

Economic Security Parameters in the Conditions of Increasing Information Risks and Threats

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Abstract

The article examines the issues of economic security in the event of risks and threats emerging in the information sphere. The assessment of the level of economic security according to the system of indicators of economic security of the country and its regions is carried out. Their individual parameters are investigated. As the analysis shows, the current state of economic security of the country and its regions is not satisfactory. The peculiarities of guaranteeing economic security for the regions are studied. A system of measures to improve the level of economic security is formed.

Keywords

Economic security, risk, threat.

1. Introduction

In modern conditions, the economic landscape is formed by different processes that are localized within different poles of influence and pursue opposing interests. The global trend is the spread and buildup of post-industrial formations, new tendencies in the development of information economy, its integration into the vast majority of areas of development. With this in mind, the dissemination of information technology occupies an important place in UN reports [1].

Information processes significantly influence and shape the parameters of a country's economy. Numerous examples of increasing the weight of information products and services in the structure of GDP, the gradual movement of the economy to the information environment have become commonplace. Under favorable conditions these processes can strengthen the economic system, otherwise—to undermine it [2]

An important concept associated with the sustainability of a state's economy is economic security. Like the concept of economics, economic security is also in the zone of influence of the information sphere and is adjusted by it. Economic security is the foundation of a cost-effective state as a whole [3].

What is the concept of economic security? This is a state of providing the necessary resources at a level that guarantees the development and growth of the economy, protection of the social sphere while maximizing the use of a country's own potential in defending economic interests from the system of threats of external and internal origin. The main way to maintain the proper state of security is the formation of a holistic systemic dynamics—the processes of maximizing macroeconomic indicators of most components of economic security.

2. Source Review

The issue of economic security is the subject of diverse research. Some publications touch upon the conceptual foundations of a country's security [4]. A significant number of authors study the economic security of the country in combination with environmental and energy safety. Thus, the authors [5], for example, analyze the economic and energy strategy, predict the consequences of Brexit for the EU economy and its external and internal economic security. The author of [6] examines China's energy and economic security and the factors that affect it.

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A number of articles are devoted to methods of assessing the level of economic security of the country. The authors [7] proposed an integrated index of environmental, energy and economic security. Much attention is paid to the development of economic security indices in countries with economies in transition, such as Russia and Ukraine. At the same time, developed countries are more focused on energy and environmental security. In particular, the [8] is devoted to the current state of economic security of the regions of Russia on the basis of the index approach. In [9] the concept of the integrated index of economic security of Ukraine in the conditions of COVID-19 on the basis of the innovative concept is stated. Economic, demographic, energy, foreign economic, food, environmental and epidemiological indices are integrated. For the time being, no practical calculations are given. The authors [10] propose a method for determining the threshold values of key indicators of economic security of the country.

The article [11] is devoted to the integrated assessment of the level of economic security of Ukraine using two groups of indices: incentives and anti-incentives. The authors [12] analyze the crisis phenomena in the Russian economy, using rapid indices of economic security—12 indicators united into four groups. The research [13] is dedicated to the financial and economic security of Donetsk region using economic and social indicators.

A significant attention is paid to the comparison of indices of economic security and indices of sustainable development of the economy of Ukraine [14]. Of interest is the study, the results of which are presented in [15]. It is devoted to assessing the economic security of the EU and Ukraine and its impact on the sustainability of economic development. The novelty of the proposed approach is due to the fact that the assessment of the level of economic security is based on four components: economic, political, social and environmental, which are not domestic indicators, but are the recognized international indices: the Index of Globalization, the Fragile States Index, the Legatum Prosperity Index, the Global Competitiveness Index and the Environmental Performance Index. This approach is seen as original, universal and objective. At the same time, it is debatable, given the analysis of the stability of economic growth in [16], according to which the economy of Ukraine demonstrates its lowest level among European countries. However, the Index of Economic Instability shows no correlation with the above indices.

Numerous publications assess external and internal factors that affect the level of economic security of the country or region: globalization [17], the progress of European integration for Ukraine [18], corruption [19], mineral resources [20], intellectual potential [21], industrial specialization [22]. In the article of the journal [23] the authors substantiated the methodological basis and developed a complex for diagnosing the state of economic security of the university. The method presented by the authors provides an opportunity to quantify the integrated indicator of the level of economic security of the university on the basis of individual indicators, which is then used for management decisions.

An important terminological issue is the name of the indicator that would characterize the level of economic security of the country. Many authors who proposed this indicator called it the "index of economic security." Instead, this is the name of the "integrated indicator of instability of available household resources, which takes into account fluctuations in income, medical expenditure and financial well-being," which is widely known in international reporting, including the International Labor Organization [24]. The index characterizes the economic security of citizens, the degree of their protection from economic losses [25]. Therefore, it is necessary to distinguish between the above-described index of economic security and the index that reflects the level of economic security of a country or its region.

3. Goals and Methodology

Given the relevance of these issues, the objectives of the study are to develop methodological frameworks and establish quantitative parameters for assessing the level of economic security of a country or region, which will contribute to a more balanced policy in this area.

The method of estimation of the index (coefficient) of economic security of the country by application of procedure of standardization of indicators during a specific year (A. Stepanenko and M. Gerasimov) is offered.

According to this procedure, it is possible to identify the main stages:

1. Establishing the share of regions in relation to the level of the country according to the system of indicators. The weight of the region is formed taking into account its potential.

2. Standardization (rationing) of indicators that characterize the features of economic security. Due to the fact that the values of the indicators used for the calculation differ in nature and weight, it is important to form a comparable information plane, which serves as a starting point for further calculations. There are different approaches to this procedure.

3. Calculation of integrated values for regions, which are the weighted average values of standardized indicators. Calculated by formula (1):

$$\tilde{Z}_i = \sum_{j=1}^n \alpha_{ij} Z_{ij}, \quad (1)$$

where Z_{ij} is the value of the i -th indicator in the j th region;

α_{ij} is the value of the weighting factor of the i th indicator in the j th region.

Weights are introduced to take into account conditions in different regions, including the level of economic development, competitiveness, sales, risks. For an approximate estimate or when it does not seem possible to quantify these factors, the average values are used:

$$\alpha_{ij} = 1/n \quad (2)$$

4. Standardization of security factors of regions.

For the convenience of assessment, it is proposed to normalize the indicator of economic security depending on the direction of the study. The rationing coefficient can be the security coefficient of the most successful region, its average value in countries with identical conditions, the base period of development (for example, before the pandemic), and so on. This article presents the results obtained by standardizing the largest coefficient of the region:

$$Y_i = \frac{\tilde{Z}_i}{Z_{max}}, i = \overline{1, m}, \quad (3)$$

where Y_i is coefficient of economic security of the region.

The coefficient Y of economic security of the country as a whole is calculated as the ratio of the weighted average value of the country by region to such an indicator for countries with similar conditions (Eastern European, post-Soviet). Weights are introduced to take into account conditions in different regions, including the level of economic development, competitiveness, sales, risks. For an approximate estimate or when it does not seem possible to quantify these factors, average values ($\alpha_{ij} = 1/n$) are used.

The coefficient of economic security is formed into account the system of regional indicators (n1–n8):

n1 is gross regional product.

n2 is revenues of the regional budget (excluding transfers).

n3 is budget expenditures of the region (including transfers).

n4 is the amount of actual revenues from taxes and fees (mandatory payments) to the regional budget and to state trust funds.

n5 is capital investments in the region.

n6 is foreign direct investment in the region.

n7 is the volume of regional exports of goods.

n8 is the cost of research in the region.

According to the methodology, the calculation of coefficients involves a number of stages. After formation of initial tables (data are taken from [26]) places of regions on each indicator among other regions of the state are investigated (Table 1). The calculations were performed in a Microsoft Excel 2010 spreadsheet, developed by Microsoft. The maximum value (1.0) is allocated to the country. Variations in the weight of indicators are typical for regions.

Table 1

Weights of regions in relation to the level of the state according to the system of indicators (fragment)

Region	n1	n2	n3	n4	n5	n6	n7	n8
Ukraine as a whole	1	1	1	1	1	1	1	1
Vinnitsia	0.0313	0.0354	0.0402	0.0343	0.0305	0.0036	0.0302	0.0029
Volyn	0.0170	0.0190	0.0264	0.0182	0.0150	0.0050	0.0152	0.0011
Dnepropetrovsk	0.1038	0.1053	0.0901	0.1072	0.1042	0.0682	0.1634	0.1210
Donetsk	0.0540	0.0492	0.0493	0.0482	0.0466	0.1064	0.1025	0.0010
Zhytomyr	0.0217	0.0251	0.0311	0.0250	0.0151	0.0214	0.0140	0.0018
Transcarpathian	0.0147	0.0194	0.0278	0.0190	0.0130	0.0052	0.0351	0.0045
Zaporozhye	0.0489	0.0475	0.0455	0.0488	0.0272	0.0055	0.0715	0.0827
Ivano-Frankiv	0.0220	0.0224	0.0331	0.0221	0.0162	0.0058	0.0184	0.0029
Kyiv	0.0557	0.0556	0.0517	0.0564	0.0704	0.0494	0.0393	0.0245
Kirovograd	0.0181	0.0214	0.0240	0.0222	0.0124	0.0040	0.0110	0.0060

Source: own evaluation.

Table 1 shows that among the studied regions, high weights gravitate to Dnipropetrovsk and Kyiv regions. The situation is similar for capital investments. A high position of foreign investment is recorded in Donetsk region. Among the studied regions, the maximum values tend to the city of Kyiv. Such weights form the basis for the manifestation of the position of the region for further stages of the calculation.

An important step is the standardization of indicators in order to bring their quantitative parameters to a single statistical base, which is associated with the number of regions (Table 2). Basically, given the data in Table 1, the standardization is significantly correlated with the location of the region by weight. After rationing, the maximum values for each indicator of economic security are determined. As the assessment shows, the highest level is fixed for the indicator “research costs.”

Table 2
Standardization of economic security indicators (fragment)

Region	n1	n2	n3	n4	n5	n6	n7	n8
Ukraine as a whole	25	25	25	25	25	25	25	25
Vinnitsa	0.7829	0.8847	1.0043	0.8571	0.7615	0.0912	0.7559	0.0731
Volyn	0.4244	0.4752	0.6607	0.4550	0.3753	0.1258	0.3808	0.0275
Dnipropetrovsk	2.5941	2.6327	2.2527	2.6795	2.6044	1.7046	4.0846	3.0252
Donetsk	1.3499	1.2296	1.2324	1.2041	1.1655	2.6607	2.5628	0.0242
Zhytomyr	0.5414	0.6272	0.7763	0.6248	0.3776	0.5347	0.3496	0.0457
Transcarpathian	0.3682	0.4858	0.6956	0.4744	0.3240	0.1289	0.8775	0.1119
Zaporozhye	1.2222	1.1868	1.1367	1.2197	0.6796	0.1384	1.7863	2.0686
Ivano-Frankiv	0.5508	0.5593	0.8268	0.5531	0.4058	0.1447	0.4607	0.0714
Kyiv	1.3913	1.3896	1.2923	1.4102	1.7588	1.2360	0.9817	0.6123
Kirovograd	0.4524	0.5346	0.5996	0.5552	0.3102	0.1006	0.2756	0.1502
The upper pole	5.8492	3.9600	2.5461	3.9225	8.6531	11.1964	5.4207	11.5034

Source: own evaluation.

4. Empirical Results and Discussion

For the period 2010-2018 there was an increase in the main indicators of the economic sector of the country and regions. That was due to the growth of the gross surplus value (by 4.3 times), the income of the consolidated and local budgets (by 3,7 and 3,5 times respectively), the amount of actual revenues from taxes and fees (mandatory payments) to budgets and to state trust funds (more than by 3.7 times), capital investments (by 5.6 times) and other indicators. These indicators to a great extent form the coefficients of economic security of the state and regions.

The calculations of economic security ratios is carried out by formulas 3 and 4. They showed that in the national dimension the coefficient of economic security in 2018 was 0.1508 (Table 3). Given this, the level of economic security of the state and regions is not satisfactory. Many of these parameters show negative phenomena and trends that reflect the general state of the economy.

The regions are significantly differentiated in terms of economic security. Only 8 regions exceed the national level: Dnipropetrovsk, Donetsk, Zaporizhie, Kyiv, Lviv, Odesa, Kharkiv and the city of Kyiv. The indicators of other regions are lower.

Regarding other spatial features of the localization of economic security indicators, it is possible to identify a number of positions. In particular, the levels of indicators of regions relative to the level of the state are important. Only if the region has significant values of economic security, there is a possibility of such an assessment (Table 4). The evaluation of economic security ratios also reveals significant regional variations. The scope of variation demonstrates the spatial features of the formation for indicators.

Table 3

Integral values and coefficients of economic security of the state and regions, 2018

Region	Integral values	Coefficient of economic security of the state (CESS)	CESR-CES
Ukraine	—	0.1508	—
Vinnitsa	0.6513	0.0982	-0.0526
Volyn	0.3656	0.0551	-0.0957
Dnipropetrovsk	2.6972	0.4067	+0.2560
Donetsk	1.4286	0.2154	+0.0646
Zhytomyr	0.4847	0.0731	-0.0777
Transcarpathian	0.4333	0.0653	-0.0854
Zaporozhye	1.1798	0.1779	+0.0271
Ivano-Frankiv	0.4466	0.0673	-0.0835
Kyiv	1.2590	0.1899	+0.0391
Kirovograd	0.3723	0.0561	-0.0947
Luhansk	0.3239	0.0488	-0.1020
Lviv	1.1688	0.1763	+0.0254
Mykolayiv	0.6326	0.0954	-0.0554
Odessa	1.0868	0.1639	+0.0131
Poltava	0.9896	0.1492	-0.0016
Rivne	0.4049	0.0611	-0.0897
Sumy	0.4595	0.0693	-0.0815
Ternopil	0.3192	0.0481	-0.1027
Kharkiv	1.6574	0.2499	+0.0991
Kherson	0.3957	0.0597	-0.0911
Khmelnysky	0.4438	0.0669	-0.0839
Cherkasy	0.5373	0.0810	-0.0698
Chernivtsi	0.2282	0.0344	-0.1164
Chernihiv	0.4259	0.0642	-0.0865
The city of Kyiv	6.6314	1.0000	+0.8492

Source: own evaluation.

Table 4.

Spatial features of coefficients of economic security of regions (CESR)

Feature	Parameter	Influence on economic security
1 Deviation of the coefficient of economic security of the region from the state level	Only 8 regions exceed the national level: Dnipropetrovsk, Donetsk, Zaporizhia, Kyiv, Lviv, Odesa, Kharkiv and the city of Kyiv	The possibilities of CESR's positioning at the state level need to be adjusted.
2 Localization of indicators of regions relative to the level of the state	Coefficient of economic security – 0,1508. Similar indicators are recorded only for certain regions (in particular, Zaporizhie and Kyiv regions).	Low similarity of indicators of regions in relation to the level of the state.
3 Maximum–minimum value	The city of Kyiv (1.0000) - Chernivtsi region (0.0344). The ratio between the coefficients is about 29 times.	Significant regional variations in the level of economic security.
4 The extent of variation between the coefficients of economic security of the regions	CESR of Dnipropetrovck region (0,4067) – Chernivtsi region (0,0344). The extent of variation = 0,3723.	This reveals the features of the formation of regional indicators of economic security.

Source: own evaluation.

The high values of security ratios can be explained by the significant level of concentration of economic potential within the regions. In particular, the maximum value is inherent in the capital - an important economic center of the state, which accumulates the potential for economic development. Significant financial indicators, investment flows gravitate to the capital. To some extent, this is a positive process, as such factors contribute to the development of the region's economy. On the other hand, such concentrations determine the formation of asymmetries of regional development (Fig. 1, based on the data in Table 3).

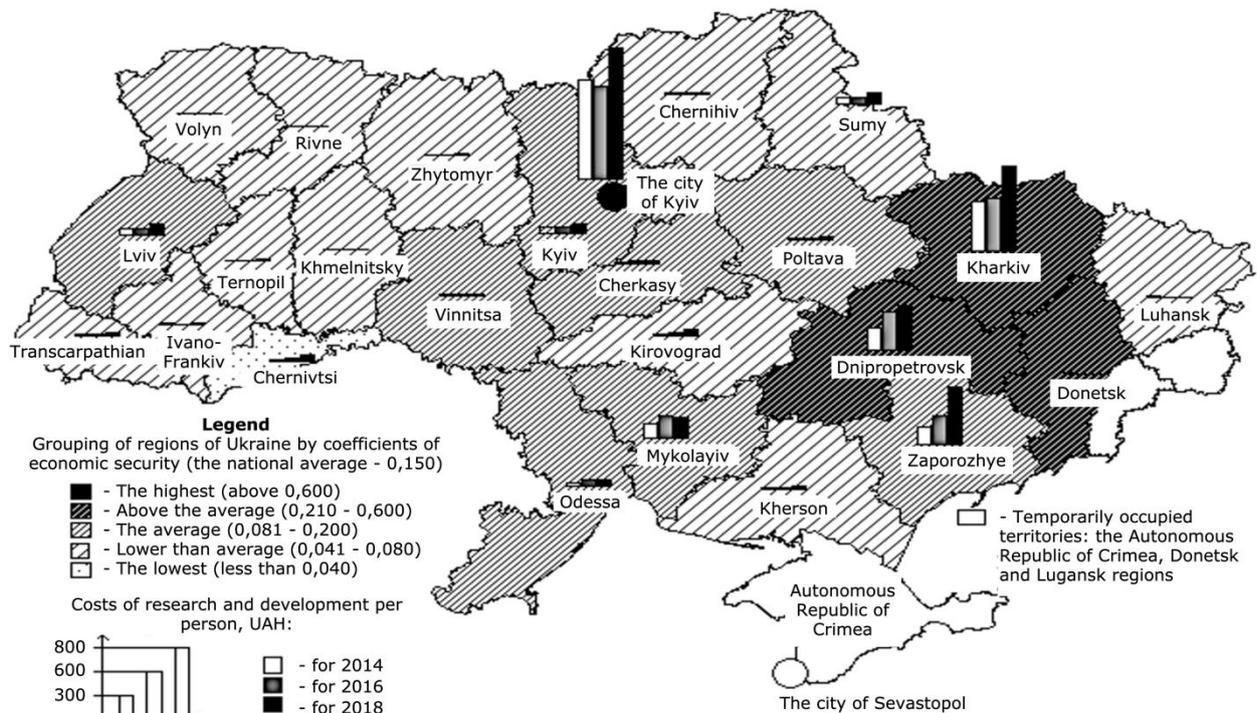


Figure 1: Coefficient of economic security of the regions of Ukraine (2018)

Source: own evaluation

High indicators of economic security of Kyiv, Dnipropetrovsk, Kharkiv and Donetsk regions are explained by strong industrial potential and more favorable conditions for investments in comparison with other regions. Listed in Fig. 1 map-scheme shows that in most parts of Ukraine such conditions need radical improvement. Charts of cost of research (Fig. 1) show a certain correlation with the level of economic security.

The opposite level of economic security is demonstrated mainly by the southern and western regions. At the same time, these regions have important preconditions for improving the development of economic systems. Drivers of their growth can be the launch of new business projects in these areas and processes that are specific to these regions. The issue of strengthening cross-border cooperation (centers, business hubs) is also possible - it is a way to accelerate the local economic development for regions bordering other countries. Niche projects have prospects for development. The formation of platforms for the interaction of natural resources and the economy is possible. What are these platforms?

A platform is a specific location (real or virtual) within which the interaction of natural resources and the economy takes place in order to realize common interests. A characteristic feature is that an ecosystem is formed near the platforms. For the sphere of natural resources, the platform is characterized by other features and peculiarities of the economy, but there is also a common basis.

What are the positive factors for the sphere of natural resources? This is an opportunity to increase the capitalization of natural resources and their value, improve other financial characteristics (rent, investment, et cet.), achieve greater integration into the business sphere. The advantages for the economy are the ability to include the cost characteristics of natural resources in market processes, to expand the field of investment, to form balanced business projects involving natural resources and reducing transaction costs in the process.

Experience shows that in an industrial economy predominant interest in natural resources was to meet the needs of the society in agricultural products, water supply functions, timber products and so on. This approach has largely led to excessive pressure on natural resources and environmental issues. But gradually there

appeared a tendency to strengthen market characteristics - the possibility of entering the zone of influence of private companies, the actualization of cost characteristics as well as the generation of financial flows.

Taking into account the studied indicators of economic security, a question arose about their possible correction against the background of risks and threats emerging in the information sphere. Studies show that such pathways can be identified. The first way is exogenous, which is associated with changes in external indicators that shape the level of economic security. According to the developed methodology, foreign direct investment and the volume of exports of goods are similar. In the conditions of the unfavorable information background outside the state borders (objective circumstances, targeted action of competitors, unfavorable information measures, cyber attacks on support measures), this will reduce the attractiveness of these indicators of the recipient state. Because of this, the volume of impact of indicators will be smaller.

Another way is endogenous - it is possible to change the indicators that are formed in the endogenous space of the state. Indicators of capital investments, local budgets can be significantly adjusted and changed under the influence of information messages generated within the country.

5. Conclusions

The study showed that the level of economic security of the state and regions can be established through the procedure of standardization of indicators for a particular year. The calculations proved that the coefficient of economic security of the state is low and for 2018 it is 0.1508. The regions are significantly differentiated in terms of economic security. It is possible to distinguish a group of regions with the highest indicators (mainly the capital and several other economic centers) and a group of outsider regions in terms of economic security. At the same time, the regions of the second group have opportunities to improve the level of economic security by introducing new business projects, strengthening cross-border cooperation, supporting the development of niche projects, building a system of interaction between natural resources and the economy.

Considering the studied indicators of economic security, it is possible to distinguish exogenous and endogenous ways of their possible correction in the process of influencing risks and threats in the information sphere. Ways of research of these issues include development of methodology of influence of processes in the information sphere on the indicators of economic security, research of their features, establishment of possible changes of economic indicators, development of basics of the state policy of a preventive nature.

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