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FINANCIAL AND ECONOMIC SECURITY AND DEVELOPMENT OF PRIORITY SECTORS OF THE NATIONAL ECONOMY UKRAINE: CASUAL NEXUS EMPIRICAL

ABSTRACT

The paper aims to investigate the causal nexus of the parameters of financial and economic security and the development of priority sectors of the national economy (on the example of agriculture, industry, construction, and transport in Ukraine) in the years 2010-2021. The results of the causal analysis showed the greatest degree of variability in the development of Ukrainian industry from the production, economic, credit and debt components of its financial security; agriculture, forestry, and fisheries – the security of money circulation and the credit component of financial security; construction, transport, warehousing, postal and courier – all components of financial security, except investment. The practical significance of the research results lies in the development of tools for modelling the impact of policy measures of strengthening financial and economic security on the development of priority sectors of the national economy, which allows for predicting the consequences of the implementation of the state security policy in the field of structural and institutional changes.

Keywords: economic growth, sectoral policy, priority sectors, nexus, security, development, elasticity, Ukraine

JEL Classification: B41, E60, O11

INTRODUCTION

Financial security of the priority sectors of the national economy is one of the conditions for the sustainable development of Ukraine, ensuring the resilience of the economic system and building up the reserve of the country's economic strength and self-sufficiency of the territories at the sectoral level. Financial security of the national economy is a condition for ensuring the investment attractiveness, increasing the innovative capacity of priority sectors, reindustrialization, the processes of intellectualization and implementation of advanced technologies in production processes, transition to the manufacture of high-tech products, and implementation of a policy of resource-saving, softization, and qualitative improvement of production processes. Economic recovery and the development of priority sectors of the national economy correlate and are determined by a high level of financial resilience. Each country, given its geography, natural resources, and the specifics of its internal and external environment, has its own specialization, focusing on which ensures its appropriate place in the international division of labour.

The current stage of development of the Ukrainian economic system is determined by imbalances in the sectoral structure of social production, loss of competitive positions of domestic enterprises in the markets, reduction of the share of knowledge-intensive industrial products, significant divergence of innovation and technological development from high-tech countries, and low efficiency of structural transformations of the national economy. Economic growth and a high level of attractiveness of the country depend on the financial security and development of priority sectors of the national economy. However, several damaging factors have significantly affected the economic situation in Ukraine. First, socio-political upheavals have created instability that has had a negative

impact on economic development. Secondly, the military conflict in the east of the country, which has been going on for several years, has led to the destruction of infrastructure and significant losses in production. The annexation of the Autonomous Republic of Crimea in 2014 also dealt a significant blow to the national economy, because of which the country lost important economic resources and strategic facilities. In addition, the global COVID-19 pandemic, which lasted from 2021 to 2022, significantly complicated the economic situation, causing a slowdown in economic growth and a drop in production indicators. Russia's full-scale war against Ukraine has further exacerbated economic problems. As a result of this conflict, the country suffered significant losses in industrial infrastructure, which led to a production crisis and a slowdown in the growth of the real sector of the economy, in particular, the country's GDP decreased to 30% [1], and according to World Bank estimates, to 45% [2]. This led to the outflow of investment, a decrease in competitiveness and stagnation of the real sector of the economy.

Ukraine's economy has found itself in an environment of global instability and war when the realization of the economic development capacity of its priority sectors has become significantly more difficult. During the post-war recovery period, the country will face an urgent need to set a new vision of investment and resource support and special programs for sectoral prioritization and specialization. Development is the quintessence of a systemic policy aimed first at building capacity and ensuring financial and economic security and, consequently, strengthening competitiveness and realization of economic interests. Therefore, the task of identifying and modelling the systemic links between financial and economic security and the development of priority sectors of the national economy of Ukraine is becoming increasingly urgent.

Monitoring of financial and economic security of priority sectors of the national economy, including longitudinal diagnostics and forecasting, as well as analysis of its relationship with the parameters of economic development, constitute the information and analytical basis for the development of the state policy of strengthening financial and economic security in the system of the structural and sectoral policy of the state. The creation of an information and analytical basis for the development of state policy in the current environment is particularly relevant in view of the spread of economic uncertainty and the resulting high level of financial risks and new challenges to the financial interests of business entities, especially in the context of the full-scale war and global instability.

The author's approach differs from those mostly used in publications on the problems of economic security of the state, region, industry, and enterprises in that it provides for the further development of tools for modelling the impact of the processes of strengthening financial and economic security on the development of priority sectors of the national economy by building regression models of elasticity of the dynamics of volumes of sold products, the cost of fixed assets, the average accounting the number of full-time employees, exports and imports of products, productivity, income from the sale of products, the rate of profitable units, ROI, investments, as well as forecasting the consequences of the implementation of the state security policy in the field of structural and institutional changes.

The results of the econometric study proved the existence of a cause-and-effect and systemic relationship between the state and characteristics of financial and economic security and the parameters of the development of priority sectors of the national economy. The results of the covariance test showed the greatest degree of variability in the development of Ukrainian industry from the production and economic, credit and debt components of its financial and economic security; agriculture, forestry and fisheries – security of money circulation and credit components of financial and economic security; construction – all components of financial and economic security, except for investment security; transport, warehousing, postal and courier activities – investment, debt, monetary components of financial and economic security.

As a result, the potential economic effect for the development of the industry (increase in the parameters of economic development by 1%) is modeled, provided that it is strengthened by financial and economic security (structural approach): an increase in the volume of industrial products sold is a consequence of strengthening the production and economic security of the industry (by 0.87 %); an increase in the level of profitability of industrial enterprises is stimulated by strengthening the security of money circulation, production, economic and debt (by 0.34%, 1.96% and 1.51%, respectively) security components; growth of profitability of agricultural enterprises can be achieved by increasing the level of investment (by 0.65 %) and system-structural (by 0.95 %) components of financial and economic security; the increase in exports of agricultural products is facilitated by the strengthening of the investment component of financial and economic security (by 0.84 %); reverse dependence of imports of agricultural products is most clearly traced for the production and economic component of financial and economic security; strengthening investment and debt security (by 0.31%, 0.93%, respectively) will contribute to an increase in the pace of construction products; the credit-dependent nature of development is distinct for research sector; a high level of ROI of transport sector is guaranteed with the strengthening of production and economic (by 1.23%) and debt security (by 0.54%).

Empirical assessments of the sensitivity of development to changes in the financial and economic security of the priority sectors of the national economy of Ukraine have shown that strengthening the financial and economic security allows to

increase the volume of products sold in all the studied industries; to renew fixed assets in industry, transport, warehousing, postal and courier activities; increase employment in industry, agriculture, forestry and fisheries; strengthen export potential in agriculture, forestry and fisheries, transport, warehousing, postal and courier activities; increase the ROI of industrial and agricultural enterprises.

LITERATURE REVIEW

To develop economic and mathematical models that allow modelling and predicting the consequences of the measures taken to strengthen the financial and economic security of sectors of the economy and the impact of these processes on sectoral development, it is necessary to understand the whole range of factors that influence and largely determine certain changes. As proved in publications on state regulation of the economy development is the result of a policy of first building capacity and ensuring financial and economic security and then improving competitiveness and growth. Therefore, an effective policy of strengthening the financial and economic security of the priority sectors of the national economy largely creates the necessary preconditions for their further development and strengthening of economic self-sufficiency. Aspects of the impact of financial and economic security, financial condition, and security on economic development are extensively studied in the economic literature. In particular, the studies characterize the factors of creating attractive conditions and environment for the development of the financial innovation market [3; 4], technological change and its financial support [5], the establishment of the integration ties between the financial and real sectors of the economy [6-8], diversification of funding sources for innovative programs and projects [9-11], and investments in innovation and technology activities [12; 13].

However, there are also reverse relationships, as financial risks are perhaps the most threatening. Therefore, the objective thesis is that in the financial management system, including at the sectoral level, sufficient attention should be paid to the identification, generalization, typology, monitoring, evaluation, and effective risk management in the field of levelling the impact of financial threats on the economic development of strategic enterprises and sectors of the economy [14; 15], analysis of the impact of factors on the financial and economic security of a sector [7; 16; 17], development of a methodological framework for the policy of managing the financial and economic security of sectoral economic systems in the face of financial risks and threats [18-20], and consideration of the positive experience of financial risk management at the sectoral level, including the use of the latest advanced technologies in the financial and economic sphere [21].

That is why (given the significant impact of finance on the economy and the need to take into account and counteract financial and economic risks and threats in the system of managing the development of priority sectors) the issues of creation and use of methods for analyzing the state of financial and economic security of enterprises, sectors, and the economy as a whole [22; 23], as well as the modelling of these processes (especially the impact of financial and economic security on development) and the forecasting of their consequences [3; 24] are becoming particularly relevant.

The study of scientific publications on the development of the methodology of financial and economic security analysis [25; 26] shows that the following algorithm is the initial provision for the generalization, clarification, development, and eventual construction of the methodology for analyzing the financial and economic security of a sector: drawing a set (list) of indicators (by expert method). At the same time, the modelling considers not only classical but also modern financial trends and factors that are actively implemented and influence the development of priority sectors of the economy [27-29]. This includes the digitalization of the financial market and the technological products offered on it (payment systems, mobile banks, digital services, cryptography, crowdfunding). Without this, it is impossible to make efficient management decisions in the field of macroeconomic development, including sectoral development. Therefore, when modelling the development of priority sectors of the economy, it is necessary, first, to understand what changes will occur in the key parameters of their financial and economic security and, second, to adjust the relevant development trajectories to take into account the trends of technological change and digitalization [30], dynamics of accumulation and use of financial and investment capacity [31; 32], the quality of monetary policy, the state of public debt, exchange rate parameters, the pace of foreign (direct and portfolio) investment inflows, and other macroeconomic changes [33; 34].

AIMS AND OBJECTIVES

The paper aims to investigate the causal nexus of the parameters of financial and economic security and the development of priority sectors of the national economy (on the example of agriculture, industry, construction, and transport in Ukraine) in the years 2010-2021.

The subject of the study is the modelling of systemic links between financial and economic security and the development of priority sectors of the national economy. This study is based on the results (the continuation) of the authors' previous research on the development of a methodology for analyzing and assessing the financial and economic security of priority sectors of the national economy.

- The objectives of the study include:
- the development of a methodological approach to a comprehensive study of the systemic interrelationships of financial and economic security and economic development of priority sectors of the national economy;
- the development of an information and analytical base for analyzing the economic development of priority sectors;
- the identification of the causal relationship and modelling of the impact of financial and economic security on the economic development of priority sectors of the Ukrainian economy;
- the identification of triggers of economic development in priority sectors of the Ukrainian economy.

METHODS

To carry out the research of the causal nexus of financial, and economic security and development of priority sectors in Ukraine the following hypothesizes are developed and tested:

H1: *the development and security of priority sectors of the national economy and economic activities have a strong causal relationship;*

H2: *strengthening the parameters of financial and economic security of the priority sectors of the national economy leads to the formation of favourable preconditions for economic growth and structurally balanced sectoral development.*

The dispute in the methodology of studying the impact of financial and economic security on the economic development of economic sectors is characterized by the fragmentation of scientific approaches in the sources of domestic and international literature. Therefore, this study proposes the authors' methodological approach, which consists of six stages of a comprehensive analysis of systemic relationships between financial and economic security and economic development of priority sectors of the Ukrainian economy (Figure 1) and ultimately allows to identify threats and destimulators of development, as well as triggers of economic growth of sectoral economic complexes.

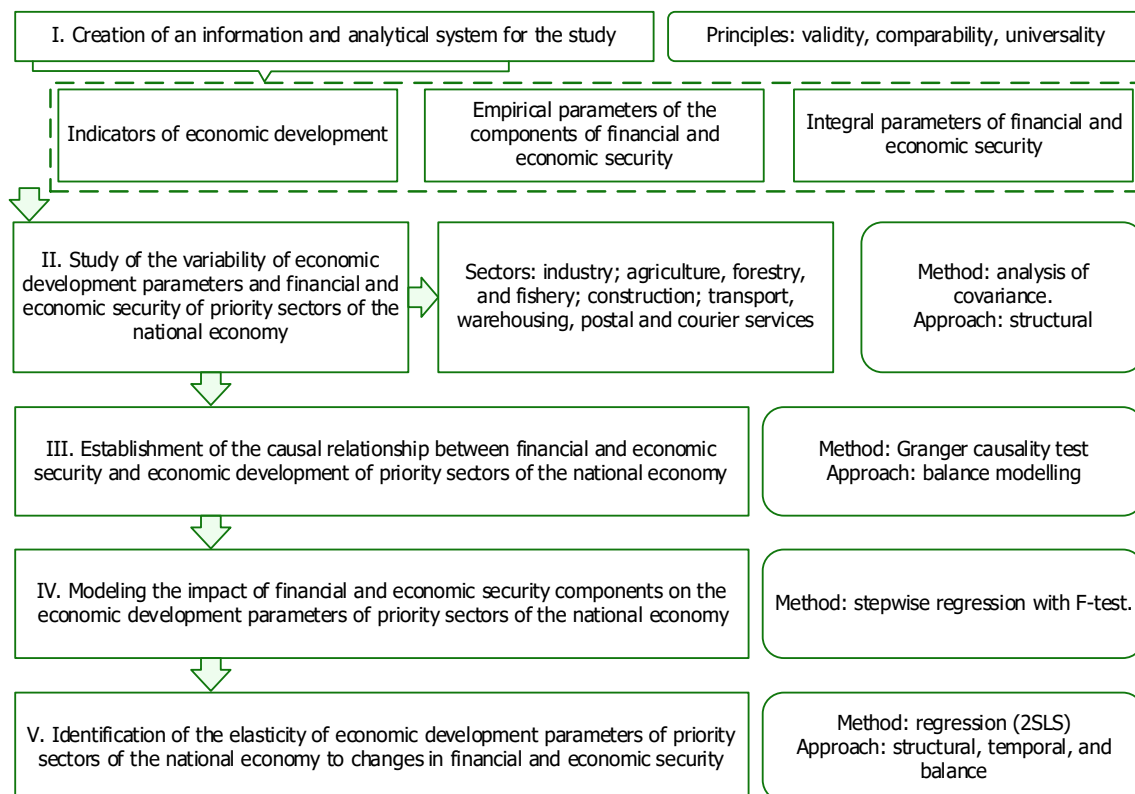


Figure 1. Research methodology.

The basis of the study includes the formation of a three-component information and analytical system that meets the principles of validity, comparability, and universality. The structural elements of the system include indicators of economic development, empirical parameters of financial and economic security components, and combined parameters of financial and economic security of foreign economic activity. The study of the variability of economic development parameters and financial and economic security of sectors is based on the determination of the level of their capacity and ability to quickly adapt to the conditions of the external environment. The third and fourth stages of the study address the establishment of a causal relationship and modelling the impact of financial and economic security components on the parameters of economic development of priority sectors of the national economy. To identify the triggers of economic growth of the basic economic activities, the fifth stage of the study includes the calculation of the elasticity coefficients for economic development parameters in priority industries to changes in the components of their financial and economic security.

The model of the information-analytical framework for the analysis of systemic relationships between financial and economic security and economic development of priority sectors of the national economy is represented by the system function (equations 1-2):

$$F_t^{pse} = f \begin{pmatrix} ED_t^{pse} \\ CFS_t^{pse} \\ FS_t^{pse} \end{pmatrix} = \begin{pmatrix} ED_t^m & ED_t^{rh} & ED_t^b & ED_t^{tr} \\ CFS_t^m & CFS_t^{rh} & CFS_t^b & CFS_t^{tr} \\ FS_t^m & FS_t^{rh} & FS_t^b & FS_t^{tr} \end{pmatrix} \quad (1)$$

where F_t^{pse} is the system model of information and analytical support for the relationships between financial and economic security and economic development of priority sectors in period t ; ED_t^{pse} are the system of parameters of economic development of priority sectors in period t ; CFS_t^{pse} are the empirical parameters of components (investment, credit, debt, money, production and business, system and structure) of financial and economic security of priority sectors in period t ; FS_t^{pse} are the integral parameters of financial and economic security of priority sectors in period t ; $ED_t^m, ED_t^{rh}, ED_t^{tr}, ED_t^b$ are the parameters of economic development of industry, agriculture, forestry, fishery, transport, warehousing, postal and courier activities, and construction, respectively, in period t ; $CFS_t^m, CFS_t^{rh}, CFS_t^{tr}, CFS_t^b$ are the empirical parameters of the components of financial and economic security of industry, agriculture, forestry, fishery, transport, warehousing, postal and courier activities, and construction, respectively, in period t ; $FS_t^m, FS_t^{rh}, FS_t^{tr}, FS_t^b$ are the combined parameters of financial and economic security of industry, agriculture, forestry, fishery, transport, warehousing, postal and courier activities, and construction, respectively, in period t .

$$f \begin{pmatrix} ED_t^m \\ ED_t^{rh} \\ ED_t^{tr} \\ ED_t^b \end{pmatrix} = \begin{pmatrix} Im_t^m, R_t^m, As_t^m, St_t^m, W_t^m, Fr_t^m, Uu_t^m, Rt_t^m, CI_t^m, Vav_t^m \\ Em_t^{rh}, W_t^{rh}, ICI_t^{rh}, As_t^{rh}, Vav_t^{rh}, Ex_t^{rh}, Im_t^{rh}, Rt_t^{rh}, Pr_t^{rh}, CI_t^{rh} \\ IBP_t^b, ReaP_t^b, As_t^b, U_t^b, VRP_t^b, CI_t^b \\ As_t^{tr}, CI_t^{tr}, Em_t^{tr}, Fr_t^{tr}, Uu_t^{tr}, Rt_t^{tr}, Ex_t^{tr}, Im_t^{tr}, W_t^{tr} \end{pmatrix} \quad (2)$$

where Im_t^m is the industrial production indices in t period, as a percentage of the previous year; R_t^m is the volume of industrial products sold in period t ; $As_t^m, As_t^{rh}, As_t^b, As_t^{tr}$ are the cost of fixed assets of industry, agriculture, forestry, fishery, construction, transport, warehousing, and postal and courier activities, respectively, in period t ; St_t^m is the average number of full-time employees in the industry in period t ; $W_t^m, W_t^{rh}, W_t^{tr}$ are the average monthly nominal wages of a full-time employee in industry, agriculture, forestry, fishery, transport, warehousing, and postal and courier activities, respectively, in period t ; Fr_t^m, Fr_t^{tr} are the pre-tax profits in industry, transport, warehousing, postal and courier activities, respectively, in period t ; Uu_t^m, Uu_t^{tr} are the shares of enterprises with pre-tax losses in industry and transport, respectively, in period t , %; $Rt_t^m, Rt_t^{rh}, Rt_t^{tr}$ are the profitability of operating activities of enterprises in the industry, agriculture, forestry, fishery, transport, warehousing, and postal and courier activities, respectively, in period t ; $CI_t^m, CI_t^{rh}, CI_t^b, CI_t^{tr}$ are the capital investments in industry, agriculture, forestry, fishery, construction, transport, warehousing, and postal and courier activities, respectively, in period t ; Vav_t^m, Vav_t^{rh} are the value added in industry and agriculture, respectively, in the total value added in period t ; Em_t^{rh}, Em_t^{tr} are the shares of employed in agriculture, forestry, fishery, transport, warehousing, and postal and courier activities, respectively, in period t ; ICI_t^{rh} is the capital investment index in agriculture, forestry, and fishery in period t ; Ex_t^{rh}, Ex_t^{tr} are the exports of agricultural products and transport services, respectively, in period t ; Im_t^{rh}, Im_t^{tr} are the imports of agricultural products and transport services, respectively, in period t ; Pr_t^{rh} is the labour productivity at agricultural enterprises in period t ; IBP_t^b is the index of construction products in period t ; $ReaP_t^b$ is the construction products sold in period t ; U_t^b is the number of construction enterprises in period t ; VRP_t^b is the construction work performed in period t .

The Granger test consists of three stages:

- converting the source data into logarithms;
- selection of the number of time lags (for the study, three lags were selected: short-run (lag 1), medium-run (lag 2) and long-run (lag 3), for which the relationship between financial and economic security and economic development of priority sectors is checked;
- verification of the null hypotheses.

Based on the results of the calculation of elasticity coefficients with a one-year lag, the degree of sensitivity of the development of priority sectors of the national economy of Ukraine to changes in financial and economic security in general and its components has been identified.

The study is based on the statistics of four priority sectors of the national economy of Ukraine for the period of 2010-2021.

RESULTS

Causality nexus 'financial and economic security – economic development of priority sectors'

The most volatile parameters of the economic development of Ukraine's industry in relation to changes in the parameters of financial and economic security include the sector's gross value added in the total volume of gross value added, fixed assets, and profitability of operating activities. Thus, among all the components of financial and economic security, debt (fixed assets (the covariance coefficient is 119.5), average monthly salary of full-time employees (115.2), and profitability of operating activities (49.2)) and production and business (industrial products sold (119.8), fixed assets (367.9), average number of full-time employees (204.6), average monthly salary (425.8), and profitability of operating activities (140.2)) have the most significant impact on the parameters of economic development of Ukraine's industry in 2010-2021.

Interestingly, pre-tax profits (0.916), profitability of operating activities (0.939), capital investments (0.843), and average monthly salary of full-time employees (0.712) have a high degree of variability with a combined parameter of the financial and economic security of the Ukrainian industry. The share of enterprises with losses has the lowest variability with financial and economic security (the covariance coefficient is 0.079).

The covariance analysis shows moderate to high variability between the parameters of economic development and the components of financial and economic security of Ukrainian agriculture in 2010-2021. Thus, during the period under study, changes in the level of investment security had the greatest impact on the number of employed in agriculture, forestry, and fishery (coefficient is 0.404), agricultural exports (0.632), capital investments (0.335), and profitability of agricultural output (0.404). Meanwhile, the volume of capital investment in this sector of Ukraine demonstrates high volatility relative to changes in credit and monetary components of financial and economic security (coefficients equal to 227.0 and 334.6, respectively). Interestingly, the credit, debt, and monetary components of financial and economic security could be strengthened by a decline in agricultural imports. In general, financial and economic security in 2010-2021 was most closely related to the share of employed in the sector (coefficient equal to 0.602), the growth of capital investment (0.464), and agricultural exports (0.570).

In 2010-2021, the impact of financial and economic security on the parameters of economic development of the construction sector in Ukraine was significant, which is particularly evident in terms of the volume of construction products sold (coefficient equal to 0.260) and the number of construction enterprises (0.270). The highest degree of volatility is shown by the construction output in relation to changes in the credit (coefficient equal to 113.5), debt (224.9), money (289.8), production and business (825.9), and system and structure (579.3) components of financial and economic security. It should be noted that investment security had the least impact on the volume of construction products sold (0.026). Meanwhile, the investment component of the financial and economic security of the construction sector of Ukraine during the study period had the greatest impact on changes in the volume of capital investments (9.0) and construction works performed (10.2). The production and business (836.6) and debt (250.8) components of financial and economic security have the greatest degree of variability with the number of business entities in the construction sector of Ukraine.

The development of transport, warehousing, postal and courier activities in Ukraine in 2010-2021 was most significantly influenced by the investment, debt, and production and business components of the sector's financial and economic security. Thus, the value of fixed assets was highly volatile relative to changes in credit (coefficient equal to 436.8) and investment (1.816) security. The volume of capital investments in the transport sector of Ukraine depends to the greatest extent on changes in the investment (5.548) and credit (246.3) components of financial and economic security. Changes in the average number of employees in the sector are driven by high variability in credit (966.8), debt (1.411), and

investment (9.288) security. The level of profitability of Ukraine's transport sector is most closely related to the credit (99.572) and production and business (6.235) components of financial and economic security.

Foreign economic activity in the transport sector of Ukraine is the most volatile to changes in the production and business (4.251) and credit (73.602) components of financial and economic security. In particular, the volume of imports of transport services in 2010-2021 had a strong reverse pattern of variability in relation to the strengthening/weakening of credit security (-436.8) and moderate variability in relation to the investment (-10.816) and debt (-8.392) components of financial and economic security. Interestingly, the integrated parameter of financial and economic security of this sector of the national economy in 2010-2021 determined a strong connection with all development parameters of the transport sector, except for the profitability of operating activities of transport enterprises (1.088).

The results of the Granger causality test show that a distinctive feature of Ukraine's industrial development in 2010-2021 is the dependence of industrial output on financial and economic security, which can be traced at the level of statistical significance of 90-95 % with a lag of one year (stable cause-and-effect relationship) (Table 1). The causal relationships of the financial and economic security of this economic activity can be traced in the first-time lag with fixed assets (statistical significance 90 %), pre-tax profits (99 %), the share of enterprises with pre-tax losses (95 %), the profitability of operating activities (95 %), and gross value added (0.95 %).

Table 1. The Granger causality test for the mutual causality of financial and economic security and development parameters in the industry of Ukraine, 2010-2021. Note: $IntFS_t^m$ is the integral parameter of financial and economic security of the Ukrainian industry; ***, **, * is an error at 1 %, 5 %, and 10 %. (Source: calculations were made in Eviews 10 software)

Variables	Lag			Variables	Lag		
	(1)	(2)	(3)		(1)	(2)	(3)
$Im_t^m - IntFS_t^m$	0.356 (0.569)	4.228 (0.103*)	1.698 (0.057*)	$Fr_t^m - IntFS$	2.565 (0.008***)	5.065 (0.080*)	1.385 (0.542)
$R_t^m - IntFS_t^m$	6.531 (0.037**)	8.149 (0.039**)	139.375 (0.062*)	$Uu_t^m - IntFS$	2.758 (0.025**)	2.054 (0.047**)	0.379 (0.797)
$As_t^m - IntFS_t^m$	2.564 (0.098*)	3.256 (0.012**)	67.183 (0.089*)	$Rt_t^m - IntFS$	6.371 (0.039**)	0.156 (0.859)	2.865 (0.104*)
$St_t^m - IntFS_t^m$	0.473 (0.514)	2.341 (0.102*)	6.788 (0.102*)	$Vav_t^m - IntFS$	11.578 (0.011**)	7.210 (0.047**)	2.997 (0.396)
$Wt_t^m - IntFS_t^m$	0.225 (0.649)	2.625 (0.101*)	0.427 (0.777)	$Cl_t^m - IntFS$	0.38325 (0.555)	1.897 (0.089*)	2.568 (0.056*)

The analysis shows that the changes in gross value added (increasing share of GVA of agriculture, forestry, and fishery in the country's economy), profitability, and labour productivity of agricultural enterprises (the relationship is traced at the level of 90-95% statistical significance) in the short term can be clearly ensured by strengthening the financial and economic security of Ukrainian agriculture in general (Table 2). Interestingly, the causal relationship between agricultural imports and the financial and economic security of this economic activity is traced in the first-time lag. In the second and third time lags the results demonstrate the impact of financial and economic security on agricultural exports, which shows the importance of improving the key financial parameters of enterprises in relation to further increasing the export capacity of the sector. Since the dynamic growth of agricultural exports and imports is a consequence of Ukraine's integration into the global economic space, there is a need to develop import substitution programs to reduce raw material exports, increase the volume of agricultural processing in Ukraine, and thus create more added value.

Table 2. The Granger causality test for the mutual causality of financial and economic security and development parameters in the agriculture, forestry, and fishery of Ukraine, 2010-2021. Note: $IntFS_t^{rh}$ is the integral parameter of financial and economic security of the Ukrainian agriculture, forestry, and fishery; ***, **, * is an error at 1 %, 5 %, and 10 %. (Source: calculations were made in Eviews 10 software)

Variables	Lag			Variables	Lag		
	(1)	(2)	(1)		(1)	(2)	(3)
$Em_t^{rh} - IntFS_t^{rh}$	0.082 (0.783)	2.564 (0.098*)	38.389 (0.108*)	$Ex_t^{rh} - IntFS_t^{rh}$	0.002 (0.899)	0.157* (0.059)	2.699** (0.014)
$Wt_t^{rh} - IntFS_t^{rh}$	0.102 (0.769)	2.529 (0.119)	7.042 (0.027**)	$Im_t^{rh} - IntFS_t^{rh}$	2.568 (0.112)	24.765 (0.006***)	1587.02 (0.018**)
$ICl_t^{rh} - IntFS_t^{rh}$	0.607 (0.461)	0.796 (0.512)	10.069 (0.103*)	$Rt_t^{rh} - IntFS_t^{rh}$	2.547 (0.098*)	2.016 (0.112)	1.499 (0.056**)
$As_t^{rh} - IntFS_t^{rh}$	3.298 (0.112*)	0.465 (0.658)	1.837 (0.486)	$Pr_t^{rh} - IntFS_t^{rh}$	3.547 (0.005***)	2.971 (0.112)	0.709 (0.679)
$Vav_t^{rh} - IntFS_t^{rh}$	6.087 (0.043**)	2.041 (0.244)	20.479 (0.016**)	$Cl_t^{rh} - IntFS_t^{rh}$	1.004 (0.349)	2.564 (0.099*)	2.568 (0.111)

Steady efficiency and high profitability of economic entities are the existential challenges of development and, at the same time, strengthening the financial and economic security of the priority sectors of the national economy of Ukraine, in particular, the construction sector, which is confirmed by the results of the Granger test (Table 3). Thus, a stable causal relationship between financial and economic security was found with the change in the volume of construction output and the share of enterprises with losses in three-time lags, with a statistical significance of 90 %. Strengthening financial and economic security contributes to an increase in the volume of construction work performed (95% probability) in the short and medium term. Interestingly, financial and economic security had no relationship with the volume of construction work performed in the third time lag.

Table 3. The Granger causality test for the mutual causality of financial and economic security and development parameters in the construction of Ukraine, 2010-2021. Note: $IntFS_t^b$ is the integral parameter of financial and economic security of the Ukrainian construction; ***, **, * is error at 1 %, 5 %, and 10 %. (Source: calculations were made in Eviews 10 software)

Variables	Lag			Variables	Lag		
	(1)	(2)	(3)		(1)	(2)	(3)
$IBP_t^b - IntFS_t^b$	3.722 (0.095**)	1.254 (0.112)	1.215 (0.104*)	$U_t^b - IntFS_t^b$	2.154 (0.100*)	1.987 (0.111)	2.547 (0.113)
$ReaP_t^b - IntFS_t^b$	2.789 (0.099**)	1.245 (0.112)	1.254 (0.151)	$VRP_t^b - IntFS_t^b$	6.904 (0.034**)	5.246 (0.012**)	1.235 (0.215)
$As_t^b - IntFS_t^b$	12.935 (0.00***)	18.219 (0.009***)	59.797 (0.095**)	$CI_t^b - IntFS_t^b$	5.202 (0.057**)	2.125 (0.012**)	63.95 (0.092**)

Interestingly, according to a study by the European Business Association, the Infrastructure Index of the Ukrainian transport industry in 2021 was 2.76 points (out of 5 possible) [35]. The development of Ukraine's transport sector requires significant refinancing, diversification of investment sources (domestic and international), innovation and technological modernization, and increasing export capacity. In particular, an increase in exports of transport services in the medium term (the causal relationship is confirmed in three lags with a statistical significance of 95%) can be achieved by strengthening the financial and economic security of the sector. A close causal relationship between financial and economic security can be traced in the medium and long term with fixed assets and in all-time lags – with capital investments (Table 4). With a 95 % probability, it can be argued that strengthening the financial and economic security of transport, warehousing, postal and courier activities in Ukraine will help to increase wages and profitability of enterprises in this economic activity.

Table 4. The Granger causality test for the mutual causality of financial and economic security and development parameters in the transport, warehousing, and postal and courier activities of Ukraine, 2010-2021. Note: $IntFS_t^{tr}$ is the integral parameter of financial and economic security of the Ukrainian transport, warehousing, and postal and courier activities; ***, **, * are errors at 1 %, 5 %, and 10 %. (Source: calculations were made in Eviews 10 software)

Variables	Lag			Variables	Lag		
	(1)	(2)	(3)		(1)	(2)	(3)
$As_t^{tr} - IntFS_t^{tr}$	0.212 (0.690)	2.564 (0.012**)	3.257 (0.025**)	$Rt_t^{tr} - IntFS_t^{tr}$	4.562 (0.112)	5.657 (0.056*)	6.214 (0.078*)
$CI_t^{tr} - IntFS_t^{tr}$	21.564 (0.001***)	2.568 (0.115)	3.547 (0.096*)	$Ex_t^{tr} - IntFS_t^{tr}$	0.661 (0.501)	2.547 (0.125)	2.128 (0.139)
$Em_t^{tr} - IntFS_t^{tr}$	2.478 (0.125)	1.254 (0.389)	2.415 (0.214)	$Im_t^{tr} - IntFS_t^{tr}$	15.779 (0.058*)	16.587 (0.012**)	20.746 (0.036**)
$Fr_t^{tr} - IntFS_t^{tr}$	1.623 (0.112)	2.567 (0.094*)	3.254 (0.002**)	$W_t^{tr} - IntFS_t^{tr}$	34.124 (0.028**)	12.547 (0.054*)	5.624 (0.164)
$Uu_t^{tr} - IntFS_t^{tr}$	5.529 (0.098*)	6.587 (0.012**)	2.145 (0.135)				

Modelling "security – development" results

Financial and economic security have different degrees and natures of influence on the economic progress of economic sectors. Determining the contribution of financial and economic security components to the variation in the development of priority sectors of the national economy using the stepwise regression with F-test allows modelling the partial impact of financial and economic security on the development parameters of key economic activities. The results of the empirical model confirm the thesis that the improvement of the financial result in the Ukrainian industry largely depends on the

equity capital of enterprises, the growth of which will contribute to the strengthening of the financial resilience of this economic activity. Therefore, it is natural that the financial results of the industry in 2010-2021 are most directly influenced by money and investment components. The 1% increase in financial results is driven by a 0.76 % increase in the money component and a 0.26 % increase in the investment component (equation 3).

$$FR_t^m = (3.677^{***})MFS_t^m + (1.275^*)IFS_t^m, \quad (3)$$

$$R^2 = 0.812 \quad DW = 1.54$$

where FR_t^m is pre-tax profits of industrial enterprises in period t ; MFS_t^m is the money component of the financial and economic security of the industry in t period; IFS_t^m is the investment component of the financial and economic security of the industry in t period.

To ensure a stable upward trend in the volume of products sold in Ukraine's industry, measures should be taken to strengthen the production and business and investment components of financial and economic security. Thus, a 1 % increase in sales can be achieved by strengthening production and business security by 0.87 %. However, it has been empirically established that strengthening investment security by 0.23 % will lead to a decrease in the volume of industrial products sold, as the sector's economy needs to implement effective tools to reduce import dependence (equation 4).

$$RP_t^m = (6.477^{***})ManFS_t^m - (1.725^*)IFS_t^m, \quad (4)$$

$$R^2 = 0.927 \quad DW = 1.63$$

where RP_t^m is the volume of industrial products sold in t period; $ManFS_t^m$ is the production and business component of the financial and economic security of the industry in t period.

The study reveals that the profitability of enterprises, including in industry, depends not only on the amount of income, expenses, and profit but also on the efficiency of debt and production and business policies technological and innovative modernization and optimization of structural parameters of production. In particular, the profitability of Ukrainian industrial enterprises can be increased by strengthening the security of money circulation (by 0.34 %, 95 % statistical significance), production and business (by 1.96 %, 99 % statistical significance) and debt (by 1.51 %, 99 % statistical significance) (equation 5) security.

$$PRF_t^m = (3.163^{***})MFS_t^m + (6.536^{***})ManFS_t^m + (5.263^{***})DFS_t^m, \quad (5)$$

$$R^2 = 0.969 \quad DW = 2.06$$

where PRF_t^m is the profitability of the operating activities of industrial enterprises in t period; DFS_t^m is the debt component of the financial and economic security of the industry in t period.

Complementary increase in the level of profitability, upward trend of financial results of agricultural enterprises, and a positive balance of foreign trade in agricultural products can become triggers for the development of production, transport, trade, and other infrastructure in rural areas, modernization of the food market, technical and technological re-equipment of agricultural enterprises, and an increase in the domestic raw material base for agricultural production and its deep processing. The profitability of Ukrainian agricultural enterprises is most influenced (by 79.9%) by investment and system and structure security (equation 6).

$$PRF_t^{rh} = (2.766^{**})SFS_t^{rh} + (1.881^{**})IFS_t^{rh}, \quad (6)$$

$$R^2 = 0.799 \quad DW = 2.45$$

where PRF_t^{rh} is the profitability of operating activities of agricultural enterprises in t period; SFS_t^{rh} is the system and structure component of the financial and economic security of the agriculture, forestry, and fishery in t period; IFS_t^{rh} is the investment component of the financial and economic security of the agriculture, forestry, and fishery in t period.

Interestingly, the investment component of financial and economic security had the greatest impact on Ukraine's agricultural exports in 2010-2021, and its strengthening by 0.84 % with a 99 % probability will contribute to a 1 % increase in agricultural exports (equation 7).

$$EXP_t^h = \frac{0.841}{(4.657^{***})} IFS_t^h, \quad R^2 = 0.841 \quad DW = 1.51 \quad (7)$$

where EXP_t^h is agricultural exports in t period.

Meanwhile, Ukrainian agriculture, forestry, and fishery developed in conditions of turbulence and uncertainty and still do not fully realize their capacity to supply the domestic market with agricultural products, which has become one of the reasons for the increase in agricultural imports. The results of empirical assessments show that the production and business components of agriculture should be strengthened to reduce import dependence in this segment (equation 8).

$$IMP_t^h = \frac{-0.819}{(-4.280^{***})} ManFS_t^h, \quad R^2 = 0.819 \quad DW = 1.53 \quad (8)$$

where IMP_t^h is agricultural imports in t period; $ManFS_t^h$ is the production and business component of the financial and economic security of agriculture, forestry, and fishery in t period.

As one of the key sectors of the national economy, construction in Ukraine ensures the realization of the country's strategic development goals through the implementation of construction and investment projects. Therefore, the economic progress of this sector is possible provided that the investment activity of business entities and the volume of investments in new construction, technological and innovative modernization of fixed assets, and the production capacity of the economic activity increase. It is verified by the empirical model (equation 9), in particular, the identified favourable impact of the credit and money components of financial and economic security on the volume of construction products sold (95 % and 90 % statistical significance, respectively).

$$ReaPr_t^b = \frac{-0.706}{(-3.515^{***})} DFS_t^b + \frac{0.406}{(2.937^{**})} CrFS_t^b + \frac{0.230}{(1.581^*)} MFS_t^b, \quad R^2 = 0.954 \quad DW = 1.76 \quad (9)$$

where $ReaPr_t^b$ is the volume of construction products sold in t period; DFS_t^b is the debt component of the financial and economic security of the construction in t period; $CrFS_t^b$ is the credit component of the financial and economic security of the construction in t period; MFS_t^b is the money component of the financial and economic security of the construction in t period.

It is worth emphasizing that significant budget support for any sector of the economy leads to a decrease in the volume of products sold by it, as government subsidies have a reverse effect on investment sustainability by reducing the financial and investment capacity and attractiveness of enterprises in key economic activities. Therefore, strengthening the investment and debt components of financial and economic security will ensure high development rates for the construction sector of Ukraine, which is confirmed by the results of the econometric study (equation 10).

$$IndBP_t^b = \frac{0.934}{(3.084^{***})} DFS_t^b + \frac{0.308}{(1.019^*)} IFS_t^b, \quad R^2 = 0.767 \quad DW = 1.72 \quad (10)$$

where $IndBP_t^b$ is the construction products index in t period; IFS_t^b is the investment component of the financial and economic security of the construction in t period.

Internal sources of financial support for business entities play an important role in ensuring the development of the transport sector. Thus, the main sources of sustainable development of transport, warehousing, postal and courier companies are their financial results, net profit, and revenues. Moreover, the modelling results show that increasing the efficiency of production and business activities and improving the business lending system are the priority factors for enhancing the financial development of enterprises. Considering credit security, the impact of production and business security on the financial results of the transport sector of Ukraine becomes more pronounced (the respective coefficient becomes statistically significant at the level of 99%) (equation 11).

$$FR_t^{tr} = (7.725^{***})ManFS_t^{tr} + (0.234^*)CrFS_t^{tr} \quad (11)$$

$$R^2 = 0.979 \quad DW = 2.24$$

where FR_t^{tr} is the pre-tax profit of transport enterprises in t period; $ManFS_t^{tr}$ is the production and business component of the financial and economic security of the transport, warehousing, and postal and courier activities in t period; $CrFS_t^{tr}$ is the credit component of the financial and economic security of the transport, warehousing, and postal and courier activities in t period.

External sources of the financial framework of Ukrainian transport companies include international and government support and bank and other loans. The current state of the sector requires measures to attract foreign investment. The implementation of measures to upgrade the fixed assets of enterprises in this economic activity has been critically low. The state funding for modernization programs also remains insufficient. The estimated regression model proves that the development of the transport, warehousing, postal and courier activities in Ukraine depends on budget allocations since investment, production and business, and debt security have the greatest impact on the level of profitability of the transport sector (equation 12).

$$PRF_t^{tr} = (38.158^{***})ManFS_t^{tr} + (15.284^{***})DFS_t^{tr} - (7.919^*)IFS_t^{tr} \quad (12)$$

$$R^2 = 0.983 \quad DW = 2.35$$

where PRF_t^{tr} is the profitability of operating activities of transport enterprises in t period; DFS_t^{tr} is the debt component of the financial and economic security of the transport, warehousing, and postal and courier activities in t period; IFS_t^{tr} is the investment component of the financial and economic security of the transport, warehousing, and postal and courier activities in t period.

Therefore, the positive dependence of the profitability of Ukrainian transport enterprises on the production and business (by 1.23 %) and debt (0.54 %) components of financial and economic security and the reverse dependence (0.22 %) on the investment security can be interpreted as the need to intensify investment in the renewal of production and business capacities of enterprises in the sector. Thus, lending for enterprise modernization projects and increasing foreign direct investment in the sector are the means to develop the transport sector, in particular, to increase exports of transport services (equation 13). Interestingly, strengthening the investment (by 0.56 %) and system and structure (0.9 %) components of financial and economic security can contribute to a 1 % increase in exports of transport services, with statistical significance of 90 % and 95 %, respectively.

$$EXP_t^{tr} = (-11.899^{***})MFS_t^{tr} + (7.839^{**})SFS_t^{tr} + (5.875^*)IFS_t^{tr} \quad (13)$$

$$R^2 = 0.935 \quad DW = 1.86$$

where EXP_t^{tr} is transport services exports in t period; MFS_t^{tr} is the money component of the financial and economic security of the transport sector in t period; SFS_t^{tr} is the system and structure component of the financial and economic security of the transport sector in t period.

Elasticity estimation results

Based on the results of calculating the elasticity coefficients with a one-year lag, the degree of sensitivity of the development of priority sectors of the national economy to changes in financial and economic security in general and its components, in particular, is revealed (Table 5).

Table 5. The elasticity of development of priority sectors of the national economy of Ukraine depending on changes in financial and economic security, 2010-2021, %. Note: *IFS, CrFS, BFS, MFS, ManFS, SFS* are investment, credit, debt, money, production and business, and system and structure components of financial and economic security; *M* is industry, *Rh* is agriculture, forestry, and fishery, *B* is construction, *Tr* is transport, warehousing, and postal and courier activities. (Source: calculations were made in Eviews 10 software)

Development parameter	Sectors	Components of financial and economic security						IntFS
		<i>IFS</i>	<i>CrFS</i>	<i>BFS</i>	<i>MFS</i>	<i>ManFS</i>	<i>SFS</i>	
Volumes of products sold	M	0.316	0.074	0.121	0.172	0.110	0.060	0.189
	Rh	0.874	1.125	0.962	0.745	0.891	0.989	1.124
	B	0.376	0.023	0.443	0.469	0.618	0.009	0.045
Cost of fixed assets	M	0.149	0.012	0.164	0.037	0.546	0.072	0.457
	Rh	0.099	0.017	0.174	0.193	0.095	0.069	0.033
	Tr	0.156	0.697	1.268	0.680	1.415	0.220	0.980
	B	0.689	0.351	0.687	0.793	1.085	0.016	0.089
Average number of full-time employees	M	0.503	0.210	0.527	0.242	1.833	0.057	0.468
	Rh	1.097	0.165	0.909	0.925	0.325	0.352	0.254
	Tr	2.271	1.092	1.963	2.061	1.144	0.977	1.071
Exports	M	1.021	0.987	0.458	0.478	1.059	1.112	1.235
	Rh	1.084	0.163	0.570	0.663	0.062	0.353	0.198
	Tr	0.505	0.303	1.065	0.427	0.930	0.202	0.128
Imports	M	-0.125	-0.784	-0.268	-0.987	-0.541	-0.127	-1.254
	Rh	-0.009	-0.028	-0.817	-0.703	-0.578	-0.269	-0.084
	Tr	-0.693	-0.325	-1.186	-0.239	-0.218	-0.053	-1.049
Labor productivity	Rh	0.776	0.110	0.722	0.801	0.239	0.377	0.186
Pre-tax profits	M	0.445	0.122	0.411	0.207	0.188	0.024	0.477
	Tr	0.032	0.011	0.056	0.019	0.109	0.704	1.802
	B	0.341	0.109	0.362	0.361	0.383	0.008	0.015
Share of enterprises with losses	M	0.125	0.258	0.014	0.745	0.265	0.367	0.457
	Tr	0.333	0.429	1.680	0.693	1.720	0.307	0.198
Profitability of operating activities	M	0.029	0.253	0.316	0.217	0.328	0.205	0.108
	Rh	0.045	0.005	0.332	0.305	0.315	0.222	0.014
	B	0.830	1.579	1.199	0.320	0.262	0.021	0.140
	Tr	0.376	0.036	0.428	0.115	0.738	0.108	0.021
Capital investment	M	0.401	0.047	0.213	0.174	0.013	0.034	0.118
	Rh	0.344	0.471	0.332	0.326	0.118	0.178	0.080
	B	0.556	0.092	0.986	0.090	0.041	0.058	0.169
	Tr	0.450	0.441	0.872	1.150	0.624	0.019	0.088

The study shows that strengthening financial and economic security in the industry, agriculture, forestry, fishery, and construction in Ukraine by 1 % allows to increase the volume of products sold by 0.19 %, 1.12 %, and 0.05 %, respectively. The largest increase in the volume of industrial products sold (by 0.32 %) can be achieved by strengthening the investment component of financial and economic security. Strengthening the production and business component of financial and economic security by 1 % will increase the volume of construction products sold by 0.62 %. Meanwhile, the volume of agricultural sales is the most sensitive to changes in the credit component of the sector's financial and economic security.

DISCUSSION

The results of the study are not devoid of objective discussion, which consists, for example, of the ambiguity of the degree of elasticity of changes in the parameters of development of priority sectors of the national economy because of the impact of changes in the characteristics of their financial and economic security. After all, there are many other, including non-

deterministic, factors that can affect the course and determine the consequences of relevant influences and relationships. Moreover, the situation can develop in such a way that it will lead even to the opposite direction of changing the conditionally dependent variable.

Therefore, when forecasting the consequences of the implementation of the state security policy in the field of sectoral and structural changes, it is important to understand that the achievement of planned indicators requires the establishment of a high-quality effective system of state policy to ensure financial and economic security and development of priority sectors of the national economy, capable of achieving the necessary state of security and the desired degree of realization of the financial and economic interests of its stakeholders. The basic characteristics of the state of financial and economic security of the industry are the provision of financial and other economic resources, the ability to prevent the impact of risks and threats, the stability and stability of the financial and economic condition of industry entities, the formation of conditions and the availability of opportunities for the development and realization of the economic potential of the sectoral system.

CONCLUSIONS

The study confirms the hypothesis that there is a close connection between financial and economic security and the development of priority sectors of the national economy. This is verified by the results of an econometric study based on the implementation of six stages (creation of an information and analytical system of the study; study of the variability of economic development parameters and financial and economic security of sectors of the national economy; establishment of the causal relationship and modelling the impact of financial and economic security on the economic development parameters of sectors of the national economy; identification of the elasticity of sectoral development parameters depending on changes in financial and economic security of the sector; identification of triggers for economic development in the projection of strengthening the financial and economic security of the sector). On this basis, the existence of a causal and systemic relationship between the state and characteristics of financial and economic security and the development parameters of priority sectors of the national economy of Ukraine is verified.

The study proves that the impact of changes in the key parameters of financial and economic security creates favourable preconditions for economic growth and structurally balanced sectoral development. In particular, the results of the covariance test show the greatest degree of variability in the development of Ukraine's industry depending on the production and business, credit, and debt components of its financial and economic security; agriculture, forestry, and fishery – the security of money circulation and the credit component of financial and economic security; construction – all components of financial and economic security, except for investment; transport, warehousing, postal and courier activities – investment, debt, and money components of financial and economic security.

The results of the study made it possible to establish links and dependencies between changes in several components of financial and economic security of industries and their development, which, from the standpoint of theory, gives grounds to say the impact of certain aspects of security on sectoral development, and, from the point of view of practice, makes it possible to model and forecast the expected changes, their scale. Namely, empirical assessments of the sensitivity of development to changes in the financial and economic security of priority sectors of the national economy of Ukraine have shown that strengthening financial and economic security allows:

- increase the volume of products sold in all the industries studied;
- to renew fixed assets in industry, transport, warehousing, postal and courier activities;
- increase employment in industry, agriculture, forestry and fisheries;
- strengthen export potential in agriculture, forestry and fisheries, transport, warehousing, postal and courier activities;
- Increase the profitability of operating activities of industrial and agricultural enterprises.

In general, the main stimulators for the development of priority sectors of the national economy in the projection of ensuring their financial and economic security are increasing the volume and improving the structure of lending, including preferential lending, attracting foreign capital, reducing the tax burden; stimulating the introduction of high technologies to increase the level of labour productivity and optimize costs, expand production capacity, stimulate the processing of products to increase the created added value.

It is important to pay attention to the aspect of interdisciplinarity, connections and security impacts on industry development and vice versa. For example, strengthening the financial and economic security of agricultural sectors is a factor in increasing the volume of agricultural production, which has a positive effect on the development and strengthening of the

financial and economic security of a few sectors of the processing industry, the production of pharmaceutical products, the chemical industry, etc. Strengthening safety in construction serves as a determinant of the expansion of production capacities in the sectors of the real sector of the economy. Strengthening security in the transport industry revives trade, ensures the development of logistics, and minimizes commercial and financial risks.

During further improvement of the methodology for analyzing the impact of changes in security parameters on the components of economic development of industries, it is important to extend the study to the microeconomic level with the inclusion of data on many enterprises and indicators, especially financial and economic with business detailing into large, medium and small.

ADDITIONAL INFORMATION

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CONFLICT OF INTEREST

The Authors declare that there is no conflict of interest.

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ФІНАНСОВО-ЕКОНОМІЧНА БЕЗПЕКА ТА РОЗВИТОК ПРІОРИТЕТНИХ СЕКТОРІВ НАЦІОНАЛЬНОЇ ЕКОНОМІКИ УКРАЇНИ: ПРИЧИНОВО-НАСЛІДКОВИЙ ЗВ'ЯЗОК

Метою дослідження є вивчення каузального зв'язку параметрів фінансово-економічної безпеки та розвитку пріоритетних галузей національної економіки (на прикладі сільського господарства, промисловості, будівництва й транспорту України) у 2010-2021 роках. Результати причиново-наслідкового аналізу показали найбільший ступінь варіативності розвитку промисловості України з боку виробничої, економічної, кредитної та боргової складових її фінансового забезпечення; сільського, лісового та рибного господарства – безпеки грошового обігу та кредитної складової фінансової безпеки; будівництва, транспорту, складського господарства, поштової та кур'єрської служб – усіх складових фінансової безпеки, крім інвестиційної. Практичне значення результатів дослідження полягає в розробці інструментарію моделювання впливу заходів політики зміцнення фінансово-економічної безпеки на розвиток пріоритетних галузей національної економіки, що дозволяє прогнозувати наслідки реалізації державної політики безпеки в царині структурних та інституційних змін.

Ключові слова: економічне зростання, галузева політика, пріоритетні галузі, зв'язок, безпека, розвиток, еластичність, Україна

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