INTEGRATED ASSESSMENT, ANALYSIS AND MANAGEMENT OF FINANCIAL SECURITY AND STABILITY OF JOINT-STOCK COMPANIES OPERATING IN THE AGRICULTURAL SECTOR: A CASE STUDY OF UKRAINE

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Abstract

The study substantiates that the issue of assessing the state of financial security of joint-stock companies in the agricultural sector became relevant with the growth of their number in the dynamics, as well as with the further development of the agricultural market in Ukraine. The article proves the need to identify and calculate the general indicator of the integrated state of financial security of JSC, which will allow us to identify trends in its change in general, compare the levels of different JSCs operating in the agriculture and identify relevant factors of their financial security. The study proves the feasibility of integrated assessment of the financial security of the JSC are confirmed by the fact that the basis of such a scientific and methodological approach creates conditions for reflecting the effectiveness of formation and use of financial resources in the financial and economic activities of agricultural JSCs in the most generalized form. identify the rank of efficiency of financial activity of the JSC, operating in the agricultural sector. In our opinion, this helps the JSC, operating in the agricultural sector to choose the most effective source of financing its financial and economic activities and helps to maximize the market value of the JSC itself by ensuring a sufficient level of its financial security.

*Key words***:** *agricultural sector, integrated assessment, stability, investor uncertainty, joint-stock companies.*

INTRODUCTION

Each business entity has a state of financial security, as it carries out its financial and economic activities in such circumstances, which are characterized by a high level of dynamism, a variety of factors, strengthening the relationship between all types of financial processes in the economy. The issue of assessing the state of financial security of joint-stock companies in the agricultural sector became relevant with the growth of their number in the dynamics, as well as with the further development of the agricultural market in Ukraine. As such entities are a significant part of the country's economic system as a whole, the need to address the problems of ensuring the proper state of their financial security is a priority in the context of increasing the investment attractiveness of joint-stock companies (JSC) in the agricultural sector.

The identified issues are not new in financial science; to this day we can observe attempts to conduct independent research on the choice of a method of assessing the state of financial security of business structures. In practice, various theoretical and methodological approaches are used to assess the state of financial security of the JSC in the agricultural sector. However, some of these techniques can be combined into a separate approach, which is called integrated and is based on the calculation of relevant criteria, which will be included in the integrated indicator based on expert assessments. Therefore, there is a need to identify and calculate the general indicator of the

integrated state of financial security of JSC, which will allow us to identify trends in its change in general, compare the levels of different JSCs and identify relevant factors of their financial security. Using this indicator creates the conditions for corrective action in the long run to achieve optimal financial performance of the JSC.

Many researchers of scientists and practitioners are devoted to researches questions of the maintenance of financial safety of the enterprises of the agricultural sector. Various approaches to its provision were considered, which were based not only on the financial aspects of the agricultural sector but also took into account the objective specifics of management in the agricultural sector. Among the important works in this aspect are the studies of such specialists as O. Agres [1], O. Apostolyuk [2], M. Dziamulych [3-5], H. Haken [6], D. Lewis [8], I. Parvutoiu [9], Y. Peter [10], A. Popescu [11-19], G. Schinasi [21], T. Shmatkovska [22-24], R. Sodoma [25], I. Tofan [27], I. Tsymbaliuk [28], V. Yakubiv [29], Ya. Yanyshyn [30], I. Zhurakovska [32].

The relevance and feasibility of integrated assessment of the financial security of the JSC are confirmed by the fact that the basis of such a scientific and methodological approach creates conditions for reflecting the effectiveness of formation and use of financial resources in the financial and economic activities of agricultural JSCs in the most generalized form. identify the rank of efficiency of financial activity of the JSC. In our opinion, this helps the JSC to choose the most effective source of financing its financial and economic activities and helps to maximize the market value of the JSC itself by ensuring a sufficient level of its financial security. Given the above, we consider it necessary to systematize the proposals developed by scientists on methods of integrated assessment of financial security of agricultural entities and identify those features that can be used in the process of integrated assessment of financial security of JSC, operating in the agricultural sector.

MATERIALS AND METHODS

An integrated method of evaluation, as shown by the analysis of the scientific literature, arises from the use of indicators proposed in the indicator, resource-functional, or another approach with adjusting their set according to the type of economic activity, scale, or organizational and legal form of business entity. At the same time, the application of the integrated method to the assessment of financial security of the JSC is due to the fact that the above approaches have certain shortcomings, which reduces the level of objectivity of the assessment. This method is more accurate and suitable for use for multiplicative, multiple, and combined models [7]. In our opinion, the definition of an integrated indicator of financial security of the JSC of the agricultural sector has the following features:

1) combination of the action of all the most important indicators of efficiency of financial activity of joint-stock company of agrarian sphere;

2) solving the problem of assessing the state of financial security of the JSC by determining a single performance indicator that simplifies the interpretation of partial and summary indicators;

3) possibility of identification of exogenous and endogenous threats and dominants of financial security of JSC.

Integrated evaluation expands and introduces new capabilities to classical analysis, as well as based on the use of previously proposed methods of evaluation and a set of indicators, as well as allows you to compare indicators with different dimensions and characteristics. Integral indicators can be composed based on various prerequisites for their construction and depend on the following factors: the direction of evaluation and the available information base [20]. In particular, T. O. Telna in the process of studying scientific and methodological approaches to assessing the financial security of agricultural enterprises concluded that the assessment on the basis of indicators does not give a reliable result, because such an approach is not systemic. The level of financial security of enterprises should be assessed using an

integrated indicator, which is obtained by using multidimensional statistical methods [26].

In our opinion, to assess the state of financial security of the JSC it is necessary to use the integrated method given its advantages. However, the indicators proposed for inclusion in the methodology of calculation of the summary indicator should have such selection criteria as informativeness, comparability of results, availability of primary information, strategic direction, universality, complexity, and systematization. We consider it expedient to conduct an integrated assessment of the state of financial security on the basis of a combination of such scientific and methodological approaches as an indicator and expert assessment, which will, on the one hand, improve the quality of information and take into account the most important indicators of their financial and economic activity. reduce the level of subjectivity inherent in each of these approaches autonomously. At the same time, the symbiosis of these assessment methods to determine the integrated indicator of financial security of the JSC, in our opinion, will identify threats and dominants of financial security and assess their impact on the integrated indicator and conduct a strategic analysis of financial security of the JSC.

Given that the studied JSCs operate in the field of agro-industrial production, we justify our own approach to the integrated assessment of financial security of such JSCs. For this purpose, we will use the tools of indicator and rank methods in symbiosis. In general, the algorithm for determining the integrated indicator contains 4 stages: 1) selection of coefficients that best reflect the features of financial and economic activities of JSC agricultural sector and their calculation; 2) determination of the safety margin for each indicator; 3) assigning weight to each partial indicator in the model of calculation of the integrated indicator; 4) calculation of the integrated value of the indicator of financial security agrarian JSC (Fig. 1).
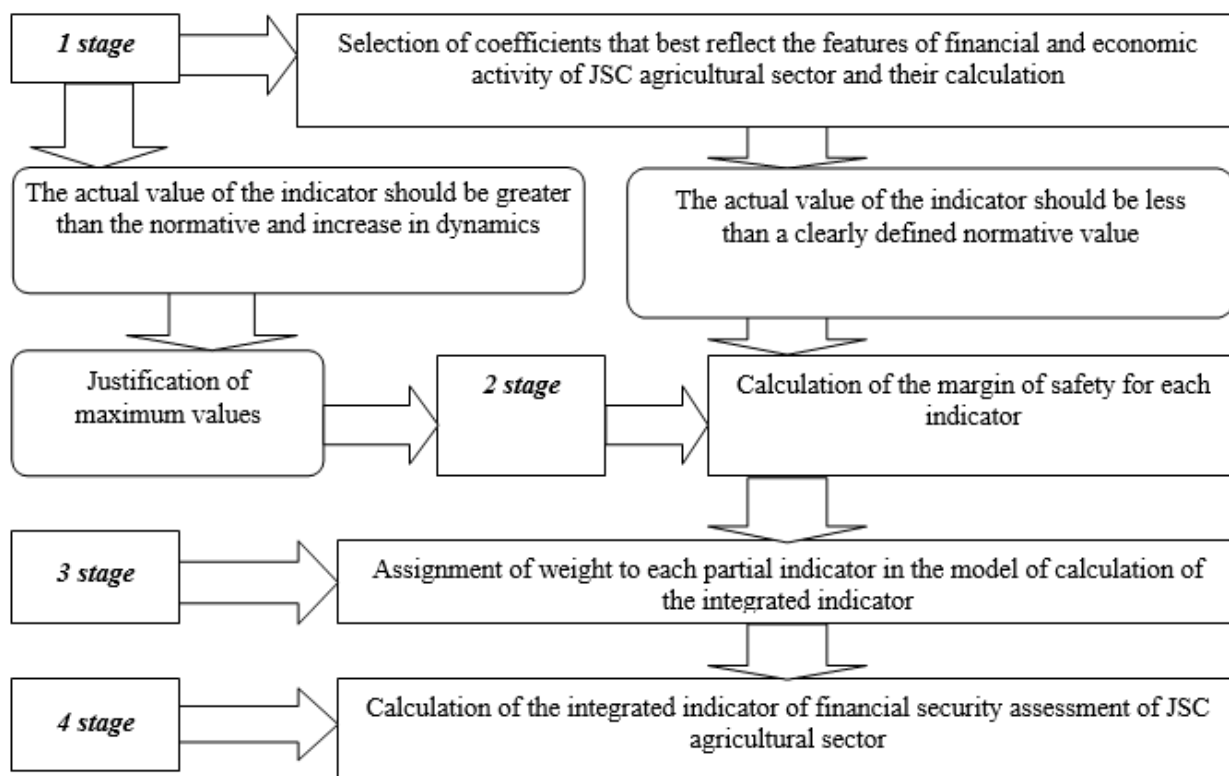

Fig. 1. Algorithm for calculating the integrated indicator of the state of financial security of JSCs operating in the agricultural sector.
Source: own development.

We propose to determine the integrated indicator of the state of financial security of the JSC on the basis of indicators of property status, profitability, financial stability, liquidity, business and market activity, defined. Given that most of them reflect the same characteristics of financial and economic activities of the JSC, we consider it necessary to reduce their list, limited to those indicators that characterize the level of financial security to the greatest extent, as they reflect the features of organizational and legal form, the specifics of life. the cycle of agricultural products, the formation and use of fixed and working capital. At the same time, despite the great importance of market activity indicators, on the basis of which it is possible to characterize the efficiency of the JSC, we take into account only the indicator of reinvestment and return on equity (calculated on the basis of the book value of shares).

Thus, the initial indicators on the basis of which we will form an integral include the coefficient of depreciation of fixed assets; return on assets; profitability of sales; return on equity; coverage ratio; coefficient of autonomy (solvency); funding ratio; asset turnover ratio; inventory turnover ratio; the turnover ratio of fixed assets (return on assets); receivables turnover ratio; accounts payable turnover ratio; reinvestment ratio; return on equity (shares).

Incidentally, for the purpose of further analysis, each of these indicators will be assigned a designation with the appropriate serial number, which will correspond to its actual value. (k_1, k_2, k_3, k_4, k_5, k_6, k_7, k_8, k_9, k_{10}, k_{11}, k_{12}, k_{13}, k_{14}).

RESULTS AND DISCUSSIONS

Indicators of their property status are extremely important for enterprises in the agricultural sector, as the specifics of the activity require the capitalization of a significant share of their own financial resources in the form of non-current assets, in particular, fixed assets. After all, this indicator characterizes the degree of suitability of fixed assets, the need to update existing and disposal of worn-out, the level of which reflects the other three coefficients of the property. Therefore, in order to conduct a general assessment of the property status of the JSC, it is sufficient to calculate the depreciation rate of fixed assets.

In order to assess the profitability of agricultural JSCs, it is enough to analyze their financial and economic profitability. From the indicators of profitability, we believe that the most important indicators are the return on assets (to assess the efficiency of financial resources) and capital (to assess the effectiveness of the most important source of their formation) because capital adequacy reduces the need for borrowed funds, and lack - on the contrary, necessitates in credit resources and this is perhaps the most important in ensuring the effective operation of agricultural enterprises. The return on operating activities will be reflected in the return on assets and equity, as they are calculated on the basis of indicators that directly proportionally affect the amount of net income, assets, and equity, on the basis of which the return on assets and equity is calculated.

However, in order to form more reliable conclusions, avoid collisions when calculating the return on equity, when the amount of losses exceeds the size of the latter (mathematically giving a positive result of financial profitability), as well as, given the specifics of agricultural JSC, we consider it necessary to take into account integrated indicator of financial security of JSC indicator of the profitability of sales. The fact is that in light of the current realities of the Ukrainian economy, agricultural JSCs, for the most part, do not use the potential to increase resources in the financial market, which is typical for JSCs - they do not place their shares on the stock market, do not carry out any operations in order to increase their profits, do not invest in the joint activities of other enterprises, do not make financial investments, etc. The list of operations that are not conducted by Ukrainian JSCs in the agricultural sector is very wide and this is mainly due to the lack of free financial resources, experience, and the necessary specialists in this field. Thus, due to

the negative impact of exogenous and endogenous factors on agricultural JSCs, all their profits are generated from income from the main activity, which is sometimes insufficient to maintain their own funds, so they use borrowed resources.

In addition, it is quite normal for unprofitable blood vessels to function, despite the fact that the magnitude of their losses is significant or permanently increasing. At the same time, they bear the costs of production and receive income from its sale, assessing the relationship between which you can analyse the profitability of their core business, which is often supported by the state, given the priority of agriculture for the national economy. Therefore, the profitability of sales can be used to assess the profitability of the main activity.

From all relative indicators of financial stability, we consider it appropriate to choose two indicators that best reflect the level of financial stability of the JSC in the agricultural sector, and a decrease in values below the recommended signals the risk of reducing their solvency. This is the ratio of autonomy and funding. The first can assess the effectiveness of the use of own financial resources and determine whether the assets of the JSC are financed by equity and what part of it is invested in assets, and the funding ratio allows you to assess the level of dependence of the JSC on borrowed resources.

We believe that the main feature of the liquidity of agricultural JSCs is the presence of net working capital, which indicates the ability of enterprises to pay their short-term liabilities, and its negative value signals the threat of liquidity loss. Since indicator coefficients are used to calculate the integrated indicator, we will use a coverage ratio to determine the level of security for this group of indicators of financial condition, which allows us to assess the extent to which the company's assets cover its current liabilities.

The successful operation of JSCs and their stable position in the market is manifested in excellent indicators of business activity. In this group of indicators for the JSC agricultural sector, the most important, in our opinion, is the indicator of turnover of assets, inventories, fixed assets, receivables, and payables. While the first of them testifies to the efficiency of use of all financial resources, including operating activities, the second - characterizes the policy of sales, which for agricultural JSCs is a prerequisite for creating competitive advantages in a market that can meet the needs of buyers in any a period of time that is beneficial for them. The turnover ratio of fixed assets indicates the efficiency of their use, which against the background of a significant share in the structure of assets (the range of its fluctuation in the studied enterprises is about 7-76% (Table 1) increases the level of financial and economic profitability in general.

Table 1. The share of fixed assets in the assets of joint-stock companies operating in the agricultural sector of Ukraine (at fair value) in 2016-2019, %

Business entities	2016	2017	2018	2019	2017 /2016	2018 /2017	2019 /2018	2019 /2016
PJSC "Mykolaiv Agricultural Company"	34.3	31.5	28.0	25.7	91.7	89.0	91.5	74.7
PJSC "Blok Agrosvit"	8.9	8.5	7.0	6.5	96.0	82.1	93.3	73.6
PJSC "Bakhmut Agricultural Union"	9.5	12.1	10.4	10.5	127.3	85.7	100.8	110.0
PJSC Agricultural firm "Verbivske"	47.5	30.9	26.7	25.7	65.0	86.5	96.3	54.1
PJSC Agricultural PJSC "Ukraine"	37.6	41.8	38.0	24.0	111.1	90.9	63.1	63.7
PJSC "Vinnytsiaagrotransservis"	61.1	62.3	55.1	58.5	102.1	88.4	106.1	95.7
PJSC "Technological agrarian company united"	48.6	52.6	75.6	72.7	108.3	143.7	96.2	149.6

Source: compiled according to the financial statements of joint-stock companies operating in the agricultural sector of Ukraine.

As for the receivables turnover ratio, it is very important to assess the impact of settlements with customers on the level of financial security of the JSC agricultural sector, as often the delay in payment of shipped products by counterparties in the form of deferred advances or breach of payment discipline reduces working capital required

for financing. other production costs. Given that the share of material costs of agricultural joint-stock companies in the operating structure is on average about 50% and they are carried out throughout the production cycle, this ultimately leads to a slowdown in business activity of JSC, and outstanding overdue receivables can turn into and reduce the profitability of JSC in general.

Given the lack of most indicators of the market activity of the JSC, we consider it necessary when calculating the integrated indicator of financial condition to take into account the reinvestment indicator, which allows assessing the financial growth potential of share capital and, accordingly, the level of owners' profits. The greater its value, the more promising is the development of blood pressure in the future. This indicator is, first of all, interesting for potential investors and contractors who are more willing to deal with a successful company. Given that this indicator is not calculated in the case of JSC losses in the relevant periods, in order to conduct an integrated assessment, we will consider its value equal to zero.

Another indicator of market activity is the return on equity of the agricultural sector. However, we will calculate it on the basis of the book value of shares, due to the lack of information about their market price and the lack of shares in circulation on the secondary securities market. This indicator shows how much profit per unit of the book value of a share and, accordingly, allows you to estimate the scale of return on equity, which is extremely important for corporate entities.

In contrast to existing methods, the calculation of the margin of safety is based on the idea of determining the potential financial stability, which indicates the presence of financial potential or the threat of its lack to ensure a certain level of financial security. To this end, and to avoid significant differences between the performance of different agricultural entities due to the peculiarities of settlements with debtors and creditors, inventory management policy, stage of the product life cycle, etc., we consider it necessary to calculate the relative margin of safety. To implement this, we use the theory of properties of solids, namely the method of calculating the coefficient of the strength of parts and machines, which is calculated as the ratio of the maximum (limit) stress characteristic of a particular material to its actual value when the actual stress value must be less than clear a certain value, which is normative (determination of the margin of safety by the stress) [31].

We extrapolate what is indicated on the features of the calculation of the coefficients of financial condition, the values of which must be less than a clearly established regulatory value. However, among these indicators there are those whose values, on the contrary, should increase in dynamics, crossing the threshold. For them, we calculate the margin of safety by the inverse formula, taking as a basis, again, the algorithm for calculating the margin of safety of solids at the allowable stress - the ratio of the actual (or regulatory, other than 0 limits) their value to the maximum allowable.

In other words, provided that the recommended value of the indicator should be less than a certain number, which is the strength threshold, it is calculated as follows:

$$Z_i = K_0 / K_n \qquad (1)$$

If the normative value of the indicator moves in the direction of increase in a certain or in the absence of a clearly defined limit, the margin of safety is determined by the formula:

$$Z_i = K_n / K_0 \qquad (2)$$

where: K_n – the actual value of the indicator;
K_0 – limit (normative) value of the indicator (known or defined not clearly).

The integrated indicator of financial security of JSC in the agricultural sector is the sum of the values of the margin of safety for each indicator, entered into the set of those on the basis of which it is calculated in a particular period. The value of the margin of safety for each partial indicator (introduced into the model of the integrated indicator) is adjusted to its assigned weight in the specified sample of coefficients:

$$Z = \sum_{i=1}^{n} Z_i \times q_i \qquad (3)$$

where: Z – integrated indicator of financial security of JSC in a certain period;

Z_i – the margin of safety on the i-th indicator;
n – the number of indicators that are part of the integrated indicator (14);
q_i – the weight of each indicator in the value of the integral value of the margin of safety (from 2 to 5).
It should be noted that the assignment of weight to each coefficient is designed to equalize the indicators of the margin of safety,

which will (sometimes significantly) differ in the studied joint-stock companies of the agricultural sector under the influence of the previously mentioned factors. In general, the composition of the input indicators and the algorithm for calculating the margin of safety on such indicators are shown in table 2.

Table 2. System of indicators for integrated assessment of financial security of JSC agricultural sector and algorithm for calculating their safety margin

Nr	Indicator	Normative value of the indicator, K	The actual value of the indicator, K_n	Safety margin		Wages, q_i
				Strength threshold, K_0	Calculation formula, Z_i	
1.	Wear coefficient	<0.5, reduction	k_1	0.5	$0.5/k_1$	3
2.	Return on assets ratio	>0, amplification	k_2	0.5	$k_2/0.5$	5
3.	Profitability of sales	>0, amplification	k_3	0.7	$k_3/0.7$	4
4.	Return on equity	>0, amplification	k_4	0.7	$k_4/0.7$	5
5.	Coverage ratio	>1, amplification	k_5	1	$k_5/1$	4
6.	Coefficient of autonomy (solvency)	>0.5, amplification	k_6	0.5	$k_6/0.5$	4
7.	Funding ratio	<1, reduction	k_7	1	$1/k_7$	5
8.	Asset turnover ratio	>0, amplification	k_8	2	$k_8/2$	3
9.	Inventory turnover ratio	>0, amplification	k_9	5	$k_9/5$	2
10.	Fixed assets turnover ratio	>1, amplification	k_{10}	1	$k_{10}/1$	3
11.	Receivables turnover ratio	>0, amplification	k_{11}	43	$k_{11}/43$	2
12.	Accounts payable turnover ratio	>0, amplification	k_{12}	14	$k_{12}/14$	2
13.	Reinvestment ratio	>0, amplification	k_{13}	3	$k_{13}/3$	4
14.	Return on equity ratio	>0, amplification	k_{14}	16	$k_{14}/16$	4

Source: systematized independently.

Let us explain in more detail the mechanism of calculating the value of the margin of safety, which is actually a reserve for increasing or decreasing the corresponding indicator by determining the limit value of the deviation of the actual value of the indicator from the normative (recommended). In this case, for each of these indicators, the margin of safety will be calculated differently. Thus, the threshold value of the depreciation factor, the excess of which is a threat to reduce the level of financial security, is taken to increase its threshold - 0.5, so for it, the margin of safety will be calculated by the formula (1), i.e. $z_1=0.5/k_1$
Indicators of return on assets, sales, and equity should be greater than zero and grow in dynamics. Therefore, the margin of safety for them will be determined by the formula (2). Given that the upper limit of the increase in

these indicators has not been determined, these limit values have been set expertly, taking into account the potential for their development. For a return on assets, this limit will be 50%, assuming that corporate companies are likely to make a profit of half the value of all assets. Based on the same principle of determining the upper limit, for the return on sales and equity - it will be 0.7. Therefore, the margin of safety for these indicators will be determined by formula (2), i.e. $z_2=k_2/0.5$, $z_3=k_3/0.7$, $z_4=k_4/0.7$.
The limit value of the coverage ratio is a unit, the excess of which indicates the efficiency of the formation and use of financial resources of the JSC, which timely repays its financial obligations. If this value is less than 1, then the company is illiquid. The margin of safety by this coefficient is determined by formula (2), i.e. $z_5=k_5/1$.

The same formula is used to calculate the margin of safety for the coefficient of autonomy, which will be $k_6/0.5$ because its value must be> 0.5 (at the threshold of strength – 0.5), and for the funding factor - according to formula (1), substituting the data in which we have $z_7=1/k_7$ (at $k_0=1$).

In the same way, we will calculate the margin of safety according to the turnover ratios of assets and stocks, which we introduced in the calculation of the integrated indicator, and the values of which must be greater than zero and increase in dynamics. However, for the purposes of conducting the necessary calculations, we will set the maximum (threshold) values for them at levels 2 and 5, again by the expert method, taking into account their growth potential. That is, the margin of safety on the turnover of assets – $z_8=k_8/2$, on the turnover of inventories – $z_9=k_9/5$. The same formula (2) calculates the margin of safety for the return on assets – $z_{10}= k_{10}/1$, given that its value must be > 1 (for $k_0=1$).

Once again, the hypothetical limit values of the mentioned coefficients are substantiated by the results of the synectics method in view of their external maximum values obtained in the process of analysis of the corresponding coefficients of BP of the agricultural sector taking into account the potential increase of indicators. Thus, the threshold value of the turnover of receivables can be considered 43, the limit value of the indicator of turnover of accounts payable – 14. The margin of safety for the turnover ratios of receivables and payables is calculated by the formula (2), according to which we have: for the first indicator $z_{11}=k_{11}/43$, for the second – $z_{12}=k_{12}/14$.

Regarding the coefficients of market activity, which we take into account when calculating the integrated indicator of financial security of agricultural JSCs, the margin of their strength is also calculated by the formula (2). In the absence of normative values of these indicators, we consider it necessary to set it at level 3 for the reinvestment ratio (taking into account the value of this ratio at PJSC Agricultural firm "Verbivske" in 2016 – 2.46) and 16 – for return on shares (based on return

on equity), at PJSC "Bakhmut Agricultural Union" in 2018 – 15.44) given the already mentioned mechanism for calculating the threshold values of the strength reserve. The latter is established by selecting the largest exterior value of a certain indicator, calculated for all studied blood pressure, taking into account the potential for their increase. We consider it necessary in this way to emphasize the need for the development of JSC in the agricultural sector, which, accordingly, will help increase their level of financial security. Therefore, for the reinvestment indicator, formula (2) is transformed into $z_{13}=k_{13}/3$, for the return on equity ratio – into $z_{14}=k_{14}/16$. It should be noted that for unprofitable enterprises the reinvestment ratio will be considered equal to 0, since in terms of losses it is not calculated, and therefore their margin of safety is also equal to 0.

To increase the reliability of the conclusions, we consider it appropriate to introduce a weight for each indicator, which will reflect its place in the integrated indicator of financial security and smooth the difference between the values of safety margins given the differences in scale, management, and life cycle of agricultural products. To do this, again, we will use the method of expert assessments, namely the survey of employees of the JSC in the agricultural sector, which are related to financial security.

The proposed structure of the questionnaires provided for the number of indicators of financial condition, the probable number of points that can be assigned to each indicator (from 1 to 5), and justification. According to the results of the questionnaires, the largest number of experts agreed that the ratios of the return on assets, equity, and financing should be assigned the highest score - 5. These indicators, according to experts, are sufficient to assess the level of financial security of the JSC, distinguishing dominants (threats) of profitable (unprofitable) activity, low (high) financial dependence.

Indicators of return on sales, stocks, autonomy, current liquidity, and reinvestment of profits will be assigned a weight of 4 points. The vast majority of experts believe that the analysis of these ratios allows

systematizing such dominants (threats) as profitability (loss) of the main activity, ability (inability) to meet their short-term financial obligations, the presence (absence) of sufficient funds to finance current activities and reinvestment. Complementary to these are indicators of depreciation of fixed assets, asset turnover, receivables, and return on assets, which allow assessing the efficiency of use of JSC assets. However, even in the conditions of unprofitability, they can be positive and fall into the range of recommended values, so in order to avoid distorted results of the calculation of the integral value of financial security, they are given less weight in the integrated indicator - 3. Given that in the JSC of the agricultural sector the indicator of inventory turnover and receivables at unprofitable enterprises may be higher than at profitable ones, the ratios of inventory turnover and receivables are given a weight of 2 points. The faster the product is sold and paid for, the faster the entity settles its liabilities, which, of course, affects the acceleration of accounts payable. Assuming the turnover ratio of accounts payable in addition to the above indicators of business activity, we assign it the same weight - 2 points (Table 2). Therefore, we calculate the margin of safety for each indicator on the basis of already determined actual values of the relevant indicators for assessing the state of financial security of joint-stock companies, which are taken into account when calculating the integrated indicator and grouped in Table 3-9.

Table 3. Indicators of financial security assessment of PJSC «Mykolaiv Agricultural Company» (Ukraine)

Indicators	2016	2017	2018	2019
Depreciation rate of fixed assets	0.27	0.30	0.33	0.38
The return on assets	0.11	0.10	0.18	0.09
Profitability of sales	0.15	0.15	0.25	0.19
Return on equity	0.15	0.16	0.27	0.13
Coverage ratio	3.26	2.82	2.79	3.21
Coefficient of autonomy (solvency)	0.70	0.65	0.69	0.65
Funding ratio	0.43	0.54	0.46	0.55
Asset turnover ratio	0.69	0.72	0.74	0.46
Inventory turnover ratio	0.98	0.87	0.55	0.36
Fixed assets turnover ratio (return on assets)	1.49	1.57	1.71	1.11
Receivables turnover ratio	5.83	5.70	6.13	4.90
Accounts payable turnover ratio	4.25	3.91	3.45	2.53
Reinvestment ratio	1.16	0.98	1.01	1.04
Return on equity ratio	4.70	5.56	12.12	7.00

Source: calculated and systematized according to the annual financial statements of PJSC «Mykolaiv Agricultural Company».

Table 4. Indicators of financial security assessment of PJSC Agricultural firm «Verbivske» (Ukraine)

Indicators	2016	2017	2018	2019
Depreciation rate of fixed assets	0.20	0.32	0.36	0.39
The return on assets	0.07	0.23	0.34	0.24
Profitability of sales	0.06	0.16	0.22	0.16
Return on equity	0.10	0.33	0.43	0.28
Coverage ratio	1.88	2.39	6.71	6.08
Coefficient of autonomy (solvency)	0.70	0.70	0.87	0.84
Funding ratio	0.42	0.43	0.15	0.19
Asset turnover ratio	1.25	1.47	1.56	1.49
Inventory turnover ratio	4.50	4.40	3.88	3.84
Fixed assets turnover ratio (return on assets)	2.11	2.89	3.60	3.53
Receivables turnover ratio	7.27	8.50	10.02	9.75
Accounts payable turnover ratio	4.98	5.73	9.00	13.65
Reinvestment ratio	2.46	0.99	1.02	0.29
Return on equity ratio	0.12	0.52	1.04	0.84

Source: calculated and systematized according to the annual financial statements of PJSC Agricultural firm «Verbivske».

Table 5. Indicators of financial security assessment of PJSC «Bakhmut Agricultural Union» (Ukraine)

Indicators	2016	2017	2018	2019
Depreciation rate of fixed assets	0.67	0.60	0.62	0.63
The return on assets	0.17	0.16	0.37	0.22
Profitability of sales	0.33	0.35	0.61	0.49
Return on equity	0.31	0.27	0.51	0.30
Coverage ratio	2.00	2.62	4.21	2.35
Coefficient of autonomy (solvency)	0.58	0.64	0.78	0.71
Funding ratio	0.72	0.56	0.28	0.40
Asset turnover ratio	0.50	0.48	0.61	0.45
Inventory turnover ratio	0.70	0.73	0.74	0.79
Fixed assets turnover ratio (return on assets)	1.70	1.61	2.13	1.63
Receivables turnover ratio	2.90	3.41	7.47	5.77
Accounts payable turnover ratio	1.13	1.34	2.47	1.91
Reinvestment ratio	1.31	0.66	0.73	-0.38
Return on equity ratio	5.48	6.00	15.44	10.08

Source: calculated and systematized according to the annual financial statements of PJSC «Bakhmut Agricultural Union».

Table 6. Indicators for assessing the state of financial security Agricultural PJSC «Ukraine»

Indicators	2016	2017	2018	2019
Depreciation rate of fixed assets	0.63	0.65	0.67	0.68
The return on assets	-0.03	-0.10	-0.19	0.06
Profitability of sales	-0.03	-0.11	-0.23	0.07
Return on equity	-0.07	-0.24	-0.69	0.23
Coverage ratio	1.08	0.96	0.83	1.37
Coefficient of autonomy (solvency)	0.42	0.38	0.18	0.34
Funding ratio	1.38	1.63	4.67	1.94
Asset turnover ratio	0.88	0.87	0.83	0.96
Inventory turnover ratio	1.87	2.03	1.94	1.88
Fixed assets turnover ratio (return on assets)	0.91	0.80	0.71	1.06
Receivables turnover ratio	3.82	3.80	3.79	3.70
Accounts payable turnover ratio	1.90	2.13	1.88	2.01
Reinvestment ratio	0	0	0	1.00
Return on equity ratio	-0.56	-1.597	-3.05	0.383

Source: calculated and systematized according to the annual financial statements of Agricultural PJSC «Ukraine».

Table 7. Indicators of assessment of the state of financial security of PJSC «Vinnytsiaagrotransservis» (Ukraine)

Indicators	2016	2017	2018	2019
Depreciation rate of fixed assets	0.66	0.68	0.70	0.72
The return on assets	-0.06	-0.10	0.02	-0.11
Profitability of sales	-0.04	-0.07	0.01	-0.07
Return on equity	-0.08	-0.13	0.03	-0.15
Coverage ratio	1.80	1.57	1.63	1.49
Coefficient of autonomy (solvency)	0.79	0.77	0.73	0.72
Funding ratio	0.27	0.31	0.37	0.39
Asset turnover ratio	1.38	1.39	1.86	1.47
Inventory turnover ratio	3.82	4.03	4.58	3.54
Fixed assets turnover ratio (return on assets)	0.79	0.74	0.97	0.75
Receivables turnover ratio	33.39	34.71	42.35	33.18
Accounts payable turnover ratio	7.43	7.25	8.21	5.96
Reinvestment ratio	0	0	1.00	0
Return on equity ratio	-0.144	-0.218	0.044	-0.226

Source: calculated and systematized according to the annual financial statements of PJSC "Vinnytsiaagrotransservis".

Table 8. Indicators of financial security assessment of PJSC «Blok Agrosvit» (Ukraine)

Indicators	2016	2017	2018	2019
Depreciation rate of fixed assets	0.15	0.11	0.18	0.24
The return on assets	-0.04	-0.30	-0.32	-0.19
Profitability of sales	-0.07	-1.29	-1.03	-0.98
Return on equity	-0.14	-2.09	1.44	0.54
Coverage ratio	1.13	0.82	0.65	0.59
Coefficient of autonomy (solvency)	0.24	-0.06	-0.35	-0.50
Funding ratio	3.19	-16.79	-3.85	-2.99
Asset turnover ratio	0.53	0.23	0.31	0.19
Inventory turnover ratio	1.85	0.88	1.25	0.83
Fixed assets turnover ratio (return on assets)	5.21	2.34	3.49	2.27
Receivables turnover ratio	0.96	0.59	0.67	0.32
Accounts payable turnover ratio	4.86	0.94	0.83	0.48
Reinvestment ratio	0	0	0	0
Return on equity ratio	-0.225	-1.967	-2.47	-1.608

Source: calculated and systematized according to the annual financial statements of PJSC «Blok Agrosvit».

Table 9. Indicators of financial security assessment of PJSC «Technological agrarian company united» (Ukraine)

Indicators	2016	2017	2018	2019
Depreciation rate of fixed assets	0.06	0.08	0.05	0.10
The return on assets	-0.17	0.65	-0.25	-0.63
Profitability of sales	-0.23	0.67	-0.42	-2.99
Return on equity	0.54	-6.17	-1.16	3.02
Coverage ratio	0.71	0.43	0.23	0.11
Coefficient of autonomy (solvency)	-0.43	0.22	0.21	-0.42
Funding ratio	-3.33	3.54	3.66	-3.41
Asset turnover ratio	0.75	0.97	0.59	0.21
Inventory turnover ratio	3.31	4.21	4.52	2.62
Fixed assets turnover ratio (return on assets)	1.54	1.79	0.83	0.26
Receivables turnover ratio	4.50	3.12	12.78	4.49
Accounts payable turnover ratio	5.33	3.22	1.48	0.50
Reinvestment ratio	0	1.00	0	0
Return on equity ratio	-29.12	103.32	-50.12	-153.4

Source: calculated and systematized according to the annual financial statements of PJSC «Technological agrarian company united».

Based on the analysis. Using Excel spreadsheets, we display the margin of safety, taking into account the weights and the integral value of the financial security of joint-stock companies in the agricultural sector for each of the analysed enterprises (Table 10-16 and Fig. 2).

Table 10. Dynamics of the value of the safety margin of PJSC «Mykolaiv Agricultural Company» in 2016-2019.

Indicators	2016	2017	2018	2019
Depreciation rate of fixed assets	5.56	5.00	4.55	3.95
Return on assets	1.10	1.00	1.80	0.90
Profitability of sales	0.86	0.86	1.43	1.09
Return on equity	1.07	1.14	1.93	0.93
Coverage ratio	13.04	11.28	11.16	12.84
Coefficient of autonomy (solvency)	5.60	5.20	5.52	5.20
Funding ratio	11.63	9.26	10.87	9.09
Asset turnover ratio	1.04	1.08	1.11	0.69
Inventory turnover ratio	0.39	0.35	0.22	0.14
Fixed assets turnover ratio (return on assets)	4.47	4.71	5.13	3.33
Receivables turnover ratio	0.27	0.27	0.29	0.23
Accounts payable turnover ratio	0.61	0.56	0.49	0.36
Reinvestment ratio	1.55	1.31	1.35	1.39
Return on equity ratio	1.18	1.39	3.03	1.75
Integral value	48.35	43.40	48.87	41.88

Source: own calculations.

Table 11. Dynamics of the value of the safety margin of PJSC Agricultural firm «Verbivske» in 2016-2019.

Indicators	2016	2017	2018	2019
Depreciation rate of fixed assets	7.50	4.69	4.17	3.85
Return on assets	0.70	2.30	3.40	2.40
Profitability of sales	0.34	0.91	1.26	0.91
Return on equity	0.71	2.36	3.07	2.00
Coverage ratio	7.52	9.56	26.84	24.32
Coefficient of autonomy (solvency)	5.60	5.60	6.96	6.72
Funding ratio	11.90	11.63	33.33	26.32
Asset turnover ratio	1.88	2.21	2.34	2.24
Inventory turnover ratio	1.80	1.76	1.55	1.54
Fixed assets turnover ratio (return on assets)	6.33	8.67	10.80	10.59
Receivables turnover ratio	0.34	0.40	0.47	0.45
Accounts payable turnover ratio	0.71	0.82	1.29	1.95
Reinvestment ratio	3.28	1.32	1.36	0.39
Return on equity ratio	0.03	0.13	0.26	0.21
Integral value	48.65	52.35	97.09	83.88

Source: own calculations.

Table 12. Dynamics of the value of the safety margin of PJSC «Bakhmut Agricultural Union» in 2016-2019.

Indicators	2016	2017	2018	2019
Depreciation rate of fixed assets	2.24	2.50	2.42	2.38
Return on assets	1.70	1.60	3.70	2.20
Profitability of sales	1.89	2.00	3.49	2.80
Return on equity	2.21	1.93	3.64	2.14
Coverage ratio	8.00	10.48	16.84	9.40
Coefficient of autonomy (solvency)	4.64	5.12	6.24	5.68
Funding ratio	6.94	8.93	17.86	12.50
Asset turnover ratio	0.75	0.72	0.92	0.68
Inventory turnover ratio	0.28	0.29	0.30	0.32
Fixed assets turnover ratio (return on assets)	5.10	4.83	6.39	4.89
Receivables turnover ratio	0.13	0.16	0.35	0.27
Accounts payable turnover ratio	0.16	0.19	0.35	0.27
Reinvestment ratio	1.75	0.88	0.97	-0.51
Return on equity ratio	1.37	1.50	3.86	2.52
Integral value	37.17	41.13	67.32	45.54

Source: own calculations.

Table 13. Dynamics of the value of the safety margin Agricultural PJSC «Ukraine» in 2016-2019

Indicators	2016	2017	2018	2019
Depreciation rate of fixed assets	2.38	2.31	2.24	2.21
Return on assets	-0.30	-1.00	-1.90	0.60
Profitability of sales	-0.17	-0.63	-1.31	0.40
Return on equity	-0.50	-1.71	-4.93	1.64
Coverage ratio	4.32	3.84	3.32	5.48
Coefficient of autonomy (solvency)	3.36	3.04	1.44	2.72
Funding ratio	3.62	3.07	1.07	2.58
Asset turnover ratio	1.32	1.31	1.25	1.44
Inventory turnover ratio	0.75	0.81	0.78	0.75
Fixed assets turnover ratio (return on assets)	2.73	2.40	2.13	3.18
Receivables turnover ratio	0.18	0.18	0.18	0.17
Accounts payable turnover ratio	0.27	0.30	0.27	0.29
Reinvestment ratio	0.00	0.00	0.00	1.33
Return on equity ratio	-0.14	-0.40	-0.76	0.10
Integral value	17.82	13.51	3.76	22.89

Source: own calculations.

Table 14. Dynamics of the value of the safety margin of PJSC «Vinnytsiaagrotransservis» in 2016-2019

Indicators	2016	2017	2018	2019
Depreciation rate of fixed assets	2.27	2.21	2.14	2.08
Return on assets	-0.60	-1.00	0.20	-1.10
Profitability of sales	-0.23	-0.40	0.06	-0.40
Return on equity	-0.57	-0.93	0.21	-1.07
Coverage ratio	7.20	6.28	6.52	5.96
Coefficient of autonomy (solvency)	6.32	6.16	5.84	5.76
Funding ratio	18.52	16.13	13.51	12.82
Asset turnover ratio	2.07	2.09	2.79	2.21
Inventory turnover ratio	1.53	1.61	1.83	1.42
Fixed assets turnover ratio (return on assets)	2.37	2.22	2.91	2.25
Receivables turnover ratio	1.55	1.61	1.97	1.54
Accounts payable turnover ratio	1.06	1.04	1.17	0.85
Reinvestment ratio	0.00	0.00	1.33	0.00
Return on equity ratio	-0.04	-0.05	0.01	-0.06
Integral value	41.46	36.96	40.51	32.26

Source: own calculations.

Table 15. Dynamics of the value of the safety margin of PJSC «Blok Agrosvit» in 2016-2019

Indicators	2016	2017	2018	2019
Depreciation rate of fixed assets	10.00	13.64	8.33	6.25
Return on assets	-0.40	-3.00	-3.20	-1.90
Profitability of sales	-0.40	-7.37	-5.89	-5.60
Return on equity	-1.00	-14.93	10.29	3.86
Coverage ratio	4.52	3.28	2.60	2.36
Coefficient of autonomy (solvency)	1.92	-0.48	-2.80	-4.00
Funding ratio	1.57	-0.30	-1.30	-1.67
Asset turnover ratio	0.80	0.35	0.47	0.29
Inventory turnover ratio	0.74	0.35	0.50	0.33
Fixed assets turnover ratio (return on assets)	15.63	7.02	10.47	6.81
Receivables turnover ratio	0.04	0.03	0.03	0.01
Accounts payable turnover ratio	0.69	0.13	0.12	0.07
Reinvestment ratio	0.00	0.00	0.00	0.00
Return on equity ratio	-0.06	-0.49	-0.62	-0.40
Integral value	34.06	-1.77	19.00	6.40

Source: own calculations.

Table 16. Dynamics of the value of the safety margin of PJSC «Technological agrarian company united» in 2016-2019

Indicators	2016	2017	2018	2019
Depreciation rate of fixed assets	25.00	18.75	30.00	15.00
Return on assets	-1.70	6.50	-2.50	-6.30
Profitability of sales	-1.31	3.83	-2.40	-17.09
Return on equity	3.86	-44.07	-8.29	21.57
Coverage ratio	2.84	1.72	0.92	0.44
Coefficient of autonomy (solvency)	-3.44	1.76	1.68	-3.36
Funding ratio	-1.50	1.41	1.37	-1.47
Asset turnover ratio	1.13	1.46	0.89	0.32
Inventory turnover ratio	1.32	1.68	1.81	1.05
Fixed assets turnover ratio (return on assets)	4.62	5.37	2.49	0.78
Receivables turnover ratio	0.21	0.15	0.59	0.21
Accounts payable turnover ratio	0.76	0.46	0.21	0.07
Reinvestment ratio	0.00	1.33	0.00	0.00
Return on equity ratio	-7.28	25.83	-12.53	-38.35
Integral value	24.50	26.18	14.24	-27.13

Source: own calculations.

As can be seen from Fig. 2, PJSC Agricultural firm "Verbivske" has the highest level of financial security. The value of its integrated indicator increased during 2016-2018 by an average of 66 points, however, in 2019 it decreased. The same dynamics are characteristic of the integrated indicator PJSC "Bakhmut Agricultural Union", which is in second place in terms of financial security, given the stability of development in 2016-2018 and a slight decline in 2019, despite the fact that in 2016-2018 The values of the integrated indicator were lower than at the PJSC "Mykolaiv Agricultural Company". Regarding the latter, the level of its financial security decreased (in 2017 and 2019), then increased (in 2018). At the same time, in 2018 the level of financial security of all surveyed profitable JSCs in the agricultural sector was the highest, as evidenced by the highest value of the integrated indicator: 97.09 - in PJSC Agricultural firm "Verbivske", 67.32 – in PJSC "Bakhmut Agricultural Union" and 48.87 - in PJSC Mykolaiv Agricultural Company.

The integrated financial security indicators of PJSC "Mykolaiv Agricultural Company" and PJSC "Vinnytsiaagrotransservis" are similar in dynamics and close in value, despite the fact that the former is absolutely profitable throughout the analysed period, and the latter - was profitable only in 2018, and the number of losses in 2019 increased by as much as 57.09% compared to 2016.
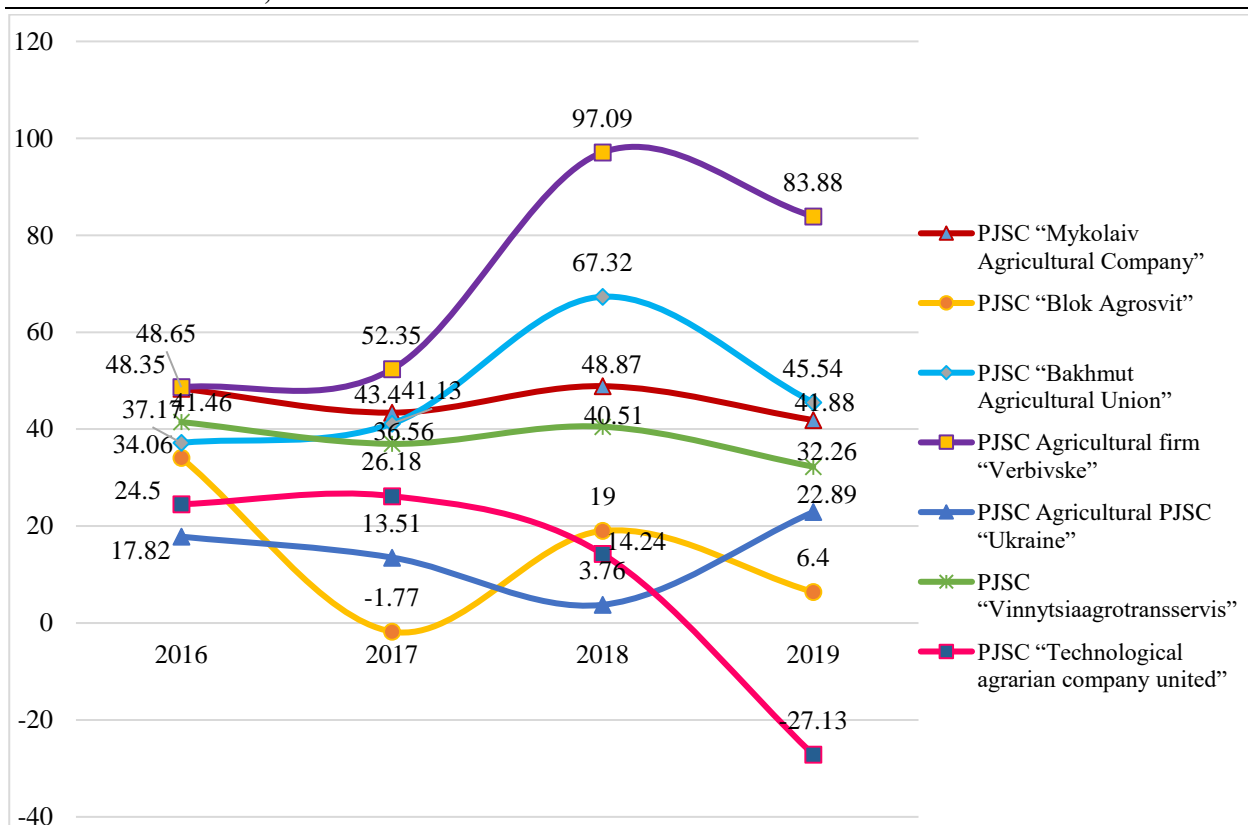
Fig. 2. Dynamics of the integrated indicator of financial security of joint-stock companies of the agricultural sector of Ukraine for 2016-2019
Source: own development.

This is an example of the realities of the JSC agricultural sector, which in terms of losses provide excellent indicators of business activity, liquidity, and financing, due to the specific life cycle of products and independence from external sources of funding.

Given the numerical values of the table. 15, the most attractive for investment is PJSC "Mykolaiv Agricultural Company", the assessment of the effectiveness of financial security management, which from the position of the investor is the highest – 0.6335.

For PJSC Agricultural firm "Verbivske" such an assessment gave less value to the global priority – 0.2884, for PJSC "Bakhmut Agricultural Union" – even less (0.2834). Therefore, in this order, it is necessary to rank the researched joint-stock companies of the agricultural sector of Ukraine on the efficiency of management of financial safety.

It should be noted that the declining dynamics of the integrated indicator in 2019 is typical for all enterprises, except for Agricultural PJSC "Ukraine", for which, on the contrary,

the trend line of the integrated indicator was upward, indicating an increase in its financial security as opposed to a steady decline. 2016–2018. This confirms the previously made conclusions about the effectiveness of actions to replenish its own financial resources with funds from the issue of additional shares, which allowed to improve its financial security.

As for PJSC "Blok Agrosvit", its integrated indicator indicates a very low level of financial security: especially in 2017, when the value of this indicator reached -1.77, which, in fact, means bankruptcy. In 2018, it increased slightly (to 19.0), but in 2019 - decreased again (to 6.4).

As expected, the worst level of financial security is PJSC "Technological agrarian company united", the value of the integrated indicator of which in 2019 decreased to -27.13, which indicates a significant deterioration in the financial condition of the company and the threat of its liquidation. This situation is obviously due to the objective need to restore the solvency of the JSC (as a

result of which the company implements the procedure of pre-trial reorganization), and the change of owner in March-April 2019, which significantly destabilized the JSC.

CONCLUSIONS

Thus, the integrated indicator can be used to assess the degree of financial security of joint-stock companies and analyse its changes in dynamics. The two profitable JSCs are characterized by a high level of their financial security, which increases in the short term (2016–2018) and slightly decreases in 2019 (PJSC Agricultural firm "Verbivske" and PJSC "Bakhmut Agricultural Union"). The level of financial security of PJSC "Mykolaiv Agricultural Company" and PJSC "Vinnytsiaagrotransservis" can be described as moderate - slightly lower than the two newly mentioned joint-stock companies with fluctuations in the direction of increase or decrease. The degree of financial security of Agricultural PJSC "Ukraine" is stably low with a slight increase in 2019. As for PJSC "Blok Agrosvit" and PJSC "Technological agrarian company united", the level of their financial security is low and catastrophically low in some periods, as indicated by the low and, in some places, a negative value of the integrated indicator.

Therefore, it can be argued that the application of an integrated indicator of financial security of joint-stock companies in the agricultural sector allows for an adequate assessment of the state of financial security and strength of these enterprises. Based on this, investors receive a well-founded information base on decisions on the feasibility of investing in shares of relevant companies, as the margin of financial strength allows with high probability to extrapolate these data to positive expectations about the return on investment. Based on the fact that for agricultural joint-stock companies the factor of forecasting the payback is one of the most important in the process of attracting investment, it can be argued that the use of an integrated indicator of financial security can solve this problem of investor uncertainty.

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