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TABLE OF CONTENTS

<i>Kumar Ravi, Dhiman Babli</i>	SOYBEAN FUTURES MARKETS- EXPLORING LINKAGES BETWEEN INDIA AND CHINA	5
<i>Sharma Swaty, Dhiman Babli</i>	IDENTIFICATION OF CO-INTEGRATION BETWEEN INDIAN AND US ENERGY AND AGRICULTURE COMMODITIES	8
<i>Chorna Svitlana</i>	FINANCIAL SOLVENCY OF INSURERS AS A BASIS FOR INSURANCE DEVELOPMENT	11
<i>Sharma Parmod K, Dhiman Babli</i>	FINANCIAL SOLVENCY OF INSURERS AS A BASIS FOR INSURANCE DEVELOPMENT	11
<i>Sharma Parmod K, Dhiman Babli</i>	NEED FOR PRIVATE SECTOR BANKS' CONSOLIDATION IN INDIA	16
<i>Mynenko Serhii, Chevguz Karina</i>	REVIEW OF METHODS OF ECONOMIC AND MATHEMATICAL MODELING OF BANKING RISKS	21
<i>Tverezovska Oleksandra, Hrytsenko Larysa</i>	GREEN BANKING IN THE SYSTEM OF EFFECTIVE FINANCING OF INVESTMENTS PROJECTS	26
<i>Gagandeep Singh, Rahul Sharma, Sukhpreet Kaur</i>	SHAREHOLDER ACTIVISM AND CORPORATE PERFORMANCE DURING COVID-19: EVIDENCE FROM THE INDIAN BANKING SECTOR	31
<i>Jasneet Kaur Ajay Chandel</i>	CONCEPT OF CREATIVE ACCOUNTING	34
<i>Shkarupa Olena, Kalchenko Ihor</i>	ANALYSIS OF THE IMPACT OF ONLINE PAYMENTS ON THE SECURITY OF BUSINESS DIGITALIZATION	39
<i>Lavryk Yevheniia</i>	BASIC APPROACHES TO MANAGING THE ECONOMIC STABILITY OF ENTERPRISES	44
<i>Ponyrko Ivan, Us Yana, Pimonenko Tetyana, Lyulyov Olexii, Kwilinski Aleksy</i>	DIGITAL MARKETING FOR SMALL AND MEDIUM BUSINESS	49

<i>Vynogradov Vladislav, Troian Maria</i>	THE GLOBAL FINANCIAL CRISIS AND ITS IMPACT ON UKRAINE'S ECONOMY	55
<i>Ziabina Yevheniia</i>	THE IMPACT OF LABOR RESOURCES ON GREEN COMPETITIVENESS AND FINANCIAL STABILITY OF ENTERPRISES	59
<i>Bozhenko Victoria, Lysenko Oksana</i>	SHADOW ECONOMY AS A THREAT TO NATIONAL SECURITY	63
<i>Kravchenko Olena Shapoval Oleksii</i>	BLOCKCHAIN TECHNOLOGY: CURRENT STATUS AND PROSPECTS	68
<i>Semenog Andrii Ostrivnyi Vadym</i>	DEVELOPMENT OF DIGITAL BANKING	70
<i>Mazurenko Oleksiy</i>	INSTITUTIONAL DETERMINANTS OF THE INTERNATIONAL TAX COMPETITIVENESS	73

REVIEW OF METHODS OF ECONOMIC AND MATHEMATICAL MODELING OF BANKING RISKS

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The activities of each financial institution are accompanied by risky decision-making. There are several approaches to determining «risk», but the vast majority of scientists consider this concept as the probability of a negative result from the activity. For example, I. Ivchenko, the author of the manual «Modeling of economic risks and risk situations» uses the following definition: «Risk is the probability of losses or non-receipt of income compared to the forecast option» (2007). In the textbook «Planning of the enterprise» the authors V. Pasichnyk and O. Akilina gives the following explanation: «the essence of risk is that every company is constantly threatened by loss of profit and solvency in the implementation of economic and financial activities under the influence of unforeseen changes in the internal environment» (2005).

Banking risks are divided into:

- liquidity risk (on the website of the National Bank of Ukraine the causes of liquidity risk are: inability to manage funds, changes in funding or execution of off-balance sheet sources of resources) (2021).
- risk of changes in credit rates (arises due to adverse changes and interest rates, impact on profitability and value of assets, liabilities and off-balance sheet instruments) (2021).
- credit risks (arising from the inability of the obliging party, the terms of any financial agreement with the bank or otherwise committed) (2021).
- capital adequacy (The editorial board under the leadership of V. Stelmakh gives the following definition in the «Encyclopedia of Banking» «Capital adequacy – an indicator, that shows the availability of capital sufficient to perform its functions and cover the risks required during banking operations» (2009).

Risks cannot be completely avoided, but they can be investigated, analyzed and their consequences minimized (Mazurenko et al., 2021; Bozhenko, 2021; Starchenko et al., 2021; Dudchenko, 2020; Samoilkova, 2020; Yarovenko et al., 2020; Mazurenko and Tiutiunyk, 2021; Pimonenko et al., 2021; Kryvykh and Goncharenko, 2020; Matsenko et al., 2021; Lazorenko et al., 2021; Oleksich et al., 2021; Mamay et al., 2021; Taraniuk et al., 2020). Economists use economic-mathematical methods and models to assess and manage risks (Yelnikova and Barhaq, 2020; Goncharenko and Lopa, 2020; Eddassi, 2020; Ziabina et al., 2020; Chukwu and Kasztelnik, 2021; Medani and Bhandari, 2019).

Economic-mathematical methods and models are a set of scientific

directions, such as statistics and econometrics, aimed at the study of economic processes by mathematical methods. The use of economic and mathematical methods is widely used to solve practical problems, namely: organizing information and creating requirements for planning and management, problem analysis and study of factors that affect economic processes (Shkarlet et al., 2019; Vasilieva et al., 2017; Bublyk et al., 2017; Fila et al., 2020; Gallo et al., 2019). Mathematical methods allow to simulate economic situations and assess the consequences of choosing certain solutions. Methods of economic and mathematical analysis regulate the activities of credit and financial institutions, providing a choice of optimal solutions, allow you to analyze the value and possibilities of minimization, reducing uncertainty.

The most common economic and mathematical methods and models used to manage banking risk are:

- Method of mathematical programming. This group of methods allows you to minimize creditor errors and maximize profits, taking into account various constraints. Using the thematic programming method, the best optimal customer shares in the loan portfolio and / or the optimal parameters of credit products.

- Methods of linear programming. This method is used by analysts in solving many optimization problems, where the functional determinants of the studied phenomena and processes are deterministic. The results obtained using linear programming methods provide an opportunity to analyze the service and analyze the potential for changing the value of any of the parameters of the object under study, as well as other reserves that are not realized by the possibilities. Linear programming problems are successfully solved using modern specialized software products (2009).

- Methods of mathematical games. Used in the field of management decisions at the stage of forming an alternative and choosing the optimal strategy. Analytically, they can be presented as a game, three or more players, each of whom wants to maximize their benefits (minimally lose) at the expense of another strategy by choosing the optimal strategy. An example is the relationship between the bank and the client.

- A method of studying the operations of use in the analysis to obtain a comparative assessment of alternative solutions. The complexity of the method is that the researched operations are open systems, as well as related to other actions, which at a certain point in time are not of interest to the study, but can affect the course of operations. However, awareness of operations, its purpose, analysis of factors used for this purpose, comparison of costs and results should give the analyst a reason to identify certain and formulate the conditions of the tasks, conducting a selection of indicators.

Thus, the use of these economic and mathematical methods allows us to reduce the probability of loss of profit.

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