

УДК 338

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DOI: 10.32702/2306-6792.2022.11—12.50

MULTIFACTOR ANALYSIS OF IDENTIFICATION OF FEATURES OF THE MECHANISM OF FINANCIAL SECURITY MANAGEMENT OF ENTERPRISES

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БАГАТОФАКТОРНИЙ АНАЛІЗ ІДЕНТИФІКАЦІЇ ОЗНАК МЕХАНІЗМУ УПРАВЛІННЯ ФІНАНСОВОЮ БЕЗПЕКОЮ ПІДПРИЄМСТВ

The urgency of the research topic is due to the fact that in modern economic conditions the issue of financial security of agricultural enterprises of Ukraine is becoming increasingly important. Thus, there is a need to identify features that have a significant impact on the financial security of enterprises and assess the impact of each component.

In order to effectively develop the enterprise, increase the capacity and achieve the best results from financial and economic activities, economic entities need to pay considerable attention to the level of their financial security. And also to investigate the main factors that have a significant impact on it. Therefore, the issue of financial security of the enterprise is sufficient research and is the basis of its stable and effective development.

The aim of the article is to develop ways to improve the financial security of the enterprise based on the analysis of the multi-factor DuPont model.

In the process of research scientific methods were used: statistical — to assess the dynamics of the level of financial security; analysis and synthesis — to find out the reasons that cause a change in the level of financial security; tabular and graphical — to depict the results of the study; abstract-logical — in the implementation of theoretical and methodological generalizations.

Using the multi-factor model of Dupont, the article analyzes the impact of the main factors that have the greatest impact on the efficiency of use of assets and equity and certainly affect the financial security of agricultural enterprises. Factor analysis based on the classic DuPont model allows you to determine ways to maximize the profitability of capital invested in the company by owners and shareholders. Studies show that the reduction of withdrawn funds has a direct impact on reducing the return on equity. Thus, the company reduces its financial risks by reducing the amount of borrowed funds, it does not have a positive impact on return on equity. According to the results of the study, proposals for the formation of a system of financial security of agricultural enterprises are formulated.

Актуальність теми дослідження обумовлена тим, що в сучасних умовах господарювання питання забезпечення фінансової безпеки аграрних підприємств України стає все більш актуальним. Так, існує необхідність ідентифікації ознак, що мають суттєвий вплив на фінансову безпеку підприємств та оцінка впливу кожної окремої складової.

Для ефективного розвитку підприємства, збільшення потенціалу та досягнення кращих результатів від фінансово-господарської діяльності суб'єктам господарювання необхідно приділяти значну увагу рівню їх фінансової безпеки. А також досліджувати основні фактори, які мають суттєвий вплив на неї. Тому дослідження питання фінансової безпеки підприємства є досить важливим і є основою його стабільного та ефективного розвитку.

Метою статті є розробка напрямів підвищення фінансової безпеки підприємства на основі аналізу багатофакторної моделі Дюпон.

У процесі дослідження використано наукові методи: статистичний — для оцінювання динаміки рівня фінансової безпеки; аналізу і синтезу — для з'ясування причин, які спричиняють зміну рівня фінансової безпеки; табличний і графічний — для зображення одержаних результатів дослідження; абстрактно-логічний — при здійсненні теоретичних та методичних узагальнень.

В статті за допомогою багатофакторної моделі Дюпона проаналізовано вплив основних факторів які мають найбільший вплив на ефективність використання активів та власного капіталу і безумовно впливають на фінансову безпеку сільськогосподарських підприємств. безумовно впливають на фінансову безпеку сільськогосподарських підприємств. Проведені дослідження свідчать, що зменшення залучених засобів що має безпосередній вплив на зменшення рівня рентабельності власного капіталу. Тобто, підприємства хоч і зменшують свої фінансові ризики шляхом зниження обсягу залучених коштів, проте це немає позитивного впливу на рентабельність власного капіталу. За результатами дослідження сформульовані пропозиції щодо формування системи фінансової безпеки сільськогосподарських підприємств.

Key words: financial security, profitability, assets, equity, DuPont model.

Ключові слова: фінансова безпека, рентабельність, активи, власний капітал, модель Дюпона.

FORMULATION OF THE PROBLEM

Financial security plays an important role in the management system of an agricultural enterprise, as evidenced by the existence of a large number of management methods that have the characteristics of a targeted approach. Reliable financial security of the enterprise is possible only with a comprehensive and systematic approach, which allows to ensure the strategic development of the enterprise, to develop tactical and operational actions to minimize the negative impact of threats.

It is important to develop approaches to assessing the level and optimal structure of financial security of agricultural enterprises. The difficulty of resolving these issues is outlined by a number of reasons, the most important of which is the significant uncertainty of the states and basic parameters of systems that are difficult to model and difficult to study. Resource (investment), cyclical, systemic, infrastructural (cluster) and process approaches are leading in determining the main indicators of financial security of an economic entity.

To ensure sustainable and effective economic development, increase capacity, as well as achieve the desired results of financial and economic activities, the enterprise needs to take care of the proper level of its security, especially financial. This is due to the relevance of the study of the financial security of the enterprise, which is the key to its stable and successful development.

ANALYSIS OF RECENT RESEARCH AND PUBLICATIONS

Theoretical principles of formation and financial security of enterprises are studied in the world and domestic scientific literature. Among

foreign scientists are A. Burle, O. Williamson, M. Jensen, R. Coase, W. Meckling, K. Murphy, G. Minza, G. Shinazi. Such national scientists as O. Arefieva, O. Baranovsky, D. Bayura, I. Blank, M. Butko, O. Vasylyk made a significant contribution to the study of this topic. n, M. Murashko, O. Plastun, N. Sablina and others. Highly appreciating the significant scientific achievements of scientists, it should be noted that it is necessary to assess the factors that affect the financial results and financial security of enterprises.

FORMULATION OF THE ARTICLE'S GOALS

The purpose of the article is to consider the main theoretical approaches to the definition of the essence of the concept of "financial security of an enterprise", as well as to identify the following areas: improving financial security based on analysis multi-factor system DuPont models.

PRESENTATION OF THE MATERIAL OF THE STUDY, SUPPORTING THE SCIENTIFIC RESULTS OBTAINED

It is important to emphasize that it is the safety of an enterprise that is such a characteristic of its activities, which directly depends on the results of the business entity's activities. Accordingly, it is advisable to distinguish financial security as the security of the effectiveness of its activities. In general, the concept of "economic security" according to its financial characteristics, namely "financial security" is an actual category and is especially relevant in conditions of economic instability and deterioration of the country's investment climate. The relevance of the study raises a certain range of topical issues on providing and supporting financial security at both the micro

and macro levels. Recent research has confirmed that approaches to understanding the concept of financial security vary significantly.

Thus, I. A. Blank considers the financial security of the enterprise in terms of quantitative and qualitative determined level of financial condition of the enterprise, which provides stable protection of its priority, balanced financial interests from identified real and potential threats of external and internal nature, the parameters of which are determined financial philosophy and create the necessary prerequisites for financial support for its sustainable growth in the current and future periods [1, p. 125].

K. S. Goryacheva studies the financial security of the enterprise as a financial condition, which is characterized, firstly, by the balance and quality of the set of financial instruments, technologies and services used by the enterprise, secondly, resistance to internal and external threats, thirdly, the ability of the financial system of the enterprise to ensure the implementation of its own financial interests, mission and tasks with sufficient financial resources, fourthly, to ensure effective and sustainable development of this financial system [2, p. 66].

K. S. Goryacheva emphasizes that the financial security of an enterprise is "... the financial condition that is characterized by the balance and quality of the totality of financial instruments, technologies and services used by the enterprise, resistance to internal and external threats, the ability of the financial system of the enterprise to ensure the implementation of its financial interests, mission and tasks with sufficient financial resources, to ensure effective sustainable development of this financial system" [3, p. 169].

Some authors highlight the financial component among the components of economic security: the weakening of financial security, as he correctly states, is indicated by a decrease in liquidity, an increase in accounts payable and receivables [4,5].

Among the main economic and mathematical methods of research of complex systems are: the method of expert estimation, methods of regression and variance analysis, methods of exponential smoothing, methods of fuzzy systems theory (in particular, methods of cluster and discriminant analysis), methods of multifactor statistical analysis. The process of ensuring the economic security of the enterprise can be considered as a process of implementation of its functional components in order to prevent possible losses and achieve the maximum level of economic security now and in the future.

In the process of assessing the state and level of financial security of the enterprise analyze: 1) financial statements and results of the enterprise (solvency, liquidity, business activity, financial independence, creditworthiness, structure and use of capital and profits); 2) the competitive state of the enterprise in the market (market share owned by the business entity, the introduction of innovations, the impact of scientific and technological progress, the level of enterprise management).

Comparing the levels of profitability is an important tool in assessing the results of the enterprise and its prospects, as well as indicate the level of its financial security. It should be noted that in countries with developed economies, the Chamber of Commerce, industry associations or the government usually publishes annual information on the "acceptable" regulatory values of profitability. Comparing the organization's own indicators with their allowable values allows us to draw conclusions about the state of financial and economic situation. This practice is not available in Ukraine yet, so the only basis for comparison is information on the value of indicators in previous years.

The most well-known methods of using factor analysis are the pyramidal structure of financial ratios, which allows a single scheme or table to briefly but clearly demonstrate several aspects of the enterprise and helps to understand the relationship between liquidity, financial structure and profitability. One way to systematically transfer information using relative metrics is to use the DuPont model.

In the DuPont factor model, for the first time several indicators are linked together and presented in the form of a triangular structure, topped by the return on total capital ratio (ROA) as the main indicator of the efficiency of funds invested in the firm, and based on two factor indicators: profitability of sales (NPM) and resource efficiency (TAT) [6].

This model was based on a rigidly determined dependence:

$$ROA = NPM * TAT \quad (1).$$

Theoretically, DuPont's specialists were not innovators; they used the original idea of interrelated indicators, first expressed by Alfred Marshall and published by him in 1892 in the book "Elements of the Sectoral Economy" [7]. However, their merit is obvious, as previously these ideas have not been applied in practice.

Factor analysis of the formation of gross profit of enterprises is based on a study of three effects on this indicator of three factors: sales, structure and range of products sold and the level of costs per UAH sold products.

Table 1. Analysis of the formation of gross profit of agricultural enterprises of Ukraine for 2017–2020, mln UAH

Indicators	Year				Deviation for the year		
	2017	2018	2019	2020	2018	2019	2020
Net income from sales of products (goods, works, services)	500,0	588,6	671,6	681,3	88,6	83,1	9,7
Cost of products sold (goods, works, services)	431,1	517,6	578,4	599,7	86,4	60,8	21,3
Gross profit	68,9	71,0	93,3	81,6	2,1	22,3	-11,6

Source: Created by the author.

Table 2. Factor analysis of the formation of gross profit of Ukrainian enterprises for 2018–2020, mln UAH

Indicators	2018	2019	2020
Sales volume	13,8	8,3	3,4
Impact of changes in the structure and range of products sold	-1,6	1,7	-2,1
Impact of changes in the level of costs on 1 UAH of products sold	-10,1	12,2	-13,0
Total change in gross profit	2,1	22,3	-11,6

Source: Created by the author.

The impact of changes in sales is calculated by the formula:

$$\Delta B\Pi_{op} = B\Pi_0 \cdot \left(\frac{C_1}{C_0} - 1 \right) \quad (2),$$

Where $\Delta B\Pi_{op}$ — changes in sales volume;

EAP_0 — gross profit in the base period;

$With_1$ — cost of sales in the reporting period;

$With_0$ — the cost of products sold in the base period.

The impact of changes in the structure and range of products sold is calculated using the formula:

$$\Delta B\Pi_{cmp} = B\Pi_0 \cdot \left(\frac{C\Pi_1}{C\Pi_0} - \frac{C_1}{C_0} \right) \quad (3),$$

anywhere $\Delta B\Pi_{cmp}$ — impact of changes in the structure and product range;

BH_1 — net income in the reporting period;

BH_0 — net income in the base period.

Impact of changing the cost level for 1 UAH products sold are calculated using the formula:

$$\Delta B\Pi_{пв} = C\Pi_1 \cdot \left(\frac{C_0}{C\Pi_0} - \frac{C_1}{C\Pi_1} \right) \quad (4).$$

Studies show that during 2017–2020 revenue from sales increased by more than 36% and in 2020 amounted to 681.3 million UAH, in terms of production costs, the growth rate is higher, more than 39% during the study period. It is natural that the gross profit during the study period fluctuated significantly and in 2020 amounted to 81.6 million UAH (Table 1).

Analysis of the data in the table allows us to conclude that in 2018 the gross profit of enterprises increased by UAH 2.1 million. The main factor that

caused this situation was the growth of sales, which increased profit by UAH 13.8 million, but the change in the structure and range of its implementation had a negative impact on the final result, and the increase in costs per UAH 1 of sales led to a decrease in gross profit by UAH 10.1 million. In 2020, another trend will follow, a decrease in gross profit by UAH 11 million due to the increase in expenditures by UAH 1 of sold products — by UAH 13.0 million thousand, and the amount due to the increase in sales volume by UAH 3.4 million. Factual analysis shows that the value of the gross profit of the enterprise to the greatest extent depends on the level of expenditure per UAH sold products.

Analysis of return on equity using the DuPont model allows you to make effective management decisions related to the development of the enterprise. However, it should be borne in mind that the acceleration of the turnover of current assets has a positive impact on profits only to a certain extent, which is dictated by the requirements of maintaining liquidity. Insufficient level of current assets and their excessively high turnover there is a real risk of loss of liquidity of the organization, lack of funds to continue operating activities, loss of revenue and profit. With low turnover of current assets, the organization has a large amount of funds and, therefore, minimal risk of liquidity loss. At the same time, the return on assets decreases as the organization loses potential profits. With very high turnover of current assets, their level may be insufficient to maintain liquidity, which also increases the risk and leads to loss of profits. Therefore, it is necessary to find a compromise that would be a sufficient level of profit with an acceptable level of liquidity risk.

Mathematical representation of the modified DuPont model has the form:

$$ROE = \frac{C\Pi}{C\Pi} \cdot \frac{C\Pi}{A} \cdot \frac{A}{BK} \quad (5).$$

This model shows that the return on equity depends on three factors: return on sales, asset turnover and the structure of advanced capital.

The importance of the selected factors is explained by the fact that they in a sense summarize all aspects of financial and economic activities of the enterprise, its statics and dynamics, including accounting: the first factor summarizes the form № 2 "Statement of financial performance", the second — balance sheet asset balance [8,9].

Applying a systematic approach, we can identify the following main stages of analysis using the DuPont model:

- general assessment of the effectiveness of financial resources management of the enterprise;
- assessment of the effectiveness of the management of the main (current) activities;
- assessment of the effectiveness of asset management of the enterprise (investment activities);
- assessment of the effectiveness of financial management;
- development of proposals for further work that would improve the financial condition of the enterprise.

According to table 3 it is seen that the initial indicators have heterogeneous dynamics. Thus, the net profit of the company and its assets tend to decrease during the analyzed period, but net sales income and equity, on the contrary, increased quite significantly. It should be noted that the return on sales decreased by 9%, which is due to the decrease in net profit, the return on equity, it also has a dynamic to decrease by 11% during 2018—2022. Regarding the positive dynamics, it is worth noting a significant decrease in the coefficient of financial dependence by 2.32, which is evidence of a decrease in borrowed funds. The positive changes include an increase in the turnover ratio of assets, although its value remains below the norm.

Using the three-factor model and the method of absolute differences for factor analysis of return on equity of agricultural enterprises in 2020, the results of calculations were summarized in table 4.

As can be seen from the above data, the decrease in return on equity by 0.112 units is due to the influence of all studied factors. The decrease in return on sales led to a decrease in return on equity by 0.098 units. Acceleration of asset turnover by 0.27 turnover caused an increase in return on equity by 0.153 units, and a decrease in the ratio of financial dependence — to a decrease in return on equity by 0.167 units. Based on the results of the study of this factor

Table 3. Source data for factor analysis of return on equity

№	Indicator	Conditional value	2018	2020	Deviation
1	Net profit, UAH million	NP	90613	81619	-8995
2	Net income from sales of products, UAH million	NI	402597	602684	200087
3	Asset value, UAH million	AV	1537319	1130305	-407014
4	Cost of equity, UAH million	E	369371	612251	242880
5	Profitability of sales, (NP / NI)	a	0,23	0,14	-0,09
6	Asset turnover ratio, (NI / AV)	b	0,26	0,53	0,27
7	Financial dependency ratio (AV / E)	c	4,16	1,85	-2,32
8	Return on equity (NP / E)	y	0,25	0,13	-0,11

Source: Created by the author.

Table 4. Calculation of the influence of factors on return on equity

	Factors	Calculation	Influence of factors
1	ΔY_a	$\Delta a \cdot b_0 \cdot c_0$	-0,098
2	ΔY_b	$a_1 \cdot \Delta b \cdot c_0$	0,153
3	ΔY_c	$a_1 \cdot b_1 \cdot \Delta c$	-0,167
4	Total impact		-0,112

Source: Created by the author.

model, all factors can be reserves for increasing the return on equity.

In addition, we found that the reduction of borrowed funds (reduction of the coefficient of financial dependence) also to some extent leads to a decrease in the level of return on equity. That is, although companies reduce their financial risks by reducing the amount of borrowed funds, but this does not have a positive impact on return on equity. In addition, the high rate of financial dependence can lead to difficulties in obtaining new loans.

CONCLUSION

The complexity of the concept and the breadth of the essential features of financial security has led to the development of different approaches to the interpretation of its essence. It is considered as a component of economic security of the enterprise, as an independent object of management, as a determined level of financial condition, as a risk management activity, as a level of balance of financial indicators and so on.

Summarizing the essence of financial security of the enterprise, it can be argued that it is determined by the financial condition in which the enterprise is able to withstand existing and potential threats through effective financial management to ensure the development of economic activity. There are a significant number of indicators that characterize the level of financial security of the enterprise.

However, it should be noted that the comparison of levels of profitability is an important tool in assessing the results of the enterprise and its prospects, as well as indicate the level of its financial security.

With the help of the DuPont multifactor model, it is possible to quickly and accurately identify the main factors that have the greatest impact on the efficiency of asset and equity use and certainly affect the financial security of agricultural enterprises. Studies show that the reduction of borrowed funds has a direct impact on reducing the level of return on equity. That is, although companies reduce their financial risks by reducing the amount of borrowed funds, but this does not have a positive impact on return on equity.

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Стаття надійшла до редакції 31.05.2022 р.

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