvivska oblast demonstrated high sensitivity to changes in market conditions, political instability, and uncertainty. Thus, Russia’s full-scale war against Ukraine caused a significant change in the weight of the debt component indicators in 2022 in the financial security of enterprises. Thus, the weight of all indicators, except for the share of short-term bank loans in the cost of sales, was 21.1 %, which indicates an increase in the financial dependence of agricultural entities in Lvivska oblast on external loans and subsidies, as well as a deterioration of the situation regarding the increase of equity capital and financial and economic autonomy.

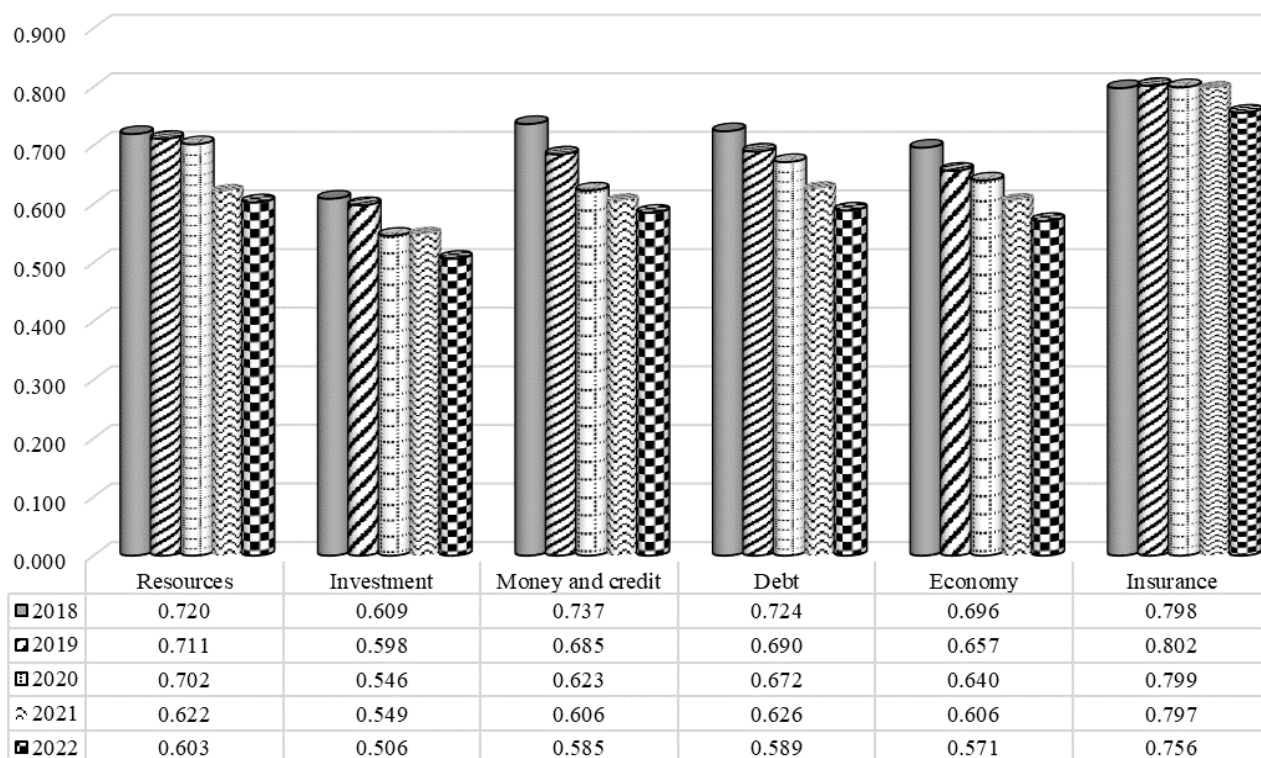
The profitability of agricultural enterprises is a key incentive for their economic

development, expansion of production, and, consequently, for ensuring financial and economic security. Business entities that demonstrate a high level of financial and economic security and resilience form a stable foundation for the economic development of regional economic sectors in general. It is worth mentioning that the structure of the weights of the indicators of the economic component confirms the thesis that the rate of return and profitability are existential indicators of the financial resilience of agricultural entities since market turbulences and macroeconomic instability did not lead to a significant change in their weight. Thus, the weight of all indicators ranged from 19.6 % to 20.2 % over the study period. In 2020 alone, the impact of solvency on the financial security of the industry's economic entities in the region increased by 1.2 p.p. (20.1 % in 2020, 21.3 % in 2021), while the weight of labor productivity and financial autonomy decreased by 0.7 p.p. and 0.5 p.p., respectively. The weight of the "return on invested capital" indicator remained constant in 2018–2022 (about 20.2 %).

The "share of insurance payable in current liabilities" indicator demonstrated the lowest weight in the insurance component of the financial and economic security of the region's agricultural business. In 2018 and 2021, weighting coefficients were 7.3 % and 7.4 %, respectively, and in 2022, the weight of this indicator increased by 3.5 p.p. to 10.8 %. At the same time, the weight of other indicators of the insurance component of financial and economic security decreased by an average of 1.0 p.p., namely, the supplier reliability rate – by 0.9 p.p. and the customer reliability rate – by 0.9 p.p. Instead, in 2020–2022, the weight of the customer reliability indicator increased by 1.2 p.p.

An adequate level of all components of financial and economic security of agricultural business correlates with the financial independence of business entities in the region, which is determined by the amount of their own financial resources and credit and investment funds, on the one hand, and the socio-political stability in the country as a whole, on the other hand. Therefore, the obtained empirical indicators of the components of financial and economic security of agricultural business in Lvivska oblast for 2018–2022 indicate a weakening of the levels of financial resilience in times of economic crises. Thus, in 2018, the level of insurance security of agricultural enterprises in the region was the highest and amounted to 0.798. The levels of the money and credit (0.737), debt (0.724), and resources (0.720) components of financial and economic security were also above moderate. The negative impact of the pandemic in 2020–2021 on the financial and economic security of agricultural business is evidenced by the empirical indicators of the relevant components. In particular, the resources component weakened by 0.18 p.p., the investment component by 0.15 p.p., and the money and credit component by 0.11 p.p. (Figure 1). Among all components of financial and economic security in the study period (except for 2018), the investment component had the lowest level (below moderate), not exceeding 60.0 %. In 2018, the level of investment security of agricultural enterprises in Lvivska oblast was 60.9 %, while resource security was 72.0 % and insurance security was 79.9 %. This trend is explained by insignificant injections of foreign and capital investments into the fixed

assets of agricultural enterprises in the region.



**Figure 1. Empirical indicators of the components of financial and economic security of the region's agricultural business, 2018–2022**

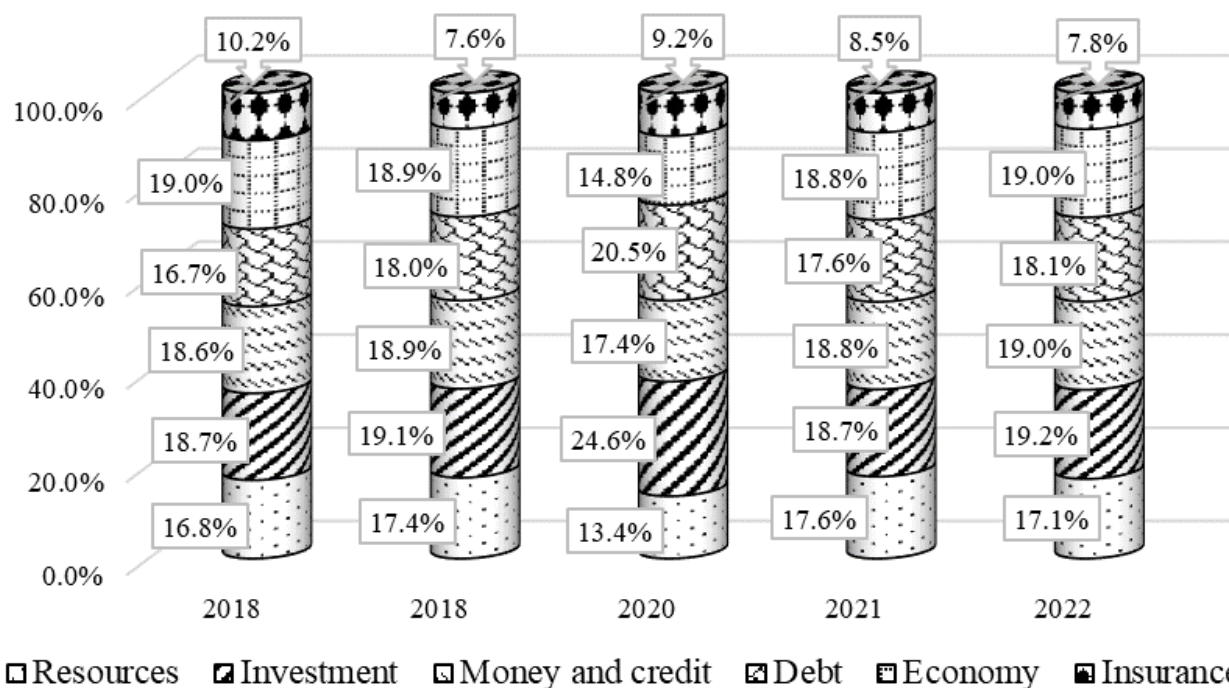
*Source:* calculated by the authors based on the data in Table 2 using the formula (4).

The level of resource security of agricultural entities in Lvivska oblast in 2018–2019 had a steady upward trend. Thus, in 2018, the empirical value of the resources component of financial and economic security was 0.720, while in 2022, it was 0.603, which is explained by a decrease in the value of enterprises' assets, the capital-labor ratio, and the working capital availability rate. It is worth mentioning that during the crisis, in order to ensure an adequate level of financial and economic security, enterprises significantly reduced funds for the renewal of fixed assets and expenditures on innovation and technology development, which ultimately led to a weakening of the resource security of agricultural entities.

The level of money and credit security of business entities in Lvivska oblast in 2018–2022 was above moderate (according to the Harrington scale) compared to other components of financial and economic security (except for 2022). The low level of money and credit security of the agricultural business in 2022 is explained by multiple decreases in the cash flow liquidity ratio and the ratio of equity growth to balance sheet total growth. A similar situation was observed for the debt component, whose empirical value decreased by 0.14 p.p. (72.4 % in 2018 to 58.9 % in 2022).

The investment security of agricultural businesses in the region was characterized by a significant average annual decline of about 2.5 p.p. The money and credit and debt components of the security of agricultural enterprises weakened by 3.52 p.p. and 3.19 p.p., respectively. Interestingly, the insurance component of the financial and economic security of business units had the lowest rate of decline (1.37 p.p.).

In 2018, the economy (weighting coefficient was 19.0 %) and investment (18.7 %) security components had the strongest impact on the financial and economic security of agricultural business in Lvivska oblast (Figure 2). The situation with the weight of the insurance component in the financial and economic security of agricultural enterprises is interesting, as its value decreased by 2.4 p.p. in 2018–2022 (from 10.2 % in 2018 to 7.8 % in 2022). The negative impact of Covid-19 on financial and economic security is confirmed by the obtained weighting coefficients of individual components, in particular, their significant decrease. Thus, in 2018–2020, the weight of the resource component decreased by 3.4 p.p. (13.4 % in 2020), and the finance and economy component decreased by 4.2 p.p. (14.8 % in 2020). Meanwhile, the weight of the investment and debt components of the financial and economic security of agricultural business increased by 5.9 p.p. and 3.8 p.p., respectively. The reasons for this may include the low level of motivation of business entities to invest, the high risks of investment activity, and the lack of effective mechanisms for reinvesting the profits of agricultural enterprises.



**Figure 2. Weighting coefficients of components of financial and economic security of agricultural business in the region, 2018–2022, %**

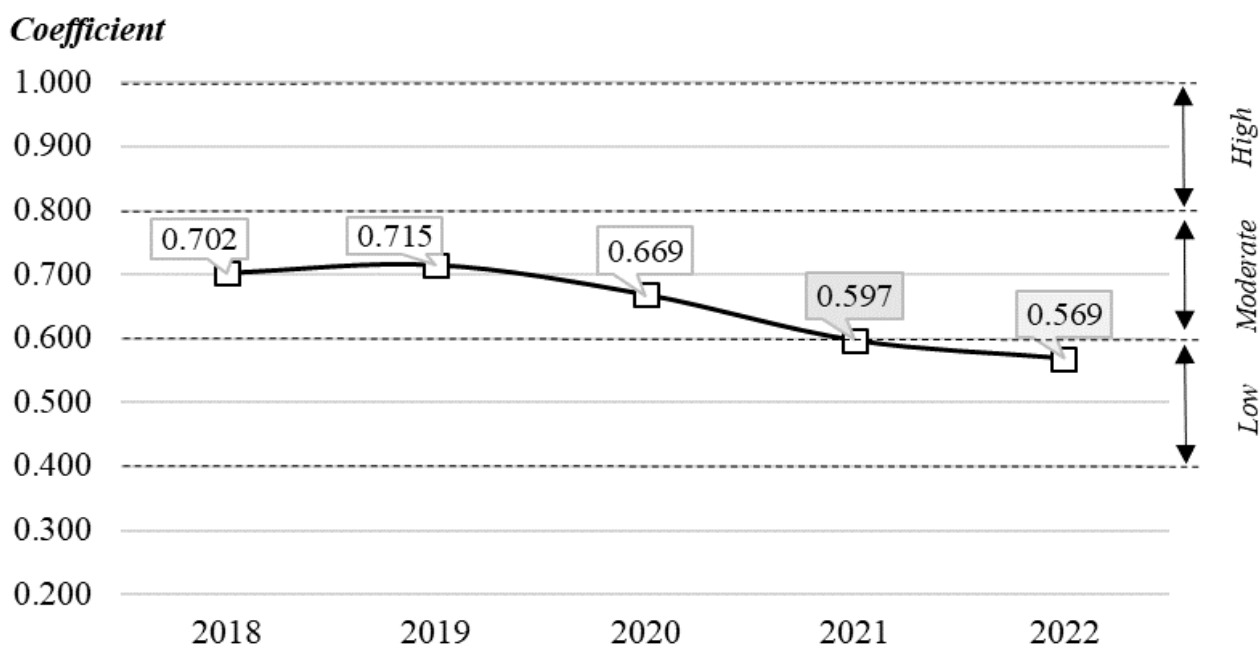
*Source:* calculated by the authors based on the data in Table 3 using the formula (5).

In the context of a full-scale war in 2022, the investment (19.2 %), economy (19.0 %), and money and credit (19.0 %) components had the greatest impact on the financial and economic security of agricultural business in Lvivska oblast. Compared to other components of financial and economic security, the weight of the insurance one was minimal and amounted to 7.8 %.

The level of financial and economic security of the region’s agricultural business directly depends on both internal and external factors of the economic environment, including the increase in investment capacity, the state of the balance sheet of



enterprises, the reliability of suppliers and consumers, the development of the domestic credit market, inflation, financial self-sufficiency, etc. The results of the empirical study of financial and economic security of agricultural business show that financial and economic security in the region is characterized by a high degree of sensitivity to changes in market conditions and the socio-political situation in the country, and also depends on the pace of development of the industry as a whole. Thus, the state of financial and economic security of agricultural business in Lvivska oblast can be assessed as below moderate, except for 2019 (Figure 3).



**Figure 3. Empirical indicators of financial and economic security of agricultural business in the region: composite approach, 2018–2022**

*Source:* built based on the authors' calculations using the data in Figure 1 and the formula (6).

The average value of the level of financial and economic security of agricultural business during the study period was 65.0 %. In 2018–2022, financial and economic security weakened by 13.3 p.p. (56.9 % in 2022); for comparison, in 2021, it decreased by 3.7 p.p. (59.7 % in 2021). The average annual rate of decline in financial and economic business security in the region was 4.1 p.p. The tendency to ensure an adequate level of financial and economic security of the region's agricultural business has been formed in the context of declining demand for the industry's products, rising costs of raw materials and supplies in the face of high energy and material intensity of production, low technological development, loss of economic capacity because of Russia's armed aggression against Ukraine, etc.

The dynamics of the development of enterprises in various economic sectors in the regions of Ukraine is not stable; a particular regression is observed in investment and innovation, resources, and social activities. Systemic problems lead to the weakening of the financial and economic security for agricultural businesses, as well as the reduction of their competitiveness and economic resilience. Ensuring an adequate level of financial and economic security of agricultural business is hampered

by the lack of coherence in certain areas of development, including the production of high-value-added products, investment support, innovation and technology modernisation, and the development of resource capacity. Therefore, the main problems in ensuring the financial and economic security of agricultural business in the region are: (1) a low level of resource security due to the critical condition of fixed assets and lack of current assets, (2) a critical level of investment security due to insignificant amounts of direct investments and low efficiency of capital investments, (3) lack of efficient incentives for innovation, technology transfer, cooperation with research centers, (4) increased financial dependence of agricultural enterprises on market fluctuations and changes in the economic situation in the region.

Thus, the unsatisfactory level of financial and economic security of agricultural business in Lvivska oblast observed in 2018–2022 requires the identification of a strategic course of proactive regional policy to ensure the financial and economic resilience of business entities, in particular, focusing on minimizing external and internal challenges and threats to the economic interests of business entities in the sectors, as well as increasing production capacity and focusing on a high level of financial autonomy.

The results of the study confirm the thesis that the financial security of business entities in all sectors of the national and regional economies, especially strategic economic activities, including the agricultural sector, has significantly weakened. The results of the weakening of financial security obtained based on a comprehensive study of the financial security of Ukrainian agriculture (investment, credit, debt, monetary, production and economic, systemic and structural components) (Kunyt'ska-Iliash, 2023) show that the financial security of Ukrainian agriculture in 2010–2021 was below the moderate level (the average level was 48.8 %, the average annual rate of weakening was 0.86 p.p.). A similar situation is observed with the budgetary security of the business environment (Voznyak et al., 2021), in particular, the growing financial and budgetary imbalances lead to a deterioration in the sustainability of local budgets, weakening the financial and economic security of business entities in all sectors of the economy. Interestingly, only a proactive policy of preventing financial risks and building financial resilience will strengthen the financial security of business entities and thus ensure the economic security of economic sectors and the economic system as a whole (Goel et al, 2021; Kozachenko, 2020; Lepers & Serrano, 2020).

The study confirms the hypothesis that the agricultural business of the region is characterized by a tendency to weaken its financial and economic security, the level of which continues to decline in the context of external military aggression, which ultimately leads to destabilisation and deterioration of macroeconomic indicators of one of the priority economic activities for the region's economy. In the current situation, it is worth implementing a set of measures aimed at eliminating key external and internal factors, as well as mitigating a few negative trends that are developing (Table 3).

The peculiarity of the study is the analysis of financial and economic security at the meso-level, i.e. the region and its economic sectors. In contrast to the assessment

of financial and economic security at the level of agricultural enterprises, this approach allows us to identify the state of the entire sector of the regional economy, which is of much greater practical importance in terms of the development and implementation of regional economic policy. In particular, in contrast to other results, which mostly state the unsatisfactory level of financial stability and liquidity of agricultural enterprises, this study identifies a much wider range of financial and economic security problems generally peculiar to most entities in this type of economic activity, which have negative consequences not only for business entities but also for the regional economic system as a whole.

*Table 3*

**Measures of regional policy applied to stabilize financial and economic security of agricultural business**

Security weakening factors	Factor/trend characteristics	Measures of adjustment
External	Reduced demand for products, growing cost intensity of production, reduced manufacturability, reduced production capacity, and complicated logistics and sales	<ul style="list-style-type: none"> <li>✓ improvement of the organizational and management system for planning the production, consumption, processing, and export of agricultural products;</li> <li>✓ maintenance of local and functional integration of agricultural and processing entities;</li> <li>✓ improvement of the system for coordinating the functioning and development of production infrastructure elements;</li> <li>✓ organizational framework for the development of logistics, sales, and export infrastructure;</li> <li>✓ establishment of vertical and horizontal coordination and cooperation of agricultural and processing entities</li> </ul>
Internal	Reduced assets, deteriorated capital-labor ratio, decreased working capital, reduced revenues, deteriorated financial and economic performance	<ul style="list-style-type: none"> <li>✓ technological modernisation of production and processing and strengthening the competitiveness of agricultural products;</li> <li>✓ improvement of financial, resource, and investment support of agricultural enterprises;</li> <li>✓ improvement of the material, technical, and technological support of agricultural enterprises;</li> <li>✓ increasing efficiency in the system: production, transportation, storage, processing, sales;</li> <li>✓ improvement of the level of quality and added value and increasing the degree of processing of agricultural products</li> </ul>
Security weakening trends	Deterioration in the resources, investment, money and credit, debt, economy, and insurance components of security	<ul style="list-style-type: none"> <li>✓ development of regional financial and credit infrastructure;</li> <li>✓ financial support for enterprises with closed-loop manufacturing and deep processing of agricultural products;</li> <li>✓ development of public-private financial and credit support for small agricultural businesses;</li> <li>✓ creation of production, logistics, and export-oriented clusters;</li> <li>✓ promotion of investment attractiveness of agricultural enterprises in the region</li> </ul>

*Source:* developed by the authors.

**Conclusion.** For a comprehensive analysis of the financial and economic security of agricultural business in the region (on the example of Lvivska oblast), the methodological approach is developed and tested. Its conceptual task is to calculate the financial and economic security's empirical indicator and the levels of its components (resources, investment, money and credit, debt, economy, and insurance). The author's methodological approach is tested based on the financial statements of agricultural enterprises (on the example of the agricultural sector) and scoring, the data series of which were formed based on the results of the expert survey by the Delphi method. The stages of building empirical indicators based on the expert survey include (1) building a matrix of indicators within the relevant component using the method of averages and (2) forming the standardized series of indicators within each component using the logarithmic method.

The article shows that the appropriate level of all components of financial and economic security correlates with the financial independence of agricultural entities. In 2018, the index of the insurance (0.798), money and credit (0.737), debt (0.724), and resources (0.720) components of the security of agricultural enterprises in Lvivska oblast was above the moderate level. In 2018–2022, the components of the financial and economic security of agricultural business significantly weakened, the resources component by 16.2 p.p., the investment component by 16.9 p.p., the money and credit component by 20.6 p.p., the debt component by 19.0 p.p., the economy component by 18.0 p.p., and the insurance component by 5.3 p.p. The article proves that the weakening of all components of the financial and economic security of the region's agricultural business is determined by economic instability and socio-political turmoil, as well as a significant decrease in the value of agricultural assets, profitability, and working capital and deterioration of capital-labor ratio.

The average level of financial and economic security of agricultural business for the period under study was 65.0 %, and the average annual rate of decline was 4.1 p.p. The level of financial and economic security of the agricultural business in the region is characterized by a high degree of sensitivity to changes in market conditions and the socio-economic situation (reduced demand for the industry's products, rising costs of raw materials and supplies in the context of high energy and material intensity of production, low level of technological development, and loss of economic capacity as a result of Russia's armed aggression against Ukraine).

The proposed methodological approach to the assessment of the financial and economic security of agricultural business in the region has certain methodological limitations, in particular, regarding (1) the development of a valid, comparative, and universal information and analytical base for the study; (2) the use of the expert method for the construction of dynamic series of indicators, which, unlike the statistical method, is characterized by a significant static error). The dynamic series of indicators built on the basis of the results of the expert survey are determined by the correctness of the methodology of the Delphi method, including the number and professionalism of the experts, the stability of the composition during the study period, etc.).

Scenario-dynamic modeling, including lag forecasting, of the level of financial

and economic security of agricultural business in the face of economic and other shocks may constitute a further area of research. The prospect of this type of research will improve methodological approaches to the analysis of the economic capacity of agricultural business, including with a view to enable the identification of the causal relationship between capacity and security.

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