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Detection of financial risks at macro-, mezo- and microlevels of economy

Abstract. *Introduction.* This paper is devoted to detection of components, factors and consequences of financial risks at the macro-, mezo- and microeconomic levels in Ukraine and the way such risks can be assessed and analysed. *Purpose* of this paper is to develop analytical tools to implement risk management on the basis of an integrated system of indicators of financial risks at different economic levels. *Results.* It is expedient to determine inflationary, credit and investment risk components by using statistical data. It has been determined that gross domestic product should be compared with other crucial indicators of financial risks at the macrolevel, such as the budget deficit, the government debt and the government debt per capita. A system of indicators for the detection of financial risks was formed according to the relevant index list at the economic mezolevel. The indicators of financial risk have been grouped into segments by risk components such as the budget component, the business component, the financial development component and the social component. Taxonomic analysis was used to evaluate the integral index of financial risks by all the components. The integral index of financial risk for Ukrainian regions was calculated by using the graphical method. A deviation from the maximum value of the integral indicator is examined as a tool to evaluate the probability of financial risks. Financial risks at the microlevel, which generate significant threats to the financial security of enterprises, are grouped as follows: financial risks which lead to a decrease in financial results and effectiveness of business entities and financial risks which have a negative impact on the financial condition of business entities.
Keywords: Financial Risk; Financial Analysis; Risk Detection; Economic Levels; Financial Security
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Ідентифікація фінансових ризиків на макро-, мезо- та мікроекономічному рівнях

Анотація. Світова економіка має передумови для виникнення фінансових ризиків на макро-, мезо- та мікроекономічному рівнях. Ідентифікацію фінансових ризиків на макрорівні пропонується здійснювати за компонентами фінансових ризиків: інфляційним, кредитним та інвестиційним. Система індикаторів для оцінки фінансових ризиків на мезоекономічному рівні сформована за бюджетною, підприємницькою, соціальною складовими, а також складовою фінансового розвитку. Для інтегрального оцінювання рівня фінансового ризику за його складовими використано метод таксономічного аналізу. Інтегральний рівень ризику для всіх регіонів України розраховано за допомогою графічного методу. Імовірність виникнення фінансового ризику за його складовими оцінено як ступінь відхилення від максимально можливих значень показників. Фінансові ризики на мікрорівні проаналізовано за двома групами: ризики, реалізація яких призводить до скорочення фінансових результатів і зниження ефективності діяльності підприємств і ризики, реалізація яких негативно відбивається на фінансовому стані підприємств, при цьому найбільшу загрозу несе ризик банкрутства.
Ключові слова: фінансовий ризик; фінансовий аналіз; ідентифікація ризиків; економічні рівні; фінансова безпека.

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Идентификация финансовых рисков на макро-, мезо- и микроэкономическом уровнях

Аннотация. Сегодня мировая экономика характеризуется неопределенностью, что создает предпосылки для возникновения финансовых рисков на макро-, мезо- и микроэкономическом уровнях. Идентификацию финансовых рисков на макроуровне предлагается осуществлять по следующим компонентам: инфляционному, кредитному и инвестиционному. Система индикаторов для оценки финансовых рисков на мезоэкономическом уровне сформирована согласно бюджетной, предпринимательской, социальной составляющей, а также составляющей финансового развития. Для интегрального оценивания уровня финансового риска по его составляющим использован метод таксономического анализа. Интегральный уровень риска для всех регионов Украины рассчитан при помощи графического метода. Вероятность возникновения финансового риска по его составляющим оценена как степень отклонения от максимально возможных значений показателей. Финансовые риски на микроуровне проанализированы по двум группам: риски, реализация которых приводит к снижению финансовых результатов и эффективности деятельности предприятий и риски, реализация которых негативно отражается на финансовом состоянии предприятий, при этом наибольшую угрозу несет риск банкротства.

Ключевые слова: финансовый риск; финансовый анализ; идентификация рисков; уровни экономики; финансовая безопасность.

1. Introduction

Today, society is often described as risk society because the social production of wealth is accompanied by the social production of risk (Higgins, 2007) [1]. Economic systems operating in a turbulent probabilistic environment have to take up different types of risk, in order to develop themselves and improve their performance. This paper is devoted to detection of components, factors and consequences of financial risks at the macro, mezo and microeconomic levels in Ukraine and the way such risks can be assessed and analysed. Also, it puts an emphasis on the use of the advantages of diagnostic methods in financial risk assessment.

2. Brief Literature Review

Problems related to the application of risk management have been widely covered in the economic literature represented by the works by D. Galai (2012) [2], M. McCarthy (2003) [3], H. Greuning (2009) [4], A. Damodaran (2008) [5] and other scientists. The aspects of applying an analysis in risk management have also been reflected in recent studies. In particular, different aspects of probability analysis and the importance of each of the aspects and related risk indicators were examined by T. Bedford and R. Cooke (2001) [6]. The impact of the usage of the fuzzy logic model on the performance of finance security was defined by T. Huang, R. Zhao and W. Tang (2009) [7]. C. Matsatsinis (2003) [8], L. Pokoadi (2002) [9]. M. McCarthy and T. Flynn (2003) [3] conclude that the risk identification will develop an effective system to minimise them by using business valuation models. The application of risk theory with regard to corporate finance was discussed in M. McCarthy and T. Flynn (2003) [3], and H. Greuning (2009) [4]. It has been used as a tool to investigate the factor and determinants of corporate threats [3], provide corporate financial security and estimate the bank's market position [4]. At the same time, it should be noted that the tools available for the detection of financial risk are based on different analytical methods relating to decision support systems at different management levels, risk components leading to inconsistency of managerial decisions based on the analysis of different metrics. Another problem which has not been addressed by researchers and practitioners is a need to consider the risk of losing intellectual capital.

3. The purpose of this paper is to develop analytical tools to implement risk management on the basis of an integrated system of indicators of financial risks at different economic levels. To do this, it is required to complete the following tasks: to form a set of indicators to measure performance of the components of financial risks; to establish the cause and effect relationships between the traditional indicators of financial risks and the risk of losing intellectual capital; to identify indicators of financial risks at the macro, mezo and microlevel of the Ukrainian economy.

4. Results

The development of the Ukrainian economy is characterised by lack of financial resources at the state level and high financial risks. This situation creates conditions for uncertainty at the different levels of the economy. It is important to note that due to the global financial and economic recession it is necessary to create a list of the country's financial risks indicators. The most important of them are generalised in Table 1. One of the basic financial risk indicators is the estimate of gross domestic product (GDP). It is important to compare GDP with direct investment. Another indicator that can be used is the comparison of the inflation index with GDP growth index per capita. These indicators are presented in Figure 1.

Figure 1 shows steady growth of GDP and direct investment, however inflation increases too. It should be noted that GDP growth has an inflationary character. The next stage is investment and monetary risk assessment by studying the dynamics of budget deficit and budget income (Figure 2). The ratio of budget deficit to GDP is a crucial indicator of financial risks for the state. According to the Maastricht Treaty, the ratio of the annual government deficit to GDP must not exceed 3% at the end of the preceding fiscal year. In Ukraine, this condition was not uphold in the years 2009, 2010, 2012-2014 and 2016. As a result, we see systemic problems with the monetary financial risk in Ukraine. Moreover it is logical to consider the next type of financial risks, which is the credit risk (Figure 3). According to Figure 3, every citizen's annual income cannot cover the government debt for each citizen. This indicates a high

Tab. 1: **Key indicators of the country's financial risks**

Risks group	Risk indicators
Inflationary	inflation, GDP growth per capita index, real GDP growth, population revenue, GDP growth, budget income
Credit	government debt, government debt per capita, budget deficit
Investment	direct investment, total merchandise trade, budget deficit
Monetary	exchange rate, current account balance, budget deficit, budget income

Source: Compiled by the authors

level of credit financial risk in Ukraine after the year 2014.

Such problems are caused by the military conflict in eastern Ukraine, the unsustainable budgetary policy and the lack of internal financial resources sources for economic development.

Risk analysis involves consideration of the source of financial risk at the mezolevel. An effective system of financial risk management at the mezolevel should provide financial security of regions. Ignoring the risks at this level can lead to threats to regional financial security. There are four main components of financial risks at the mezolevel (see Table 2). By using taxonomic analysis, we identified the integral index regarding each risk component at the mezolevel. The financial data beginning with the year 2007, which we used for this study, were obtained from the State Satistics Service of Ukraine [10].

Changes in the taxonomic index may range from 0 to 1. The risks can be estimated qualitatively by using statistical methods, for example the coefficient of variation. The integral index of financial risks for Ukrainian regions was calculated by using the graphical method. This approach helps to assess the integral index of financial risks as a square of quadrilateral formed by financial risk components (see Table 3). A deviation from the integral indicator of selected components with the maximum possible value of 1 will signal the presence of one of the financial risks (see Figure 4).

The detection of financial risks indicates the presence of components of all financial risks for many regions of Ukraine. The risk related to the financial development component is most probable for Kharkiv region.

As for the microlevel, two groups of financial risks and the risk of losing intellectual capital [11] (Zhuravlova, 2013) should be identified as objects of risk management from the point of ensuring financial security of business entities [12] (Poltinina, 2011).

Risk management at the microlevel takes into account the factors and objectives of the strategy of financial entities, uses semantic structure of knowledge about enterprise environment, allowing to perceive multidimensional environment and act in it, adapting to a situation, monitor the status of financial security and choose an appropriate development strategy [13] (Zhuravleva, 2014).

The first group incorporates financial risks, which create threats to financial results of companies. Such risks can lead to deterioration in the efficiency of business activity of business entities, falling profitability and emergence of losses. The group of financial risks for business entities includes the risk of reducing the amount of net profit, the risk of rising costs, the risk of missed financial profit, the risk of default of deposits, the risk of default of receivables (credit risk), the risk of falling efficiency, the investment risk. The share of loss-making companies in the Ukrainian

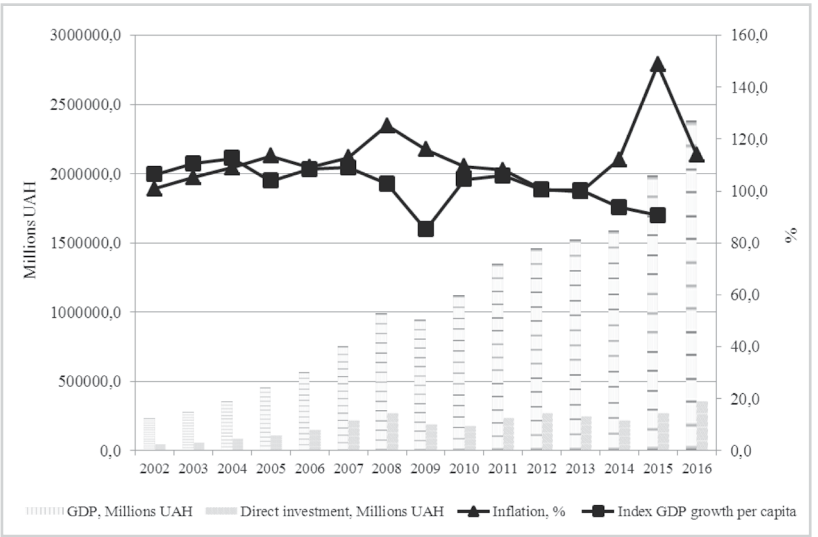

Fig. 1: **GDP and direct investment indicators dynamics in Ukraine**
Source: Compiled by the authors based on [10]

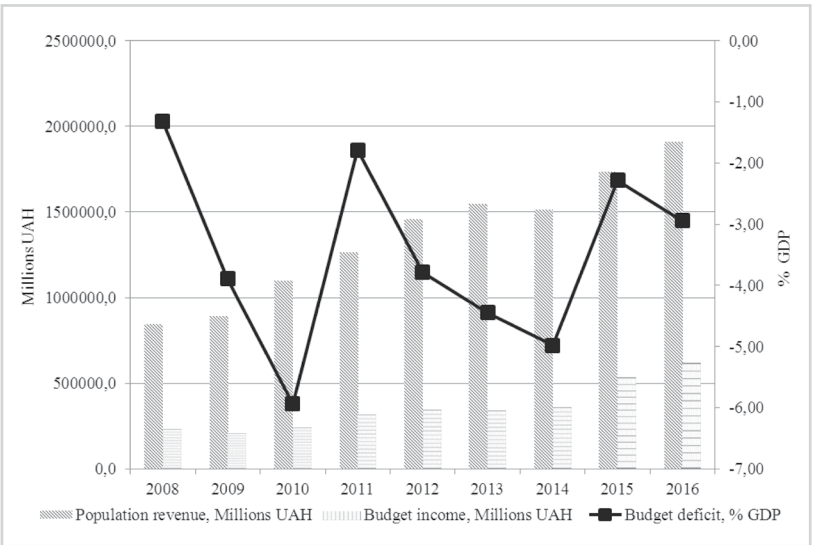

Fig. 2: **Dynamics of budget deficit, budget income and revenue of the population in Ukraine**
Source: Compiled by the authors based on [10]

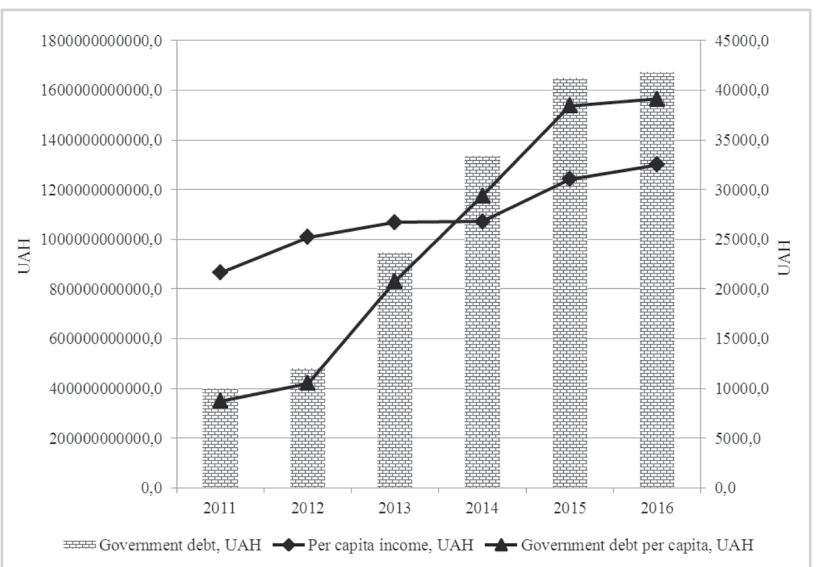

Fig. 3: **Dynamics of government debt and income per capita indicators in Ukraine**
Source: Compiled by the authors based on [10]

economy in general and in the industry (Figure 5) should be used as an important indicator of the emergence of the financial risks forming this group.

The data in Figure 5 show that the share of unprofitable companies is very high and ranges from 30% to 35% for the Ukrainian economy as a whole and in the industrial sector. It decreased in 2015 (to 26%-27%). However, it grew again in 2016. Net losses of companies are another indicator of the emergence of financial risks in the structure of financial results at the microlevel (Figure 6).

The growth of net losses in 2014-2015 and a consistently high share of loss-making companies indicate a significant level of financial risks in the structure of financial results of companies, which creates a considerable threat to financial security at the microlevel.

The second group joins financial risks, which form a threat to the financial state of business entities. They are the risk of decrease of financial stability, the risk of insolvency, the risk of unbalanced liquidity, the risk of growth of receivables, the risk of increasing the duration of the financial cycle and the risk of bankruptcy. The main indicator of the high level of the financial risk, namely the risk of bankruptcy, is the dynamics of bankruptcy cases (Figure 7).

The selected indicator increased in Ukraine in 2013-2014. A slight decrease has been observed since 2015, however, the whole number of bankruptcy cases remains quite high. This suggests the presence and a high impact of the risk of the deteriorating financial state at the microlevel, i.e at the level of financial security of business entities.

5. Conclusions

Based on the results of the conducted research, we can conclude that the modern methodology of detection of financial risks includes a set of indicators at the macro, mezo and microlevels of the economy.

At the macrolevel, it is expedient to determine financial risks by groups, which can be inflationary, credit, investment and monetary. There are arguments to use gross domestic product as one of the basic financial risk indicators in combination with other financial risk indicators at the macrolevel, such as the budget deficit, the government debt and the government debt per capita.

A comparison of the government debt and the government debt per capita allows us to properly assess the level of financial risks at the macrolevel. Hence, today, there is a risk of loss of solvency by the state because of the permanent growth of the government debt, keeping in mind that the government debt per capita has excessed income per capita in Ukraine.

The results of the financial risks analysis by their types at mezolevel allow us to group the regions of Ukraine. Financial risks components exist in many regions of Ukraine. The

Tab. 2: **System of indicators for detection of financial risks in the economy at the mezolevel**

Risk components	Indicators
Budget	GRP growth, %
	Region's GRP share in Ukraine's GDP, %
	Average revenues per capita (excluding intergovernmental transfers), UAH / person
	Average budget expenditures per capita (excluding intergovernmental transfers), UAH / person
	Share of local budgets in state revenue (excluding intergovernmental transfers),%
	Local budget revenues (excluding intergovernmental transfers), % GRP,
	Ratio of local budget deficit to gross regional product (GRP), %
	Ratio of trade balance to total foreign trade, %
	Ratio of external government debt to GRP, %
	Ratio of domestic public debt to GRP, %
	Total coverage ratio
	Special fund ratio
Business	Share of unprofitable enterprises in the total number of enterprises of the region, %
	Ratio of financial results of enterprises to GRP, %
	Enterprises' operating profitability, %
	Industrial output growth, % to previous year
	Deposits attracted by depository corporations (excluding the National Bank of Ukraine), million UAH.
	Loans, million UAH
Financial development	Foreign direct investments per capita, thousand USD
	Foreign direct investments in the region growth, % to previous year
	Ratio of foreign direct investment to GRP, %
	Index of investments in fixed assets,% to previous year
	Capital investments per capita, USD / person
	Share of capital investments from the state budget, %
	Ratio of capital investments to GRP, %
Social	Dynamics of wage arrears at the end of the year, million UAH
	Growth of wage arrears, %
	Unemployed within the 15-70 year age range (by ILO methodology)
	Consumer price indices for goods and services (to December of the previous year), %
	Cost to income ratio of the population, %

Note: GRP - gross regional product
Source: Compiled by the authors

Tab. 3: **Integral index of financial risks for Ukrainian regions**

Region	2007	2008	2009	2010	2011	2012	2013	2014	2015
Crimea	0.05	0.04	0.07	0.10	0.11	0.08	0.09	*	*
Vinnytsia	0.03	0.04	0.03	0.05	0.06	0.03	0.03	0.02	0.01
Volyn	0.06	0.01	0.03	0.03	0.05	0.01	0.01	0.01	0.01
Dnipropetrovsk	0.17	0.14	0.09	0.16	0.20	0.09	0.07	0.02	0.06
Donetsk	0.05	0.06	0.02	0.04	0.04	0.02	0.00	0.00	0.00
Zhytomyr	0.04	0.04	0.03	0.04	0.04	0.02	0.02	0.01	0.01
Zakarpattia	0.06	0.07	0.04	0.05	0.03	0.01	0.01	0.01	0.01
Zaporizhzhia	0.07	0.08	0.07	0.11	0.09	0.05	0.05	0.04	0.01
Ivano-Frankivsk	0.05	0.05	0.06	0.06	0.06	0.02	0.02	0.03	0.01
Kiev	0.08	0.06	0.11	0.13	0.18	0.10	-0.03	0.04	0.02
Kirovohrad	0.05	0.07	0.07	0.05	0.10	0.04	0.04	0.03	0.01
Luhansk	0.05	0.06	0.05	0.05	0.07	0.02	0.03	0.00	0.00
Lviv	0.04	0.05	0.06	0.09	0.09	0.04	0.03	0.03	0.01
Mykolaiv	0.04	0.06	0.06	0.06	0.05	0.03	0.03	0.02	0.15
Odesa	0.02	0.05	0.05	0.05	0.03	0.02	0.01	0.03	0.01
Poltava	0.05	0.09	0.06	0.09	0.13	0.07	0.05	0.04	0.02
Rivne	0.05	0.06	0.01	0.01	0.02	0.01	0.02	0.01	0.11
Sumy	0.04	0.04	0.05	0.03	0.05	0.03	0.03	0.02	0.01
Ternopil	0.02	0.05	0.03	0.02	0.02	0.01	0.01	0.00	0.06
Kharkiv	0.03	0.05	0.04	0.05	0.05	0.02	0.01	0.03	0.01
Kherson	0.04	0.06	0.05	0.04	0,05	0.02	0.03	0.02	0.12
Khmelnytskyi	0.04	0.06	0.06	0.04	0.07	0.03	0.03	0.02	0.01
Cherkasy	0.05	0.06	0.04	0.06	0.05	0.05	0.02	0.02	0.01
Chernivtsi	0.05	0.08	0.04	0.04	0.05	0.01	0.00	0.00	0.01
Chernihiv	0.04	0.05	0.02	0.03	0.03	0.02	0.02	0.01	0.01
Kiev	0.07	0.04	0.02	0.07	0.23	0.16	0.13	0.09	0.00
Sevastopol	0.02	0.01	0.03	0.03	0.03	0.01	0.05	*	*

Note: * - Excluding the temporarily occupied territories of the Autonomous Republic of Crimea, the city of Sevastopol and part of the anti-terrorist operation zone
Source: Compiled by the authors

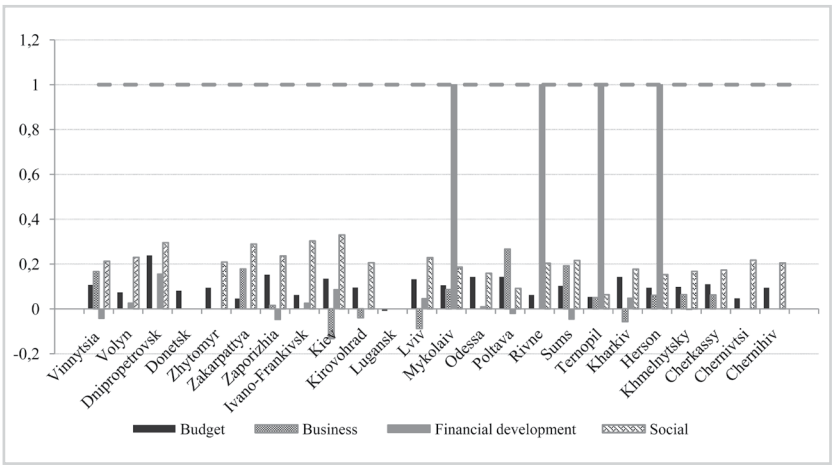

Fig. 4: **Detection of financial risks at the mezolevel in 2015**
Source: Compiled by the authors

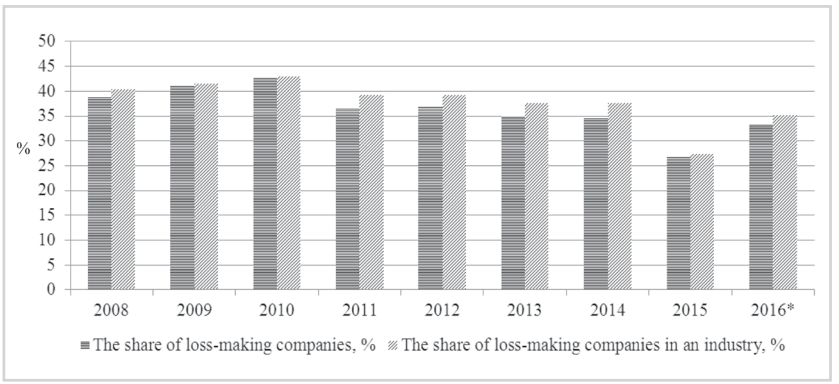

Fig. 5: **Dynamics of the share of loss-making companies**
Source: Compiled by the authors based at [10]

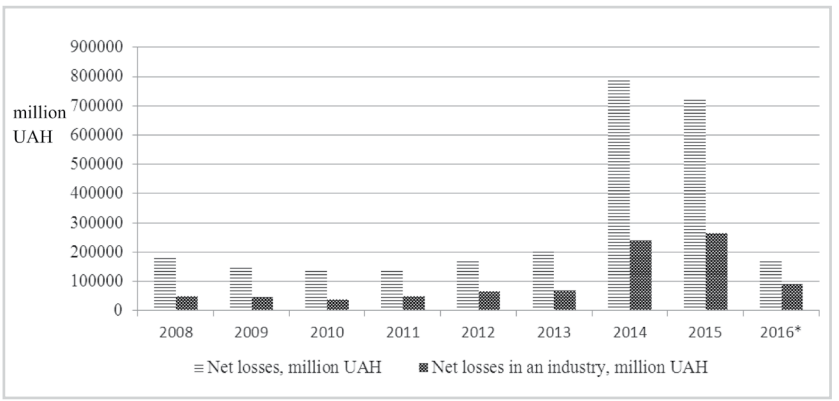

Fig. 6: **Net losses of Ukrainian companies**
Source: Compiled by the authors based at [10]

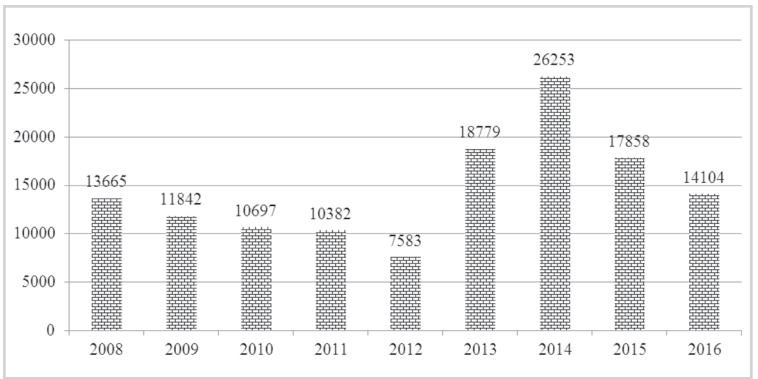

Fig. 7: **Number of bankruptcy cases**
Source: Compiled by the authors based on [10]

risk related to the financial development is most probable for Kharkiv region. Dnipropetrovsk, Mykolaiv, Rivne and Kherson regions are characterised by the lowest risk level.

We should to pay attention to the problems of financial development and risk management to stabilise the situation in the country in the context of risk management and increase the level of financial security.

Two groups of financial risks at the microlevel which create the threats to financial results and financial statement of Ukrainian companies have been singled out.

The analysis of the share of loss-making companies and the number of bankruptcy cases as indicators of risks has made it possible to study the existence and depth of different types of risks in the activities of Ukrainian companies.

The analysis has shown a high share of unprofitable companies (between 25% and 35%) and the growth of net losses in the period of 2014-2015 along with a significant number of bankruptcies in Ukraine, which confirms a high level of threats to financial security of companies.

References

1. Higgins, R. C. (2007). *Analysis for Financial Management.* New York: McGraw Hill.
2. Crouhy, M., Galai, D., & Mark, R. (2012). *Risk Management.* New York: McGraw-Hill.
3. McCarthy, M., & Flynn, T. (2003). *Risk From the CEO and Board Perspective: What All Managers Need to Know About Growth in a Turbulent World.* New York: McGraw Hill.
4. Greuning, H., & Brajovic, S. (2009). *Analyzing Banking Risk. A Framework for Assessing Corporate Governance and Financial Risk Management.* Washington: The World Bank.
5. Damodaran, A. (2008). *Strategic Risk Taking: A Framework for Risk Management.* Pearson Prentice Hall.
6. Bedford, T., & Cooke, R. (2001). *Probabilistic Risk Analysis: Foundations and Methods.* Cambridge: Cambridge University Press.
7. Huang, T., Zhao, R., & Tang, W. (2009). Risk Model with Fuzzy Random Individual Claim Amount. *European Journal of Operational Research, 192*(3), 879-890. doi: https://doi.org/10.1016/j.ejor.2007.10.035
8. Matsatsinis, M., Kosmidou, K., Doumpos, M., & Zopounidis, C. (2003). A Fuzzy Decision Aiding Method for the Assessment of Corporate Bankruptcy. *Fuzzy Economic Review, VIII*(1), 13-23. Retrieved from http://www.sigef.net/home-page-congress/item/360-a-fuzzy-decision-aiding-method-for-the-assessment-of-corporate-bankruptcy
9. Pokoadi, L. (2002). Fuzzy Logic-Based Risk Assessment. *Academic and Applied Research in Military Science 1*(1), 63-73. http://uni-obuda.hu/users/pokoradi.laszlo/02_b.pdf
10. State Statistics Service of Ukraine (2017). *The official website.* Retrieved from http://www.ukrstat.gov.ua (in Ukr.)
11. Zhuravlova, I. V. (2013). Empirical analysis of the intellectual capital functioning processes and their impact on enterprise performance. *Aktualni problemy ekonimiky (Actual Problems of Economics), 4,* 119-127 (in Ukr.).
12. Poltinina, O. (2011). Conceptual basics of controlling the management of financial security company. *Aktualni problemy ekonimiky (Actual Problems of Economics), 7,* 139-146 (in Ukr.).
13. Zhuravlyova, I. V., & Lelyuk, S. V. (2014). Management of enterprise financial security and its intellectual component based on creating multiagent decision support system. *Aktualni problemy ekonimiky (Actual Problems of Economics), 157*(7), 163-170.

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