Strategies, models and technologies of economic systems management in the context of international economic integration

Collective monograph
edited by Dr.oec. Prof. Maksym Bezpartochnyi,
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The authors of the book have come to the conclusion that to improve the efficiency of managing economic systems it is necessary to use modern modern strategies, models and technologies. Basic research focuses on assessment of intellectual capital, economic security, social sustainability in tourism, the impact of the COVID-19 pandemic on different sectors of the economy. The research results have been implemented in the different models of controlling, management methodology, personnel management, and strategies for the efficient use of financial resources, development of transport logistics, a creative economy and the creation of startups. The results of the study can be used in decision-making at the level of international business, ministries and departments that regulate the processes development of economic systems, ensuring stability and efficiency. The results can also be used by students and young scientists in developing of strategies, models and technologies for economic systems management in the context of international economic integration.

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INTEGRATED ASSESSMENT OF INSURANCE MARKET SAFETY AS AN ECONOMIC SYSTEM TAKING INTO ACCOUNT THE DEGREE INFLUENCE OF EACH INDICATOR

The effective functioning of the insurance market as an economic system is impossible without maintaining the appropriate level of its security, which, in turn, is an important component of financial security of the state and significantly affects on the national security.

The high level of financial security of the insurance market is ensured by financially reliable insurance companies that provide full insurance protection of citizens, economic entities and contribute to the economic development of the state.

The interest of the state in development of insurance and ensure financial security of the insurance market is due to the following factors [1]:

1) given the world experience it is possible to state the fact of the importance of the insurance market as one of the main sources of long-term investing funds in the economy;

2) the constant development of the insurance market leads to an increase in sources of funding for the budget through the amount of funds accumulated by insurers;

3) the use of the insurance industry should be used as an effective instrument for pension reform;

4) inefficient functioning of this segment of the economy leads to problems in other areas of economic security of the state as a whole;

5) applying the insurance system reduces the burden on the state budget, namely in terms of compensation for unforeseen losses.

The need to assess the level of security of the insurance market and its constant monitoring is especially acute today given the dynamic changes in the insurance sector of the national economy due to the globalization of the world insurance space and the emergence of new problems in the insurance sector, which are related to the political-

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economic consequences of modern transformations of the domestic economy.

In the context of this issue, it should be noted that in Ukraine has adopted two methods for calculating the level of economic security: 2007 and 2013. The method of calculating the level of economic security of Ukraine in 2007 considers the security of the insurance market as a separate component of financial security, and interprets the concept of financial security of the insurance market as the level of ensuring of the insurance companies with financial resources, which would allow them, if necessary, to reimburse the losses stipulated in the insurance contracts of their customers and ensure their effective functioning [2]. The method in 2013 considers the security of the insurance market as a component of the security of the non-banking financial sector [3].

In these methods offered indicators of financial security and their threshold values that reflect a particular state of the latter. But analyzing the state of financial security of the insurance market as one of the most important economic systems of the state it is necessary to form such a set of indicators that will provide the most complete picture of trends of development of the insurance business. For this purpose, we use the indicators defined in the guidelines [2; 3] and calculate the integrated indicator safety of the insurance market of Ukraine.

The integrated index safety of the insurance market is calculated by formula (3.10):

$$I_{\Phi BCP} = \sum_{i=1}^{n} k_i * x_i \qquad (3.10)$$

where: k_i – weights of coefficients are calculated by the principal components method;

x_i – normalized values of the i-th statistical indicator.

To calculate the weights of coefficients was chosen the principal components method. The advantage of this method is that the number of components is equal to the number of factor features the main components are not related to each other and fully explain the variation of the original data. In economics the principal components method is most often used to estimate the relationship between a set of primary data and a calculated integrated indicator.

The initial data for the calculation are formed in Table 3.2.

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Table 3.2

Statistical values indicators of financial security of the insurance market for 2014-2018

The name of the indicator	2014	2015	2016	2017	2018
Penetration level, %	1,71	1,50	1,48	1,46	1,39
Density of insurance, USD / pers.	39,51	28,98	30,37	36,50	42,30
The share of long-term insurance in the total amount of collected insurance premiums, %	8,07	7,35	7,84	6,71	7,91
The level of gross payments, %	18,92	27,24	25,13	24,26	26,06
Share of premiums owned by non-resident reinsurers, %	5,72	8,51	11,27	7,82	6,07
Share of insurance premium revenues of the three largest insurance companies in the total revenue of insurance premiums (excluding life insurance), %	15,60	14,70	18,90	21,30	15,00

To calculate the weights of coefficients and the integrated indicator of the level of financial security of the insurance market, the indicators are given in Table 3.2, it is necessary to normalize. Normalization will be carried out according to the method described in the works of A. Sukhorukov and Yu. Kharazishvili [4].

Such indicators as the level of penetration, the density of insurance, the share of long-term insurance in the total amount of collected insurance premiums, the level of gross payments are stimulators of growth of financial security of the insurance market. On the contrary, disincentives are the share of premiums owned by non-resident reinsurers and the share of insurance premiums of the three largest insurance companies in total insurance premiums (excluding life insurance), because their growth reduces the overall level of financial security.

To normalize the indicators that are incentives it is necessary the actual value of the indicator in the i-th year to divide the maximum value of each indicator in the data sample. For indicators that are disincentives we find the correlation between the minimum value of each indicator safety of the insurance market and the actual value in the i-th year.

Normalized data for the calculation weights of coefficients and integral index are given in Table 3.3.

Normalized statistical of financial security the indicators of the insurance market for 2014-2018

Indicators	2014	2015	2016	2017	2018
Penetration level, %	1,000	0,879	0,864	0,852	0,812
Density of insurance, USD / pers.	0,934	0,685	0,718	0,863	1,000
The share of long-term insurance in the total amount of collected insurance premiums, %	1,000	0,911	0,971	0,831	0,981
The level of gross payments, %	0,695	1,000	0,923	0,893	0,960
Share of premiums owned by non-resident reinsurers, %	1,000	0,672	0,508	0,731	0,942
Share of insurance premium revenues of the three largest insurance companies in the total revenue of insurance premiums (excluding life insurance), %	0,942	1,000	0,778	0,690	0,980

To calculate the weight of coefficients of each indicator was used the principal components method. The results obtained are shown in Table 3.4.

Weight of coefficients the indicators of financial security of the insurance market in 2018 are calculated by the principal components method

Indicator	Weight of coefficient
Penetration level, %	0,156
Density of insurance, USD / pers.	0,160
The share of long-term insurance in the total amount of collected insurance premiums, %	0,141
The level of gross payments, %	0,206
Share of premiums owned by non-resident reinsurers, %	0,256
Share of insurance premium revenues of the three largest insurance companies in the total revenue of insurance premiums (excluding life insurance), %	0,081

By the method of substitution of the obtained data in the formula (3.10) are determined the following values of the integrated safety indicator of the insurance market (Figure 3.9).
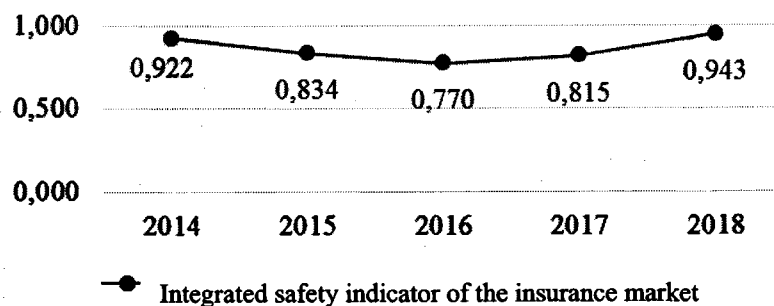

Integrated safety indicator of the insurance market

Figure 3.9 Dynamics the value of integrated safety indicator of the insurance market of Ukraine during 2014-2018

According to the obtained data calculation of integrated safety indicator of the insurance market, fluctuations are observed. During 2014-2016, the integrated indicator decreased by 16.52% due to a decrease in the penetration level of insurance by 0.23 p. p., the density of insurance by 9.14 USD / pers., the share of long-term insurance in the total amount of collected insurance premiums by 0.23 p. p., and disincentives during the specified period on the contrary increased: the share of premiums owned by non-resident reinsurers and the share of insurance premium revenues of the three largest insurance companies in the total revenue of insurance premiums (excluding life insurance) increased by 5.55 p. p. and at 3.30 p. p. respectively.

During the period 2016-2018 the integrated indicator increased by 22.54% and in 2018 amounted to 0.943. This increase was due to an increase in the density of insurance by 11.92 USD / pers., the share of long-term insurance in the total amount of collected insurance premiums by 0.08 p. p., the level of payments by 1.00%, a decrease in the share of premiums owned by non-resident reinsurers and the share of insurance premiums revenues of the three largest insurance companies in the total revenue of insurance premiums (excluding life insurance) by 5.19 p. p. and at 3.90 p. p. respectively. But given the above, it should be noted that all the studied indicators during 2014-2018 were at a level much lower than the threshold values defined in the guidelines [2; 3].

These conclusions cannot be considered sufficiently informative without determining the level of influence of each indicator on the level of integrated indicator safety of the insurance market. This calculation will identify the most influential indicators and make a more detailed analysis of threats to the financial security of the insurance market.

The methodological basis for this study was developing of Yu. Kharazishvili [5] to study the dynamic processes in the economic system and determine the coefficient of sensitivity certain indicators at the output to their changes at the input, which provides determines the impact of each x_i on y (in our case $I_{\Phi БCP}$) (formula 3.11):

$$E(y_i, x_i) = \frac{\Delta y_i}{\Delta x_i} * \frac{x_i}{y_i}$$

(3.11)

Therefore, we modify the formula for the calculation to determine the impact of a particular indicator on the integrated indicator of financial security of the insurance market, similar to the approach defined in article [6] (formula 3.12):

$$K_q = \frac{\Delta I_{\Phi БCP}}{\Delta x_i} * \frac{x_i}{I_{\Phi БCP}},$$

(3.12)

where: $\Delta I_{\Phi БCP}$ – the difference between the actual value of the integrated index of financial security of the insurance market and the value of the integrated index after changing the statistical value of the indicator by 1%;

Δx_i – delta statistical value of the i-th indicator;

$I_{\Phi БCP}$ – the actual value of the integrated index of financial security of the insurance market;

x_i – the actual value of the i-th indicator;

K_q – coefficient of sensitivity (elasticity) of the integrated indicator of financial security of the insurance market.

The results of calculation the coefficient of sensitivity are shown in Table 3.5.

It should be noted that incentives have a positive value of growth on the integrated index safety of the insurance market, and disincentives – negative.

Table 3.5

Coefficients of sensitivity of the integrated indicator to the change of indicator the financial security of the insurance market in 2018

Indicator	Coefficient of sensitivity
Penetration level, %	1,068
Density of insurance, USD / pers.	0,572
The share of long-term insurance in the total amount of collected insurance premiums, %	2,150
The level of gross payments, %	1,340
Share of premiums owned by non-resident reinsurers, %	0,503
Share of insurance premium revenues of the three largest insurance companies in the total revenue of insurance premiums (excluding life insurance), %	0,878

According to the results of the calculation in Table 3.5 on the level of integrated indicator of financial security of the insurance market is most affected by the share of long-term insurance in the total amount of collected insurance premiums. Thus, with the growth of this indicator by 1%, the integrated indicator will grow by 2.150%. With the growth level of gross payments by 1%, the integrated indicator of financial security of the insurance market will increase by 1.340%. With an increase the level of payments by 1%, the integrated indicator will increase by 1.068%. The indicator "density of insurance" has a coefficient of sensitivity less than one, so we can draw conclusions about the inelasticity of the indicator. A change of this indicator by 1% causes an increase in the integrated indicator by 0.572%. Thus, the growth rate density of insurance is higher than the growth rate of the integrated indicator, which indicates a low level of influence of this indicator.

Decreases of the disincentive-indicators increase the integrated indicator of financial security of the insurance market. However, the calculated coefficients of sensitivity indicate on low level of influence of these indicators on the integral index, as the coefficient is less than one. A decrease the share of premiums owned by non-resident reinsurers by 1% will increase the integral indicator by 0.503% and a decrease in the share of insurance premium revenues of the three largest insurance companies in the total revenue of insurance premiums (excluding life insurance) – by 0.878%.

Therefore, according to the analysis, the areas of improving the

financial security of the insurance market should be aimed at the level of penetration, the share of long-term insurance in the total amount of collected insurance premiums and the level of payments.

Summarizing the above suggestions for improving the assessment of the level of security of the insurance market, we can draw the following generalizations and conclusions.

To determine the impact of each indicator on the state of financial security of the insurance market of Ukraine, it is proposed to calculate an integrated indicator, according to the method that involves determining the weight of coefficients by the principal components method. This method is used to estimate the relationship between the set of primary data and the calculated integrated indicator. The advantage of the method is that the number of components is equal to the number of factor features the main components are not related to each other and fully explain the variation of the original data. Thus, the experimental implementation of this method of calculation made it possible to determine the value of the integrated indicator of financial security of the insurance market of Ukraine during 2014-2018.

Despite the fact that for the period 2016-2018 the integrated indicator increased by 22.54% and amounted to 0.943 in 2018, at the same time, all studied indicators were at a level much lower than the threshold values defined in the guidelines, so the overall level integrated indicator can be considered low.

The next step was to determine the most influential indicators on the level of financial security of the insurance market of Ukraine by calculating the coefficients of sensitivity. It was found that the integrated indicator security of insurance market was the most sensitive to changes in the level of penetration, the share of long-term insurance in the total amount of collected insurance premiums and the level of payments, because these indicators are elastic.

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