

# ECONOMIC SECURITY OF UKRAINIAN REGIONS: PRE-WAR AND WAR PERIODS

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## Abstract

**Background and Objective:** The relevance of the research lies in the need to in ensuring the economic security of the regions of Ukraine in the pre-war and war periods. Martial law conditions have a negative impact on the state of economic security at different levels of governance: micro, meso and macro levels and limits the processes of ensuring national competitiveness. The purpose of the study is to assess the trends in ensuring the economic security of the regions of the State in the pre-war and wartime periods.

**Study Design/Materials and Methods:** In the process of research, we used general scientific and special methods: methods of analysis and synthesis, methods of structuring and generalization, methods of factual analysis, methods of system-functional approach, methods of comparison, method of systematization. In the process of research, we used the concepts and theories of economic security were also used, which made it possible to identify the levels of its provision: danger, risk, safety, challenge. The structural components of the economic security of the country's regions are studied: production security, innovation security, investment security, financial security, foreign economic security, and social security. The quantitative boundaries of assigning a region to one of the economic security zones are presented: danger, risk, security, challenge. An analysis of industrial security is carried out, which shows that most regions of the nation were in a state of security during the analysed period. In terms of innovation security, all regions of the nation were in a state of danger.

**Results:** It is found that most of the nation's regions were at risk in terms of investment, financial and foreign economic security, and in terms of social security- in a state of danger. A comprehensive assessment and grouping of the regions of Ukraine by the level of economic security is carried out. The economic security of the country's regions was diagnosed,

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which allowed for the identification of strengths and weaknesses, as well as opportunities and threats from the external environment in order to ensure security.

**Practical implications:** A comparison of the security status of the regions of Ukraine in the pre-war and war periods is carried out. It is established that in wartime, no region of the nation is in a state of security. A significant number of the regions in wartime are in a state of danger, and another group of regions is at risk.

**Conclusion and summary:** It is concluded that this situation causes an imbalance of the national security of the country as a whole, negatively affecting its competitiveness and the safe living conditions of the population.

**Keywords:** economic security, production security, innovation security, investment security, financial security, foreign economic security, social security, region, state

**JEL Classification:** E29; H56

**Paper type:** research study

## 1. Introduction

The presence of the military conflict in Ukraine, the aggravation of contradictions in economic phenomena and processes, the growth of social tension in society, and the curtailment of production capacities in dangerous areas have a negative impact on the economic security of the regions of the nation. The economic security of the regions of Ukraine is an indicator of national security, the welfare of the nation, and the sustainable socio-ecological and economic development of the country. The national and regional authorities should assess the level of economic security, identify threats and hazards that violate the state of such security, and develop appropriate mechanisms and programmes to ensure security at the meso- and macro-levels.

At the same time, assessing the state of economic security of Ukraine's regions will allow for timely intervention of the authorities in the economy of those territories that are in a state of threat or danger. Therefore, the economic security of a region is the ability of the region's economic system to withstand threats and dangers of the internal and external environments, and to achieve stability, sustainability and economic development, while ensuring the competitiveness of Ukraine's territories and the well-being of its residents.

Therefore, the purpose of the study is to assess the trends in ensuring the economic safety of the regions of Ukraine in the pre-war period. The objectives of the study are to define a system of indicators for assessing the economic safety of a region; to analyze and evaluate the structural elements of the economic safety of a region; to carry out a comprehensive assessment of the economic safety of the regions of the state; and to diagnose the economic safety of the regions of Ukraine. In the process of research, the following methods were used to identify the state and trends in ensuring the economic security of Ukraine's regions: methods of analysis

and synthesis, methods of structuring and generalization, methods of factual analysis, methods of system-functional approach, methods of comparison, and method of systematization.

The aim of the study is to assess the trends in ensuring the economic security of Ukraine's regions in the pre-war period. The objectives of the study are to define a system of indicators for assessing the economic security of a region; to analyse and evaluate the structural elements of the economic security of a region; to carry out a comprehensive assessment of the economic security of the regions of Ukraine; and to diagnose the economic security of the nation's regions.

## 2. Literature review

The problems of ensuring the economic security of the regions of Ukraine were studied by such researchers as Burbelo, Gbur, Matviichuk, Povzun, Stetsenko, Sukrusheva, Yakymchuk and others (Rybak, 2023; Petrenko, 2020). In particular, Stetsenko highlights the position of the economic security of a region in the national security system, studies the structure of threats to regional economic security, and provides measures to ensure economic security (Stetsenko, 2013). Sukrusheva conducts a morphological assessment of the concept of the „economic security of the region” and provides threats to ensure it (Sukrusheva, 2015); Povzun, in his research, provides a classification of the threats and dangers to economic security and proposes a targeted comprehensive programme to ensure the economic security of the regions of the nation (Povzun, 2020); the team of authors Burbelo, Patriarch and Burbelo propose a model for ensuring the economic security of a region in the system of its socio-economic development (Burbelo et al., 2020); Gbur studies potential threats to the national interests and national security of Ukraine in the economic sphere by components of the economic security system (Gbur, 2017); Matviichuk provides a system of indicators for assessing financial security as a component of the economic security of a region (Matviichuk & Neshko, 2017); the authors Yakymchuk, Kardash, Postelzhuk and Yakymchuk assess the indicators of social security to be an important area for ensuring the economic security of a region (Yakymchuk et al., 2020); the authors of a collective scientific work Leonid Mohilevskiy, Viktoria Fursa, Iryna Sievidova, Mykola Komziuk, Olga Khloponina-Gnatenko and Daria Pidkopai provide a system of criteria for assessing the economic security of the country and for the calculation of the integral index (Mohilevskiy et al., 2020); Serhii Cherniavskiy, Oleksandr Dzhuzha, Viktoria Babanina and Yurii Harust have been studying foreign experience in ensuring economic security and the possibility of its implementation in Ukraine (Cherniavskiy et al., 2022). However, there are still controversial issues regarding the comprehensive assessment of the economic security of the country's regions.

### 3. Methodology

The methodological basis of the study is the scientific achievements of scholars, which highlight the theoretical and applied aspects of ensuring the economic security of the regions of the nation. To achieve this goal, a set of general scientific and special techniques and methods of scientific research was used, namely: a structuring method – to identify the structural elements of the economic security of a region (production security, innovation security, investment security, financial security, foreign economic security, social security); a system method – to form a system of indicators and performance or assessing the economic security of the regions of the nation; a method of economic analysis – to analyse and assess the economic security of the regions of the nation. The empirical and factual basis of the study comprises the scientific results of Ukrainian and foreign authors on the problems of ensuring the economic security of regions, monographs, articles on the chosen topic, statistical and analytical reports of the State Statistics Service of Ukraine, and Internet resources.

### 4. Results

The choice of directions for ensuring the economic security of a region requires an analysis and assessment of the region's structural elements. Assessing the economic security of a region involves comparing actual indicators that characterise its structural component with threshold (normative) values. Table 1 shows the criteria for assessing the economic security of a region.

**Table 1:** Criteria for assessing the economic security of a region

Indicators	Thresholds
<b>Industrial safety</b>	
Gross regional product (GRP) (adjusted for purchasing power parity) per capita compared to the national average	70%
Share in industrial output of the manufacturing industry	70%
Share in industrial output of the machine building industry	20%
Fixed assets of economic sectors per capita compared to the national average	80%
Degree of depreciation of fixed assets	35%
Share of employees in small enterprises in the total number of employees in the economy	15%

continued tab. 1

<b>Innovation security</b>	
Expenditures on research as a percentage of gross regional product (GRP)	2%
Number of enterprises in the region that introduce innovations	23%
Share of new products in total output, %	>15
<b>Investment security</b>	
Volume of investments in fixed assets:	70%
-per capita in comparison with the average value;	25%
-in % of gross regional product (GRP)	
Share of foreign direct investment in GRP	>15
<b>Financial security</b>	
Share of gross regional product (GRP) in gross domestic product (GDP) of the country	>5%
Share of local budget revenues in total national revenues	>3%
Consumer price index in the region	<110%
Expenditure to income ratio	<80%.
Profitability of operating activities of enterprises	>10%
Rate of change in industrial output in the region	>100%
<b>Foreign economic security</b>	
Volume of foreign trade turnover per capita compared to the average value	50%
Share of imports in domestic consumption	30%
Import to export coverage ratio	>1
<b>Social security</b>	
Life expectancy of the population	70 years
Natural population growth rate (per 1000 population)	1.0
Share of the population with incomes below the subsistence level 7%	1.0
Unemployment rate	7%
Crime rate (number of crimes per 100,000 population)	5,000
Demographic burden of the disabled population on the able-bodied population, %	60%
Population growth per 1000 inhabitants	3%

*Source:* own study based on: Liubchenko

The analysis and evaluation of the above criteria will allow the assessment of the state of economic security of a region, identifying regions that require national and regional intervention in the processes of ensuring economic security, especially those territories that are in a state of danger or risk.

The state of economic security of a region can be assessed by using threshold (normative) values. Such values reflect the critical limits below or above which the region is at risk, threatened, or endangered in terms of economic security. If such limits are ignored, the region may find itself in a depressed state that threatens the normal life of the population. „Thresholds are usually taken as international benchmark thresholds, the values of economically developed countries, the best values for a set of regions, countries, world and domestic experts, the maximum or minimum of the entire set of indicators” (Kovalska, 2008). To calculate the index of economic security of a region, it is proposed to use the standardisation method, which allows unifying all the indicators that characterise it and lead to uniformity. The standardisation of indicators involves the mathematical selection of statistical indicators characterising the economic security of a region, comparing them with the normative (threshold) values shown in Table 1. In order to process the indicators and implement their standardisation, we will use the Microsoft Excel software product, which will allow us to analyse and process tabular data using formulas.

All indicators that characterise the economic security of a region should be divided into stimulant and discouraging indicators. Indicators that have a positive impact on the economic security of a region are called stimulators. Indicators that have a negative impact on the economic security of a region are called discouragers.

The economic security of a region for the stimulant indicators is calculated using the following formula (Kovalska, 2008):

$$S_{es} = I_f / I_p, \quad (1.1)$$

where:  $S_{es}$  – level of economic security of the region according to the  $i$ -th stimulus indicator;

$I_f$  – actual value of the indicator characterising the economic security of the region;

$I_p$  – threshold value of the indicator characterising the economic security of the region.

The economic security of a region for the indicators is discouraging calculated using the following formula:

$$S_{ed} = I_p / I_f, \quad (1.2)$$

where:  $S_{ed}$  – is the level of economic security of the region according to the  $i$ -th indicator-destimulator.

To determine the level of economic security of a region, we will use the method of grouping partial indicators, which involves their “collapsing” into an integral

index. To “roll up” the indicators, we will use the arithmetic mean method. The quantitative boundaries for assigning a region to one of the zones (danger, risk, security, challenge) are shown in Table 2.

**Table 2:** Quantitative boundaries for assigning a region to one of the zones (danger, risk, security, challenge)

Integral security index of the region	Zone
from 0 to 0.5	risk
from 0.51 to 1	risk
from 1.01 to 1.5	security
1.51 and more	challenge

*Source:* own study based on: Kovalska (2008), Loiko (2015).

As we can see, within each interval, there are regions that are in a state of danger, threat, risk and security.

According to the proposed approach to assessing the economic security of the country’s regions (Table 1), its structural components are production, innovation, investment, financial, foreign economic and social security.

To assess the production security of the country’s regions, we propose to use the following system of indicators: gross regional product (taking into account purchasing power parity) per capita compared to the average, the share of manufacturing in industrial production, and the share of small enterprises in the total number of people employed in the economy. These indicators were compared with the threshold (normative) values, which made it possible to obtain the corresponding standardised values and calculate the index of industrial security of the country’s regions (Table 3). A schematic representation of the industrial security of the country’s regions in 2021 is shown in Figure 1.

**Table 3:** Index of industrial security of the country’s regions

Regions	2016	2017	2018	2019	2020	2021
Crimea	no data	no data	no data	no data	no data	no data
Vynnytsia	1.319	1.384	1.309	1.285	1.265	1.264
Volyn	0.948	1.137	1.077	1.094	1.111	1.11
Dnipropetrovsk	1.909	1.431	1.404	1.351	1.299	1.294
Donetsk	1.223	0.908	0.895	0.871	0.819	0.813

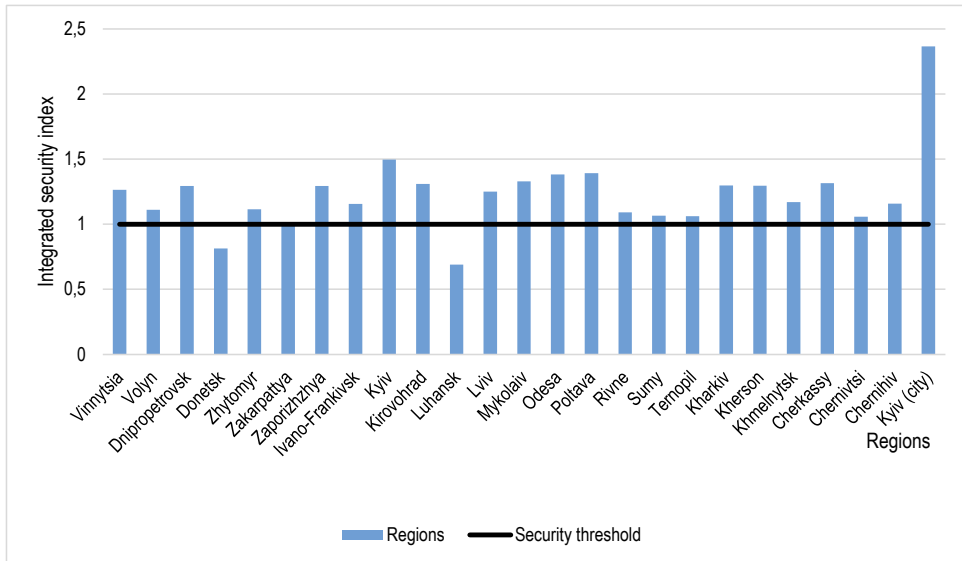
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Zhytomyr	1.064	1.214	1.198	1.131	1.126	1.115
Zakarpattia	1.017	1.112	1.099	1.035	1.004	1.002
Zaporizhzhya	1.320	1.401	1.372	1.314	1.301	1.293
Ivano-Frankivsk	1.186	1.322	1.283	1.221	1.157	1.156
Kyiv	1.395	1.536	1.532	1.488	1.501	1.496
Kirovohrad	1.252	1.424	1.401	1.334	1.313	1.309
Luhansk	0.672	0.609	0.773	0.797	0.695	0.689
Lviv	1.422	1.288	1.220	1.242	1.260	1.25
Mykolaiv	1.234	1.439	1.408	1.358	1.331	1.328
Odesa	1.588	1.505	1.425	1.403	1.383	1.382
Poltava	1.228	1.474	1.424	1.382	1.394	1.391
Rivne	1.087	1.228	1.109	1.090	1.092	1.091
Sumy	0.977	1.147	1.136	1.101	1.066	1.066
Ternopil	1.118	1.240	1.148	1.081	1.065	1.062
Kharkiv	1.630	1.393	1.386	1.307	1.307	1.298
Kherson	1.244	1.437	1.381	1.337	1.298	1.295
Khmelnitsk	1.153	1.311	1.252	1.176	1.177	1.17
Cherkassy	1.201	1.350	1.346	1.313	1.318	1.316
Chernivtsi	1.151	1.272	1.165	1.119	1.060	1.057
Chernihiv	1.055	1.302	1.221	1.160	1.162	1.158
Kyiv (city)	3.379	2.394	2.353	2.394	2.367	2.365
Sevastopol (city)	no data	no data	no data	no data	no data	no data

*Source:* Author's calculations.

The analysis shows that most regions of the country were in a state of security during the analysed period. Donetsk and Luhansk oblasts were at risk due to the annexation of these territories and a decrease in their production potential in 2021. The city of Kyiv was in a state of challenge. This is due to the favourable geopolitical location of these regions of the country. It can be concluded that the indicators of most regions of the country meet the thresholds of their industrial security.





**Figure 1.** Schematic representation of the production security of the country’s regions in 2021

Source: Own elaboration.

The innovative security of the country’s regions is determined by such indicators as research expenditures as a percentage of gross regional product (GRP), the number of regional enterprises that introduce innovations, and the share of new products in the total output. A comparison with the thresholds showed that the regions of the country are in a critical state in terms of ensuring their innovation security (Table 4). A schematic representation of the innovation security of the country’s regions in 2021 is shown in Figure 2. As we can see, all regions of the country are in a state of danger. This is due to the low level of financing of innovative developments, which does not meet the normative value, the rather low level of innovative activity of regional enterprises and the low output of innovative products. Accordingly, this state of security requires a review of both the national and regional innovation policies to ensure the innovation security of the regions.

**Table 4.** Index of innovation security of the country’s regions

Regions	2016	2017	2018	2019	2020	2021
Crimea	no data	no data	no data	no data	no data	no data
Vinnitsia	0.033	0.034	0.030	0.030	0.033	0.033
Volyn	0.037	0.032	0.032	0.020	0.035	0.033

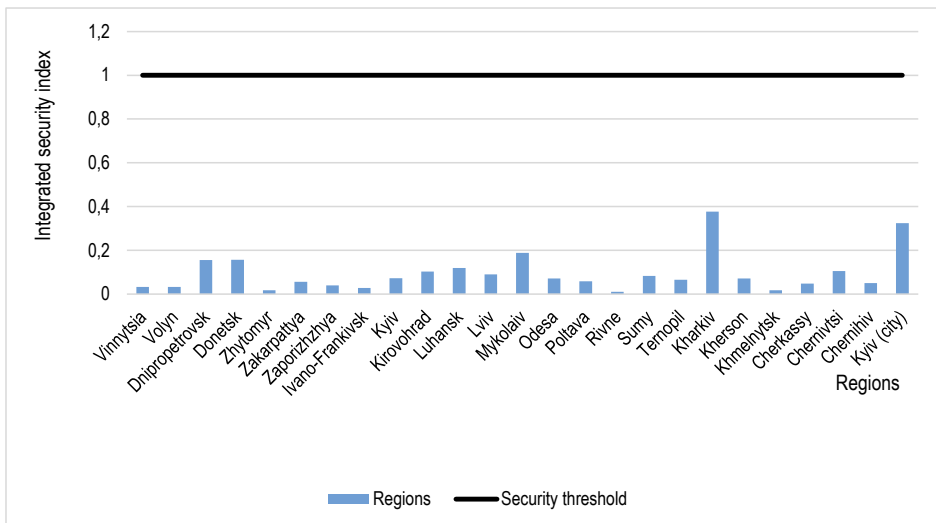
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Dnipropetrovsk	0.251	0.243	0.188	0.202	0.158	0.156
Donetsk	0.055	0.032	0.009	0.121	0.143	0.157
Zhytomyr	0.024	0.026	0.022	0.028	0.014	0.018
Zakarpattia	0.101	0.100	0.101	0.058	0.054	0.056
Zaporizhzhya	0.265	0.266	0.361	0.366	0.027	0.040
Ivano-Frankivsk	0.038	0.037	0.045	0.023	0.030	0.028
Kyiv	0.100	0.091	0.100	0.084	0.071	0.073
Kirovohrad	0.157	0.153	0.159	0.105	0.114	0.103
Luhansk	0.031	0.035	0.041	0.099	0.126	0.120
Lviv	0.098	0.100	0.102	0.090	0.092	0.090
Mykolaiv	0.226	0.187	0.145	0.139	0.195	0.188
Odesa	0.089	0.083	0.082	0.091	0.077	0.072
Poltava	0.024	0.024	0.024	0.012	0.067	0.058
Rivne	0.012	0.014	0.016	0.009	0.016	0.011
Sumy	0.138	0.139	0.135	0.086	0.088	0.083
Ternopil	0.058	0.052	0.063	0.037	0.073	0.066
Kharkiv	0.484	0.442	0.505	0.452	0.386	0.377
Kherson	0.078	0.081	0.087	0.090	0.082	0.071
Khmelnitsky	0.011	0.011	0.012	0.024	0.067	0.018
Cherkassy	0.100	0.070	0.073	0.050	0.041	0.048
Chernivtsi	0.106	0.090	0.098	0.094	0.151	0.105
Chernihiv	0.091	0.076	0.083	0.078	0.052	0.050
Kyiv (city)	0.284	0.262	0.318	0.298	0.319	0.324
Sevastopol (city)	no data	no data	no data	no data	no data	no data

Source: Author's calculations.

Innovations are the main tool for ensuring the competitiveness of the national and regional economies, which requires increased attention to ensure the innovation security of the country's regions. The diagram shows that in all regions of the country there is a significant gap between the actual and threshold values of their innovation security. Such a discrepancy may lead to a violation of the economic security of the

country's regions, a deterioration in the technological structure of their economies, and the impossibility of developing Industry 4.0 technologies and beyond.



**Figure 2.** Schematic representation of the innovation security of the country's regions in 2021

*Source:* Own elaboration.

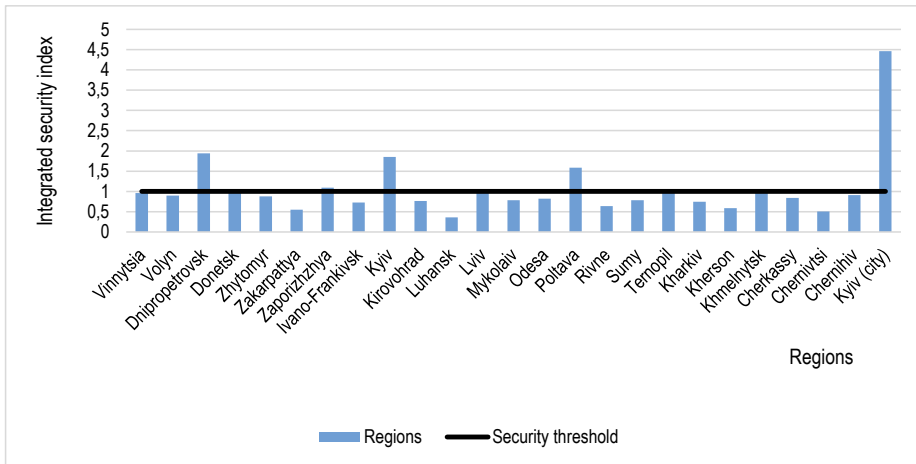
The indicators that characterise the investment security of the country's regions are capital investment, capital investment per capita, and capital investment as a percentage of gross regional product (GRP). The calculated values of the investment security of the country's regions show a different situation (Table 5, Figure 3). Most regions of the country (Vinnitsia, Volyn, Donetsk, Zhytomyr, Zakarpattia, Ivano-Frankivsk, Kirovohrad, Lviv, Mykolaiv, Odesa, Rivne, Sumy, Ternopil, Kharkiv, Kherson, Khmelnytsky, Cherkasy, Chernivtsi and Chernihiv) are at risk in terms of their investment security. Luhansk region is at risk due to the low volume of capital investment in its economy. On the other hand, Dnipropetrovska, Zaporizka, Kyivska, Poltavska and Ternopilska oblasts and the city of Kyiv are leaders and have investment security.

Each region of the country should develop its own investment attractiveness, which will stimulate foreign and domestic investment in the development of its economy. Investment resources allow for an increase in the production capacity of regional enterprises, create new jobs, diversify the activities of business entities, increase the export potential of the region, increase the volume of gross regional product, and, as a result, have a positive impact on the economic security of the region.

**Table 5.** Investment security index of the country's regions

Regions	2016	2017	2018	2019	2020	2021
Crimea	no data	no data	no data	no data	no data	no data
Vinnitsia	0.870	0.974	1.203	0.983	0.948	0.959
Volyn	0.871	0.756	0.763	1.023	0.838	0.896
Dnipropetrovsk	2.461	2.532	2.925	2.918	2.720	1.940
Donetsk	0.800	0.927	1.194	1.209	1.100	0.978
Zhytomyr	0.676	0.740	0.689	0.614	0.760	0.876
Zakarpattia	0.563	0.534	0.583	0.663	0.406	0.551
Zaporizhzhya	1.097	1.251	1.020	0.881	1.019	1.096
Ivano-Frankivsk	0.905	0.872	0.691	0.626	0.477	0.725
Kyiv	3.338	2.711	2.607	2.910	2.075	1.850
Kirovohrad	0.913	0.831	0.670	0.675	0.672	0.767
Luhansk	0.363	0.234	0.186	0.176	0.186	0.358
Lviv	1.538	1.579	1.560	1.507	1.237	0.988
Mykolaiv	1.239	1.124	0.835	0.956	0.823	0.784
Odesa	1.420	1.499	1.312	1.049	1.153	0.822
Poltava	1.704	1.401	1.355	1.535	1.884	1.586
Rivne	0.548	0.611	0.590	0.504	0.478	0.636
Sumy	0.754	0.719	0.659	0.608	0.646	0.783
Ternopil	0.659	0.760	0.730	0.740	0.668	1.010
Kharkiv	1.326	1.233	1.233	1.080	1.029	0.748
Kherson	0.619	0.784	0.774	0.999	0.664	0.590
Khmelnitsk	1.084	0.986	0.870	0.747	0.849	0.962
Cherkassy	0.793	0.786	0.882	0.834	0.753	0.839
Chernivtsi	0.400	0.352	0.359	0.364	0.338	0.506
Chernihiv	0.730	0.799	0.803	0.726	0.758	0.908
Kyiv (city)	8.282	8.390	10.123	9.647	7.851	4.463
Sevastopol (city)	no data	no data	no data	no data	no data	no data

Source: Author's calculations.



**Figure 3.** Schematic representation of the investment security of the country's regions in 2021

*Source:* Own elaboration.

Indicators that characterise the financial security of the country's regions include the share of gross regional product (GRP) in the country's gross domestic product (GDP), the consumer price index in the region, the ratio of expenditures to income, the profitability of enterprises' operating activities, and the rate of change in industrial output in the region.

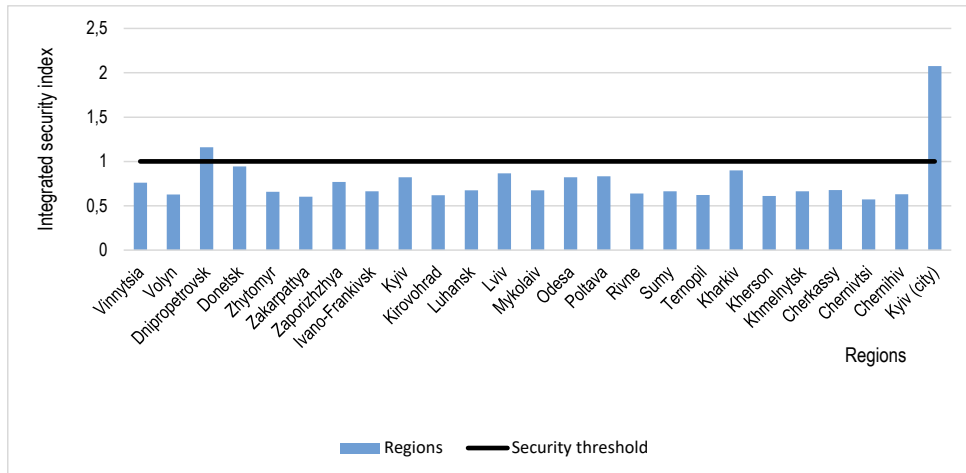
The calculated values of the financial security indicators (Table 6, Figure 4) show that all regions of the country (except for two) were at risk. This situation is due to the low level of profitability of enterprises in these regions, the low growth rates of production volumes, the high share of expenses compared to income, etc. Dnipropetrovska oblast and the city of Kyiv were in a state of financial security.

The financial security of a region determines its financial capacity, and its ability to reinvest capital in highly profitable assets, build financial potential and determine the prospects for the region's development. Conversely, the inability of a region to ensure its own financial security causes negative phenomena in the socio-economic development of the region, and social tension in society due to the low financial capacity of the population, which negatively affects the economic security of the region.

**Table 6.** Index of financial security of the country's regions

Regions	2016	2017	2018	2019	2020	2021
Crimea	No data	No data	No data	No data	No data	No data
Vinnitsia	0.729	0.726	0.746	0.759	0.762	0.762
Volyn	0.595	0.607	0.618	0.637	0.649	0.628
Dnipropetrovsk	1.190	1.222	1.237	1.247	1.195	1.161
Donetsk	0.951	0.940	0.980	0.996	0.942	0.943
Zhytomyr	0.639	0.641	0.638	0.664	0.678	0.659
Zacarpattia	0.594	0.598	0.589	1.369	0.607	0.603
Zaporizhzhya	0.811	0.806	0.805	0.818	0.803	0.770
Ivano-Frankivsk	0.648	0.642	0.658	0.666	0.677	0.664
Kyiv	0.852	0.848	0.838	0.859	0.848	0.821
Kirovograd	0.626	0.618	0.623	0.639	0.645	0.620
Luhansk	0.670	0.645	0.662	0.675	0.670	0.674
Lviv	0.824	0.847	0.832	0.821	0.881	0.868
Mykolaiv	0.667	0.663	0.669	0.682	0.689	0.674
Odesa	0.811	0.826	0.831	0.848	0.857	0.822
Poltava	0.841	0.865	0.860	0.878	0.852	0.834
Rivne	0.619	0.624	0.631	0.639	0.639	0.638
Sumy	0.648	0.653	0.651	0.665	0.680	0.664
Ternopil	0.590	0.595	0.607	0.608	0.627	0.623
Kharkiv	0.903	0.904	0.897	0.900	0.911	0.901
Kherson	0.600	0.603	0.596	0.605	0.631	0.611
Khmelnitsky	0.660	0.663	0.643	0.656	0.660	0.663
Cherkasy	0.662	0.671	0.663	0.672	0.688	0.679
Chernivtsi	0.564	0.571	0.551	0.550	0.574	0.574
Chernihiv	0.624	0.635	0.634	0.645	0.662	0.631
Kyiv (city)	2,086	2.102	2.086	2.099	2.124	2.077
Sevastopol (city)	No data	No data	No data	No data	No data	No data

Source: Author's calculations.



**Figure 4.** Schematic representation of the financial security of the country's regions in 2021  
*Source:* Own elaboration.

The indicators that characterise the foreign economic security of the country's regions are the volume of foreign trade turnover per capita compared to the average value, and the import-export coverage ratio. A comparison of these indicators with the normative values allowed us to calculate the index of foreign economic security, which is shown in Table 7 and Figure 5. The calculation showed that most regions of the country are in a state of risk or security. A state of security is observed in Vinnytsia, Dnipropetrovs'k, Donetsk, Zakarpattia, Zaporizhzhia, Kyiv, Kirovohrad, Lviv, Mykolaiv, Odesa, Poltava, Kharkiv, Khmelnytskyi, Chernihiv regions and the city of Kyiv.

**Table 7.** Index of foreign economic security of the country's regions

Regions	2016	2017	2018	2019	2020	2021
Crimea	No data	No data	No data	No data	No data	No data
Vinnitsia	2.079	1.951	1.766	1.617	1.712	1.299
Volyn	0.866	0.829	0.785	0.721	0.724	0.710
Dnipropetrovsk	4.038	4.040	3.968	3.722	3.808	4.304
Donetsk	3.100	2.906	2.846	2.575	2.675	3.479
Zhytomyr	1.001	0.947	0.917	0.918	0.941	0.825
Zacarpattia	1.338	1.323	1.335	1.168	1.177	1.108
Zaporizhzhya	2.277	2.330	2.240	2.037	2.208	2.390

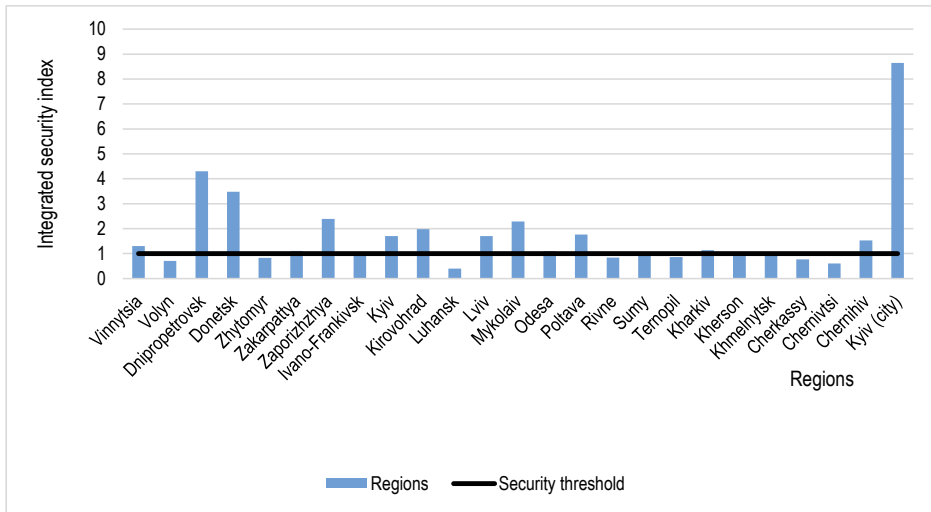
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Ivano-Frankivsk	1.041	0.886	0.949	0.940	0.936	0.977
Kyiv	1.885	1.702	1.624	1.592	1.737	1.706
Kirovograd	1.369	1.063	1.185	1.630	2.240	1.983
Luhansk	0.881	0.572	0.476	0.391	0.389	0.399
Lviv	1.394	1.423	1.496	1.539	1.744	1.704
Mykolaiv	2.020	1.968	2.135	1.793	2.168	2.293
Odesa	1.557	1.545	1.341	1.101	1.176	1.092
Poltava	1.630	1.656	1.513	1.550	1.843	1.769
Rivne	0.821	0.764	0.867	0.759	0.823	0.842
Sumy	0.955	0.954	0.935	1.020	1.028	0.968
Ternopil	0.730	0.746	0.757	0.678	0.759	0.859
Kharkiv	1.207	1.159	1.121	1.113	1.209	1.137
Kherson	0.881	0.858	0.559	0.481	0.579	0.898
Khmelnysky	0.703	0.813	0.985	0.818	0.941	1.010
Cherkasy	1.077	1.052	1.280	1.205	0.959	0.772
Chernivtsi	0.699	0.734	0.800	0.610	0.578	0.608
Chernihiv	0.765	1.001	1.088	1.240	1.601	1.533
Kyiv (city)	8.726	8.555	8.631	8.794	9.146	8.650
Sevastopol (city)	No data	No data	No data	No data	No data	No data

*Source:* Author's calculations.

The state of security in these regions indicates their high export potential, low import dependence, the presence of foreign markets for their products, and the integration of the regional economy into the international trade and economic space. The risk situation is typical for the regions of Volyn, Zhytomyr, Ivano-Frankivsk, Rivne, Sumy, Ternopil, Kherson, Cherkasy, and Chernivtsi.





**Figure 5.** Schematic representation of the foreign economic security of the country's regions in 2021

*Source:* Own elaboration.

The initial indicators for assessing the social security of the country's regions are life expectancy, the natural population growth rate (per 1,000 inhabitants), the share of the population with incomes below the subsistence level, the unemployment rate, the crime rate (number of crimes per 100,000 inhabitants), and the population growth per 1,000 inhabitants. The calculated values of the social security index are shown in Table 8 and Figure 6. We can see that the situation with social security is rather critical (negative values of the indices are observed) in the nation's regions. Almost all regions of the country were in a state of danger in terms of social security. The exceptions were Zakarpattia region (risk state), Ivano-Frankivsk region (security state), Kyiv region (security state), Rivne region (risk state), and Kyiv city (risk state).

The reasons for the critical situation in ensuring social security in the regions of the country are the low level of natural population growth (almost all regions of the country have negative population growth), low incomes that do not meet the subsistence level, high unemployment and the growth of unemployment over the period of the study.

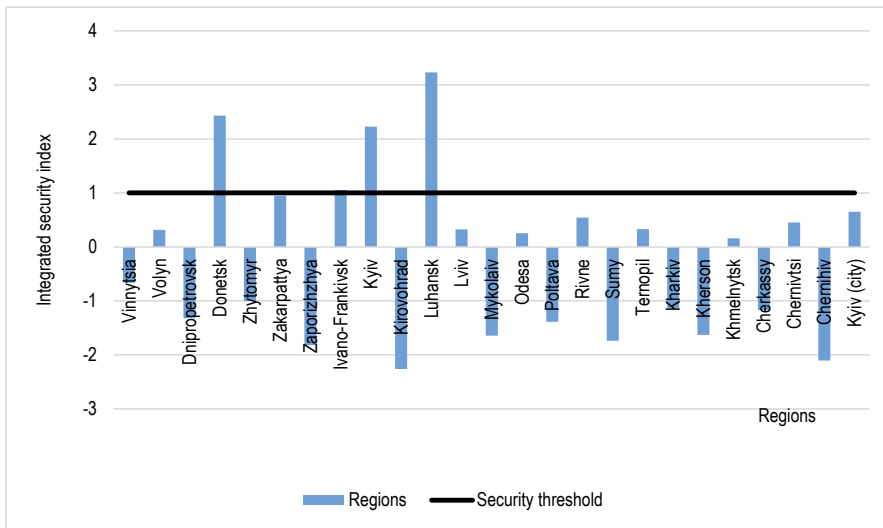
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**Table 8.** Index of social security of the country's regions

Regions	2016	2017	2018	2019	2020	2021
Crimea	No data	No data	No data	No data	No data	No data
Vinnitsia	0.199	0.238	0.174	0.164	0.155	-0.662
Volyn	1.124	0.996	1.019	0.825	0.671	0.315
Dnipropetrovsk	-0.254	-0.325	-0.541	-0.557	-0.669	-1.321
Donetsk	1.555	1.754	1.911	1.942	2.083	2.428
Zhytomyr	-0.075	-0.158	-0.316	-0.353	-0.497	-1.003
Zacarpattia	1.801	1.427	1.286	1.089	1.263	0.944
Zaporizhzhya	-0.685	-0.644	-0.733	-0.783	-0.960	-1.820
Ivano-Frankivsk	1.422	1.544	1.615	1.451	1.432	1.056
Kyiv	-0.034	-0.139	-0.185	-0.099	-0.327	2.227
Kirovograd	-0.675	-0.684	-0.777	-0.811	-1.065	-2.260
Luhansk	1.906	2.060	2.237	2.699	2.843	3.229
Lviv	0.709	0.802	0.714	0.635	0.454	0.327
Mykolaiv	-0.046	-0.144	-0.431	-0.580	-0.640	-1.642
Odesa	0.533	0.487	0.329	0.458	0.347	0.252
Poltava	-0.714	-0.729	-0.870	-0.853	-1.134	-1.387
Rivne	1.525	1.335	1.315	1.220	1.037	0.544
Sumy	-0.653	-0.456	-0.653	-0.596	-0.921	-1.737
Ternopil	0.933	0.719	0.647	0.639	0.539	0.331
Kharkiv	-0.356	-0.192	-0.467	-0.298	-0.567	-1.130
Kherson	-0.033	-0.131	-0.337	-0.435	-0.665	-1.630
Khmelnitsky	0.320	0.244	0.134	0.188	0.620	0.161
Cherkasy	-0.529	-0.604	-0.727	-0.692	-0.655	-1.167
Chernivtsi	1.183	0.998	1.054	1.081	0.812	0.454
Chernihiv	-1.044	-1.135	-1.342	-1.363	-1.460	-2.100
Kyiv (city)	1.235	1.210	1.171	1.136	0.927	0.650
Sevastopol (city)	No data	No data	No data	No data	No data	No data

Source: Author's calculations.

Negative values of the indicators of social security of certain regions of the nation are due to the negative value of natural population growth, where the number of deaths significantly exceeds the number of births. Accordingly, the primary indicators that had a negative value and were included in the calculation of the integral index caused such negative phenomena in the social development of these regions. It is worth noting that due to the military conflict in Ukraine, the situation will deteriorate, which may eventually lead to a demographic crisis and a negative impact on the economic security of the country as a whole.



**Figure 6.** Schematic representation of social security of the country's regions in 2021

*Source:* Own elaboration.

This necessitates the development of a balanced national and regional social policy aimed at ensuring the social security of the country's regions.

The calculation of the indices of production, innovation, investment, financial, foreign economic and social security allows for a comprehensive assessment of the economic security of the regions. Such an assessment will help to determine the state of economic security of the country's regions and, on this basis, to develop directions for improving the management of economic security processes for each region of the country. Table 9 shows the integral index of economic security of the country's regions for the period 2016-2021.

**Table 9.** Integral index of economic security of the country's regions

Regions	2016	2017	2018	2019	2020	2021
Crimea	No data	No data	No data	No data	No data	No data
Vinnitsia	0.872	0.885	0.871	0.806	0.813	0.609
Volyn	0.740	0.726	0.613	0.720	0.671	0.615
Dnipropetrovsk	1.599	1.524	1.530	1.481	1.419	1.256
Donetsk	1.281	1.245	1.306	1.286	1.294	1.466
Zhytomyr	0.555	0.568	0.525	0.500	0.504	0.415
Zacarpattia	0.902	0.849	0.832	0.897	0.752	0.711
Zaporizhzhya	0.848	0.902	0.844	0.772	0.733	0.628
Ivano-Frankivsk	0.873	0.884	0.874	0.821	0.785	0.768
Kyiv	1.256	1.125	1.086	1.139	0.984	1.362
Kirovograd	0.607	0.568	0.544	0.595	0.653	0.420
Luhansk	0.754	0.693	0.729	0.806	0.818	0.912
Lviv	0.998	1.007	0.987	0.972	0.945	0.871
Mykolaiv	0.890	0.873	0.794	0.725	0.761	0604
Odesa	1.000	0.991	0.887	0.825	0.832	0740
Poltava	0.786	0.782	0.718	0.751	0.818	0709
Rivne	0.769	0.763	0.755	0.704	0.681	0.627
Sumy	0.470	0.526	0.477	0.481	0.431	0.305
Ternopil	0.681	0.685	0.659	1.261	0.622	0.659
Kharkiv	0.866	0.823	0.779	0.759	0.713	0.555
Kherson	0.565	0.605	0.510	0.513	0.335	0.306
Khmelnitsky	0.655	0.671	0.649	0.570	0.719	0.664
Cherkasy	0.551	0.554	0.586	0.564	0.517	0.415
Chernivtsi	0.684	0.670	0.671	0.636	0.586	0.551
Chernihiv	0.370	0.446	0.415	0.414	0.463	0.363
Kyiv (city)	3.999	3.819	4.114	4.061	3.789	3.088
Sevastopol (city)	No data	No data	No data	No data	No data	No data

Source: Author's calculations.

One can observe different values of the indices and states of economic security of the country's regions, which have changed over the period under study. According to the quantitative boundaries of the state of economic security, four types of regions can be distinguished:

- regions that are in a state of danger (index value from 0 to 0.5);
- regions that are at risk (index value from 0.51 to 1);
- regions that are in a state of security (index value from 1.01 to 1.5);
- regions that are in a state of challenge (index value of 1.51 or more).

The integral index of economic security of the country's regions in 2021 broken down by its structural components is shown in Table 10. As we can see, there are different states of economic security by structural components. The analysis shows that the best state of economic security is observed in such components as production security (almost all regions were in a state of security in 2021), and foreign economic security (most regions were in a state of security). A critical state of economic security is observed in social security (almost all regions of the country were in a state of danger and risk), and innovation security (all regions of the country were in a state of danger). Investment and financial security did not have an unambiguous state of economic security in 2021. The calculation of the integral index of economic security of the country's regions in 2021 showed that the regions of the country were in different states, which corresponds to different thresholds of production, innovation, investment, financial, foreign economic and social security.

**Table 10.** Integral index of economic security of the country's regions in 2021

Regions	Production Security Index	Innovation Security Index	Investment Security Index	Financial Security Index	Foreign Economic Security Index	Social Security Index	2021	State of security
Vinnytsia	1.264	0.033	0.959	0.762	1.299	-0.662	0.609	Risk
Volyn	1.110	0.033	0.896	0.628	0.710	0.315	0.615	Risk
Dnipropetrovsk	1.294	0.156	1.940	1.161	4.304	-1.321	1.256	Safety
Donetsk	0.813	0.157	0.978	0.943	3.479	2.428	1.466	Safety
Zhytomyr	1.115	0.018	0.876	0.659	0.825	-1.003	0.415	Danger
Zacarpattia	1.002	0.056	0.551	0.603	1.108	0.944	0.711	Risk
Zaporizhzhya	1.293	0.040	1.096	0.770	2.390	-1.820	0.628	Risk
Ivano-Frankivsk	1.156	0.028	0.725	0.664	0.977	1.056	0.768	Risk
Kyiv	1.496	0.073	1.850	0.821	1.706	2.227	1.362	Safety
Kirovograd	1.309	0.103	0.767	0.620	1.983	-2.260	0.420	Danger

continued tab. 10

Luhansk	0.689	0.120	0.358	0.674	0.399	3.229	0.912	Risk
Lviv	1.250	0.090	0.988	0.868	1.704	0.327	0.871	Risk
Mykolaiv	1.328	0.188	0.784	0.674	2.293	-1.642	0.604	Risk
Odesa	1.382	0.072	0.822	0.822	1.092	0.252	0.740	Risk
Poltava	1.391	0.058	1.586	0.834	1.769	-1.387	0.709	Risk
Rivne	1.091	0.011	0.636	0.638	0.842	0.544	0.627	Risk
Sumy	1.066	0.083	0.783	0.664	0.968	-1.737	0.305	Danger
Ternopil	1.062	0.066	1.010	0.623	0.859	0.331	0.659	Risk
Kharkiv	1.298	0.377	0.748	0.901	1.137	-1.130	0.555	Risk
Kherson	1.295	0.071	0.590	0.611	0.898	-1.630	0.306	Danger
Khmelnysky	1.170	0.018	0.962	0.663	1.010	0.161	0.664	Risk
Cherkasy	1.316	0.048	0.839	0.679	0.772	-1.167	0.415	Danger
Chernivtsi	1.057	0.105	0.506	0.574	0.608	0.454	0.551	Risk
Chernihiv	1.158	0.050	0.908	0.631	1.533	-2.100	0.363	Danger
Kyiv (city)	2.365	0.324	4.463	2.077	8.650	0.650	3.088	Challenge

Source: Author's calculations.

The grouping of the country's regions by the level of economic security in 2021 is shown in Table 11.

**Table 11.** Grouping of regions by security level in 2021

Security status	Regions
Danger	Zhytomyr, Kirovohrad, Sumy, Kherson, Cherkasy, Chernihiv
Risk	Vinnytsia, Volyn, Zakarpatia, Zaporizhzhia, Ivano-Frankivsk, Luhansk, Lviv, Mykolaiv, Odesa, Poltava, Rivne, Ternopil, Kharkiv, Khmelnytsky, Chernivtsi
Safety	Dnipropetrovsk, Donetsk, Kyiv
Challenge	Kyiv city

Source: Author's calculations.

We can see that Zhytomyr, Kirovohrad, Sumy, Kherson, Cherkasy and Chernihiv regions are in a state of danger. The city of Kyiv is in a state of challenge due to its geopolitical location and status as the capital of the nation. The security situation is good in Dnipropetrovska, Donetska and Kyivska oblasts. The rest of

Ukraine's regions are at risk. Such a grouping requires an individualised approach to the selection of areas for improving the management of processes to ensure the economic security of the country's regions.

The analysis and assessment of the structural components of the economic security of the nation's regions allows for diagnostics to identify strengths and weaknesses related to the provision of economic security. On the other hand, such diagnostics are intended to identify threats and opportunities created by the external environment for ensuring the economic security of the nation's regions.

The diagnostics of the economic security of Ukraine's regions are presented in Table 12. We can see that the regions of the country have both strengths and weaknesses in terms of ensuring their economic security.

**Table 12.** Diagnostics of the economic security of Ukraine's regions in 2021

Weaknesses		Strengths	
<ul style="list-style-type: none"> <li>– low level of natural population growth;</li> <li>– low level of population income;</li> <li>– high unemployment rate;</li> <li>– low level of profitability of the region's enterprises;</li> <li>– low growth rates of production volumes;</li> <li>– low level of capital investment in the regional economy;</li> <li>– low level of financing of innovative developments;</li> <li>– low level of innovation activity of regional enterprises;</li> <li>– low output of innovative products</li> </ul>		<ul style="list-style-type: none"> <li>– high export potential of the regions;</li> <li>– low import dependence of the regions; availability of foreign markets for products;</li> <li>– integration of regional economies into the international economic space;</li> <li>– favourable geopolitical location of individual regions</li> </ul>	
State of economic security			
danger	risk	safe	threat
Zhytomyr, Kirovohrad, Sumy, Kherson, Cherkasy, Chernihiv	Vinnytsia, Volyn, Zakarpatia, Zaporizhzhia, Ivano-Frankivsk, Luhansk, Lviv, Mykolaiv, Odesa, Poltava, Rivne, Ternopil, Kharkiv, Khmelnytskyi, Chernivtsi	Dnipropetrovska, Donetsk, Kyivska	Kyiv city

continued tab. 12

Threats	Opportunities
<ul style="list-style-type: none"> <li>– military operations in the regions of the country;</li> <li>– martial law in the country;</li> <li>– destruction of the production potential of the country's regions;</li> <li>– migration of the population;</li> <li>– unstable political situation;</li> <li>– deterioration of the economic situation in the country;</li> <li>– reduction of the export potential of the country's regions;</li> <li>– decline in household incomes;</li> <li>– growth of social tension in the society;</li> <li>– deterioration of investment attractiveness of the country's regions;</li> <li>– growth of internal and external debt</li> </ul>	<ul style="list-style-type: none"> <li>– provision of tax holidays;</li> <li>– support for the development of small and medium-sized businesses;</li> <li>– obtaining funds from international funds to support the development of the country's economy;</li> <li>– improving the demographic situation in the country;</li> <li>– increasing the innovative potential of the country's regions;</li> <li>– preservation of the production capacities of regional enterprises</li> </ul>

Source: Author's calculations.

During the war period, the situation changed dramatically, with the relocation of some production facilities from dangerous regions to safer regions of Ukraine (Table 13).

**Table 13.** Relocation of production facilities from dangerous regions to safer regions of Ukraine in 2021

Region (oblast) relocations		Number of applications, units	Processed, units	Relocated enterprises, units	Started operations, units	Areas of economic activity of enterprises	Region of accommodation before relocation	The share of relocated enterprises in the total number of enterprises, %.
1	Lviv	412	410	93	39	metalworking, machine building, light industry, medical and pharmaceutical companies, IT industry	Kharkiv, Zaporizhzhya, Sumy, Chernihiv, Kyiv, Donetsk	0.4428
2	Ivano-Frankivsk	98	95	28	23	light and furniture industry, IT services, metalworking	Kharkiv, Zaporizhzhya, Kyiv, Donetsk	0.3435



continued tab. 13

3	Volyn	12	8	7	5	light and food industry, IT industry	Kyiv, Kharkiv, Zhytomyr	0.0991
4	Rivne	589	578	21	16	light and food industry, trade, woodworking and furniture industry	Kyiv, Kharkiv, Donetsk, Chernihiv	0.3476
5	Ternopil	131	131	24	18	light, machine-building, metalworking and food industry, IT industry	Zaporizhzhia, Sumy, Chernihiv, Kyiv, Donetsk, Luhansk	0.4652
6	Chernivtsi	45	44	23	16	IT industry, production of electric motors and high-voltage equipment, light, food and chemical industries	Zaporizhzhia, Kyiv, Dnipropetrovsk, Kharkiv	0.544
7	Khmelnitsky	170	170	19	15	Mechanical engineering and metalworking, furniture, chemical, light and food industries	Zaporizhzhia, Kyiv, Donetsk, Kharkiv	0.2476
8	Transcarpathian	500	500	81	54	furniture, chemical, light and food industries, radio electronics and IT industry	Kharkiv, Zaporizhzhia, Sumy, Chernihiv, Kyiv, Donetsk	1.2025
9	Vinnitsia	97	91	16	9	food industry, refrigeration and ventilation equipment manufacturing, metalworking and machine building, medical equipment manufacturing	Kharkiv, Dnipropetrovsk, Donetsk, Kherson, Kyiv	0.162

Source: Storonianskoi (2022).

As can be seen, a significant proportion of relocated enterprises are located in the eastern, northern and central regions of Ukraine.

Furthermore, we can compare the regions of Ukraine in terms of security in the pre-war and war periods (Table 14).

**Table 14.** Comparison of the regions of Ukraine by the state of security in the pre-war and war periods

Security status	Regions in the pre-war period	Regions during the war period
Danger	Zhytomyr, Kirovohrad, Sumy, Kherson, Cherkasy, Chernihiv	Dnipropetrovsk, Donetsk, Zhytomyr, Zaporizhzhia, Luhansk, Mykolaiv, Odesa, Sumy, Kharkiv, Kherson, Chernihiv
Risk	Vinnytsia, Volyn, Zakarpattia, Zaporizhzhia, Ivano-Frankivsk, Luhansk, Lviv, Mykolaiv, Odesa, Poltava, Rivne, Ternopil, Kharkiv, Khmelnytsky, Chernivtsi	Vinnytsia, Volyn, Zakarpattia, Ivano-Frankivsk, Kirovohrad, Lviv, Poltava, Rivne, Ternopil, Khmelnytsky, Cherkasy, Chernivtsi, Kyiv
Safety	Dnipropetrovska, Donetsk, Kyiv	–
Challenge	Kyiv city	–

*Source:* Author's calculations.

We can observe that in wartime, no region of the nation is in a state of security. A significant number of regions in wartime are in a state of insecurity, and another group of regions is at risk. This indicates that the eastern, northern and southern parts of Ukraine are in the zone of military damage, while the central part of Ukraine is at significant risk. This situation imbalances the national security of the country as a whole, negatively affecting its competitiveness and the safe living conditions of the population.

## 5. Conclusions

The analysis of production safety in the regions of Ukraine showed that it was in line with the normative safe values from the pre-war period, where most regions were safe (except for Donetsk and Luhansk regions). The assessment of innovation security revealed the presence of danger in all regions of the nation, which indicates the existence of significant deviations between the actual and threshold values of their innovation security. The analysis showed the presence of risks and dangers in ensuring investment and financial security in almost all regions of the country, except for a few (Zaporizhzhia, Kyiv, Poltava and Ternopil regions and the city of Kyiv). The analysis of foreign economic security indicated that most regions of the country are in a state of risk or insecurity. Studies have shown a critical situation

regarding social security, where negative population growth has led to negative consequences in terms of social security provision.

The study identified the following problems in ensuring the economic security of the country's regions: high unemployment, the low financial capacity of enterprises, an excess in the number of deaths compared to the number of births, low income and purchasing power of the population, low investment attractiveness regarding certain regions of the country and low investment activity of regional economic entities, low output of innovative products, etc. The elimination of these problems requires, first of all, the resolution of the military conflict, followed by developing and implementing programmes for the post-war economic recovery of the regions and Ukraine as a whole, thus attracting investments in the development of the regional and national economy, creating and developing export potential, encouraging innovative economic renewal, and more.

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