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IDENTIFICATION OF THE LEVEL OF FINANCIAL SECURITY OF AN INSURANCE COMPANY

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Kozmenko S. M., Ruban O. O. Identification of the Level of Financial Security of an Insurance Company

The article is devoted to theoretical and practical aspects of identification of financial security of the insurer. The article justifies urgency of identification of the level of financial security of the insurer and its qualitative assessment. It offers a scientific and methodical approach to identification of the level of financial security of the insurer on the basis of the conducted analysis of advantages and shortcomings of the existing approaches. The basis of the developed methods is a generalised assessment of the level of financial security of the insurer, which is offered to be carried out on the basis of calculation of statistical and dynamic integral indicators of financial security of the insurance company. The obtained integral assessments allow making a conclusion about efficiency of the selected strategy of the insurer and its ability to oppose to negative influence of threats to financial security. Results of calculation of integral indicators of financial security of the insurer allow identification of influence of fraud as the main threat to financial security of domestic insurance companies. The proposed approach was realised in practice of Ukrainian insurers and proved its efficiency.

Key words: *financial security of a company, insurance company, methodological approach, threats to financial security*
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Козьменко С. Н., Рубан О. А. Определение уровня финансовой безопасности страховой компании

Статья посвящена теоретическим и практическим аспектам определения финансовой безопасности страховщика. В работе обоснована актуальность определения уровня финансовой безопасности страховщика и предоставления ему качественной оценки. На основе проведенного анализа преимуществ и недостатков существующих подходов предложен научно-методический подход к определению уровня финансовой безопасности страховщика. Основой разработанной методики является обобщенная оценка уровня финансовой безопасности страховщика, которую предлагается осуществлять на основе расчета статического и динамического интегральных показателей финансовой безопасности страховой компании. Полученные интегральные оценки позволяют сделать вывод об эффективности выбранной стратегии страховщика и его способности противодействовать негативному влиянию угроз финансовой безопасности. Результаты расчета интегральных показателей финансовой безопасности страховщика позволяют определить влияние мошенничества как основной угрозы финансовой безопасности отечественных страховых компаний. Предложенный подход был реализован на практике украинских страховщиков и доказал свою эффективность.

Ключевые слова: *финансовая безопасность компании, страховая компания, методологический подход, угрозы финансовой безопасности.*
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Козьменко С. М., Рубан О. О. Визначення рівня фінансової безпеки страхової компанії

Стаття присвячена теоретичним і практичним аспектам визначення фінансової безпеки страховика. У роботі обґрунтовано актуальність визначення рівня фінансової безпеки страховика та надання йому якісної оцінки. На основі проведеного аналізу переваг і недоліків існуючих підходів запропоновано науково-методичний підхід до визначення рівня фінансової безпеки страховика. Основою розробленої методики є узагальнена оцінка рівня фінансової безпеки страховика, яку пропонується здійснювати на основі розрахунку статичного та динамічного інтегральних показників фінансової безпеки страхової компанії. Отримані інтегральні оцінки дають змогу зробити висновок про ефективність обраної стратегії страховика та його здатність протидіяти негативному впливу загроз фінансовій безпеці. Результати розрахунку інтегральних показників фінансової безпеки страховика дозволяють визначити вплив шахрайства як основної загрози фінансовій безпеці вітчизняних страхових компаній. Запропонований підхід був реалізований на практиці українських страховиків і довів свою ефективність.

Ключові слова: *фінансова безпека компанії, страхова компанія, методологічний підхід, загрози фінансовій безпеці.*
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Modern development of the insurance market is characterized by rapid growth and increasing competition among insurance companies. Today productive activity of an insurance company, first of all, related to the insurer's ability to effectively evaluate their own financial situation.

Evaluation of the financial condition of the insurer could be done in many ways, which is related primarily to determining of financial stability, solvency and liquidity of the insurance company. Despite the existence of various ways to determine the financial condition of insurance companies, less attention is paid to the level of financial security. Insurer's financial security is an essential component of economic security, along with investment, human resources, technology, information and other components. Financial security is a dynamic integral charac-

teristic of insurer's effectiveness in the long term, depending on the capacity to withstand external and internal threats.

1. Selection of indicators. The methodological approach of determining the level of insurer's financial security consists of some groups of indicators, which represent different aspects of insurer's financial situation. The formation of data-base for the calculation of static (IFS_{st}) and dynamic (IFS_{dn}) integral indicators of insurer's financial security should begin from the liquidity and solvency. This is due to the fact that liquidity and solvency is a necessary condition to achieve insurer's financial sustainability in the medium term and its financial security in the long term [9, 2, 4]. Four relative indicators are selected for this group: current liquidity ratio (coverage ratio), quick liquidity ratio, absolute liquidity ratio, mobility assets) and one absolute indicator (size of exceeding the available solvency margin against calculated solvency margin.

An important part of assessing the level of financial security of a company is a group of indicators of business activity and turnover [7, 6]. Total assets turnover ratio, current assets turnover ratio, inventory turnover ratio and accounts receivable turnover ratio are selected for this group.

Input data group of methodological approach should include indicators that reflect the level of financial stability of the insurer, because the financial stability is a characteristic of its financial position in the medium term, financial security - in the long term [9, 1]. Indicators of financial sustainability, selected as a separate indicator of the level of insurer's financial security include: financial stability ratio, financial autonomy ratio, financial dependence ratio, debt concentration ratio, rate of financing, own working capital ratio, cash flow adequacy ratio, reserve adequacy ratio, financial capacity ratio, financial leverage ratio and balanced portfolio ratio.

As one of the main indicators of company's financial security are indicators of the effective capital structure [8, 3], then the approach include insurer's rate of return on equity and return on insurance operations for the hryvnia equity. The other indicators of insurer's effectiveness are indicators chosen rate of return on sales, return on assets, efficiency of insurance operations ratio and return on insurance operations for the hryvnia premiums.

In addition to the above four groups of indicators the approach should be supplemented with a set of input data of some other indicators that reflect the specific determination of just financial security. The following group includes indicators of intensity changes analysis of the overall development of the insurer (equity, assets, income, and insurance premiums). As the analysis of the intensity change indicators in the long term most of all is reflected with growth rate, this group indicators includes own capital growth ratio, total assets growth ratio, income growth ratio, insurance premiums growth ratio, and the share of the insurer's assets in the total assets of domestic insurers.

The next group of indicators (indicators of financial security) describes specifics of insurance companies in comparison with the enterprise of the real economy. Using in the calculations only conventional indicators of financial analysis (liquidity ratios, solvency, business activity, financial stability and company's effectiveness) is not sufficient for holistic assessment of the level of financial security. To form a complete set of input data for further using it in the assessment of the insurer's financial security it's necessary to take into account the peculiarities of the insurers. This prompted for including in the calculation of indicators of the status of insurance premiums, the adequacy of insurance reserves, efficiency investments, the degree of dependence on reinsurance, etc. The inclusion of data indicators in the overall set of assessment of the insurer's financial security to avoid the disadvantages associated with the incompatibility of the existing system inputs for essence of the category "financial security" which exists in some methods [5].

Thus, into the group of indicators to measure the insurer's financial security is selected ratio of net income to gross income premiums, ratio of net income to the existing insurance reserves, the ratio of the share of gross premium income in total assets, ratio depending on reinsurance. These indicators are particulate indicators of evaluation of the insurer's financial security. Also, the list of indicators of insurer's financial security should include ratio matching of equity and share capital, the level of paid-up share capital, the ratio of the amount of investments and cash to total assets, the level of investment assets covering insurance reserves and the ratio of the insurer's own funds.

2. Self-organized model. Evaluation of insurance company's financial security is to formalize the impact of group financial indicators of the financial condition of the insurer and measure of macro-level factors that affect the ability of insurance companies to take the benefits from the activity, avoiding the negative effects of threats on the level of financial security. Quantitative determination of the insurer's financial security will be implemented through a static and dynamic integrated assessment of insurance company's financial security.

The methodical approach to the assessment of the insurer's financial security provides practical realization of several stages. The first phase of the model involves the formation of primary data and an information base for further calculations. The information calculations are based on six groups of indicators, which have been described higher: liquidity, turnover and business activity, financial stability, company's effectiveness, relative indicators and ratios of insurer's financial security.

Systematics indicators and their division in groups will help to normalize inputs, determine indicators influence orientation, weight of each group and scoring.

The matrix of micro indicators for estimation the static integral index of the insurer's financial security (IFS_{st}) will have the following form:

$$A = (k_{ij})_{i=1,\,j=1}^{e,\,f}, \qquad (1)$$

where A – the matrix of values of the financial situation k_{ij} at the micro level, i – the index number of indicator ($i = 1 \div e$), j – the index number of the year ($j = 1 \div f$), k_{ij} – the i-th indicator of the financial condition of the j-th aggregate time series at the micro level.

To determine the static integral indicator of the insurer's financial security (IFS_{st}) micro indicators time series are taken for each individual period. Calculation of dynamic integral indicator of financial security (IFS_{dn}) begins with defining of micro indicators values for three periods. That is, the basic data set is formed by using a moving average as equation (2):

$$k_{ij}^{mv} = \frac{k_{ij-1} + k_{ij} + k_{ij+1}}{3}, \qquad (2)$$

where k_{ij}^{mv} – the i-th indicator of the financial condition of the aggregate j-th set of time series at the micro level for IFS_{dn}, k_{ij-1} – the i-th indicator of the financial condition of the aggregate (j – 1)-th time series at the micro level, k_{ij+1} – the i-th indicator of the financial condition of the aggregate (j+1)-th time series at the micro level.

After defining the initial data set for calculating the static integral indicator of insurer's financial security (IFSdn), new matrix takes the form of equation (3):

$$B = (k_{ij}^{mv})_{i=1,\,j=1}^{e^{mv},\,f^{mv}}, \quad (3)$$

where B – the matrix of values of the financial situation k_{ij}^{mv} at the micro level ($i = 1 \div e^{mv}$, $j = 1 \div f^{mv}$).

The next stage of the methodological approach is to develop a set of indicators of macroeconomic impact on the insurer's ability to receive benefits in various areas to improve its activities.

The macroeconomic indicators are proposed and include the following:

- macroeconomic stability in the country;
- increase the level of socio-economic development of the regions in the country;
- inflation expectations and volatility of the currency market;
- monetary policy in the country;
- development and stability of the stock market in the country;
- political stability and legislative development;
- development of scientific and technical progress;
- investment climate in the country and the attractiveness of the insurance sector;
- stability of financial markets;
- stability of the tax regime.

The benefits received by the insurer as a result of avoiding the negative effects of financial security threats as a result of the manifestation of macroeconomic factors may have a different character. These benefits include: expanding customer base, providing sufficient insurance reserves, increasing demand for insurance services, additional financial resources to ensure efficient financial resources, improve the implementation of underwriting case, the development of intermediary network, improving the scientific and human resources, improving image and reputation of the insurance company and increase the level of population's insurance culture.

Thus, set of indicators at the macro level is formed following matrix:

$$C = (k_{zq})_{z=1,q=1}^{x,y}, \quad (4)$$

where C – the matrix of values of the financial situation k_{zq} at the macro level, z – the index number of indicator ($z = 1 \div x$), q – the index number of the year ($z = 1 \div x$), k_{zq}– the z-th index of financial position of the aggregate q-th time series at the macro level.

Array data is combined into the matrix C and will be used for evaluation IFS_{st} and to determine IFS_{dn}.

Evaluation of the impact of macro-level indicators of the ability to realize these benefits is determined by the Fishburn method. Preference on Fishburn is to reduce per unit weight fraction the numerator of the rational coefficient weaker alternative from the existing benefits attained as a result of the insurer to avoid the negative effects of threats to its financial security.

The third phase of this approach is carrying out divisions of indicators at the micro and macro level for the impact trends on the insurer's financial security. The separation is carried out in two ways - unicast and antitropic impact. If the growth rate has a positive effect on the resulting value IFS, then this indicator has unidirectional (unicast) influence. Otherwise, if the growth rate leads to reduction of IFS, then this indicator is characterized undirected (antitropic) influence. Also antitropic impact to the insurer's financial security relates to indicators which don't accord with the normative values.

The set of generated data contains both absolute and relative indicators with different units of measurement. The scoring of insurance company's financial security it's necessary to lead the array of input data to comparable (normal) form. Comparability of indicators is provided by using the method of normalization comparison. The essence of this type of normalization is to find the relationship between the input rate and the maximum value of the entire series. Normalization of the input data for the calculation of static indicator IFS_{st} is based on equations (5) and (6):

$$k_{ij}^{nl} = \frac{k_{ij}}{\max\limits_{j}\{k_{ij}\}}, \quad (5)$$

$$k_{zq}^{nm} = \frac{k_{zq}}{\max\limits_{q}\{k_{zq}\}}, \quad (6)$$

where k_{ij}^{nl} – the normalized value of the i-th indicator of the financial condition of the j-th time series at the micro level;

k_{zq}^{nm} – the normalized value of the z-th indicator of the financial condition of the q-th time series at the macro level;

$\max\limits_{j}(k_{ij})$ – the maximum value among the indicators of financial condition of the j-th aggregate time series at the micro level;

$\max\limits_{q}(k_{zq})$ – the maximum value among the indicators of financial condition of the q-th aggregate time series at the macro level.

After normalization the matrix is changed to the matrix of normalized parameters whose values will be between 0 and 1.

As the number of indicators of macroeconomic impact on the insurer's financial security and the amount of benefits received by the insurer as a result of avoiding the negative effects of threats to financial security equal to ten units, the scoring normalized values appropriate to a 10-point scale. For the purpose of comparability score evaluations of micro- and macro level scoring indicators at the micro level should also include to a 10-point scale. According to the methodical approach to scoring indicators of unicast and antitropic impact at the micro level will be as follows:

$$b_{ij}^{l+} = \begin{cases} 1 \mid if \;\; 0 \le k_{ij}^{nl} < 0.1; \\ 2 \mid if \;\; 0.1 \le k_{ij}^{nl} < 0.2; \\ 3 \mid if \;\; 0.2 \le k_{ij}^{nl} < 0.3; \\ 4 \mid if \;\; 0.3 \le k_{ij}^{nl} < 0.4; \\ 5 \mid if \;\; 0.4 \le k_{ij}^{nl} < 0.5; \\ 6 \mid if \;\; 0.5 \le k_{ij}^{nl} < 0.6; \\ 7 \mid if \;\; 0.6 \le k_{ij}^{nl} < 0.7; \\ 8 \mid if \;\; 0.7 \le k_{ij}^{nl} < 0.8; \\ 9 \mid if \;\; 0.8 \le k_{ij}^{nl} < 0.9; \\ 10 \mid if \;\; 0.9 \le k_{ij}^{nl} \le 1. \end{cases} \quad b_{ij}^{l-} = \begin{cases} 1 \mid if \;\; 0.9 \le k_{ij}^{nl} \le 1; \\ 2 \mid fi \;\; 0.8 \le k_{ij}^{nl} < 0.9; \\ 3 \mid if \;\; 0.7 \le k_{ij}^{nl} < 0.8; \\ 4 \mid if \;\; 0.6 \le k_{ij}^{nl} < 0.7; \\ 5 \mid if \;\; 0.5 \le k_{ij}^{nl} < 0.6; \\ 6 \mid if \;\; 0.4 \le k_{ij}^{nl} < 0.5; \\ 7 \mid if \;\; 0.3 \le k_{ij}^{nl} < 0.4; \\ 8 \mid if \;\; 0.2 \le k_{ij}^{nl} < 0.3; \\ 9 \mid if \;\; 0.1 \le k_{ij}^{nl} < 0.2; \\ 10 \mid if \;\; 0 \le k_{ij}^{nl} < 0.1. \end{cases} \quad (7)$$

where b_{ij}^{l+} – scoring rate indicator of unicast impact at the micro level, b_{ij}^{l-} – scoring rate indicator of antitropic impact at the micro level.

After finding squares score evaluations the model proceeds to the sixth stage - defining the proportion of groups and weights of each indicator. To determine the proportion of groups and weights of each indicators at micro level (v_i^l) method is proposed to use an experts.

Determination of weights for the indicators at the macro level is performed using the Fishburn method by equation (8):

$$v_z^m = \frac{2\cdot(N-z+1)}{N\cdot(N+1)}, \quad (8)$$

where v_z^m – the weight indicator at the macro level, z – the index number of the f_z^m-th indicator of priorities ad_q^m at the macro level ($z = 1 \div N$, $q = 1 \div 10$), N – total number of indicators f_z^m taken for analysis at the macro level.

The results of this assessment are weights that according to Fishburn method represent a rational fraction, the denominator of which is the sum of an arithmetic progression members of natural numbers with step one, and the numerator contains the elements of natural numbers, which are reduced by one.

As the result of evaluation of the z-th indices of the q-th benefit and calculating weights impact of indicators at the macro level to IFS_{st} and IFS_{dn} the matrix formed aggregate score evaluations provided benefits and weights macro-indicators presented in *Figure 1*.

	ad_1^m	ad_2^m	ad_3^m	ad_4^m	ad_5^m	ad_6^m	ad_7^m	ad_8^m	ad_9^m	ad_{10}^m	
f_1^m	b_{11}^+	b_{12}^+	b_{13}^+	b_{14}^+	b_{15}^+	b_{16}^+	b_{17}^+	b_{18}^+	b_{19}^+	b_{110}^+	v_1^m
f_2^m	b_{21}^+	b_{22}^+	b_{23}^+	b_{24}^+	b_{25}^+	b_{26}^+	b_{27}^+	b_{28}^+	b_{29}^+	b_{210}^+	v_2^m
f_3^m	b_{31}^-	b_{32}^-	b_{33}^-	b_{34}^-	b_{35}^-	b_{36}^-	b_{37}^-	b_{38}^-	b_{39}^-	b_{310}^-	v_3^m
f_4^m	b_{41}^+	b_{42}^+	b_{43}^+	b_{44}^+	b_{45}^+	b_{46}^+	b_{47}^+	b_{48}^+	b_{49}^+	b_{410}^+	v_4^m
f_5^m	b_{51}^+	b_{52}^+	b_{53}^+	b_{54}^+	b_{55}^+	b_{56}^+	b_{57}^+	b_{58}^+	b_{59}^+	b_{510}^+	v_5^m
f_6^m	b_{61}^+	b_{62}^+	b_{63}^+	b_{64}^+	b_{65}^+	b_{66}^+	b_{67}^+	b_{68}^+	b_{69}^+	b_{610}^+	v_6^m
f_7^m	b_{71}^+	b_{72}^+	b_{73}^+	b_{74}^+	b_{75}^+	b_{76}^+	b_{77}^+	b_{78}^+	b_{79}^+	b_{710}^+	v_7^m
f_8^m	b_{81}^+	b_{82}^+	b_{83}^+	b_{84}^+	b_{85}^+	b_{86}^+	b_{87}^+	b_{88}^+	b_{89}^+	b_{810}^+	v_8^m
f_9^m	b_{91}^+	b_{92}^+	b_{93}^+	b_{94}^+	b_{95}^+	b_{96}^+	b_{97}^+	b_{98}^+	b_{99}^+	b_{910}^+	v_9^m
f_{10}^m	b_{101}^+	b_{102}^+	b_{103}^+	b_{104}^+	b_{105}^+	b_{106}^+	b_{107}^+	b_{108}^+	b_{109}^+	b_{1010}^+	v_{10}^m

Fig. 1. Matrix aggregate score evaluations provided benefits and weighting of indicators at the macro level

The next step of the proposed method is an adjustment score evaluations in terms of their priority, which will take into account both the impact of scoring parameters and weights. For adjustment score evaluations according to indicators at the micro level of priority is based on equations (5) and (6):

$$g_{ij}^{l+} = (b_{ij}^{l+})^2 \cdot v_i^l, \quad (9)$$

$$g_{ij}^{l-} = (b_{ij}^{l-})^2 \cdot v_i^l, \quad (10)$$

where g_{ij}^{l+} – the adjustment i-score evaluations of unicast impact of the j-th year of their priority at the micro level, g_{ij}^{l-} – the adjustment i-score evaluations of antitropic impact of the j-th year of their priority at the macro level, $(b_{ij}^{l+})^2$ – square scoring index of unicast impact at the micro level, $(b_{ij}^{l-})^2$ – square scoring index of antitropic impact at the micro level.

After adjustment score evaluations of indicators priority, turn to the calculation of static integral indicator of the insurer's financial security (IFS_{st}) by the equation (11):

$$IFS_{st} = \frac{\sum_{i=1}^{s_l} g_{ij}^l \left|k_{ij}^+ + \sum_{z=1}^{s_m} g_{zq}^m \right| k_{zq}^+}{\sum_{i=1}^{d_l} g_{ij}^l \left|k_{ij}^- + \sum_{z=1}^{d_m} g_{zq}^m \right| k_{zq}^-}, \quad (11)$$

where IFS_{st} – static integral indicator of the insurance company's financial security, s_l – number of indicators of unicast impact at the micro level, s_m – number of indicators of unicast impact at the macro level, d_l – number of indicators of antitropic impact at the micro level, d_m – number of indicators of antitropic impact at the macro level.

The extended index IFS_{st} is calculated by equation (12):

$$IFS_{st} = \frac{\sum_{i=1}^{s_l} (b_{ij}^l)^2 \cdot v_i^l \left|k_{ij}^+ + \sum_{z=1}^{s_m} (b_{zq}^m)^2 \cdot v_z^m \right| k_{zq}^+}{\sum_{i=1}^{d_l} (b_{ij}^l)^2 \cdot v_i^l \left|k_{ij}^- + \sum_{z=1}^{d_m} (b_{zq}^m)^2 \cdot v_z^m \right| k_{zq}^-}. \quad (12)$$

Evaluation dynamic indicator of insurer's financial security IFS_{dn} is provided by equation (13):

$$IFS_{dn} = \frac{\sum_{i=1}^{s_l} g_{ij}^{mvl} \left|k_{ij}^+ + \sum_{z=1}^{s_m} g_{zq}^{mvm} \right| k_{zq}^+}{\sum_{i=1}^{d_l} g_{ij}^{mvl} \left|k_{ij}^- + \sum_{z=1}^{d_m} g_{zq}^{mvm} \right| k_{zq}^-}, \quad (13)$$

where IFS_{dn} – dynamic integral indicator of the insurance company's financial security, g_{ij}^{mvl} – the adjustment i-score evaluations of unicast (antitropic) impact of the j-th year of dynamic time series at the micro level, g_{zq}^{mvm} – the adjustment z-score evaluations of unicast (antitropic) impact of the q-th year of dynamic time series at the macro level.

After defining integral parameters of insurer's financial security the model is turned for the qualitative assessment IFS_{st} and IFS_{dn}. At this stage of methodological approach is carrying out the limits for each level. According to the method calculated value of the IFS (IFS_{st}, or IFS_{dn}) is into a certain interval that corresponds to one of the four levels: low, middle, sufficient and high. The levels of IFS_{st} and IFS_{dn} determined by using the equation (14):

$$IFS \Rightarrow \begin{cases} low & IFS_{\min} \le IFS < IFS_{\min} + 0.25\cdot(IFS_{\max} - IFS_{\min}); \\ middle & IFS_{\min} + 0.25\cdot(IFS_{\max} - IFS_{\min}) \le \\ & \le IFS < IFS_{\min} + 0.5\cdot(IFS_{\max} - IFS_{\min}); \\ sufficient & IFS_{\min} + 0.5\cdot(IFS_{\max} - IFS_{\min}) \le IFS < IFS_{\min} + \\ & + 0.75\cdot(IFS_{\max} - IFS_{\min}); \\ high & IFS_{\min} + 0.75\cdot(IFS_{\max} - IFS_{\min}) \le IFS \le IFS_{\max}. \end{cases} \quad (14)$$

3. Testing for deviance. The estimation is carried out apparently that the performance indicators can be much higher (lower) than comparable values of the same time series. This deviance may be due to errors in the collection and processing of information, or as a result of objective factors which are sporadic. To obtain the correct trend model is necessary to smoothing of time series. The final step in the methodological approach is checking values of IFS_{st} and IFS_{dn} for deviance using Irwin criterion. Since the effect of objective factors can't be eliminated, the abnormal rate of IFS (IFS_{st}, or IFS_{dn}) can be replaced by the arithmetic mean value of two adjacent indicators. Thus, verify the obtained values of the Irwin criterion for deviance provides by using the equation (15):

$$\lambda_t = \frac{\left| IFS_t - IFS_{t-1} \right|}{\sigma_{IFS}}, \qquad (15)$$

where λ_t – the estimated value of the Irwin criterion in year t, IFS_t – integral indicator of the insurer's financial security in year t, IFS_{t-1} – integral indicator of the insurer's financial security in year $t-1$, σ_{IFS} – standard deviation.

If the calculated value exceeds the Irwin criterion λ_t critical value λ_t^{cr}, than the resulting value IFS_t is abnormal and needs to be replaced. Critical values λ_t^{cr} are tabulated using the values of the Irwin criterion.

If $\lambda_t > \lambda_t^{cr}$, the value of the integral index of the insurer's financial security is replaced by equations (16) – (18):

$$IFS_t = \frac{IFS_{t+1} + IFS_{t-1}}{2}, \text{ for } IFS_{t+1} < \lambda_t^{cr}, \text{ or } IFS_{t-1} < \lambda_t^{cr}, \text{ and} \qquad (16)$$

$$IFS_t = \frac{IFS_t + IFS_{t-1}}{2}, \text{ for } IFS_{t+1} > \lambda_t^{cr}, \text{ or } IFS_{t+1} = 0, \text{ and} \qquad (17)$$

$$IFS_t = \frac{IFS_t + IFS_{t+1}}{2}, \text{ for } IFS_{t-1} > \lambda_t^{cr}. \qquad (18)$$

4. Empirical results. The values of static integral indicators of financial security during the years 2006 – 2012 for the insurance company «Skaid» vary from 6.40 to 7.34, for the insurance company «Crimean insurance company» – from 6.83 to 7.17 and for insurance company «Just Insurance» – are within 6.35 – 6.89.

After testing for deviance the model analyzes dynamics of indicators and provides qualitative assessment of investigational trends. During the years 2006 – 2011 the level of financial security of insurance company «Skaid» was extremely low. The situation is improved in 2012, when the static integral indicator of financial security is increased to 7.1, which corresponds to a sufficient level of financial security of «Skaid».

The «Crimean Insurance Company» characterizes by an opposite trend that is compared with the insurance company «Skaid». During the study period, the level of financial security of «Crimean insurance company» dropped from sufficient in 2007 to a low in 2010 – 2011 and average in the year 2012. While during the 2009 – 2012 level of financial security is raised by 0.06 points and mades at the beginning of year 2013 to 6.96.

The results of the analysis demonstrate that the most financially secure insurance company is «Just insurance». During the study period only its insurer's degree of security hasn't reduced below the average. During of the years 2010 – 2012 the value of static integral indicator of financial security is increased by 0.27 points, that has been razed from an average level in 2010 (IFS_{st} = 6.50) and sufficient in 2011 (IFS_{st} = 6.66) to high level of financial security in 2012 (IFS_{st} = 6.77) (*Table 2*).

Thus, evaluation of the level of financial security in 2012 demonstrates the highest level in the «Just insurance» company. Insurance company «Skaid» is characterized by a sufficient level of financial security. The level of financial security of the «Crimean insurance company» was the lowest among the surveyed insurers.

Concluding remarks. Thus, the methodical approach allows not only to carry out a partial calculation of certain financial indicators, but also realize the integral assessment of the insurer's financial security. Based on the values of the static and dynamic performance of integral financial security of the insurance company, it's management can draw conclusions on the effectiveness of the chosen insurer's strategy, its ability to avoid the negative impact of the financial security's threats. ■

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Table 1

Levels of static integral indicators of financial security for insurance companies «Skaid», «Crimean Insurance Company» and «Just Insurance» in the years 2006 – 2012

Level of company's financial security	The limits of set levels of insurance companies					
	«Skaid»		«Crimean Insurance Company»		«Just insurance»	
Low	6.40	6.64	6.83	6.92	6.35	6.48
Middle	6.65	6.87	6.93	7.00	6.49	6.62
Sufficient	6.88	7.10	7.01	7.08	6.63	6.75
High	7.11	7.34	7.09	7.17	6.76	6.89

Table 2

Values of static integral indicators of financial security after testing for deviance and qualitative assessment for the insurance companies «Skaid», «Crimean insurance company» and «Just Insurance» in the years 2006 – 2012

Static integral indicators of financial security and their level	The value of static integral indicators of financial security and quality assessment						
	2006	2007	2008	2009	2010	2011	2012
«Skaid»							
IFS_{st}	6.41	6.59	6.61	6.51	6.40	6.64	7.10
Level of IFS_{st}	low	low	low	low	low	low	sufficient
«Crimean Insurance Company»							
IFS_{st}	7.00	7.01	7.02	6.93	6.83	6.90	6.96
Level of IFS_{st}	middle	sufficient	sufficient	middle	low	low	middle
«Just insurance»							
IFS_{st}	6.53	6.63	6.72	6.53	6.50	6.66	6.77
Level of IFS_{st}	middle	sufficient	sufficient	middle	middle	sufficient	high

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