








“Determining the leaders of Ukraine’s insurance market based on the adaptation of the DEA method”

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DETERMINING THE LEADERS OF UKRAINE'S INSURANCE MARKET BASED ON THE ADAPTATION OF THE DEA METHOD

Abstract

The escalating wartime risks in Ukraine has led to a rapid reduction in insurance coverage in life and non-life segments. The purpose of the study is to rank Ukraine's insurance companies based on an adaptation of the DEA method to the insurance market conditions. The study utilized the Supervisory Statistics of the National Bank of Ukraine as data. The study also used ranking of insurance companies based on technical efficiency criteria. The output indicators include the profitability of total capital (Output1) and the occupied share of the insurance market (Output2). The input indicators comprise the volume of total assets of insurers (Input1), the share of equity capital in assets (Input2), the level of gross payments (Input3), and the level of payments to insurance reserves (Input4). The ranking of insurance companies is based on minimizing the distance of each from the bounds of technical efficiency by solving a set of optimization problems. Based on the modeling results, a list of market leaders (7 companies) was formed for the end of the third quarter of 2023. They served nearly 37% of the insurance market in Ukraine, accumulating 41.5% of the total assets of this financial market sector. So, the primary issue for insurance companies is the loss of solvency due to the absence of adequate levels of insurance reserves. Therefore, priority measures should include strengthening regulatory constraints in this financial market segment to facilitate its qualitative renewal.

Keywords

insurance market, insurance payouts, insurance reserves, technical efficiency

JEL Classification

G22, G32, L25

INTRODUCTION

Any economic activity in market conditions is accompanied by uncertainty and, therefore, risk. As a consequence, this can lead to losses, loss of financial stability and solvency, and ultimately, bankruptcy of a business entity. Ownership of property rights by individuals and legal entities is also associated with the risk of potential losses due to force majeure circumstances, especially in the current conditions of Russian aggression in Ukraine. In the practice of statistical research, this segment of the insurance market is referred to as "non-life". On the other hand, insurance of risks related to human life and health is served by the "life" market segment.

The primary and essential purpose of the insurance market is its compensatory function, which involves protecting policyholders by compensating them for their losses resulting from insured events. The mechanism for implementing this function involves risk redistribution through the formation of insurance funds by accumulating in-

insurance contributions from economic agents. Thus, the insurance market plays a key role in ensuring financial stability for businesses and individuals in adverse conditions and is one of the effective factors supporting the economy in times of uncertainty. The rapid reduction in the number of insurers in Ukraine from 2020 to 2023 and the increased risks of insured events occurring in times of war are currently observed. On the other hand, by accumulating significant financial resources, insurance companies gain the opportunity to engage in investment activities, which positively impacts regional socio-economic development. Therefore, the restoration of the full functioning of the insurance market using various tools for analyzing and monitoring the state of this segment is a pressing issue of considerable scientific interest.

1. LITERATURE REVIEW

Given the relevance and timeliness of the scientific problem mentioned, recent research and publications on this topic must be analyzed. In the research, Romashko and Shpylchak (2020) note the variety of interpretations of the essence of the insurance market among contemporary scholars. Through generalization, the authors propose to consider the insurance market from market, institutional, economic, and segmental positions, thereby deepening the theoretical and substantive content of this concept. Dymalovska and Kyryluk (2021) investigated this issue from another perspective, summarizing the characteristic trends in the development of the world insurance market by regional feature. This allowed them to identify the main features of the modern world market for insurance services, namely, the creation of strategic alliances; accumulation and concentration of assets; the use of new technologies; consolidation of banking, financial, and insurance capital; the establishment of a unified regulatory framework; the emergence of new types of insurance and reinsurance. By examining recent trends, the authors conclude that the future development of the global insurance market should be linked to: digitization to create personalized insurance products; innovations in customer service and the establishment of feedback communication channels; and in-depth analytics for tariff policy formation and financial forecasting. Since Ukraine is a participant in the global processes of globalization, this direction of scientific thought is extremely relevant for understanding the general processes taking place in this segment of the financial market.

A significant volume of scientific research is dedicated to analyzing the current state, problems, and prospects of the development of the insur-

ance market in Ukraine, covering the period before the full-scale Russian invasion (Zoria et al., 2018; Steshenko & Gamora, 2019). Kotsiurba and Nasypaiko (2020) note that as of the beginning of 2021, Ukraine significantly lagged behind EU countries in terms of the development level of the insurance market. The authors attribute this mainly to the difficult economic situation in the country and quarantine restrictions caused by the COVID-19 pandemic. On the other hand, the latter factor has acted as a catalyst for the digital transformation of insurance services and the emergence of new types of products on the market, such as P2P and microinsurance, smart contracts, and blockchain in insurance.

To assess the state and explore the prospects of the insurance market, Melnychuk et al. (2020) studied the stages of its formation throughout Ukraine's recent history from the perspective of legislative support. According to scientists, this segment of the financial market has undergone stages of inception and activation since 1991 and is currently in a stage of decline. They attribute this to the global financial crisis of 2008–2013 and the military conflict in eastern Ukraine from 2014 to the present day.

Purii (2018) agrees with the previous authors' theses that the functional and institutional characteristics of the insurance market in Ukraine do not meet the real needs of the national economy. In addition, Rud (2019) notes that domestic insurers should adopt the experience of foreign markets, adjust their own operating models, and improve mechanisms of state regulation by adapting national legislation to global standards.

Khroponiuk and Dlugopolskyi (2022) note the following main problems: the absence of perfect legislation, which prevents the effective development of

the insurance market in Ukraine; the low solvency of the population and insufficient level of trust in insurance companies; the use of insurance as a tool for tax evasion or capital withdrawal; the low quality of insurance companies' assets, and so on.

The majority of scholars adhere to the opinion that the imperfection of state governance is the main root cause of the insurance market's unsatisfactory state. Moreover, the latter cannot function effectively despite the external environment, as it is an open system. Therefore, political and socio-economic stability is a necessary condition for the development of the insurance market. In recent years, this observation has gained particular significance due to the introduction of martial law in Ukraine.

The discussion regarding the necessity of further liberalization of the insurance market in Ukraine, or conversely, strengthening regulatory constraints among representatives of the domestic scientific community, also received attention in the work (Hranovska et al., 2023). The general legal principles of insurance activity in Ukraine are defined at the legislative level (Legislation of Ukraine, 2021). Hranovska et al. (2023) refer to the recommendations of the Insurance Business Association regarding the regulation of the situation in the insurance market of Ukraine in conditions of war. The proposals of this association include softening regulatory requirements by reviewing norms for the formation of insurance reserves; easing the tax burden on insurance companies; creating a mechanism for instant refinancing with funds from state banks and the NBU; supporting internal reinsurance, etc. In fact, in conditions of increased risks of the occurrence of insurance events, the Association members propose to transfer responsibility for ensuring the financial stability of insurers to state financial institutions. In our opinion, this mechanism is not a market response to internal and external threats and does not contribute to restoring competitiveness. Hranovska et al. (2023) also doubted the effectiveness of the proposed simplifications of regulatory requirements, emphasizing the importance of insurance companies adhering to a proper level of business reputation and quality management, thus preventing the occurrence of critical risks of insolvency in their activities. According to Kuzmak and Svereda (2023), the war in Ukraine

is not a reason to delay the implementation of organizational and legal changes according to the requirements of the European Union. Their main arguments include the urgent need to ensure the financial stability of insurers and transparency in the domestic insurance market. The authors note that currently insurance companies in Ukraine do not always adhere to principles of business ethics, unwilling to provide insurance compensation under certain conditions. It is proposed to strengthen state control by introducing the institution of an insurance ombudsman to protect the rights of consumers of these services.

Undoubtedly, an urgent issue is the unprecedentedly high level of risks of insurance events, as noted by Marina and Petsenko (2023). They point out that existing mechanisms in modern global practice to cover these risks cannot effectively operate in conditions of war. Therefore, the authors emphasize the need for the development of new, effective models of functioning of the insurance market through the consolidation of all its participants and international institutions within this issue.

The objective situation in Ukraine at the beginning of 2024 indicates that the reduction of regulatory burden on operators of the insurance market has only contributed to further accumulation of liquidity problems in these companies. Therefore, the reform of the existing state regulation policy of the insurance market, which has been highlighted by Tymchak and Chepara (2023), is an extremely urgent task today.

Thus, it can be stated that although various researchers have diverged in their views on state measures to stabilize the insurance market in Ukraine, they all agree that its stagnation will persist. Given this, the forefront becomes the use of economic-mathematical tools for making effective managerial decisions. Summarizing contemporary experience, Miachyn and Yavors'ka (2018) emphasize methods such as simulation modeling, fuzzy logic, neural networks, cognitive maps, etc. Since the experience of insurance companies is closely related to stochastic factors, it is advisable to analyze the main indicators of their functioning using simulation modeling, particularly the Monte Carlo method (Iurchenko, 2020). On the

other hand, the high level of diversity and complexity of processes does not always allow for the construction of an adequate simulation model. Relevant management decisions often have to be made in conditions of uncertainty. The development of computational power and “Big Data” tools has enabled the construction of artificial neuro-fuzzy models, which, after appropriate training, acquire properties of artificial intelligence and allow for logically justified optimal decisions.

The aforementioned direction of simulation modeling found further development in the work of Dyba (2017). He proposes using a developed multi-stage stochastic model for managing assets and liabilities of a prudent type insurance company. The result of such modeling is a long-term strategy for the development of the insurance company aimed at ensuring its competitiveness in the market, financial stability, and profitability. Among the advantages of the model, the author notes the possibility of optimal distribution of the obtained investment income taking into account probable insurance payments.

For modeling insurance risks, Slobodyanyuk and Orlov (2021), Shapoval and Kolotiy (2019), Shmygol (2021), Zavidna et al (2019), Tarnavskiy and Kolomiets (2021), Sukhovyi and Yakovleva (2020), and Demydenko and Pistunov (2021) utilize correlation-regression models. For instance, Slobodyanyuk and Orlov (2021) proposed a regression model using the STATISTICA software package to determine the dependence of the insurance market share on the level of net payments for individual types of insurance. According to the authors, the results of their research allow identifying unpromising insurance products, establishing the maximum criteria for their demand and supply. In contrast, Kolotiy and Shapoval (2019) evaluated the effectiveness of cash flows of an insurance company using similar methods based on a set of key indicators. In their opinion, the proposed model enables the current assessment of the target indicator by decomposing it into individual factors.

It should be noted that these studies have limitations where the adaptation of the methods to the given tasks is practically not carried out, or the level of their application is limited to a narrow range of tasks. Therefore, to address these shortcomings, this study proposes to expand the scope

of application of the economic-mathematical apparatus based on the foreign experience of using the Data Envelopment Analysis (DEA) method (Nowak, 2015; Škare & Rabar, 2015; Zagoruyko & Petkova, 2021; Blagun, 2020). In the study by Nowak (2015) which investigates the usefulness of the DEA method for diagnosing organizational efficiency, attention is drawn to the peculiarities of its practical application. The researcher notes that this method does not allow for the analysis of the dynamic component of the efficiency of economic entities if the structure of goals and output indicators is prone to change over time. In other cases, its high practical significance is noted.

The subsequent work Škare and Rabar (2015) is dedicated to the direct application of the DEA method to compare the economic growth of different countries worldwide. For this purpose, the researchers proposed several variations of this model, combined with statistical methods and analysis of time series. Among the followers of this direction, Žagoruyko and Petkova (2021) should also be mentioned. The authors also used the DEA method for a comparative analysis of the efficiency of national economies. The classical model was expanded with a pair of linear programming tasks. The first of them involved projecting the objects of study onto the technological and economic plane with a comparison to global efficiency benchmarks, while the second focused on the distribution of gross domestic product and prices.

The universality of the DEA method extends its application to any type of economic activity, including the financial sector of a country (Abdikadirova et al., 2024). Blagun (2020) proposes to use DEA-based evaluation of the efficiency of commercial banks. Among the advantages of DEA modeling, the author notes the mitigation of the heteroskedasticity problem that arises in parametric modeling. Thus, it should be noted, firstly, the high relevance of the implementation of the DEA method for ranking participants in the Ukrainian insurance market and, secondly, the limited use of modern information and analytical tools for this purpose.

The main trend in recent years is a significant reduction in the number of insurance companies in Ukraine. From the beginning of 2020 to the end of the third quarter of 2023, their number decreased

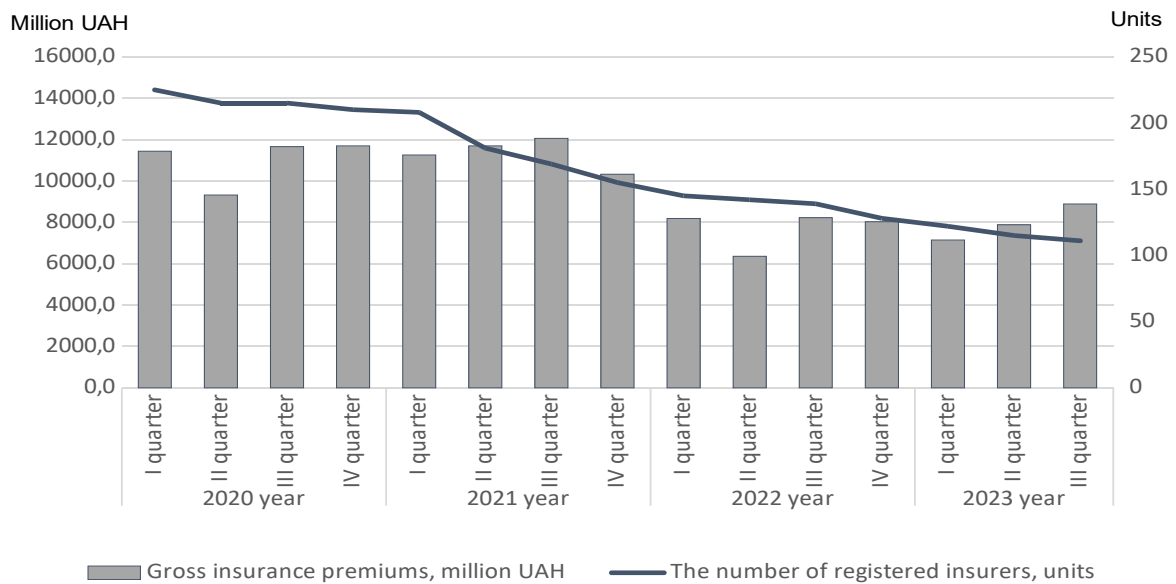


Figure 1. Quarterly dynamics of Ukraine’s insurance market and the number of insurers based on data from 2020–2023

from 225 to 111, or by 2.0 times, as shown in Figure 1. This trend indicates that negative tendencies in the insurance market of Ukraine began before the full-scale Russian invasion in early 2022, and the recent events have only intensified their dynamics.

In statistical practice, the volume of the insurance market is measured by gross insurance premiums, or the amounts of insurance contributions paid by individuals and legal entities to insurers. Figure 1 shows the quarterly dynamics of this indicator in comparable prices from the beginning of 2020. As can be seen, the most significant decrease of 1.9 times in the insurance market of Ukraine occurred from the third quarter of 2021 to the second quarter of 2022, after which there was a relative stabilization. At the same time, the “life” insurance market, which accounted for approximately 12%, decreased by 43.5%, and the “non-life” market by 47.7%.

Thus, there is currently a negative trend where, in the face of increasing risks of wartime, the compensatory function reduces the volumes of its coverage in both segments of the insurance market. On the other hand, policyholders are facing additional problems associated with the mass exit of insurance companies from the market, including the inability to timely provide all compensations.

Taking into account the above, the purpose of the paper is to rank insurance companies of Ukraine based on the adaptation of the DEA method to the conditions of the insurance market.

2. METHOD

This study proposes the use of foreign experience, namely, ranking insurance companies based on the criterion of technical efficiency using the Data Envelopment Analysis (DEA) method. This optimization method is based on the assumption that for each set of input resources, there is a certain maximum achievable level of performance output.

Technical efficiency (TE) is assessed by the ratio of the weighted indicator of normalized performance output to the weighted indicator of normalized input resources, as shown in formula (1).

$$TE = \frac{\text{Weighted normalized output parameters}}{\text{Weighted normalized input parameters}} \quad (1)$$

The term “output parameters” refers to indicators characterizing the performance of an economic system, including production volumes, production quality, profitability, etc. Consequently, “input parameters” refer to expenses, volumes of resources

and assets utilized, as well as manifestations of other negative external factors, such as risk, which are an integral component of any economic activity and must be managed to achieve the final result.

From the perspective of insurance companies, output indicators may include market share, financial performance, or profitability. On the other hand, input parameters may encompass the volumes of capital employed, indicators of risk assessment in insurance activities, etc.

The weighting coefficients in the numerator and denominator of formula (1) are adjusted so that the objects under evaluation, which are at the efficiency frontier, assume a value of $TE = 1$. Such a state indicates their attainment of Pareto optimality and signifies that, under the existing technological development and resource provision conditions, it is impossible to improve one performance indicator of the economic system without worsening the values of other indicators.

In all other cases, the level of technical efficiency of systems will range from 0 to 1 and should be maximized. Thus, its maximization implies that such a system seeks to minimize its deviation from the efficiency frontier.

The application of the TE indicator has its unique characteristics, namely:

- the efficiency frontier of economic systems at the time of analysis is not constant over time and depends on the technological and informational development of society;
- the comparison basis relies on available statistical data on the activities of homogeneous economic entities. Therefore, the accuracy of calculations directly depends on the completeness and coverage of economic subjects.

Next, this study will proceed to the economic-mathematical formulation of the DEA method and its further development in the context of investigating insurance companies in the insurance market of Ukraine. As mentioned above, the objective function involves maximizing technical efficiency, which is determined sequentially for all objects of analysis according to formula (2).

$$TE_0 = \frac{\sum_{j=1}^s (u_j \cdot Output'_{j0})}{\sum_{i=1}^r (v_i \cdot Input'_{i0})} \rightarrow \max, \quad (2)$$

where TE_0 is the level of technical efficiency of the object under investigation; s and r are, respectively, the number of output and input factors; u_j , $Output'_{j0}$ represent the weights and normalized values of the j -th output parameter and i -th input parameter of the object under investigation; v_i , $Input'_{i0}$ the weight and normalized value of the i -th input parameter of the object under investigation.

The DEA method assumes that the technical efficiency indicator for all objects does not exceed 1. Therefore, the objective function (2) is maximized subject to the constraints system (3)

$$\left(TE_m = \frac{\sum_{j=1}^s (u_j \cdot Output'_{jm})}{\sum_{i=1}^r (v_i \cdot Input'_{i3})} \right) \leq 1, \text{ for all objects } m = 1 \dots n, \quad (3)$$

where n is the total number of objects under investigation; TE_m is the level of technical efficiency of the m -th object under study; $Output'_{jm}$ is the normalized value of the j -th output parameter of the m -th object under study; $Input'_{i3}$ is the normalized value of the i -th input parameter of the m -th object under study.

The optimization of the model is performed with unknown variables represented by weight coefficients u_j , v_i which must satisfy the non-negativity conditions: $u_j \geq 0$ and $v_i \geq 0$.

Some authors note that a drawback of this model is its nonlinear form, which in certain cases may complicate the optimization process. Therefore, using the theory of fractional programming, it has been successfully transformed into linear form problems in various interpretations. On the other hand, modern information technologies and analytical optimization tools allow solving this problem in its original form (4).

$$TE_0 = \frac{\sum_{j=1}^s (u_j \cdot Output'_{j0})}{\sum_{i=1}^r (v_i \cdot Input'_{i0})} \rightarrow \max, \quad (4)$$

$$\frac{\sum_{j=1}^s (u_j \cdot Output'_{jm})}{\sum_{i=1}^r (v_i \cdot Input'_{is})} \leq 1, \forall m = 1 \dots n, \quad (5)$$

$$u_j \geq 0, \forall j = 1 \dots s, \quad v_i \geq 0, \forall i = 1 \dots r. \quad (6)$$

Normalization of input and output parameters is carried out according to the formula (7)

$$X' = \frac{X - X_{worse}}{X_{better} - X_{worse}}, \quad (7)$$

where X and X' are, respectively, the original and normalized values of the input or output parameter, and X_{better} , X_{worse} are, respectively, the best and worst values of the input or output parameter among the set of insurers present in the market.

Such normalization involves bringing the domain of the selected indicators into the interval $[0; 1]$ and is a standard procedure in econometric modeling. For output parameters, a higher normalized value corresponds to a better result. Conversely, for input parameters, located in the denominator of the objective function, a lower normalized value corresponds to a better result.

The adaptation of model (4) to the needs of the insurance market in Ukraine involves justifying the selection of input and output indicators of economic activity for assessing the technical efficiency of insurers. The choice of these parameters is influenced by the availability and relevance of statistical data, the feasibility of their direct assessment, and their economic significance. Taking this into account, the following output indicators of insurance companies' activities have been included:

- return on total capital (Output1), representing the ratio of net financial income to the volume of assets under management;
- market share (Output2) occupied by the insurance company.

The capacity of the insurance market in the country during the reporting period is measured by the size of gross insurance premiums received by insurers from policyholders. Therefore, the level of market presence is determined by the ratio of a particular company's earned insurance premiums to the market capacity.

Both indicators, Output1 and Output2, should be maximized. They indicate, on the one hand, policyholders' trust in the company's activities and, on the other hand, profitability and the presence of internal reserves for further growth, which is positive.

The following were considered as input indicators in constructing the DEA model:

- total assets of insurers (Input1) – a quantitative measure of accumulated resources involved in economic activity;
- share of equity capital in assets (Input2), indicating the insurer's dependence on borrowed funds;
- level of gross claims (Input3), calculated as the ratio of insurance claims and compensation to earned insurance premiums;
- level of claims to insurance reserves (Input4), or the ratio of insurance claims and compensation to formed insurance reserves.

The advantages of the DEA method, in the context of addressing the stated tasks, include:

- This method is non-parametric, meaning it does not require the determination of a functional relationship between input and output indicators.
- It allows for the use of various indicators with different economic meanings and dimensions, as they undergo normalization procedures.
- It enables dynamic assessment of insurance companies' technical efficiency and prompt responses to indicated changes.

Supervisory statistics provided by the National Bank of Ukraine offer such data in open access (NBU, 2024).

3. RESULTS AND DISCUSSION

The optimization direction for indicators Input1 and Input2 in this study is maximization. At the same time, input indicators Input3 and Input4 should be minimized, which should be considered

during their normalization. Thus, minimizing the lag of each insurance company from the bounds of technical efficiency using the optimization model (4) and selected input and output parameters will mean achieving the maximum return on invested capital with minimal risk from carrying out insurance activities. Insurance premiums should not only guarantee insurers an acceptable level of risk but also ensure the profitability of their operations, which in turn is an internal source of increasing the company's economic potential. The formation of sufficient insurance reserves also contributes to risk reduction. On the other hand, insurance premiums should not hinder the company's entry into the market and increase its presence in it.

The results of the calculations based on the optimization model (4) and the selected set of indicators allowed us to obtain a list of leaders in the insurance market of Ukraine as of the end of the third quarter of 2023, for which the level of technical efficiency ranged from $TE \in [0.7; 1]$, as shown in Table 1.

The insurance companies listed in Table 1 served nearly 37% of the insurance market in Ukraine in 2023, accumulating 41.5% of the total assets of this sector of the financial market. Unlike many other insurance companies, their operations were profitable, with asset profitability ranging from 0.8% to 7.5% for the first three quarters of 2023. The levels of gross insurance payouts did not threaten their financial stability. From the perspective of policyholders, these companies are considered the most prioritized in terms of technical efficiency and reliability.

On the other hand, around 24% of insurance companies in Ukraine remained unprofitable in 2023. The

vast majority of them lagged significantly behind the market leaders in terms of economic potential and market share. For instance, 68% of the smallest insurance companies accumulated only 13.3% of the total assets and held a cumulative market share of less than 10%. Based on data from the first three quarters of 2023, the volumes of insurance payouts in 11 companies exceeded their formed insurance reserves. In some cases, this excess amounted to 3-4 times. In three companies, gross payouts for insurance compensation exceeded the volume of earned insurance premiums, while two other companies were approaching this limit. Typically, the technical efficiency of companies facing these problems did not exceed 0.2-0.3, indicating significant deviations from the efficiency frontier.

Therefore, the insurance market in Ukraine is characterized by instability and fundamental problems. The absence of strategic guidelines and reasoned tactical measures for the development of the national insurance market, the imperfection and fragmentation of the regulatory framework, the inadequate level of information transparency, and the low level of innovation implementation are the main inhibiting factors of its development (Kotsiurba & Nasypaiko, 2020). Among the measures of state regulation that should contribute to its recovery, researchers propose more actively adopting global experience regarding legislative support and creating the necessary infrastructure for the insurance market, and paying attention to the effectiveness of state supervisory control and effective mechanisms for protecting the interests of insurance consumers (Melnychuk et al., 2020).

The restraining factors are considered to be the lack of a unified state strategy for the development of the

Table 1. Leaders of the Ukrainian insurance market as of the end of the third quarter of 2023

Institution Name	Total assets of insurers, million UAH	Share of equity capital in assets, %	Level of gross claims, %	Level of claims to insurance reserves, %	Return on total capital, %	Market share, %	TE
JSC SC "ARKS"	5,455.0	38.3%	41.6%	34.8%	7.3%	8.4%	1.00
PJSC "MetLife"	7,296.4	14.6%	22.3%	6.5%	4.4%	6.0%	1.00
PJSC "GRAVE UKRAINE Life Insurance"	5,292.7	6.5%	49.7%	3.0%	0.8%	1.0%	0.86
JSC IC "UNIQA"	4,557.3	35.8%	50.4%	41.4%	7.5%	7.0%	0.81
JSC IC "TAS" (private)	3,696.3	24.2%	45.3%	37.5%	3.4%	7.3%	0.77
PJSC SC "VUSO"	1,725.9	34.2%	40.2%	62.6%	0.9%	6.0%	0.72
"PJSC SC "PZU UKRAINE LIFE INSURANCE"	2,178.4	24.2%	12.0%	2.2%	5.7%	1.0%	0.71

insurance market in the country, low level of financial literacy among market participants, lack of liquid financial instruments, and delays in implementing mandatory medical, agricultural, and pension insurance. As a solution to this problem, strengthening the coordination between state regulatory bodies and insurance companies is proposed. Government management should ensure a modern and stable regulatory framework and non-burdensome control over the activities of market participants. In turn, insurance companies should be guided by a policy of integrity and corporate social responsibility (Purii, 2018). Rud (2019) points out that without a comprehensive solution to the problems of political and economic instability, insufficient financial support for the population, lack of trust in insurance services, low financial literacy, and high inflation, achieving positive changes is impossible.

In the face of sharply increasing risks of insurance events, the regulator, represented by the National Bank of Ukraine (NBU), implemented a series of measures aimed at simplifying or deferring mandatory procedures. Such reduction of administrative burden on operators of the insurance market, according to Baranov and Baranova (2022), is considered a positive but insufficient step, as insurance companies faced an unprecedented loss of solvency. In their opinion, market participants require greater state support in the form of deferral of insurance payments, refinancing, or lending against assets, as well as the creation of other sources of coverage for war risks.

Bratyuk (2022) takes the opposite point of view. According to him, the insurance market is closely linked to the development of the national economy. Therefore, in conditions of economic stagnation, state support for the insurance market will only exacerbate its internal problems. Instead, the regulator should address the tasks of timely withdrawal of unstable and unreliable insurance companies from the market, activate support for a competitive environment therein, and conduct effective supervisory

policies, among other measures. This position is also shared by Vovk et al. (2023); they note that strengthening supervisory control will contribute to the recovery and further development of the insurance market. Regarding coverage of risks during wartime, the authors propose more actively utilizing international reinsurance practices and engaging the state compensation fund and other financial donors.

Consequently, this segment of the financial market, in the conditions of wartime risks, is forecasted to continue shrinking. Since the situation in Ukraine does not have prerequisites for improvement, the mass exit of insurance companies, especially those with limited economic potential, from the market will continue due to the unprofitability of their activities and loss of solvency. The task of the state regulator, represented by the National Bank of Ukraine, is to reduce the corresponding risks in the future by strengthening regulatory constraints on the formation of mandatory insurance reserves. This measure will prevent the activities of insurance companies that are already close to bankruptcy today and protect potential policyholders from possible losses.

A proportional reduction in competition in the Ukrainian insurance market will contribute to an increase in the average weighted price of services in it. The National Bank of Ukraine needs to refine the methodology for forming insurance tariffs, taking into account the risks of wartime. These measures will restore trust among individuals and legal entities and stabilize the situation in the market in the future.

It is necessary to increase the entry threshold for insurance companies into the insurance market in the form of regulatory constraints on the minimum required amount of total assets. So, with a significant increase in the risk of insurance events occurring, the existing state of equilibrium is unattainable. The price for the new state of equilibrium is adaptive tariff pricing and restoring trust in the market through additional regulatory constraints.

CONCLUSION

The aim of this study was to rank insurance companies in Ukraine by adapting the DEA method to the specific features of this financial market sector to assess the technical efficiency of insurers. Based on the modeling results, a list of market leaders was formed for the end of the third quarter of 2023, charac-

terized by high market share and economic potential, profitability of activities, and a moderate level of insurance payouts. The selected indicators, on the one hand, allow measuring the return on investment capital within the existing risk of insurance activities: insurance tariffs should not only guarantee insurers an acceptable level of risk but also ensure the profitability of their activities, which in turn is an internal source of increasing the company's economic potential. On the other hand, insurance tariffs should not hinder a company's entry into the market or increase its presence in it. Fundamental problems were identified in the majority of other insurance companies related to insolvency due to increased risks in insurance activities and a lack of adequate levels of insurance reserves. Among the priority measures, in this case, were strengthening regulatory constraints on the formation of mandatory reserves by insurance companies, refining the methodology for setting insurance tariffs, taking into account the risks of wartime, and raising the threshold for entry of insurance companies into the insurance services market.

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