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A word from the Editor

The stability of the financial system results from various factors that affect its multiple sectors. Traditionally, the greatest attention in scientific research is paid to its main element, i.e. the banking sector. Even the definitions of financial stability proposed by many authors refer to its understanding in the context of banks and banking. However, the financial system also consists of other sectors. One of them is the insurance sector, which is the main subject of this issue of Safe Bank. The considerations presented in the 97th issue of our journal seem to create an ideal background for the important events that have taken place in recent weeks and which determine the conditions for insurance activity, as well as the stability of insurance companies. This concerns the publication in the Official Journal of the EU of two important regulations, i.e. the revision of the Solvency II Directive[1] and the new IRR Directive[2]. IRRD creates a framework for conducting recovery and resolution processes in the insurance sector. In the face of these events, we present several interesting articles.

In the first one, Mr. Krzysztof Budzich, a member of the Management Board of the Bank Guarantee Fund, presents his considerations regarding financial stability in the context of the insurance sector. In these considerations, he directly refers to the recently published IRR Directive. He indicates that the insurance sector is an important element of the financial system and that crisis phenomena occurring in it may have an impact on financial stability. This also influences changes in thinking about crisis management in this sector, which results in the introduction of regulations (e.g. the IRR Directive) allowing for minimization of the financial and social consequences of potential bankruptcies.

1 Directive (EU) 2025/2 of the European Parliament and of the Council of 27 November 2024 amending Directive 2009/138/EC as regards proportionality, quality of supervision, reporting, long-term guarantee measures, macro-prudential tools, sustainability risks and group and cross-border supervision, and amending Directives 2002/87/EC and 2013/34/EU, OJ L, 2025/2, 8.1.2025.

2 Directive (EU) 2025/1 of the European Parliament and of the Council of 27 November 2024 establishing a framework for the recovery and resolution of insurance and reinsurance undertakings and amending Directives 2002/47/EC, 2004/25/EC, 2007/36/EC, 2014/59/EU and (EU) 2017/1132 and Regulations (EU) No 1094/2010, (EU) No 648/2012, (EU) No 806/2014 and (EU) 2017/1129, OJ L, 2025/1, 8.1.2025 (IRR Directive, IRRD).

The next text concerns the underestimated liquidity risk in the insurance sector, which is generally considered to be a typical banking risk. The author, Hubert Grochowski, a practitioner dealing with risk management in an insurance company, comprehensively presents the issues of defining liquidity risk and its subtypes. He also proposes his own approaches to capturing liquidity risk in the activities of an insurance company. The text presents a systematic division of risks, which can be a helpful tool in appropriate liquidity risk management processes in individual entities.

As mentioned, legal conditions are also an element that creates the framework for insurance activity. Prof. Marcin Orlicki presents considerations regarding the scope of liability of the Polish Insurance Guarantee Fund (pol. *Ubezpieczeniowy Fundusz Gearancyjny*, UFG). As he points out, it is difficult to interpret the scope of UFG's guarantee liability unequivocally. The author puts forward the thesis that UFG is liable in the event of bankruptcy of an insurance company only in relation to compulsory insurance in the strict sense of the word and only to the extent to which insurance protection for a given entity is required by law. This seems to prove the even greater importance of the resolution process in the Polish insurance sector.

In the next article, author Julia Kuchno takes up the niche topic of segmentation of overdue receivables from the insurance sector, originating from the secondary market. The author has demonstrated a high level of risk of this type of receivables and their low recoverability. The results of this research should constitute an important contribution to considerations on the quality of overdue receivables from the insurance sector in the context of the safety of the operation of companies, as well as in the context of planning crisis management processes in this sector.

In the following part of the issue, Andrea Battista presents the causes, course and effects of the crisis of the Italian insurer Eurovita. The text contains the author's own observations, which were possible mainly thanks to the author's direct and personal involvement in the management of Eurovita – the author was the president of this company for years before it ran into financial problems. The analysis of the Eurovita crisis shows that bankruptcy of the insurer is possible, and factors and risks assessed as typical for banks may also affect the insurance sector. The example of Eurovita proves how important the regulations published in recent weeks are, in particular the IRR Directive.

The issue ends with a text by Dr. Edyta Cegielska and Dr. Piotr Kuszewski, in which they provide an in-depth review of the book by Prof. Pukała entitled: *Insurance in financing the effects of start-up risk* [*Ubezpieczenie w finansowaniu skutków ryzyka start-upów*].

I hope that the presented issue of Bezpieczny Bank will contribute to expanding the readers' knowledge about the insurance sector and will become a contribution to interesting discussions.

I wish you a pleasant and inspiring reading!

Dr. Magdalena Kozińska

Problems and Opinions

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Krzysztof Budzich*

Importance of the insurance sector for the stable functioning of the financial system and the real economy

Abstract

The stability of the financial system (financial stability) is crucial to the proper functioning of modern economies. Among many institutions that influence this stability are insurers. Traditionally, they have had a stabilising function in economies, as their primary role is risk diversification. In addition, the literature points to numerous other functions of insurance and insurance companies in the economy. However, they can also contribute to generating systemic risk, particularly when they engage in non-insurance activities. The aim of this article is therefore to identify the role of insurance and insurance companies in the functioning of the financial system and the real economy in the context of creating financial stability. To this end, the results of empirical studies published in the academic literature were reviewed. An analysis of the guidelines and recommendations of global, European and national supervisory and crisis management institutions on enhancing safety in the insurance market was also carried out. The analysis leads to the conclusion that the impact of insurers on systemic risk is increasing, primarily due to their growing role and interconnectedness, both with each other and with other financial market participants. The preponderance of the literature indicates that a potential source of systemic risk from insurers are their non-

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The article expresses the private thoughts and views of the Author and should not be identified with the position of the institutions with which the Author is professionally associated.

insurance activities (investments, securities and derivatives transactions). However, the negative consequences of insurer insolvency require appropriate mechanisms to manage such a situation.

Keywords: insurance, systemic risk, crisis management, resolution

JEL Codes: G01, G22, G32

Znaczenie sektora ubezpieczeniowego dla stabilnego funkcjonowania systemu finansowego i gospodarki realnej

Streszczenie

Stabilność systemu finansowego (stabilność finansowa) ma kluczowe znaczenie dla prawidłowego funkcjonowania współczesnych gospodarek. Wśród wielu instytucji, które mają wpływ na tę stabilność, są ubezpieczyciele. Tradycyjnie pełnią oni w gospodarkach funkcję stabilizatora, ponieważ ich podstawową rolą jest dywersyfikacja ryzyka. Ponadto literatura wskazuje na liczne inne funkcje ubezpieczeń i zakładów ubezpieczeń w gospodarce. Mogą oni jednak przyczyniać się także do generowania ryzyka systemowego, szczególnie gdy angażują się w działalność pozaubezpieczeniową. Celem artykułu jest zatem określenie roli ubezpieczeń oraz zakładów ubezpieczeń dla prawidłowego funkcjonowania systemu finansowego i gospodarki realnej. W tym celu dokonano przeglądu wyników badań empirycznych publikowanych w literaturze naukowej. Dokonano także analizy wytycznych i rekomendacji globalnych, europejskich i krajowych instytucji nadzorczych i instytucji zajmujących się zarządzaniem kryzysowym, dotyczących zwiększenia bezpieczeństwa na rynku ubezpieczeniowym. Analiza prowadzi do konkluzji, że wpływ ubezpieczycieli na ryzyko systemowe zwiększa się, przede wszystkim ze względu na ich rosnącą rolę oraz wzajemne powiązania, zarówno między sobą jak i z innymi podmiotami rynku finansowego. Przeważająca część literatury przedmiotu wskazuje, że potencjalnym źródłem ryzyka systemowego ze strony ubezpieczycieli jest ich działalność pozaubezpieczeniowa (inwestycje, transakcje związane z papierami wartościowymi i instrumentami pochodnymi). Negatywne konsekwencje upadłości ubezpieczycieli wymagają jednak dysponowania odpowiednimi mechanizmami zarządzania taką sytuacją.

Słowa kluczowe: ubezpieczenia, ryzyko systemowe, zarządzanie kryzysowe, resolution

JEL codes: G01, G22, G32

Introduction

The primary role of insurance companies is to provide insurance cover, i.e. to finance the consequences of unwanted events, by assuming risk from entities and, in turn, dispersing it for a specified insurance premium. In other words, insurers convert the unknown cost of a future insurance event with a specified probability into a certain present cost in the form of an insurance premium (Mayerson 1960, p. 85–103). In addition to the protective function described above, insurance companies also perform an investment function by investing funds in various types

of instruments, primarily in securities with negligible risk, such as government bonds. Another function of insurance is the preventive function, which is realised either by financing preventive initiatives or by preventing risky behaviour through exclusions or limitations of the insurer's liability in insurance contracts. In other words, insurers perform a variety of microeconomic, macroeconomic and socio-economic functions (Bednarczyk 2007, p. 264–270).

All the identified functions are important for the functioning of the financial system and the real economy, as they affect the level and management of risk by economic entities, including participants in the financial system. Of particular importance, however, are the protection function and the investment function, which are essential for the proper and undisturbed functioning of the financial system and, consequently, also the real economy, including the welfare of policyholders, insureds, claimants and victims. The sudden need to liquidate the investments of insurance companies, and therefore to sell quickly the financial instruments they hold (both their own and those where the investment risk is borne by the policyholders) may result in serious repercussions on the financial market. At the same time, the bankruptcy of an undertaking (linked to other entities and providing protection to a large number of entities or entities of strategic importance to the economy) may have an impact on other (non-insurance and even non-financial) entities in the real economy (contagion effect) (Kozińska 2023, p. 677–678). It is due to the fact that the role of insurance companies in the economy, their size and interconnectedness, as well as the offering of products and services other than strictly insurance products and services, have changed the way the sector is being evaluated as a potential source of systemic risk.

The purpose of this article is to assess the role of insurance and insurance companies for the proper functioning of the financial system and the real economy. In this respect, it seems crucial to identify the role and functions of insurance and insurance companies, which directly translate into the functioning of the real economy. The role of insurers in the financial system, which then affects the real economy, is also not without significance. In this context, it seems necessary to relate the concept of systemic risk to both traditional insurance activities, investment activities and activities outside the traditional insurance offerings, such as derivatives trading. An analysis of the two indicated areas (which are to some extent common and interact with each other) will make it possible to define the overall role of the insurance sector.

The first part of this paper analyses the function of insurance and insurers in the economy. The second part of this paper cites the approaches of different organisations to the concept of systemic risk and also presents the common features of these approaches and the related implications for the insurance market, in the context of the role of insurers in the real economy and the financial system. The second part reviews recent researches on the impact of insurers on systemic risk in the context of the types of insurance and non-insurance activities they undertake. The next part of the article is devoted to regulations related to systemic risk in the context of insurance. The fourth part is an attempt to assess the Polish insurance sector in terms of generating systemic risk. The article ends with conclusions on the role of insurance in today's economies and the necessary security mechanisms for this market.

1. Functions of insurance and insurers and their role for the real economy

The primary function of insurance is to lift or reduce the burden of certain random events whose risk of occurrence accompanies various entities, including households and businesses (Ronka-Chmielowiec 2016, p. 14). As Bednarczyk (2016, p. 45) points out, insurance makes it possible to disperse and redistribute the financial consequences of random damage and to increase the financial security of entities. In doing so, she distinguishes the following functions of insurers: protective-compensatory (providing insurance cover), mobilisation (mobilising savings in the economy) and investment (facilitating the transfer of savings into physical capital).

Citing Rejda (1966, p. 195–208), Bednarczyk divides the functions of insurers into microeconomic (enabling the restoration of assets damaged by the materialisation of random events) and macroeconomic (ensuring that the whole economy functions in a relatively even and stable manner). She also points out that non-life insurance is classified as a so-called macroeconomic stabiliser of the economy, as it mitigates shocks related to the occurrence of casualties.

Jonas (2020, p. 11) indirectly indicates the functions and role of insurance by citing various definitions that define the category of insurance. In doing so, he cites the following:

- Protection against the consequences of unfavourable, random events, by spreading the coverage of their consequences over a number of units (after Gluchowski 2001),
- Removing or reducing the burden of certain random events, the risk of which accompanies a person at different stages of life (after Ronka-Chmielowiec 2002).

In addition to the classic functions, Bednarczyk (2016, p. 46) points out that the practice of insurance companies provides further functions of companies not described in the literature, i.e.: contributing to financial stability, replacing and/or supplementing government social programs, facilitating trade and exchange, assisting in the accumulation of savings, enabling more efficient risk management, encouraging the reduction of random losses, and fostering more efficient capital allocation.

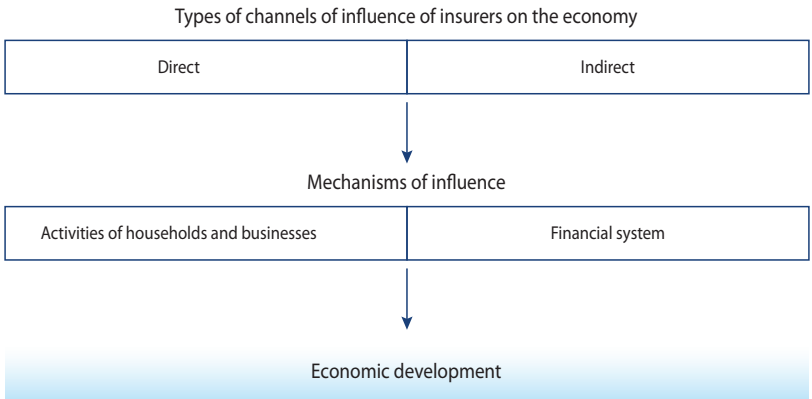
Signorini (2024, p. 2–3) points out that the contingencies that insurance companies safeguard can range from the effects of natural disasters to the effects of demographic change. Therefore, insurance and insurance companies play an important role in the real economy.

A review of the literature on the functions performed by insurance companies indicates that the classic insurance business plays a significant role as a stabiliser of economic life. The proper functioning of insurers should therefore have a positive impact on the real economy, and any disruption to the stable operation of the insurance sector deprives the real economy of an additional mechanism to support its development.

2. Insurance business and its importance for the financial system

A full assessment of the impact of the insurance sector on the real economy also requires an assessment of the sector's role in the financial system. Indeed, a properly functioning financial system is one of the conditions for the development of the real economy. The impact of the insurance sector on the financial system is therefore the second, indirect, channel of influence of insurers on the real economy. The channels of influence on the economy are summarised in Figure 1.

Figure 1. Channels of influence of the insurance sector on the real economy



Source: own study.

Assessing the role of the insurance sector in the stable functioning of the financial system involves, first and foremost, an analysis of the systemic risks that the sector can generate.

a. Definition of systemic risk

Risk is an inherent element of the activities of any business entity. It is defined as the possibility of an outcome that differs from the expected one (Jajuga 2019, p. 18). However, there are many types of risk. As Koleśnik (2017, p. 141) points out, in addition to the classic types of risk (such as credit risk, market risk, operational risk or liquidity risk), systemic risk, understood as the risk of simultaneous bankruptcy of multiple entities in a given sector of the financial system, should be indicated. Here, he points to the banking sector as an example.

Research related to systemic risk gained prominence after the outbreak of the financial crisis in 2008. As Smaga (2020, p. 20) notes, systemic risk, unlike the other types of

risk studied in financial markets, is more than the sum of risks generated by individual entities. It is an aggregation of all risks and arises not only from the functioning of individual entities, but also from the interconnectedness between them.

According to De Bandt and Hartmann's (2000) approach, the key element in systemic risk is, a systemic event, which consists of two elements: a shock and contagion (propagation). Shocks can be idiosyncratic or systematic. Idiosyncratic ones initially affect only the condition of a single financial institution or only the price of a single asset, whereas systematic shocks can affect the entire economy, e.g. all financial institutions simultaneously.

Chen et al. (2014) point out that systemic risk is often caused by financial institutions that are 'too big to fail' or 'too interconnected to fail'. Systemic risk is also the possibility of simultaneous failure of major financial institutions. The authors add that traditional measures, such as correlation coefficients, are often inadequate for measuring systemic risk, because they usually involve 'tail behaviour' (this can be read as a reference to the propagation cited earlier – author's note), which is not captured by conventional measures.

According to the definition used by the International Monetary Fund (IMF), systemic risk is defined as a situation in which the risk that the failure of a particular financial institution will cause large losses to other financial institutions threatens the stability of the financial system (IMF 2014). The European Central Bank (ECB), on the other hand, in relation to banks, adopts a definition of systemic risk as "the probability of a systemic event occurring in the financial system over a specified period of time. A systemic event, in turn, is characterised by a clear and measurable indicator, i.e. the number of financial institutions failing at the same time over a specified period". The ECB (2020) emphasises that three main forms of systemic risk can be distinguished, i.e. first, contagion risk, which is idiosyncratic in nature, second, common exposure to shocks in financial markets or adverse macroeconomic developments, which can cause simultaneous problems for a number of entities, and third, financial imbalances, such as credit and asset bubbles, which build up gradually and can have a sudden harmful effect on markets. All forms of systemic risk can be interconnected.

In developing its approach to systemic risk in the insurance sector, the International Association of Insurance Supervisors (IAIS) cites the concepts of both the IMF and the Bank for International Settlements (BIS) and the Financial Stability Board (FSB), noting that the term systemic risk "refers to the risk of disruption to financial services that is caused by an impairment of all or part of the financial system and can have serious negative consequences for the real economy." According to the IAIS, the source of systemic risk can be either a single financial institution or a group of such institutions (IAIS 2019).

b. Systemic risk – an approach to definition from an insurance perspective

While the definitions of systemic risk adopted by different institutions differ, certain common features can be observed in each approach (e.g. emphasis on the size of institutions, interconnectedness, contagion). Referring strictly to the specifics of the insurance market, one can recall the so-called key exposures of the insurance sector, developed by the IAIS (IAIS 2019), which can have systemic effects. These are:

1. Liquidity risk, defined as the inability of an insurer to use its investments and other assets in a timely manner to meet its financial obligations, including collateral needs, as they fall due.

According to the IAIS, liquidity risk is lower for companies doing traditional insurance business and higher for insurers operating in securities lending, derivatives or hedging liquid liabilities with illiquid assets.

2. Interconnectedness, including:
   a. Exposures of a macroeconomic nature, defined as the exposures of an insurer (or the insurance sector) to macroeconomic risk factors;
   b. Exposures to the counterparty risk, i.e. the interactions between insurers and counterparties through which each entity is exposed to the effects of the other's financial distress.
3. Limited substitutability, concerning continuity of cover in the event of insurer failure. Substitutability may be low in the case of high market concentration or in the case of niche insurance products offered by a small number of insurers.

The pandemic showed that systemic risk can also increase as a result of an equal and strong external factor. In the case of the pandemic, for example, most insurance companies were exposed to the risk of a strong increase in compensation payments due to the large-scale materialisation of various risks. As Lisowski (2021, p. 246–250) points out, this risk is primarily associated with insurances such as e.g. travel insurance, business *interruption*, business and professional liability, cyber risk, event cancellation or financial losses. At the same time, worsening macroeconomic conditions, e.g. a drop in interest rates (reducing the profitability of the assets held by the undertakings), an increase in the unemployment rate or a reduction in the scale of demand for insurance products (or even causing the withdrawal of funds from savings insurance products), reduce the profitability and liquidity[1] of undertakings on a system-wide scale. This generates the risk of simultaneous risk of bankruptcy of many undertakings, which is a manifestation of systemic risk.

In response to financial crises such as the one in 2008, regulators around the world introduced a number of changes to reduce systemic risk generated by financial institutions, including insurers. In the European Union, a key element of this effort was the Solvency II Directive, which introduced more stringent risk management

[1] At the same time, analyses by Kozińska et al. (2021) suggest that liquidity problems in a crisis are particularly difficult to manage due to the difficulty of obtaining such sources of liquidity to address the institution›s problems in terms of both the nature and scale of available funds.

and capital requirements for insurers. Poposki et al. (2024) point out that the introduction of this directive was aimed at reducing systemic risk through better monitoring of interdependencies between financial institutions.

With Solvency II, insurers are required to maintain adequate level of own funds to ensure their solvency, considering claims. In addition, these regulations require insurance companies to implement effective risk management strategies, which contribute to greater stability in the insurance sector.

Solvency II is an instrument to monitor the risk of insurer bankruptcy and thereby counteract the effects of potential bankruptcies on the financial system and the real economy. While Solvency II has significantly increased the resilience of the insurance sector to shocks, it has not entirely eliminated the risk of bankruptcy. For this reason, tools are being developed to manage systemic risk when an insurance company is on the verge of failure (FOLTF – failing or likely to fail). The IRR Directive establishes in this context the concept of critical functions, understood as "*activities, services or operations performed by an insurance or reinsurance undertaking for third parties that cannot be substituted within a reasonable time or at a reasonable cost, and where the inability of the insurance or reinsurance undertaking to perform the activities, services or operations would be likely to have a significant impact on the financial system or the real economy in one or more Member States including, in particular, the impact resulting from effects on the social welfare of a large number of policy holders, beneficiaries or injured parties or from a systemic disruption or a loss of general confidence in the provision of insurance services*."

The identification of a critical function in an insurance company is one of the prerequisites for its resolution, in order to better protect the financial system and the real economy from the possible consequences of an insurer's exit from the market.

c. The nature of systemic risk in the context of the insurance sector – a review of research

A review of the academic literature shows that opinions on the ability of insurers to generate systemic risk are divided and there is no consensus, unambiguous position on this issue.

As A. Denkowska and S. Wanat (2020, p. 39) point out, prior to the 2008+ financial crisis, there was a belief among researchers that insurers were not a systemically important sector. This approach was changed by the crisis and the associated role of AIG, one of the largest US insurance groups. While AIG lost liquidity due to the crisis, this phenomenon was due to the group's involvement in trading derivatives based on credit risks rather than offering traditional insurance products. The 2008 crisis resulted in a new research approach, which maintains that traditional insurance business does not generate systemic risk, while it can be generated by the

presence of insurers in the business of asset management, investment, derivatives trading. Evidence for this approach can be found in the IAIS (2013) document, i.e. the methodology for assessing globally systemically relevant insurers, where supervisors' association states the following:

- in general, insurance risks are not correlated with economic cycles and financial market risks,
- insurance groups and conglomerates that engage in non-traditional or non-insurance activities may be more susceptible to changes in the financial market and may therefore be more likely to increase or contribute to systemic risk.

P. Drake et al. (2017), citing a number of works, conclude that insurance risk, classically conceived, generates low risk compared to services performed by other financial market institutions. Nevertheless, this risk increases as insurers' activity shifts towards investment management, derivatives operations, CDS and underwriting of financial products. Also T. Bednarczyk (2013) points out that traditional insurance activities, although stabilising, become a risk when insurers engage in high-risk financial activities.

Also Bobtcheff et al. (2016) distinguish between two types of insurance business:

1. Traditional insurance – includes products that can be diversified according to the law of large numbers (e.g. property insurance, life insurance). This type of business is considered low risk in terms of systemic risk as the perils they cover have little correlation with the economy.
2. Non-traditional activities – e.g. insurance products with guaranteed minimum returns or surrender options, which can lead to systemic risk. These products are more correlated with the economic cycle and can generate insolvency risk, especially in crisis situations.

The authors point out that the biggest threat to systemic risk from the insurance sector is posed by large insurance companies with non-traditional operations and those with strong links to other financial institutions.

The IAIS lists as non-traditional or non-insurance activities the guarantees, activity in financial markets (e.g. CDS), non-hedging transactions and leveraged activities. In summary, the activities of insurers may involve systemic risk if they involve investing (own funds or customers' funds) or offering products similar in nature to bank or investment products.

The changing assessment of insurers in terms of systemic risk is not only related to non-insurance business. The evolution of the assessment of the insurance sector is also related to the increasing global linkages between insurers, reinsurers and other financial market players, including banks. A study by T. Gehrig and M. Iannino (2018) on systemic risk in the insurance sector analyses the evolution of systemic risk exposures in the insurance sector in Europe. A key finding of this study is that the increasing degree of interdependence between banks and insurers correlates with systemic risk exposure. According to the authors, one of the main factors

contributing to the increase in systemic risk in the insurance sector is the increasing involvement of insurers in non-insurance activities. This change in the business model of insurers may be the result of regulatory arbitrage, which incentivize the financial institutions to transfer some risk from the banking sector to insurance.

In 2013 the Financial Stability Board (in consultation with the IAIS) published for the first time a list of Global Systemically Important Insurers (G-SIIs), where 9 entities were identified, among which were:

- Allianz,
- AIG,
- Generali,
- Aviva,
- Axa,
- Metlife,
- Ping An,
- Prudential Financial,
- Prudential.

In November 2019, the FSB suspended the identification (in the context of insurers) of global systemically important institutions. In November 2022 the FSB announced that it will stop identifying global systemically important institutions in the context of insurers, which is related to the finalisation by the IAIS and approval by the FSB of the so-called holistic framework – a comprehensive framework, on the assessment and mitigation of systemic risk in the insurance sector (FSB 2022).

The differences in terms of assessing the potential for insurers to generate risk relate not only to the question "if?" but also to what the size of that risk might be. D. Kessler (2014) argues that the traditional insurance and reinsurance model does not generate systemic risk, unlike banks and other financial institutions. The main research thesis is based on the assumption that the reinsurance and insurance sector is inherently stable and is not exposed to the same mechanisms that can lead to systemic financial crises, such as sudden bankruptcies or bank runs. The author also states that insolvencies in the insurance and reinsurance sector are rare and, unlike banks which can fail quickly and generate cascading problems in the financial system, the failure of an insurer or reinsurer is a lengthy process that usually takes place in an orderly manner.

According to Kozinska (2023), the insurance sector is not free from the risk of insolvency, hence the need to reform crisis management in the insurance sector, which is being implemented in the European Union through the proposed IRR Directive. It will introduce resolution mechanisms into the sector, similar to those in the banking sector. The IRRD will strengthen the stability of the insurance sector and reduce the financial and social impact of possible insurance company bankruptcies.

B. Srbinoski et al. (2024) who, also citing other researches, conclude that, given the strong evidence of increasing networking among insurers globally and locally, as well as the increasing frequency and severity of natural disasters, the potential

for insurance-induced crises becomes a significant future risk. This is one of a few current examples of work in which the authors link insurers as a potential source of crises to the traditional insurance business of protecting assets from the effects of the elements. The authors analysed the evolution of insurers' linkages between 2000 and 2021, as well as the insurance sector's linkages with firms outside the financial market. The results show increasing trends in interconnectedness. The authors acknowledge that the evidence on the destabilising impact of catastrophes on European insurers and non-financial firms is weak and it is highly unlikely that systemic disruption is due to crises caused by significant catastrophic events. However, according to the authors, there is the potential for a contagion effect of catastrophe risk, both due to interconnectedness within and outside the sector. The most interconnected non-financial firms (with the insurance industry) are experiencing negative weather events, suggesting that as the scale and uncertainty of catastrophic events increases, insurers and non-financial firms may suffer significant losses.

In conclusion, the current approach to the insurance sector in the context of systemic risk, is that the capacity of the sector to generate this risk increases with the number of interconnections, the size of the entities and the pursuit of activities going beyond classic insurance services.

3. The insurance sector in Poland in the context of systemic risk

The assets of the Polish insurance sector at the end of 2023 amounted to more than PLN 218 billion. Out of more than PLN 114 billion of insurance companies' investments, as much as 84% were debt securities. The largest segment of insurance business in Poland is the motor insurance market, whose value in 2023, measured by premiums, amounted to PLN 28.3 billion, while premiums in the entire insurance market amounted to PLN 78.8 billion[2] (PIU 2024). Many segments of the insurance market are highly concentrated, such as life insurance linked to an insurance capital fund (unit-linked). At the end of 2023, unit-linked assets in Poland amounted to less than PLN 40 billion (Zalewska 2024), and 66% of assets are managed by three insurance companies. In compulsory crop insurance, on the other hand, two insurance companies held, according to data for 2020, almost 77% of the market (Janowicz-Lomott 2023).

Given the size and operations' scale of some entities on the Polish insurance market, the network of relations with other entities, as well as the strong concentration in certain market segments, it should be assumed that the possible bankruptcy of an insurance company in Poland may have systemic consequences. Avoiding these consequences are the primary objectives of the proposed IRR Directive. These are:

[2] Motor insurance, understood as the sum of the written premiums of classes 3 and 10 of Branch II, as defined in the Polish legal system.

- protecting the collective interest of policy holders, beneficiaries and claimants;
- maintaining financial stability, in particular by preventing contagion and by maintaining market discipline;
- ensuring the continuity of critical functions;
- protecting public funds by minimising reliance on extraordinary public financial support.

In addition to the issue of the day-to-day operations of the insurance undertakings and their impact on systemic risk, there is a need to analyse these risks and their effects also at the level of insurer insolvency. The described objectives of the IRR Directive translate into concrete risks of a systemic nature, i.e.: lack of insurance protection or funding of damages for a large group of entities when insurance coverage is essential for daily functioning or for undertaking certain professional activities, sale of assets caused by the entity's poor financial situation affecting valuations of financial instruments, permanent undermining of confidence in the sector due to the default on insurance contracts.

The IRR Directive provides further necessary tools to increase security in the insurance sector and allows for systemic risk testing in the insurance sector, in face of the risk of insolvency.

Cyclical reports by the National Bank of Poland (NBP), indicate that for the insurance sector, double gearing and the high proportion of expected profits included in future premium (EPIFP) in own funds may be a problem. The NBP recognises that due to these two factors, the real resilience of the insurance sector to shocks may not be adequately reflected by capital ratios. The NBP's calculations show that reducing double gearing and not including EPIFP in own funds would result in a decrease in the solvency capital requirement (SCR) for the whole sector from 240% to 175% (NBP 2024, p. 75). This problem is not identified in materials published by the Polish Financial Supervision Authority and the Ministry of Finance.

The EIOPA report (2021), in turn, shows that European insurers are not free from the risk of insolvency. Over the past 20 years, 219 cases of 'failures and near misses' have been identified. In an earlier study, EIOPA (2018) also gives reasons for insurers' failures or near misses. In the life insurance sector, these were: management and staff competence risk, investment management risk, equity/liability risk, market risk, reserve valuation risk and economic cycle risk. In the non-life sector, reserve valuation risk was the most significant, followed by internal management and control risk, board and staff competence risk, underwriting risk and actuarial risk. EIOPA (2021), citing the conclusion that insurers are not free from the risk of insolvency and the associated costs, also stresses that one of the objectives of the resolution mechanism is to protect taxpayers' money. EIOPA cites the case of the bankruptcy of AIG, for which the protection package cost the US economy $150 billion, and the case of Australian insurer HIH. The bankruptcy took place in 2001 and its cost was estimated at 5.3 billion Australian dollars, with the main emphasis being on the financial losses of policyholders and the lack of continuity of cover. Both of these issues are among the objectives of the IRRD and

the directive itself refers to the impact on the real economy and the financial system through damage to the interests of policyholders, which is reflected, among other things, in the definition of the critical function, provided in the IRRD and cited in Part 2 of this paper.

The history of the bankruptcy of Polish insurance companies is cited by Kozinska (2023, p. 676–686), concluding that 'they have not been extensively analysed in the national literature'. Instead, the author cites the potential effects of the possible bankruptcy of an insurance company on the Polish market. This is not only about the impact directly on customers (e.g. related to the rules of the Insurance Guarantee Fund, which protects only a part of the insurer's customers in case of bankruptcy), but also about imperfections in the Polish legal system. The author cites a number of provisions from the bankruptcy law and the mandatory insurance law, which are sometimes inconsistent or imprecise, so that it is not possible to clearly define 'the principles of settlement of insurance claims, as well as the division of tasks and responsibilities between the trustee and the Insurance Guarantee Fund (pol. Ubezpieczeniowy Fundusz Gwarancyjny, UFG)'.

Conclusions/Summary

Although the academic literature does not provide a clear answer to the question to what extent insurance activity translates into systemic risk, there are studies that confirm the adverse impact of insurers' troubles on the financial system and the real economy. This has to do primarily with the growing importance of insurers, greater interconnectedness within and beyond financial markets, and activities beyond traditional insurance coverage. The growing importance of the insurance sector is influencing changes in thinking about crisis management in the sector. Regulations (IRRD) are being introduced to minimise the financial and social impact of potential insolvencies. The insurance sector as an element of the financial market is starting to be treated similarly to the banking sector (maintaining all proportions), i.e. the increase in importance for the economy and society is correlated with the need to fill the gaps in regulation related to crisis management.

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Identification of liquidity risk in insurance activity

Abstract

The aim of the article is to present the issues of defining liquidity risk and its subtypes, as well as to present an original approach to a comprehensive framework of liquidity risk in the activities of an insurance company. A systematic division of risks was presented, which can be a helpful tool in appropriate liquidity risk management processes in individual entities. Based on the presented analysis of the companies' practical approaches to risk management, several conclusions can be formulated. First, there is a difference between the systematics of liquidity risk, which can be created within the framework of the interpretation of legal norms and guidelines of supervisory authorities, and the practice of insurance companies presented in annual reports on solvency and financial condition. Moreover, within insurance companies themselves, there is a different approach to the problem of liquidity risk. In most cases, it does not go beyond recording this risk in the internal risk map and defining it in a way similar to regulatory standards. The presented analyses should be continued in the future with research on methods for measuring and assessing liquidity risk in insurance companies.

Keywords: insurance sector, liquidity, liquidity risk, liquidity management

JEL Codes: G22

Identyfikacja ryzyka płynności w działalności ubezpieczeniowej

Streszczenie

Celem artykułu jest przedstawienie problematyki definiowania ryzyka płynności i jego podrodzajów, a także prezentacja autorskiego podejścia do kompleksowego ujęcia ryzyka płynności w działalności zakładu ubezpieczeń. Przedstawiono usystematyzowany podział ryzyk, który może być narzędziem pomocnym w odpowiednich procesach zarządzania ryzykiem płynności w poszczególnych podmiotach. Na podstawie zaprezentowanej analizy praktycznych podejść zakładów do zarządzania ryzykiem można sformułować kilka wniosków. Po

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The article expresses the private thoughts and views of the Author and should not be identified with the position of the institutions with which the Author is professionally associated.

pierwsze da się zauważyć różnicę pomiędzy systematyką ryzyka płynności, którą można stworzyć w ramach interpretacji norm prawa oraz wytycznych organów nadzoru, a praktyką zakładów ubezpieczeń prezentowaną w corocznych sprawozdaniach o wypłacalności i kondycji finansowej. Ponadto w ramach samych zakładów ubezpieczeń ma miejsce różne podejście do problemu ryzyka płynności. W większości przypadków nie wykracza ono poza odnotowanie tego ryzyka w wewnętrznej mapie ryzyka oraz zdefiniowanie go w sposób zbliżony do norm regulacyjnych. Zaprezentowane analizy w przyszłości powinny być kontynuowane o badania nad metodami służącymi pomiarowi oraz ocenie ryzyka płynności w zakładach ubezpieczeń.

Słowa kluczowe: sektor ubezpieczeniowy, płynność, ryzyko płynności, zarządzanie płynnością

Kody JEL: G22

Introduction

Risk management is one of the elements of the management system in an insurance company. The vast majority of market participants perceive risk management as focused on risks explicitly listed in the law, which are part of the solvency capital requirement. However, the catalogue of risks describing insurance activity is broader, which will be discussed later in this paper. This article focuses on one of the types of risk that has not yet been included in the regulations governing capital requirements, despite some attempts. This risk is liquidity risk. It is currently attracting increasing interest in the research of the European and national supervisory authorities. Stress tests are conducted, among others, to assess the quantity of this risk. Materialisation of liquidity risk within the analyses in question is a factor that may affect the change in the valuation of individual components of the economic balance sheet when the assumptions of the model valuation are confronted with the market in an extraordinary situation and therefore precedes the calculation of capital requirements by imposing stress scenarios on the new calculation basis. Taking the above into account, it seems reasonable to pay more attention to the mentioned risk category and to attempt to systematize it.

The aim of the article is to present the issues of defining liquidity risk and its subtypes, as well as to present an original approach to a comprehensive approach to liquidity risk in the operations of an insurance company. The conducted study begins with the presentation of the concept of liquidity, the division of risks resulting from legal regulations and the separation of liquidity risk in this respect. As part of indicating the standards on the basis of which liquidity risk is identified, an analysis of the definition of this risk was made at the same time and interpretation problems that may occur in this context were presented. In this part of the publication, liquidity risk was also placed on the total map of risks covering the operation of an insurance company.

The next two points of the work present the liquidity risk module[1] from the perspective of the regulatory and supervisory bodies of the insurance market and within the framework of market practice. At the beginning of the study, the provisions of legal acts were analyzed, among others. The aim of the above was to diagnose what division of liquidity risk actually takes place within the potential submodules of this risk and what the regulator expects with regard to the management of this risk. The study used simultaneously the guidelines and publications of the Polish Financial Supervision Authority (pol. *Komisja Nadzoru Finansowego*, KNF), the European Insurance and Occupational Pensions Authority (EIOPA) and the International Association of Insurance Supervisors (IAIS). At the end of the chapter, as a result of the analyses, a liquidity risk diagram is presented, in which the author tried to take into account each of the aspects raised by the above-mentioned institutions.

The rest of the work focuses on insurance companies and research conducted within the Polish Insurance Association (pol. *Polska Izba Ubezpieczeń*, PIU). Based on public reports on solvency and financial condition, a review was made of all insurance companies authorized by the Polish supervisory authority to conduct insurance activity in section II (of Polish legal insurance system). Both the applied definitions of liquidity risk and additional sub-modules of this risk identified by these entities were presented in tabular form. In the case of PIU, the analysis of risk factors was conducted as part of the work of this institution, and its results were presented in a publication entitled "*Classification of types of risk occurring in the activity of insurance companies*". Similarly to the part describing legal standards and practice of supervisory authorities, the final effect is a liquidity risk diagram containing an attempt to capture the sub-modules of this risk diagnosed by insurance market entities.

The work is summarized in a liquidity risk diagram containing both the risks recognized by regulators and those diagnosed in the practice of insurance companies.

1. The concept of liquidity and liquidity risk

Starting the identification and analysis of liquidity risk at the beginning of the considerations, it seems that, following many outstanding representatives of the world of science, we should start presenting the problem by defining the concept of liquidity itself. Within the framework of economic sciences, many authors use the described concept of liquidity and try to define it. In the literature, liquidity is usually discussed in three aspects: capital, assets and cash flows (Lisowski, Stępień

[1] In this article, in order to systematize the risks occurring within the insurance activity, a risk tree structure was adopted, in which at the highest level there are risk groups interchangeably called risk modules and at subsequent levels risk subgroups interchangeably called submodules / risk submodules. The last level in a given risk submodule is a single risk. Due to the above, liquidity risk was identified as a separate risk group/module (at the highest level of aggregation).

2013, p. 41–43). E. Walz understands liquidity as the ability of an entity to repay its obligations, H. Joschke indicates that liquidity is the ability to repay payment obligations within a specified period. The indicated approaches identify liquidity to a large extent with the ability to pay. Liquidity is understood similarly by W. Jeleń (Jeleń 1991, p. 13). W. Rogowski and M. Lipski indicate that it is the ability to meet the most due obligations on time, in their definition they emphasize the short-term nature of obligations (Rogowski, Lipski 2014, p. 13). This approach is called the capital approach and is the most common in defining the concept of liquidity (Grzywacz 2014, p. 49). In the scientific literature, other terms for liquidity in this approach are potential liquidity and latent liquidity (Grzywacz 2021, p. 23).

The definition of liquidity is also identified with the solvency of an enterprise, i.e. its ability to meet its obligations both within the framework of current, ordinary transactions and extraordinary and unexpected situations (Bannock, Manser 1992, p. 158). Two assumptions are distinguished here, related to the period in which it will be necessary to meet the obligations. The first one concerns short-term events, the second one is of a long-term nature. D. Wędzki uses the concept of asset and capital liquidity in this meaning (Wędzki 2002, p. 33–38). J. Grzywacz, in the analysis of the concept of liquidity, points to the problem of treating the concepts of liquidity and solvency interchangeably. In his opinion, solvency in the sense of liquidity can only be one of the aspects of liquidity referring to the long-term perspective, nevertheless the concept of solvency also goes beyond the aspect of liquidity assessment. To sum up, these concepts are certainly not equivalent, but to some extent they form a common area (Grzywacz 2014, p. 52–53).

The above-mentioned context of liquidity in the capital or capital-asset approach is extended by P. Meimberg, who assesses liquidity within the framework of exchanging individual assets for cash and, therefore, each asset is considered through the potential possibility of its liquidation (Kulawiak 1991, p. 1–5). In this approach, potential transaction costs incurred by the entity are important (Pluta, Michalski 2005, p. 5) as well as the potential time necessary to carry out such an exchange (Sierpiński, Jachna 2007, p. 81; Wędzki 2003, p. 12). This problem is defined by the authors as the property aspect of liquidity, linking liquidity with asset classes and it points to the feature of convertibility (Maślanka 2019, p. 24; Sokół 2014, p. 83; Cicirko 2015, p. 19).

In addition to the so-called static aspects of liquidity theory, a dynamic context is also distinguished, referred to as the cash flow aspect (Kreczmańska-Gigol 2015, p. 19; Rzeczycka 2016, p. 46–47). It is based on both inflows and outflows illustrating the process of financing the entity. Current financial inflows are to guarantee the implementation of upcoming expenses, and the difference between the two streams is referred to as the level of cash flows. In the operations of an enterprise, therefore, they can have either positive cash flows if inflows exceed expenses, or a negative cash flow balance otherwise. Within the dynamic approach to liquidity, an important element is the entity's ability to generate positive cash flows, and not only whether the entity has liquid assets (Kusak 2006, p. 11). In this aspect, some

authors understand liquidity not only as the ability to meet obligations, but also as the ability to acquire goods and services when they are needed in the course of business activities (Pluta 2005, p. 7).

The rarest attempt to define liquidity in the context of an enterprise refers to the very essence of the market game, i.e. the possibility of transactions on the market, i.e. whether there is both demand for a given asset and its supply (Henderson, Maness, 1989, p. 95). In the context of the concept of liquidity, the capacity of the market is indicated in this sense.

The word fluidity is also defined in the Dictionary of the Contemporary Polish Language, in many meanings: in the context of the concentration of matter, e.g. fluidity of a liquid, movement, shape, e.g. edge, style of speech and in the understanding of character or feature, e.g.: unstable, fluid boundary, fluid composition of the commission (Wierzbicka 1998, p. 57). None of the above terms refer unambiguously to the matter discussed in this article related to the concept of fluidity within economic sciences. However, for further considerations, it seems helpful to reason a contrario, negating the state of fluidity, i.e. describing the features of stability. The word solid in Polish is defined as something that is characterized by a rigid form, remains in the same place, does not change, is clearly shaped or defined, uninterrupted, continuous, unwavering (Szymczak 1978, p. 296). Using both general definitions in our considerations, it can be assumed, however, that the linguistic definition of the word liquidity reflects the meaning of the institution of liquidity in the financial sense, because the essence of the problem in question is a situation in which there is a lack of stability, and therefore a problem of implementing processes in an enterprise related to its changing assets and their broadly understood financing. In the context of an enterprise and its assets, a lack of liquidity is an inappropriate and undesirable state, making it difficult or even impossible for the entity to continue its operations.

2. Identification of liquidity risk in the insurance company's risk system

Risk segmentation used in insurance activity can be carried out in many ways. Risk modules and sub-modules result primarily from the applicable provisions of national and supranational law. Public entities supervising the application of legal regulations[2], research centers[3], professional associations[4], entities conducting insurance activity and chambers associating such entities are also of significant importance[5].

2 In Poland, the Polish Financial Supervision Authority.
3 An example of a publication is: Gąsiorkiewicz (2010, p. 91–103).
4 In Poland, the Polish Association of Actuaries (PSA).
5 In Poland, the Polish Insurance Association (PIU).

It seems reasonable to start the analysis with the applicable legal regulations. The use of risk division in accordance with the applicable legal regulations is a natural approach of insurance companies to building their own risk map, which allows for reducing uncertainty related to compliance with legal regulations. The introduction of a different division could lead to a situation in which the insurance company would have to justify the correctness of the solutions adopted internally in the face of the applicable regulations.

It can therefore be assumed that, in principle, the risk map structure used within the insurance business results from the implementation of Directive 2009/138/EC of the European Parliament and of the Council of 25 November 2009 on the taking-up and pursuit of the business of Insurance and Reinsurance (Solvency II) (OJ L 335, 17.12.2009)[6] (hereinafter referred to as the "Directive") into the internal Polish system, as well as the introduction of standards resulting from the Commission Delegated Regulation (EU) 2015/35 of 10 October 2014 (OJ L 12, 17.01.2015) supplementing the Directive (hereinafter referred to as the "Delegated Regulation") and EIOPA guidelines and regulatory technical standards[7].

All types of risks related to the activity of an insurance company within the framework of legal regulations can be divided into risks listed within the solvency capital requirement[8] (these are risks described in a quantitative manner) and risks exceeding the capital requirement. In this case, the principles of quantification are not specified in legal regulations. The separation of these risk groups is confirmed, among others, in the standard describing the risk management system. Article 44 of the directive states that the risk management system of an insurance company includes those risks that should be included in the calculation of the solvency capital requirement, risks that are partially included in this calculation and those that are not included in the calculations. However, the legal regulations do not clearly indicate how the division between[9] risks included in full or in part in the capital requirement is carried out.

6 The implementation in Poland took place through the Act of 11 September 2015 on insurance and re-insurance activities (OJ 2021, item 1130) (hereinafter referred to as the "Insurance and Reinsurance Activity Act").

7 The second group of legal norms are regulations related to a given issue, but in principle not covering only insurance activities. An example such legal norms is the AML/ATF Act. Approach based on analysis AML/ATF Risk Recommends between including FATF (2022, p. 31–33).

8 The Directive regulates this matter in Article 101.

9 The same regulation applies to this matter in Article 57 of the Insurance and Reinsurance Activity Act.

In view of the above, considering the above together, the first and second groups include insurance risk, credit risk, market risk[10], operational risk[11] and intangible assets risk[12]. The third group is strategic risk, reputation risk[13] and liquidity risk (Fig. 1). Additionally, in addition to the above-mentioned division, other types of risk classification are introduced in legal regulations, which make it difficult to conduct a uniform taxonomy. These are risks named as: concentration risk[14], large risk[15], capital group risk (contagion risk)[16], investment risk[17] and sustainable development risk[18]. However, these additional introduced risk cross-sections do not constitute new risk categories at the highest level of taxonomy, but only single risks or even factors describing them[19].

[10] Under Article 13 regulating the definitions in points 30, 31 and 32 of the aforementioned directive, insurance risk, market risk and credit risk have been distinguished in insurance activity. In general, they are defined as the risk of loss or an unfavourable change for the insurance company related to the essence of the materialising risk. Additionally, it should be noted that the directive introduces spread risk and concentration risk in the definition of credit risk. Under the provisions of Polish law in Article 2 of the Insurance and Reinsurance Activity Act, the defined catalogue of risks is identical to the European regulations. There is a subtle difference in the name of the insurance risk institution because under the Act it is called actuarial risk.

[11] Article 13, point 33 of the directive defines operational risk (taking the rational legislator's principle as the basis for considerations). This risk is defined in a way that is partly different from credit risk, market risk and insurance risk because it refers exclusively to loss, i.e. financial loss, resulting from improper or erroneous internal processes, from personnel or system actions or from external events. The definition does not include an unfavourable change related to materialised risk, and therefore it can be assumed that there is no room for distinction here, e.g. from market risk, a temporary change in valuation, which can be reversed, for example, as an unfavourable change in revaluation capital.

[12] The risk of intangible assets does not arise directly from the Solvency II Directive and has not been mentioned in the Insurance and Reinsurance Activity Act, but it results from a lower-level act, which is the Delegated Regulation referred to. This risk can be found in Article 87 and Article 203 of the Regulation. It concerns a specific item of the economic balance sheet, which are intangible assets, which are assets that are difficult to sell.

[13] These risks are listed in Article 101 of the Directive a contrario by indicating that they are not covered by the capital requirement. It is also worth emphasizing the lack of legal premises for including these risks within the risk management system specified in Article 44 of the Directive. Nevertheless, there is no consistency in the law in this respect, because the lowest-level acts, i.e. EIOPA guidelines on the management system, Guideline 23, title them as strategic risk and reputational risk.

[14] Article 13(35) of the Directive introduces an independent definition of concentration risk.

[15] Article 13(27) of the Directive describes what is meant by the term "large risk".

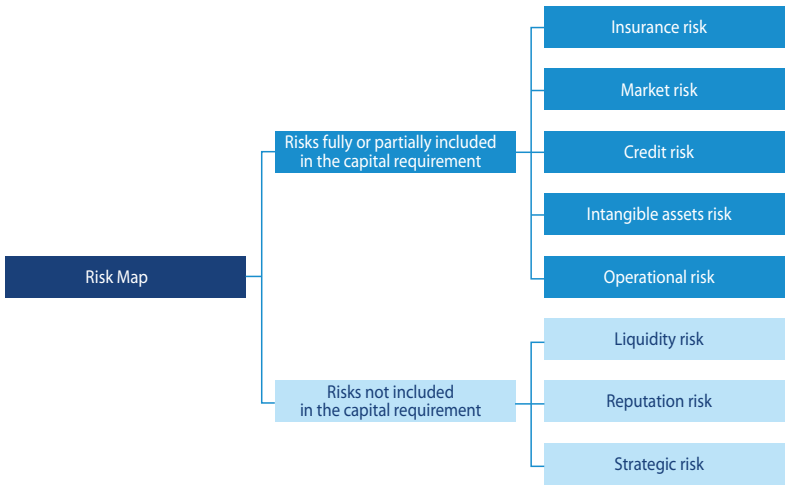
[16] Article 244(3) of the Directive and Article 260(1)(e) of the Delegated Regulation.

[17] The investment risk institution in the context of the governance system appears in the EIOPA guidelines, i.e. in the title of guideline 25 – principles of investment risk management.

[18] For example, in Article 2 of Regulation (EU) 2019/2088 of the European Parliament and of the Council of 27 November 2019 on disclosure of information related to sustainability in the financial services sector, sustainability risk is understood as an environmental, social or governance situation or condition that could have an actual or potential material negative effect on the value of an investment.

[19] Analyzing the explanatory text of guideline 25, it can be assumed that investment risk is an element of other types of risk, including in particular market risk, credit risk and liquidity risk, but only within the investment process. One can also wonder whether the intention of the standard-setter within the aforementioned guideline was not to assign investment risk as related to the decision-making process, and in this context also as part of operational risk.

Figure 1. Risk map classifying risks in accordance with the systematics resulting from Article 44 of the Directive



Source: own study based on the directive, delegated regulation, the Insurance and Reinsurance Activity Act and EIOPA guidelines.

The risk that is the subject of in-depth interest in this article and will be analyzed in a broader way is liquidity risk. In its basic definition resulting from art. 13 point 34 of the directive, it was defined as the risk of inability of insurance and reinsurance undertakings to realize investments and other assets in order to settle their financial obligations when they fall due. However, in the definition of this risk there is no literal reference directly to loss or unfavorable change in value, as is the case in other definitions of risks. In view of the above, this definition itself, due to its different nature, raises certain doubts and can be understood in two ways. In the first hypothetical understanding, it is permissible to assume that a certain potential state is described, which is already a risk factor on its own at a specific point in time, when a given obligation falls due. In this context, it does not matter whether the actual financial loss occurs or not, what is important is the mismatch between assets and liabilities at the current moment, which may have repercussions in the future. This approach would be close to liquidity in terms of assets. In a partially different interpretation, the key problem in the assessment can be attributed to the moment just before maturity, when, for example, new significant circumstances occur that fundamentally change the valuation model, or when the scale of the materializing primary risk fundamentally affects the materialization of the liquidity risk as well[20]. In this case, an actual financial loss will be incurred, or its size will exceed the initial assumptions, due to the need to revise the valuation due to the supply side. The entity does not have the possibility to use a compensating strategy.

[20] An example of the above is the materialization of catastrophic insurance risks.

In this interpretation, we therefore have an emphasis on the need to immediately settle its liabilities, and therefore an approach close to the definition of liquidity in capital terms.

There are significant differences in the presented approaches. The first concerns the specific time of risk materialization and the potentially related scale of impact and the possibility of adjusting the risk mitigation strategy. The second concerns the reason for risk materialization, i.e. whether there is a structural mismatch of the estimated future cash flows or an event resulting in immediate settlement of liabilities. In the first case, the risk is not the liquidation of the asset itself, because it may not take place at all. The risk is the very fact of the mismatch of flows, both in terms of their estimated values and realization dates. In the second case, however, there is an actual financial loss, because the asset will be liquidated with the necessary discount as a result of an extreme event characterized by low probability but exceptionally high impact[21]. The presented distinction is important due to the structure of the insurance company's liabilities, consisting mainly of technical and insurance reserves. Technical and insurance reserves are not, by their nature, liabilities with a strictly defined value and maturity dates. They are generally estimated within statistical mathematical models for both of the above-mentioned variables (EIOPA 2021, p. 5), they correspond to the need for the most reliable statistical adjustment to future flows. A completely different situation is related to the assets held by the insurance company, for which the maturities and values of cash flows are determined.

Liquidity risk, as mentioned, within the main division of risk types due to partial or full recognition or not being included in the calculation of the capital requirement is not a risk that is quantified within the framework of legal standards. The approach to liquidity risk, however, changed during the work on the Solvency II system. It should be emphasized that it was tested in the last study before the implementation of legal regulations, the so-called QIS5, i.e. in the Fifth Quantitative Study organized by CEIOPS. Liquidity risk in this study was included as a sub-module of market risk, and therefore was a sub-module of risk generating capital requirements (CEIOPS 2010).

[21] Liquidity risk defined in the directive through the risk of impossibility of realization may, however, be understood in different ways. In terms of scaling the problem, it may be the impossibility of realization in the sense of the fair valuation specified within the valuation principles in accordance with the Solvency II system, the impossibility of realization in a way that does not lead to a state of financial security in which there is no coverage of the solvency capital requirement or minimum solvency requirement by own funds, or in a way that does not lead to bankruptcy of the entity, or the impossibility of actual realization within a specified necessary time, or the inability to realize the asset at all.

3. Review and classification of liquidity risk within the framework of legal regulations and practices of supervisory entities

Liquidity risk is also described in lower-level legal acts. This risk is, among others, an element of the management system through its enumerative discussion in Guideline 26 and is taken into account in defining the prudent investor principles in Guideline 29 (EIOPA 2014). The latter guideline indicates that the entity is obliged to monitor and regularly review the liquidity of the entire investment portfolio, taking into account: limitations of liability, level and nature of risk, characteristics of assets, in particular an assessment of their liquidity, environmental factors that may change the current characteristics of the asset and the availability of assets.

Guideline 26 – Liquidity Risk Management Principles specifies requirements for liquidity risk management. Based on this guideline, liquidity risk can also be further divided into sub-modules.

The first aspect of this risk would be the mismatch between assets and liabilities, taking into account the expected flows. In view of the above, the regulator recommends having an appropriate procedure to determine the level of mismatch between inflows and outflows within the cash flows and to determine the total liquidity requirement in the short and medium term, as well as to establish a safeguard against a potential loss of liquidity. It can be assumed that this type of approach is consistent with the first interpretation of liquidity risk signaled in the previous chapter[22].

The second aspect, however, is directed towards forced liquidation and financial losses associated with it. It is therefore a risk of a very close financial loss due to the impossibility of realising an illiquid asset. This issue is discussed in letters c), d) and e) of the aforementioned guideline. EIOPA indicates that the insurance company should determine the manner and methods of assessing potential losses associated with the necessity of forced liquidation of the asset, analyse the costs of alternative financing and determine how the new type of activity would affect the liquidity situation. The EIOPA guideline, through its content, also defines what the regulator understands by the risk of impossibility of realising the asset. According to the supervisory authority, it seems that this is not a categorical actual impossibility of realising the asset, but rather the impossibility of realising it in a way that would not lead to negative financial consequences.

In addition to the aforementioned regulations, as part of the analysis of liquidity risk management, it is also necessary to pay attention to the approach used by the PFSA in this area, among others, as part of the annual assessment of entities in the Supervisory Review and Evaluation Process (BION). This approach seems all the more justified because the supervisory authority in the methodology emphasizes risks not included in the solvency capital requirement and tries to identify and name phenomena observed

[22] This type of risk is also mentioned by IAIS in guideline 16.5.6 (IAIS 2019, p. 196).

in the supervisory process, which significantly affect the activities of insurance companies. The undoubted value of the list of risk types presented in the BION is an attempt to build an approach to the problem of liquidity risk (KNF 2024). As part of the assessment of microprudential risk, the supervisory authority has separated the area of "Capital adequacy and liquidity"[23]. This area has been divided into many correlating assessments and coefficients, which are to assess both of the aforementioned elements. The methodology explicitly proposes liquidity risk indicators and describes factors generating liquidity risk, including the determination of liquid assets and potential financial losses in the event of the need to liquidate a certain group of assets. To sum up, emphasis was placed on the problem of forced liquidation and the related financial losses mentioned in the preceding paragraph.

A new aspect proposed by the supervisory authority since 2019, correlating with liquidity risk, is the recognition of capital management risk and insolvency risk. The PFSA has defined capital management risk as a potential lack of capital adequate for the activity or a lack of sources to obtain it, including by achieving effects different from those planned, for example in the context of the financial result. Insolvency risk, on the other hand, has been defined as the risk of reducing the level of capital to a level at which the entity will not be able to cover the financial loss. Both of these risks are related to capital management, which is very close to liquidity risk. It is worth emphasizing that risks of this type do not occur within the solvency capital requirement. Moreover, they are secondary to the types of risks included therein, they are revealed as a result of their materialization. To sum up, at their original source they are identical to liquidity risk in the context of the quantitative mismatch of financial flows. In addition, an interesting historical perspective on liquidity risk was the consideration of the dependence of the possibility of fulfilling obligations on the right of the counterparty to change the amount and timing of cash flows. This is called the option risk by the supervisory authority (KNF 2011). Currently, there is no such defined risk in the BION methodology.

In addition to the assessment of microprudential risk, the supervisory authority placed liquidity risk elements within the assessment of the "management" area. These elements include model risk in the context of implementing business plans and financial result risk. This risk was defined as obtaining a result other than necessary for the needs of the business. We are therefore dealing with the previously mentioned quantitative cash flow mismatch. An interesting older perspective on liquidity risk was the separation of settlement risk in the risk map, indicating problems with settlement with the counterparty due to a mismatch in the structure of cash flows.

[23] In the Methodology for the Annual Supervisory Review and Evaluation (pol. *Badanie i ocena nadzorcza*, BION) of insurance and reinsurance undertakings (2020 assessment), the supervisory authority referred to this area as the capital adequacy of microprudential risk. This area also did not directly refer to liquidity, which indicates a significant increase in the importance of this risk in the perception of both EIOPA and the supervisory authority.

Similarly to the Polish Financial Supervision Authority, the IAIS also presents the guidelines on the management of insurance companies in the ICP16 Enterprise Risk Management for Solvency guideline. Purposes divided the risk modules, including the liquidity risk module. The IAIS guidelines indicate that liquidity risk is difficult to quantify and seems to be on the border between the principles of quantitative and qualitative assessment. In one of its studies, the IAIS states, among other things, that liquidity risk may increase when there is an imbalance between the liquidity on the entity's assets and its needs on the liabilities side, as well as when there is a long-term imbalance between cash flows (IAIS 2022, p. 8). In the context of managing this risk, the IAIS recommends, first of all, correctly defining risk tolerance limits and an adequate control system in this area. Additionally, the IAIS assesses that liquidity risk is usually secondary, i.e. materializing after the occurrence of other types of risk. This organization, like EIOPA, has undertaken work on creating a coherent system for identifying and managing liquidity risk (IAIS, 2020).

Returning to the basic problem of financial loss caused by having an illiquid asset, it should be emphasized that in recent years it has been diagnosed due to the difficult market situation that occurred during the Covid-19 virus pandemic[24]. Currently, EIOPA has also added general geopolitical factors affecting the European single market, in particular the Russian invasion of Ukraine, to the factors negatively changing the market situation. The European supervisory authority emphasized the importance of the disruption of the supply chain and the increase in energy prices, which translates into significant inflationary pressure with repercussions for many economic variables (EIOPA 2024, p. 6). For this reason, EIOPA decided to take into account liquidity risk more strongly in the insurance company's management system. This institution drew attention, among other things, to an important aspect, which is the characteristics of insurance activity in the context of liquidity (EIOPA 2021, p. 1–12). Insurance activity, unlike other types of activity in the financial sector, is characterized by the so-called reverse production cycle. The insurance premium first flows into the insurance company, while the compensatory function of the insurance service, if it is necessary to pay compensation or provide a service, often occurs many years later. This often happens when the insurance contract period has expired and the insurance company is obliged to provide services to the insured or beneficiaries due to the fact that the insured event occurred during the period covered by insurance. To sum up, the fundamental problem faced by the insurance company is the proper estimation of the insurance risk, and thus the determination of such a price for the service that will be sufficient to cover future losses and costs, as well as the appropriate determination of the cash flow pattern on the liabilities side. In view of the above, the materialization of liquidity risk can be redefined in two ways:

- as the inability to meet the insurance obligation due to an incorrect estimation of the expected value of insurance claims,
- when there is a correct estimation of the expected value of future claims but

[24] In many countries, it applies to commercial real estate (EIOPA 2020, p. 29).

extreme events have occurred (e.g. catastrophic, significantly increasing the burden of liabilities in a short period), and therefore there was no statistical estimation of the sum of the expected value of flows, but the extreme event led to a disturbance in the value structure of future flows. In this circumstance, a specific concentration of primary risk is realized, which affects liquidity risk.

Another group of factors undoubtedly affecting liquidity risk, cited by EIOPA, among others, are macroeconomic events (EIOPA 2024, p. 6). They mean that the insurance company is not inclined to make decisions that would result in realizing losses by liquidating assets due to, for example, a reduced valuation caused by changes in interest rates. This approach is generally the result of a rational and correct liquidity risk management policy, consisting in maintaining long-term financial instruments on the active side of the balance sheet, ensuring that flows on the asset side are matched to long-term liabilities, including annuities. In the event of a stressful situation related to a sudden significant change in interest rates, the fact of having a long-term asset in the investment portfolio unfortunately leads to a potential deepening of the problem due to a downward revaluation of the asset value, often also affecting the entity's solvency. There is also a low propensity to realize losses.

The next group of liquidity risk factors is the mismatch between operating activities and potential sources of its financing. This situation is visible primarily when there are insufficient current cash flows from insurance premiums to cover maturing liabilities. This means a lack of consistency between the assumed expenses and the source of their financing. This type of liquidity risk can undoubtedly be associated with the planning process. An inadequate and irrationally optimistic plan, which provides for, for example, significant increases in the premium written and low indicators related to the compensation paid, and at the same time large certain financial outlays, can lead to a plan implementation different from the assumed one, and thus also to the materialization of liquidity risk. In the case where, in addition, unfavourable macroeconomic factors mentioned in the previous paragraph occur, the negative effects of liquidity risk are deepened.

Sub-risk of the liquidity area that is largely independent of the company is the risk of policy failures related to the need to return insurance premiums to policyholders. An increase in this factor also significantly disrupts planned cash flows[25].

An important issue raised by the PFSA in the Guidelines on passive reinsurance/retrocession is the need to take into account in the cash flows the time shift of the payment from the reinsurance contract in relation to the insurance contract. This may happen in particular in the case of large catastrophic losses (EIOPA 2019), for which it would be a very big burden to pay compensation before the reinsurer's obligation to the insurance company is fulfilled. In such a situation, there is a significant mismatch of cash flows, which potentially generates a financial loss due to the need to liquidate the insurance company's assets on unfavourable

[25] The problem of sources of liquidity risk is described in great detail, also with examples, by the IAIS (IAIS 2020, p. 13–23).

terms, and therefore, according to EIOPA's interpretation, the inability to sell the asset at a value previously assessed as market value. The second and more difficult problem would be the materialisation of credit risk related to the failure to fulfil the reinsurance contract, e.g. caused by the bankruptcy of the reinsurer, which was unable to bear the loss.

The Directive, within the types of risks covering the activities of insurance companies in general, draws attention to another risk module. These are risks related to the entity's membership in a financial group, such as: contagion risk, conflict of interest risk and concentration risk related to group contracts. Focusing first on the risk of contagion and conflict of interest risk, there should be no doubt that as factors increasing the risk in the other modules, they are also significant for liquidity risk. The potential transfer of its problems by the parent company to the subsidiary may lead to an increase in exposure to liquidity risk in the insurance company. This may happen in the context of liquidity, e.g. by adjusting the cash flow pattern on both sides of the balance sheet by the parent company at the expense of the subsidiary or with the need to finance projects that are important from the ownership perspective.

This situation may also lead to the materialization of liquidity risk due to, among other things, the need to liquidate long-term assets held[26]. The risk of contagion as part of the default of a counterparty within a capital group in the area of reinsurance is drawn to by the KNF guidelines on passive reinsurance/retrocession[27]. The IAIS also considers the risk associated with the capital group very broadly in its guidelines. Most of the factors that are referred to are factors that simultaneously significantly increase liquidity risk (this includes the risk of the domino effect, the risk of financial leverage and leverage, concentration risk, the risk of large joint insurance exposures, the risk of joint investments, the risk of mutually granted guarantees, loans, collateral and other instruments affecting the actual significant burden of the capital group and the risk associated with off-balance sheet items or intangible assets).

Taking into account the above considerations, one can additionally assume, within the systematization of liquidity risk, the division of factors generating this risk into internal and external factors. To the external factors indicated above (i.e. materialization of insurance risk, market risk and credit risk), it is necessary to add events of an operational nature (e.g. materialization of legal risk or materialization of risk concerning insurance crime)[28].

In the context of liquidity risk, off-balance sheet items also deserve attention. They are often an element omitted in broader analyses, and may result in a mismatch

[26] The IAIS regulation, guideline 15.1.12 (IAIS 2019, p. 173–174), refers to issues related to the risk of infection.

[27] Guideline 7 (KNF 2014).

[28] The scope of operational risk types is included, among others, in the EIOPA Guidelines on the system of governance, indicating four sub-risks. Guideline 21 divides operational risk into 3 internal risks (risk resulting from inadequate or failed internal processes, from the actions of staff or systems) and the occurrence of external events.

between the active and passive side of the balance sheet. The potential need to meet an off-balance sheet obligation undoubtedly has its repercussions not only within the entity's financial result itself, but also losses related to the materialization of liquidity risk.

The last factor of liquidity risk considered within the framework of legal regulations is its concentration. In the cited Article 44 of the Directive, describing what the risk management system includes, the area of liquidity management and concentration risk are combined in a separate point. Risk concentration, regardless of the module in which it takes place or in which it materialized, seems to be a significant element that may lead to an additional increase in exposure to liquidity risk[29]. Within the framework of concentration risk, the aspect of the capital group's activity should also be taken into account.

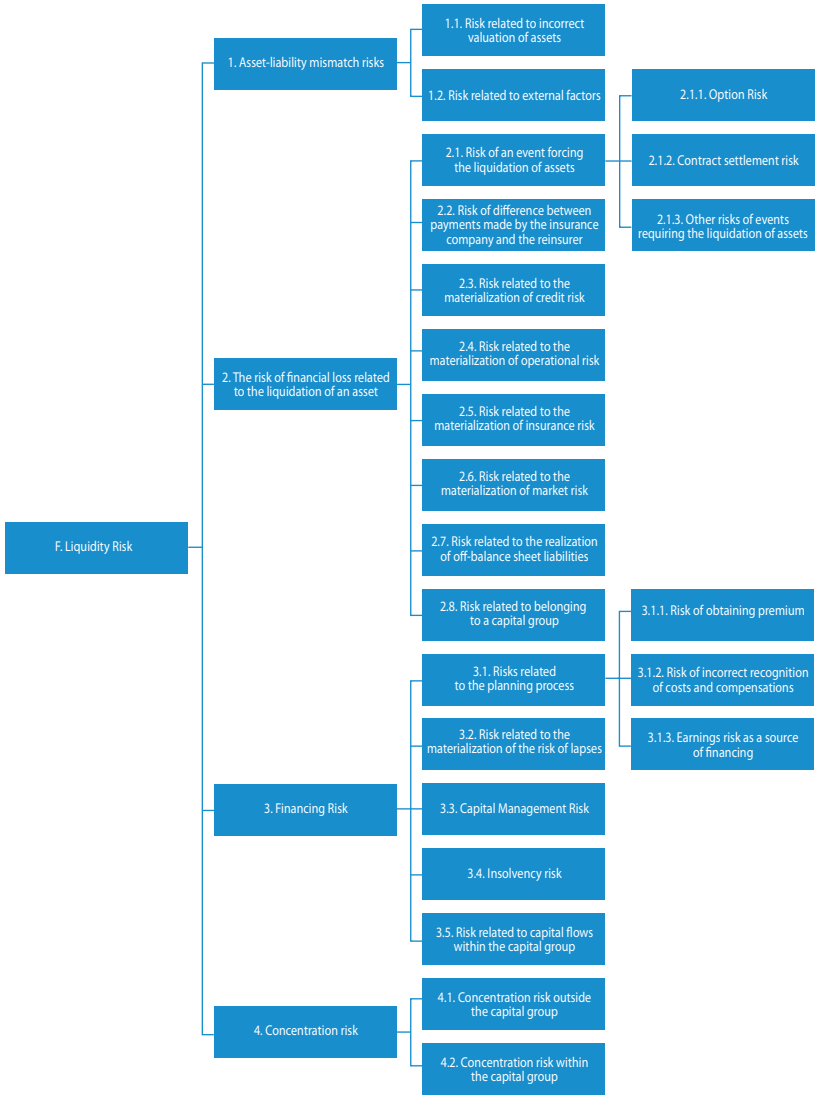
Taking into account the above considerations, the following scheme of liquidity risk modules (Fig. 2) can be proposed, based on the indicated sources of law, regardless of their nature.

4. Liquidity risk in the practice of insurance companies – an example of the Polish insurance market

Leaving issues related to legal regulations and soft sources of law resulting from the activities of the Polish Financial Supervision Authority on the other side of the issue of the principles of isolating liquidity risk, it is necessary to familiarize ourselves with and present the practice of insurance companies themselves and the institutions associating them. As part of their annual own risk and solvency assessment, insurance companies review all types of risks occurring in their activities. It can be assumed that most often using this study, they prepare a public report on the solvency and financial condition of the insurance company in a given reporting period. By reviewing and analyzing available reports, one can learn about the risks identified by entities and understand their essence in insurance activity. As part of this study, an analysis was made of all insurance companies from section II with a permit issued by the Polish Financial Supervision Authority to conduct insurance activity. The study used available public data included in Part C of the Solvency and Financial Condition Reports for the period 2022–2023. The table below presents the main information related to the identification and definition of liquidity risk by individual insurance companies.

[29] As part of the concentration that generates liquidity risk, it seems that physical factors should be mentioned as part of the risks of sustainable development. In the case of climate change, the problem under consideration is the increase in exposure to extreme natural disasters, e.g. cyclones and hurricanes, more frequent weather events such as torrential rains, general changes related to the increase in average temperature, and thus e.g. sea level rise or desertification of areas and the impact of climate change, among others on infectious diseases in Europe (PIU 2020, p. 5; PIU, Deloitte 2021; EIOPA 2019, p. 11–12).

Figure 2. Liquidity risk structure



Source: own study based on, among others, EIOPA Guidelines on the governance system EIOPA -BoS-14/253 PL and EIOPA, *Methodological Principles of Insurance Stress Testing – Liquidity Component*, Commission Delegated Regulation (EU) 2015/35 of 10 October 2014 supplementing Directive 2009/138/EC of the European Parliament and of the Council on the taking-up and pursuit of the business of Insurance and Reinsurance (Solvency II) (OJ L 12, 17.01.2015), Act of 11 September 2015 on the business of Insurance and Reinsurance (OJ 2021.1130), Directive 2009/138/EC of the European Parliament and of the Council of 25 November 2009 on the taking-up and pursuit of the business of Insurance and Reinsurance (Solvency II) (OJ L 335, 17.12.2009), guidelines, recommendations, circulars of the Insurance Supervision Commission and guidelines of the so-called EIOPA's third level guidelines, including the EIOPA Guidelines on the governance system EIOPA-BoS-14/253 PL, as well as the supervisory authority's methodologies, including *the Methodology for the annual supervisory review and evaluation process (BION) of insurance and reinsurance undertakings.*

Table 1. Summary of liquidity risk definitions

Insurance Company	Risk identification	Risk concentration	Risk definition within the SFCR (in the event that the insurance company did not explicitly present the risk definition, no independent interpretation was introduced in the table, which could have taken place, among others, based on risk management methods)
AGRO Insurance TUW	YES	NO	Risk related to the possibility that an entity will not redeem deposits or other assets to settle its financial obligations as they fall due.
Allianz Polska TUiR SA	YES	YES	The risk of being unable to meet current or future financial obligations as they become due or of being able to meet them based on unfavorably changed conditions. The risk may result primarily from a mismatch between the timing of cash flows on the assets and liabilities side.
Compensa TU SA VIG	YES	NO	There is no clear definition provided in the SFCR
Credit Agricole TU SA	YES	NO	The risk of failure to meet current obligations due to a mismatch in cash flows.
CUPRUM TUW	YES	NO	The risk of failure to meet current obligations due to a cash flow mismatch.
Ergo Hestia STU SA	YES	NO	The risk that the Company will not redeem deposits and other assets to settle financial obligations as they fall due.
THIS IS EUROPE SA	YES	NO	There is no clear definition provided in the SFCR
Generali TU SA	YES	NO	Risk related to the ability to meet payment obligations in a timely manner and in full resulting from operating, investing and financing activities without incurring excessive costs associated with the sudden sale of assets or access to loans on unfavourable terms.
TU Inter Polska SA	YES	NO	The risk of not realizing deposits and other assets to settle your financial obligations when they fall due
InterRisk TU SA VIG	YES	NO	There is no clear definition provided in the SFCR

Table 1 (continued)

Insurance Company	Risk identification	Risk concentration	Risk definition within the SFCR (in the event that the insurance company did not explicitly present the risk definition, no independent interpretation was introduced in the table, which could have taken place, among others, based on risk management methods)
KUKE SA	YES	NO	Risk of unexpected financial losses caused by non-fulfilment or fulfilment on unfavourable terms of short-term payment obligations due to the lack of sufficient liquid assets to meet cash needs
Link4 HERE	YES	NO	Risk of inability to obtain financial resources to cover the Company's liabilities on time without incurring additional losses.
MEDICUM TUW	YES	NO	There is no clear definition provided in the SFCR
Nationale--Nederlanden TU SA	YES	NO	Risk of inability to carry out a transaction while maintaining the current market price – risk of inability to liquidate assets.
Partner TUiR SA	YES	NO	The risk of an entity being unable to redeem its deposits and other assets to settle its financial obligations as they fall due.
PKO HERE	YES	NO	The risk that an entity is unable to use its investments or assets or does not have enough assets to meet its financial obligations when they fall due.
Polish Gas TUW	YES	NO	The risk of failure to meet current obligations due to a mismatch in cash flows.
PTR SA	YES	NO	The risk of losing the ability to service liabilities on time is related to a mismatch between the maturity structure of assets and liabilities.
PZU SA	YES	NO	Risk of losing the ability to settle the Company's obligations to its customers or contractors on an ongoing basis.
TUW PZUW	YES	NO	The risk of the Company being unable to realize its deposits and other assets without affecting their market prices in order to settle its financial obligations when they become due
SALTUS TUW	YES	NO	There is no clear definition provided in the SFCR

Table 1 (continued)

Insurance Company	Risk identification	Risk concentration	Risk definition within the SFCR (in the event that the insurance company did not explicitly present the risk definition, no independent interpretation was introduced in the table, which could have taken place, among others, based on risk management methods)
SIGNAL IDUNA HERE	YES	NO	Risk of unexpected financial losses incurred due to non-performance or performance on the basis of unfavourable, changed terms of short-term, current or future payment obligations, as well as the risk that in the event of a liquidity crisis of the Company, refinancing will only be possible at higher interest rates or through the liquidation of assets at a discount.
TUW TUW	YES	NO	The risk of failure to meet current obligations and the costs associated with the need to urgently provide funds to cover them.
TUZ TUZ	YES	NO	The risk of an entity being unable to redeem its deposits and other assets to settle its financial obligations as they fall due.
UNIQA HERE	YES	NO	The risk relates to the ability to repay one's liabilities on time due to uncertainty regarding both the future value of these liabilities, their maturity date (so-called liquidity needs), and the amount of liquid funds held by the entity that can cover these liabilities (so-called liquidity resources). Liquidity risk therefore relates to assets and liabilities, but also their availability and due date over time.
TUiR Warta S.A.	YES	NO	There is no clear definition provided in the SFCR
TU Health SA	YES	NO	The risk of being unable to use deposits and other assets to settle financial obligations when they fall due, which may result in the obligation to repay the obligation earlier than the funds on deposits are returned
Wiener TU SA VIG	YES	YES	The risk is related to the possible loss of the Company's ability to meet its obligations due to a mismatch between assets and liabilities, generating a lack of appropriate assets to settle the Company's financial obligations when they fall due, both in terms of the maturity date and the type of assets held.

Source: own study based on SFCR reports for 2023 of individual insurance companies.

When analysing the presented list, it is first worth emphasising that liquidity risk has been specified for each of the insurance companies, however, some of the companies:

- did not introduce a clear definition of risk in the reports, e.g. TU Europa SA (2023),
- did not indicate this risk as significant, e.g. Compensa TU SA VIG (2023),
- did not demonstrate that there is a concentration of liquidity risk, e.g. PKO TU SA (2023).

This risk is divided in various ways. Insurance companies generally list the risk of asset-liability mismatch, settlement risk and option risk (Credit Agricole TU SA 2023, p. 40; TUW CUPRUM 2023, p. 412). STU Ergo Hestia SA, also indicates as liquidity sub-risks the risk of a different than planned demand for cash, i.e. plan risk and the risk related to macroeconomic factors causing additional financial losses in the event of the need to liquidate assets (2023, p. 41). PKO TU SA defines liquidity risk in a broader context than plan risk resulting in the unpredictable flow of cash. It is worth emphasizing that this is an entity related to the banking sector in the form of the main shareholder. The company indicates the problem of financing sources, which may significantly limit the insurance activity conducted (PKO TU 2023, p. 54). ARGO Ubezpieczenia TUW, as part of liquidity risk, additionally mentions the risk of the need to increase capital requirements resulting from legal regulations, somehow combining this risk with legal risk (AGRO Ubezpieczenia TUW 2023, p. 57). Wiener TU SA VIG also signals similar problems, specifying capital risk. This risk is further divided into business continuity risk, current activity coefficient risk and other capital risks (Wiener TU SA VIG 2023, p. 77). Additionally, this company mentions contagion risk as a potential factor that may materialize liquidity risk and excess liquidity risk, in the case of which the problem of incurring financial losses due to market conditions and the inability to conduct an investment policy that would generate appropriate investment results and the costs incurred for maintaining very liquid assets (e.g. due to bank fees) is highlighted. Uniqa TU SA, as part of liquidity risk, also raises the aspect of the occurrence of a significant insurance loss of a catastrophic nature, which will generate the need to quickly settle insurance obligations regardless of the available risk transfer settlement in the form of reinsurance (Uniqa TU SA 2023, p. 58). The table below distinguishes some of the additional risk factors defined by individual insurance companies.

Table 2. Summary of additional liquidity risk factors presented in the solvency and financial condition reports in 2023

Insurance Company	Liquidity Risk Name	Liquidity Risk Definition
AGRO Insurance TUW	Transaction Settlement Risk	Risk of insolvency or failure of the reinsurer to meet its obligations
	Risk of external factors Capital Risk	The risk of loss of asset value due to a decline in the price of a given security, bank deposits or, in the worst case, the bankruptcy of the issuer
	Capital Risk	The risk of having to increase capital requirements due to external or internal regulations
Ergo Hestia STU SA	Risk of financing sources Risk of incorrect planning process	Risk of inability to cover known and planned demand for funds,
	Risk of financing sources Risk of incorrect planning process	The risk of significantly higher than expected demand for cash from current insurance activities,
	Risk of external factors	The risk of losses resulting from fluctuations in economic factors.
PKO HERE	Risk of financing sources	Financing risk and increased financing costs,
	Transaction Settlement Risk	Transaction risk
	Option Risk	Option exercise risk
TUW TUW	Transaction Settlement Risk	Risk of restrictions on the transfer of funds
UNIQA HERE	Transaction Settlement Risk Concentration risk	The risk associated with the occurrence of a large insurance loss and the need to pay for that loss within a short period of time.
Wiener TU SA VIG	Concentration risk Risk of infection	The risk specified in the Solvency II legal system related to the impact on the Company of settlements with a shareholder or the financial situation of the shareholder or an entity related by capital to the shareholder.
	Risk of excess liquidity	The risk of difficulties in investing highly liquid assets in a way that enables the achievement of assumed strategic goals

Source: own study based on SFCR reports (AGRO Ubezpieczenia TUW 2023, p. 57; STU Ergo Hestia SA 2023, p. 41; PKO TU SA 2023, p. 54; TUW TUW 2023, p. 71; Wiener TU SA VIG 2023, p. 77; UNIQA TU SA 2023, p. 63).

To sum up the above, three schemes of procedure can be indicated in the scope of identification and definition of liquidity risk by insurance companies. The first one concerns entities that have distinguished liquidity risk, however, they have not defined it clearly within the published SFCR reports. The second scheme is used by insurance companies, which, as a rule, have applied only a general definition similar to the definition resulting from the standards regulating the Solvency II system, i.e. the inability to realize deposits and other assets in order to settle financial liabilities when they become due. The last group of entities used both the generally applicable definition, but also tried to define risk factors that would additionally allow for the description of liquidity risk elements. In this summary, it should be borne in mind, however, that public reports on solvency and financial condition were analyzed, in relation to which insurance companies have different disclosure strategies, and as a result, the lack or superficial information very often does not result from a limited method of managing a given risk, but from the reluctance to provide potentially sensitive business information or to disclose their know-how in the context of risk management methods.

The second place where attempts were made to segment and define liquidity risk are the PIU Commissions. PIU within the Subcommittee for Audit and Internal Control in cooperation with KPMG (PIU 2018) developed two collective analyses entitled "*Classification of types of risks occurring in the activities of insurance companies*". The 2017 publication took into account the new legal situation covering Solvency II[30]. The developed risk map was divided into three main risk modules, i.e. actuarial risk, operational risk and financial risk. Risks defined as financial risks were divided into sub-modules: liquidity risk, market risk, asset and liability management risk and concentration risk and credit risk. Liquidity risk was divided into four sub-risks: insolvency risk, asset and liability mismatch risk, settlement risk and options risk. Analyzing this list, it seems that the idea of liquidity risk within the Solvency system has been very well reflected in it. These modules describe all the important issues for this risk.

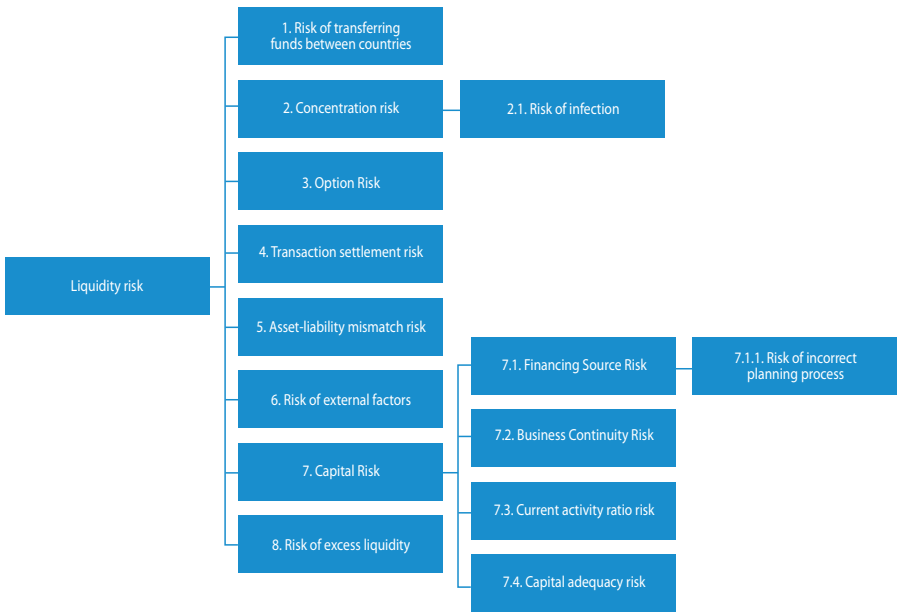
The risk of insolvency is related to a situation when an insurance company cannot obtain funds within its assets to settle its due liabilities. The risk of mismatch between assets and liabilities is a problem of the structure of flows in terms of their value and due dates. The settlement risk, although similar to the risk of insolvency, is related in this case to the actual possibility of making payments, potentially resulting in additional financial losses. The last risk is the already signaled option risk, i.e. a change of the terms by the contractor due to his right resulting from the application of a clause specified in the contract.

[30] The starting point for developing the document was the classification issued in 2007. The historical document obviously could not take into account today's legal solutions, its authors, when making the initial risk classification, focused on the map of internal processes to which risks were then assigned. 14 internal processes were listed: administration, information security, investment activity, HR, IT, Accounting/Reporting/Planning, Claims settlement, Marketing, Law, Reinsurance, Sales, Product Management, Technical and Insurance Reserves, Business Continuity Management.

Liquidity risk elements in the PIU statement also appear in the asset and liability management risk module. In this group, a subgroup of capital adequacy risk and asset concentration risk have been distinguished. The first of these is defined as the risk of lack of adequate capital, the possibility of obtaining capital or improper implementation of assumptions related to, for example, the financial result in relation to the assumed plans. The second risk has the same name as the risk in the credit risk submodule. It has been defined as the risk of reducing capital below the level necessary to cover losses. This risk therefore seems to be a kind of risk of complete insolvency of the insurance company. In connection with the above, it can also be classified as an element of liquidity risk in the meaning of capital risk.

Taking into account the content of the SFCR reports and the analyses of insurance company employees conducted within the PIU, it is possible to combine the research results into one diagram illustrating liquidity risk.

Figure 3. Types of risks based on annual SFCR reports prepared by insurance companies from the Polish insurance market in 2021–2023 and analyses conducted by the Polish Chamber of Insurance



Source: own study based on SFCR reports for 2021–2023 and PIU, *Classification of risks occurring in the activities of insurance companies in 2017*, Warsaw 2018.

Summary

In this article, only two steps of analysis were carried out within the liquidity risk management process, i.e. risk identification and an attempt to catalogue it in the joint risk map of insurance companies. By combining both risk patterns, i.e. resulting from market practice and the previously presented pattern covering broadly understood legal regulations, a proposal for a liquidity risk module related to the activities of insurance companies is presented below.

The presented structured risk diagram can be a helpful tool in the liquidity risk management processes identical to these risks in individual entities. However, it should be noted that a universal catalog taking into account the total set of risks does not have to and in most cases does not reflect the risks of a given insurance company. The presented list can be a reference set for comparative purposes, systematizing the identification conducted internally.

Based on the presented analyses, several conclusions can be drawn at the same time. First, there is a significant discrepancy between the risk taxonomy, which was presented in the context of liquidity risk within the interpretation of legal norms and guidelines of supervisory authorities, and the practice of insurance companies regarding the identification of submodules of this risk, discussed in annual reports on solvency and financial condition. It seems that the perception of risk factors or the expectations of supervisory authorities go further than today's market standard. Moreover, within insurance companies themselves, there is a different approach to the problem of liquidity risk. In most cases, it does not go beyond noting this risk in the internal risk map and defining it in a way similar to regulatory standards. However, a fairly narrow group of entities has made further taxonomy. The vast majority of companies indicated this risk as insignificant and did not diagnose the problem of risk concentration in the context of liquidity risk.

The analyses initiated and presented in the submitted text should be continued in the future with research on methods for measuring and assessing liquidity risk. After combining both issues, it will be possible to create a coherent model on the basis of which the actual analysis of liquidity risk within insurance activity can take place. The last element concluding the process of systemic management would be the development of theoretical assumptions for handling liquidity risk and principles of its monitoring and reporting.

Figure 4. Risk schema model developed based on supervisory requirements and market practice

* The light blue color highlights the risks that occurred within the reporting framework of insurance companies, while the dark blue color highlights the risks identified within the framework of legal standards or the supervisory process.

Source: own study based on the preceding risk diagrams.

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The scope of tasks of the Insurance Guarantee Fund in the context of the concept of "compulsory insurance" in Polish law

Abstract

The article concerns the scope of liability of the Polish guarantee body – the Insurance Guarantee Fund. The Polish statutory regulation of the scope of UFG's liability does not raise any doubts when it comes to compulsory third-party liability insurance for motor vehicle owners, compulsory third-party liability insurance for farmers, compulsory insurance of buildings on farms and life insurance. However, it is difficult to clearly interpret the scope of UFG's guarantee liability concerning other compulsory insurance – concerning third-party liability resulting from the performance of business or professional activity. The author puts forward the thesis that UFG is liable in the event of bankruptcy of an insurance company only in relation to compulsory insurance in the strict sense and only to the extent in which insurance protection for a given entity is required by law.

Keywords: compulsory insurance, Polish insurance law, Insurance Guarantee Fund, minimum insurance amount, guarantee protection, bankruptcy of the insurer, civil liability insurance (third party insurance)

JEL Codes: G22, G52

Zakres zadań Ubezpieczeniowego Funduszu Gwarancyjnego w kontekście pojęcia „ubezpieczenia obowiązkowe" w prawie polskim

Streszczenie

Artykuł dotyczy zakresu odpowiedzialności polskiego podmiotu gwarancyjnego – Ubezpieczeniowego Funduszu Gwarancyjnego. Polskie regulacje ustawowe zakresu odpowiedzialności UFG nie budzą wątpliwości, jeśli chodzi o obowiązkowe ubezpieczenia OC posiadaczy pojazdów mechanicznych, obowiązkowe ubezpieczenia OC rolników, obowiązkowe ubezpie-

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czenia budynków w gospodarstwach rolnych oraz ubezpieczenia na życie. Trudno jednak jednoznacznie zinterpretować zakres odpowiedzialności gwarancyjnej UFG w odniesieniu do innych obowiązkowych ubezpieczeń – dotyczących odpowiedzialności cywilnej z tytułu wykonywania działalności gospodarczej lub zawodowej. Autor stawia tezę, że UFG ponosi odpowiedzialność w przypadku upadłości zakładu ubezpieczeń wyłącznie w odniesieniu do obowiązkowego ubezpieczenia w ścisłym tego słowa znaczeniu i tylko w zakresie, w jakim ochrona ubezpieczeniowa dla danego podmiotu jest wymagana przez prawo.

Słowa kluczowe: ubezpieczenie obowiązkowe, polskie prawo ubezpieczeniowe, Ubezpieczeniowy Fundusz Gwarancyjny, minimalna suma ubezpieczenia, ochrona gwarancyjna, upadłość ubezpieczyciela, ubezpieczenie OC

Kody JEL: G22, G52

General remarks

The provisions of European Union law, and following them – the regulations of the Member States, have created over decades the protection of the interests of injured persons who pursue claims against insurance companies. This system primarily protects the interests of persons injured in road accidents who pursue claims in connection with damage caused by the movement of a motor vehicle. Secondly, the systemic protection covers persons pursuing claims for damage covered by the compulsory insurance system resulting from the provisions of European law or the regulations of the Member States of the European Union.

The current insurance guarantee system is of a transitional and partial nature. It applies to arbitrarily selected elements of the insurance market (claims resulting from selected insurance contracts), not to the insurance market as a whole. At the European level, actions unifying the guarantee system concern primarily compulsory third-party liability insurance for motor vehicle owners and claims of people injured in road accidents. The coming years will probably bring comprehensive solutions covering the entire insurance market or significant parts of it, separated according to clear and uniform criteria in all European Union Member States (Kozińska 2022, p. 39–60).

This article is intended to answer the question of the qualification of the injured party's claim as a claim covered by compulsory third-party liability insurance for motor vehicle owners or other compulsory insurance. This qualification is necessary to determine whether, in crisis situations specified in law, the injured party will be able to count on benefits paid by the guarantee institution. The considerations contained in this article are based on Polish law, although their significance in some aspects goes beyond the area of Polish law. This applies in particular to those compulsory insurances that have been mandated by the provisions of European Union law, and at the same time, benefits for injured parties in these insurances are guaranteed by the guarantee institution.

In Polish law, the determination of whether the claim is covered by compulsory insurance (in the strict sense given by the Act) is of particular importance for the recognition that a given claim should be satisfied by the Polish Insurance Guarantee Fund (pol. *Ubezpieczeniowy Fundusz Gwarancyjny*, UFG)[1]. Therefore, the subject of the analysis in this article will be to determine which insurances are compulsory insurances in the strict sense, and what is the statutory scope of the insurer's liability in each of the compulsory insurances.

1. Compensation for damage to property or personal injuries caused by an unidentified vehicle or a vehicle for which the insurance obligation has not been satisfied

In Article 10 of Directive 2009/103/EC[2], the European legislator ordered Member States to establish a guarantee body in their national legal systems, whose task would be to protect the interests of road accident victims. This concerns cases where the standard insurance system fails due to the objective impossibility of pursuing claims from the civil liability insurer. These are "crisis" situations – such that the road accident victim would be deprived of the means to repair the damage.

Article 10 subparagraph 1 of the directive 2009/103/EC provides: *Each Member State shall set up or authorise a body with the task of providing compensation, at least up to the limits of the insurance obligation for damage to property or personal injuries caused by an unidentified vehicle or a vehicle for which the insurance obligation provided for in Article 3 has not been satisfied.*

As can be seen, the scope of the warranty obligation of the body responsible for compensation is determined by the limits of the insurer's hypothetical liability, which would apply if the vehicle was identifiable and properly insured with compulsory third-party liability insurance for motor vehicle owners (*at least up to the limits of the insurance obligation for damage to property or personal injuries*). This does not concern an actually concluded insurance contract (because it is impossible to establish that such a contract was concluded), but a hypothetical contract.

It therefore concerns the insurance cover that would be provided to the vehicle owner if he or she could be identified and, at the same time, if he or she had fulfilled his or her statutory obligation to conclude an insurance contract. This is a liability in a uniform and minimum scope, mandatory for every vehicle owner. It is a liability that should

[1] The Insurance Guarantee Fund (UFG is an institution with great traditions and many years of experience in operation. The development of the structure and tasks of the UFG has been described in: Z. Ofiarski (1991, p. 23–30), and under new legal system – E. Turkowska-Tyrluk (2003, p. 500–508), M. Orlicki (2007, p. 129–156).

[2] Directive 2009/103/EC of the European Parliament and of the Council of 16 September 2009 relating to insurance against civil liability in respect of the use of motor vehicles, and the enforcement of the obligation to insure against such liability (Codified version), OJ L 263, 7.10.2009, p. 11–31.

be expected to exist in every case if the perpetrator of the damage was identified and properly insured.

In the scope of extensions or modifications of liability above the minimum level required by law, insurance loses its mandatory character and becomes voluntary insurance. In the scope of voluntary insurance, the guarantee body does not operate.

It should be emphasized that the required minimum scope of insurance cover in individual Member States of the European Union is specified by the legislator in each Member State (although, of course, it cannot be lower than the scope specified by the European legislator in the content of the directive).

2. Compensation for damage caused by vehicle insured by a bankrupt insurance company

Article 10a subparagraph 1 of the directive 2009/103/EC provides: *Each Member State shall set up or authorise a body entrusted with the task of providing compensation to injured parties resident within its territory, at least up to the limits of the insurance obligation, for damage to property or personal injuries caused by a vehicle insured by an insurance undertaking, from the moment when:*

(a) the insurance undertaking is subject to bankruptcy proceedings; or
(b) the insurance undertaking is subject to winding-up proceedings as defined in Article 268(1), point (d), of Directive 2009/138/EC.

In this case, the task of the guarantee body is to pay compensation in the event that it is certain that a compulsory civil liability insurance contract for motor vehicle owners has been concluded. It is also known which insurance company concluded this contract and what its provisions were (including the scope of the insurance company's liability towards the person injured in a road accident).

Does this mean that the guarantee body must pay compensation to the injured person in accordance with the content of the insurance contract actually concluded by the vehicle owner, if the scope of the insurer's liability resulting from that contract was wider than the minimum scope (i.e. the scope that had to be mandatorily indicated in the civil liability insurance contract)?

This would mean that the guarantee body would bear liability of different amounts for different motor vehicle liability insurance policies. In the event of bankruptcy of an insurer that concluded insurance policies with amount exceeding the minimum level, the guarantee body would also have to pay compensation up to the amount of the actual liability of the bankrupt insurer, and not up to the amount of the minimum liability resulting from the content of the applicable national law in this area.

However, such a conclusion is not reflected in the provisions of the Directive. Article 10 paragraph 2 of the Directive provides: *Each Member State shall take*

appropriate measures to ensure that the body referred to in paragraph 1 has sufficient funds available to compensate injured parties in accordance with the rules set out in paragraph 10 when compensation payments are due in situations provided for in paragraph 1, points (a) and (b).

The European legislator clearly refers to the scope of liability of the compensation body specified in Article 10 – thus to uniform liability resulting from the content of the applicable law and minimum. This means that in the event that the insurance contract actually concluded determines the scope of liability wider than that specified by law, the guarantee body is obliged to pay the injured party in a road accident compensation (which should be paid by the bankrupt company) insurance within the limits of the minimum liability specified by law. This is the minimum level of insurance protection specified in the law of a Member State (but not lower than that set out in the directive).

Therefore, it can be concluded that European law requires that the guarantee bodies in motor vehicle owners' insurance allow injured parties to obtain compensation to the minimum extent required by law of a Member State. This applies to all cases of liability of the guarantee body – both liability in the event of inability to identify the vehicle, as well as failure to fulfil the insurance obligation and bankruptcy of the insurance company.

3. Liability of the Insurance Guarantee Fund under Polish law

The guarantee body under Polish law is the Insurance Guarantee Fund (UFG). In accordance with the provisions of the Polish Act on Compulsory Insurance, the Insurance Guarantee Fund and the Polish Motor Insurers' Bureau[3], the tasks of the UFG include satisfying claims under compulsory insurance: civil liability of motor vehicle owners and civil liability of farmers, within the limits specified on the basis of the provisions of the Act on Compulsory Insurance, the Insurance Guarantee Fund and the Polish Motor Insurers' Bureau, for damages incurred in the territory of the Republic of Poland:

1) in the case of personal injury, when the injury was caused in circumstances justifying the civil liability of the owner or driver of the motor vehicle, and their identity has not been established;
2) in the case of property damage, in the case of damage in which at the same time any participant in the event suffered death, impairment of the functioning of a bodily organ or health disorder lasting longer than 14 days, and the injury was caused in circumstances justifying the civil liability of the owner or driver of the motor vehicle, and their identity has not been established;

[3] Act of 22 May 2003 on compulsory insurance, the Insurance Guarantee Fund and the Polish Motor Insurers' Bureau (consolidated text: OJ 2023, item 2500).

3) in the case of personal injury, property damage, both personal injury and property damage, when:
   a) the owner of the identified motor vehicle, the movement of which caused the damage, was not insured with compulsory third party liability insurance for motor vehicle owners,
   b) the owner of the identified motor vehicle, the movement of which caused the damage, registered abroad in the territory of a country whose national office is a signatory to the Multilateral Agreement, was not insured with compulsory third party liability insurance for motor vehicle owners, and the motor vehicle was devoid of registration marks, or these marks were not, at the time of the event, assigned to that vehicle by the competent authorities,
   c) the farmer, a person living with him in a common household or a person working on his agricultural holding are obliged to pay compensation for damage caused in connection with the farmer's possession of the agricultural holding, resulting from death, bodily injury, health disorder or loss, destruction or damage to property, and the farmer was not insured with compulsory third party liability insurance for farmers.

As can be seen, the scope of liability of the Insurance Guarantee Fund in the event of the inability to identify the person responsible for the damage or failure to conclude a compulsory insurance contract is not limited to the compulsory civil liability insurance of motor vehicle owners, but also includes the compulsory civil liability insurance of farmers.

In the event of the declaration of bankruptcy of an insurance company or the dismissal of the application for the declaration of bankruptcy of an insurance company or the discontinuation of bankruptcy proceedings, if the debtor's assets are clearly not sufficient even to cover the costs of bankruptcy proceedings or in the event of an order for the compulsory liquidation of an insurance company, if the claims of entitled persons cannot be covered from assets covering technical insurance reserves, the Fund's tasks also include satisfying the claims of entitled persons from:

1) compulsory insurance contracts: civil liability of farmers and insurance of farm buildings, for damages incurred in the territory of the Republic of Poland, within the limits specified under the provisions of the Act;
2) compulsory insurance contracts for civil liability of entities covered by insurance for damages caused to natural persons while performing activities, performing a profession or conducting business or resulting from product defects, specified in the Act introducing a given obligation or an international agreement ratified by the Republic of Poland, in the amount of 50% of the claim, up to an amount not exceeding the equivalent in zloty of EUR 30,000;
3) life insurance contracts, in the amount of 50% of the claim due to a natural person, up to an amount not exceeding the equivalent in złoty of EUR 30,000.

The Insurance Guarantee Fund's tasks also include satisfying the claims of injured parties or persons entitled to compensation, residing or having their registered office in the territory of the Republic of Poland, under compulsory third party liability insurance contracts for motor vehicle owners, resulting from events that occurred in the territory of the Republic of Poland and arose in connection with the movement of a motor vehicle, the owner of which has concluded a third party liability insurance contract for motor vehicle owners with an insurance company having its registered office in a Member State of the European Union against which bankruptcy or liquidation proceedings have been initiated.

4. Scope of guarantee protection related to various types of compulsory insurance and life insurance

Polish law provides for the operation of a guarantee body in a much broader scope than is required by the provisions of European law mentioned at the beginning. This scope includes not only claims from compulsory third-party liability insurance for motor vehicle owners, but also other (all) compulsory insurances in Poland, as well as life insurance.

However, the intensity of protection provided by the guarantee body in Poland varies. It depends on two factors:

- type of damage (in the case of the inability to identify the perpetrator of the damage or the perpetrator's failure to comply with the insurance obligation) or type of insurance (in the case of bankruptcy of the insurer),
- status of the injured party (in particular whether it is a natural person or a legal person).

The most privileged are people injured as a result of events that are considered insurance accidents in the third-party liability insurance of motor vehicle owners for damages caused in connection with the movement of these vehicles and in the civil liability insurance of farmers for the possession of an agricultural holding, when the person responsible has not been identified, has neglected the obligation to insure or when the insurance company has declared bankruptcy. UFG pays compensation benefits to these people to the widest extent. Only in this case does UFG pay benefits to all those entitled to compensation – both individuals and other entities.

To a lesser extent, benefits paid by UFG may be used by individuals entitled to compensation under compulsory insurance of buildings that are part of a farm against fire and other accidental events. In such a case, UFG's liability is limited to a situation where the entitled individual cannot obtain compensation due to them in the event of the declaration of bankruptcy of the insurance company or discontinuation of bankruptcy proceedings, if the debtor's assets are obviously not sufficient even to cover the costs of bankruptcy proceedings or in the event of ordering compulsory

liquidation of the insurance company, if the claims of entitled persons cannot be covered from assets covering technical and insurance reserves.

The most modest are the rights of natural persons injured as a result of events that are recognized as insurance accidents in compulsory civil liability insurance resulting from the provisions of separate acts (i.e. other than the Act on Compulsory Insurance) or international agreements ratified by the Republic of Poland, imposing on specific entities the obligation to conclude an insurance contract. In such a case, the liability of the UFG is limited to a situation where the entitled natural person cannot obtain the compensation due to them in the event of the declaration of bankruptcy of the insurance company or discontinuation of bankruptcy proceedings, if the debtor's assets are obviously not sufficient even to cover the costs of bankruptcy proceedings or in the event of ordering compulsory liquidation of the insurance company, if the claims of entitled persons cannot be covered from assets covering technical and insurance reserves. The UFG is obliged to provide a benefit in the amount of 50% of the receivable, up to an amount not exceeding the equivalent in zloty of EUR 30,000.

5. The issue of identifying the type of insurance as mandatory in the context of UFG liability

The provisions of Polish law cited earlier indicate that UFG liability is related to the following types of insurance:

a) compulsory third-party liability insurance for motor vehicle owners,
b) compulsory third-party liability insurance for farmers,
c) compulsory insurance for buildings on farms,
d) life insurance,
e) compulsory insurance for various types of activities, if Polish law or an insurance agreement ratified by the Republic of Poland imposes an obligation to insure on specific entities.

The types of insurance specified in points a-d are easy to identify. Compulsory insurance specified in points a-c are clearly and specifically regulated in the provisions of the Act on Compulsory Insurance, the Insurance Guarantee Fund and the Polish Motor Insurers' Bureau. Therefore, there is no problem in determining what insurance is meant and what is the scope of the Insurance Guarantee Fund's liability.

Also in the case of life insurance, their identification is not difficult. They are clearly regulated in the provisions of the Polish Civil Code[4].

The situation is different in the case of compulsory insurance for various types of activities, if Polish law or an insurance agreement ratified by the Republic of Poland

[4] Act of 23 April 1964 – Civil Code (consolidated text: OJ 2024, item 1061).

imposes an obligation to insure on specific entities. This concerns many different types of insurance, which result from many different legal acts, concern different types of economic or professional activity.

The Act on Mandatory Insurance indicates the criteria that should be used to recognize a given insurance as mandatory insurance in the strict sense. However, these criteria are understood in different ways, and their application leads to different conclusions.

The most important reason why it should be clear which insurance should be recognized as compulsory insurance in the strict sense is the precise determination of the scope of UFG's liability in the event of the insurer's bankruptcy[5]. UFG is liable only when the insurance is mandatory within the meaning of the Act on Mandatory Insurance, the Insurance Guarantee Fund and the Polish Motor Insurers' Bureau and within the scope of liability specified by law. In other cases, UFG is not liable.

6. Compulsory insurance in the strict sense

The most general definition of compulsory insurance has been formulated in the provision of art. 3 sec. 1 of the Act on Compulsory Insurance. This provision states that compulsory insurance is the civil liability insurance of an entity or property insurance if an act or an international agreement ratified by the Republic of Poland imposes the obligation to conclude an insurance contract.

The insurance obligation must have **a clear and direct statutory basis or a basis in an international agreement ratified by Poland**, and all issues related to compulsory insurance must be specified in detail in a legal act or a statutory provision containing the authorization to issue an implementing act.

Art. 3 sec. 1 of the Act on Compulsory Insurance states that compulsory insurance is **civil liability insurance of an entity or property insurance**, if an act or an international agreement ratified by the Republic of Poland imposes an obligation to conclude an insurance contract[6]. This means that all compulsory insurance within

[5] I. Szczęsna, writing about the prospects of building a pan-European insurance guarantee system, indicates that a special category of insurance contracts that could be covered by guarantee protection in the event of the bankruptcy of an insurance company are compulsory insurance. However, the author also points out the difficulties associated with this: "*At the EU level, there is no definition anywhere of what is to be understood as compulsory insurance. In Polish conditions, the huge number of compulsory insurances, as well as the fact that many of them are offered by a single insurer, means that covering all of them with a 100% guarantee would not make much economic sense.*" Source: Szczęsna (2020, p. 67).

[6] The concept of "compulsory insurance" in Polish law is consistent with the provisions of the Solvency II Directive (Directive 2009/138/EC of the European Parliament and of the Council of 25 November 2009 on the taking-up and pursuit of the business of Insurance and Reinsurance – Solvency II), OJ L 335, 17.12.2009, p. 1. Article 179 of this Directive states: "*1. Non-life insurance undertakings may offer and conclude compulsory insurance contracts under the conditions set out in this Article. 2. Where a Member State imposes an obligation to take out insurance, an insurance contract shall not satisfy*

the meaning of the Act on Compulsory Insurance is property insurance. Therefore, no compulsory insurance can be personal insurance (i.e. life insurance or accident insurance).

This means that personal insurance, which is defined as "compulsory" in special acts, is not compulsory insurance in the strict sense, e.g.

a) compulsory accident insurance in sports for an athlete participating in a sports competition organized by a Polish sports association and an athlete of the national team (Article 38, paragraph 1 of the Act on Sports[7]),
b) compulsory accident insurance for rescue firefighters and candidates for rescue firefighters and members and guardians of youth fire brigades and children's fire brigades (Article 10, paragraph 1, point 2 of the Act on Volunteer Fire Brigades[8]).

Insurance is compulsory in the strict sense if the legislator imposes a **firm obligation to conclude an insurance contract, and not an obligation to "secure", which can be fulfilled in several different ways, e.g. by concluding an insurance contract or by means of an insurance guarantee.** In those cases, when various legal instruments (and not only an insurance contract) can be used in accordance with the law, we are not dealing with compulsory insurance in the strict sense.

This means that insurance or an insurance guarantee concerning the use of a vehicle in motorsport events and activities, including races, competitions, training, testing and demonstrations in a restricted and demarcated area, is not compulsory insurance in the strict sense. In such a case – in accordance with Directive 2021/2118 – Member States may provide that the organizer of the activity or any other party has taken out an alternative insurance or guarantee policy covering the damage to any third party, including spectators and other bystanders but not necessarily covering the damage to the participating drivers and their vehicles (Article 23 of Directive 2021/2118, Article 23(3) of the Act on Compulsory Insurance, the Insurance Guarantee Fund and the Polish Motor Insurers' Bureau).

It should be added that all compulsory insurance in the strict sense is **civil liability insurance** (third party insurance), and the only exception to this rule is insurance of buildings that are part of an agricultural holding.

This means that they cannot be considered compulsory in the strict sense, e.g.:

- crop insurance against a specific risk of the effects of random events in agriculture[9],

that obligation unless it complies with the specific provisions relating to that insurance laid down by that Member State." This means that the European legislator also assumes that compulsory insurance should not be of the nature of life insurance, and the scope of the insurance obligation results from the law of the Member State.

7 Act of 25 June 2010 on sports (consolidated text: OJ 2014, item 715).

8 Act of 17 December 2021 on Volunteer Fire Departments (OJ 2021, item 2490).

9 Act of 7 July 2005 on insurance of agricultural crops and farm animals (consolidated text: OJ 2015, item 577).

- insurance of medical expenses for travelers participating in a tourist event[10],
- insurance of compulsory reserves of crude oil or fuels against fire and other accidental events[11].

Moreover, the scope of the obligation should be precisely and unambiguously defined. Article 10 section 1 of the Act on compulsory insurance, which states that the obligation to conclude a civil liability insurance contract is considered to be fulfilled if the contract was concluded in accordance with the provisions of the Act or separate acts or international agreements introducing the obligation to insure, with a insurance amount not lower than the minimum insurance amount established for a given insurance. If the minimum insurance amount has not been established for a given insurance, then there is no basic parameter of insurance protection resulting from compulsory civil liability insurance.

If the legislator has not specified the scope of the obligation to provide civil liability insurance (in particular by specifying the scope of risks and the required minimum insurance amount), then it is not possible to separate compulsory insurance (insurance within the scope of compulsory insurance) from excess insurance (i.e. voluntary insurance).

However, if the legislator has precisely defined the scope of mandatory insurance coverage, then it is possible to determine where the obligation ends and the area of voluntariness and contractual freedom begins. In the scope of extensions or modifications of liability above the minimum level required by law, insurance loses its mandatory character and becomes voluntary insurance. In the scope of voluntary insurance, the guarantee institution does not operate[12].

[10] Act of 24 November 2017 on tourist events and related tourist services (consolidated text: OJ 2023, item 2211).

[11] Act of 16 February 2007 on reserves of crude oil, petroleum products and natural gas and the principles of conduct in situations of threat to the fuel security of the country and disruptions on the oil market (consolidated text: OJ 2024, item 1281).

[12] M. Monkiewicz and G. Sordyl noticed this. These authors wrote: "However, the protection of a wide range of beneficiaries – injured parties – has been significantly expanded, due to the fact that the number of compulsory insurances within the meaning of art. 4 item 4 of the Act is growing dynamically. While in 1991 this criterion was met by three groups of compulsory insurances, at present it is estimated that there are almost 50 such groups. Paradoxically, along with the growth of the broadly understood compulsiveness of various insurances, the number of insurances that do not fall within the definition of the above-mentioned art. 4 item 4 of the Act is growing at the same time, even though the legislator uses wording in the regulations concerning them indicating the obligation to conclude, as a rule, third party liability insurance". Source: Monkiewicz, Sordyl (2015, p. 170).

7. Motives for the guarantee protection of injured parties pursuing claims from compulsory civil liability insurance

The thesis on the scope of UFG's liability should find its justification not only in the wording of the provisions of the Act, but should also correspond to considerations of equity and implement specific social, economic and moral values (Orlicki 2021, p. 11–22). It is therefore necessary to ask whether it is right to engage UFG to protect the interests of injured parties who have a claim against a bankrupt insurance company, in a situation where that company provided insurance coverage from compulsory insurance of business or professional activity?

The motives that speak in favor of recognizing a given civil liability insurance as compulsory also speak in favor of securing the effectiveness of pursuing claims by the injured party in the event of the insurer's bankruptcy. The legislator's will be to ensure the reality of compensation claims of a certain group of privileged injured parties. Their privilege consists in creating legal mechanisms ensuring the solvency of the debtor, who will be obliged to pay the compensation benefit.

The first – usually sufficient – step is to impose an insurance obligation on specific entities performing business or professional activities of a specific type. The second step is to create a guarantee mechanism that will ensure that the injured party's claims will be effective even if the insurance company has declared bankruptcy.

The essence of the matter is well illustrated by the words taken from the justification of the draft German act on the reform of insurance contract law (*Gesetz zur Reform des Versicherungsvertragsrecht)*, which came into force on 1 January 2008: "The insurance obligation is introduced at least also in the interest of the injured party, in order – within the framework of minimum guaranteed amounts – to provide them with a debtor ready to negotiate and pay, and also certain in their solvency."

This "certainty of solvency" of the insurer is not only its good financial condition (which should prevent bankruptcy), but also a legal mechanism guaranteeing that even in the event of the insurer's bankruptcy, the injured party will not be left without compensation.

On the other hand, however, the guarantee mechanism, in order to be effective, must have clear limits of its operation. The scope of insurance in relation to which the UFG is liable must clearly and unambiguously result from the applicable regulations. That is why this article puts forward the thesis that the UFG is liable only in relation to precisely defined types of insurance by law, including compulsory civil liability insurance in the strict sense given to it by the provisions of the Act on Compulsory Insurance, the Insurance Guarantee Fund and the Polish Motor Insurers' Bureau.

Summary: Consequences of recognizing insurance as compulsory in the strict sense for the existence and scope of liability of the Insurance Guarantee Fund

The Insurance Guarantee Fund is liable in the event of bankruptcy of the insurer who concluded the insurance contract. compulsory insurance contract for civil liability of entities covered by insurance for damages caused to natural persons while performing activities, performing a profession or conducting business or resulting from product defects, specified in the Act introducing a given obligation or an international agreement ratified by the Republic of Poland.

However, it must be compulsory insurance in the strict sense given to it by the Act on Compulsory Insurance, the Insurance Guarantee Fund and the Polish Motor Insurers' Bureau and to the extent resulting from the provisions of the Act or a ratified international agreement.

The problem is that in Poland many insurances are called "compulsory", although they do not meet the criteria for being classified as compulsory insurance in the strict sense. This means that without a detailed legal analysis it is difficult to decide which insurances are actually compulsory and in which cases the injured parties in the event of the insurer's bankruptcy can count on assistance from the Insurance Guarantee Fund.

Fortunately, insurer bankruptcies are very rare in Poland and so far the lack of clarity in the regulations regarding the recognition of insurance as "compulsory" has not had any practical consequences regarding the difficulties in the activities of the Insurance Guarantee Fund. However, bankruptcies do happen and – sooner or later – this problem will arise. Therefore, regulating the legal status regarding compulsory insurance and UFG liability is a great challenge for the Polish legislator.

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Clustering overdue receivables in the insurance sector: a mixed data approach

Abstract

This study addresses the issue of overdue receivables from the secondary market. The main objective of the research is to evaluate the application of the Fast K-Prototypes algorithm to the overdue insurance receivables segmentation, considering how selected parameters and data quality influences obtained results. The article also addresses the repayment of receivables from the insurance sector and the assessment of the risks they generate. The research sample includes 2376 recourse claims which arose from motor insurance and have been acquired between 2012–2023 by a Polish debt collection company.

The application of the Fast K-Prototypes method enabled the segmentation of overdue receivables into various credit risk groups, provided that specific parameters were applied, and the input data was of high quality thanks to preliminary analysis and appropriate preparation. The analysis confirms that these assets are associated with a significant level of credit risk. The results indicate that the application of the Fast K-Prototypes method supports the debt recovery process optimization. However, the effectiveness of this method depends on the research sample and suggests the importance of further research in the context of diverse data samples.

Keywords: overdue receivables, insurance sector, recovery claims, credit risk, Fast K-Prototypes

JEL Codes: C38, G22

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Segmentacja wierzytelności przeterminowanych z sektora ubezpieczeń z wykorzystaniem algorytmów mieszanych danych

Streszczenie

Niniejsze opracowanie podejmuje tematykę segmentacji wierzytelności przeterminowanych z sektora ubezpieczeń, pochodzących z rynku wtórnego. Celem artykułu jest ocena efektywności zastosowania metody Fast K-Prototypes do segmentacji wierzytelności tego typu z uwzględnieniem wpływu parametrów modelu oraz jakości danych wejściowych na jakość uzyskanych wyników. Artykuł podejmuje także tematykę spłacalności wierzytelności z sektora ubezpieczeń i oceny ryzyka przez nie generowanego. Próba badawcza zawiera 2376 roszczeń regresowych z tytułu ubezpieczeń komunikacyjnych, które były nabywane w latach 2012–2023 przez polski podmiot zajmujący się działalnością windykacyjną. Zastosowanie metody Fast K-Prototypes pozwoliło na podział wierzytelności na różne grupy ryzyka kredytowego, pod warunkiem zastosowania określonych parametrów oraz zachowania wysokiej jakości danych wejściowych poprzez odpowiednie przygotowanie i wstępną analizę. Analiza wykazała wysoki poziom ryzyka tego typu wierzytelności i ich niską spłacalność. Wyniki potwierdzają, że metoda Fast K-Prototypes może być skuteczna, ale jej efektywność zależy od jakości danych i wymaga dalszych badań w kontekście różnorodnych prób badawczych.

Słowa kluczowe: wierzytelności przeterminowane, sektor ubezpieczeń, roszczenia regresowe, ryzyko kredytowe, Fast K-Prototypes

Kody JEL: C38, G22

Introduction

One of the methods of obtaining external capital on the financial market is the process of selling overdue receivables. This process can be particularly beneficial for institutions from the insurance sector, as it ensures improved financial liquidity and, consequently, supports the maintenance of their role as public trust institutions (Śliwiński 2011, p. 467). By separating specific assets from their balance sheet, these entities have the opportunity to reduce the risk associated with their operations.

The literature emphasizes that receivables of this type may pose challenges due to the complex nature of the insurer's performance, the variety of potential legal bases and controversies surrounding the mutual duties arising from the insurance contract (Gruszczyński 2018, p. 45). The basis for a claim arising from the legal relationship established by an insurance contract include unpaid insurance premiums, recourse claims or undue benefits. The legal complexity of these claims leads to delays in satisfying the creditor and an increase in credit risk. Therefore, management of these assets, defined as their valuation and servicing in the debt collection process, requires the application of appropriate analytical methods.

The aim of this article is to present the application of the Fast K-Prototypes method to the analysis of overdue receivables from the insurance sector. The research sample consists of 2,376 overdue recourse claims from motor insurance and is described in more detail in the methodology section of the article. The key element

of the presented research lies in categorizing these assets based on their credit risk and rate of return. The Fast K-Prototypes method demonstrates high efficiency and flexibility in the process of segmenting mixed data, which is of great importance in the case of overdue receivables analysis.

The research hypothesis posits that the effectiveness of overdue receivables segmentation using the Fast K-Prototypes method depends on the appropriate selection of model parameters (number of clusters, lambda value) and the quality of the input data.

The article is structured into four parts: literature review, research methodology, analysis of the research results and summary. The literature review includes a presentation of the Fast K- Prototypes method and an overview of the application of cluster analysis in the insurance and banking sectors. The methodological section presents the research sample and the research process. Subsequently, the results of the analyses and their implications for applying the Fast K- Prototypes method for segmenting receivables from the insurance sector are discussed. The article concludes with a summary that emphasizes the key elements of the research and their significance in the context of analyzing overdue receivables.

The results presented in the article provide valuable insights, complementing the existing literature by demonstrating the application of the FAST K-Prototypes method to segment overdue receivables from the secondary market. Moreover, the formulated conclusions provide practical recommendations that can support the process of managing overdue receivables from the insurance sector.

1. Selected Clustering Methods: From Theory to Application

The literature divides clustering methods into hierarchical, non-hierarchical and fuzzy cluster analysis methods (Sala 2017, p. 142). Hierarchical methods focus on creating a hierarchy of clusters in the form of a dendrogram, enabling the analysis of relationships between groups at various levels of detail (Saxena et al. 2017, p. 666). In turn, non-hierarchical methods, such as the k-means method, divide the data set into a predefined number of groups. The assignment of observations to classes is based on their distance to the cluster centers (Sobolewski, Sokołowski 2017, p. 217). The fuzzy cluster analysis method, in contrast, assigns each data point to all clusters with a varying degree of membership instead of definitively assigning it to a single cluster (Saxena et al. 2017, p. 667). Given that the analyzed Fast K-Prototypes method belongs to non-hierarchical methods, the further overview of the database analysis methodology is limited to this domain.

Non-hierarchical methods (*k*-means, *k*-modes) are considered highly efficient and easy to interpret. However, they are criticized for their sensitivity to the initial data distribution and the initial placement of the cluster centroids (Sala 2017, p. 143). The *k*-means algorithm is effective for numerical data, whereas *k-modes*

algorithm focuses on categorical data (Huang 1998, p. 301). The combination of these methods provides the foundation for the K-Prototypes algorithm, which is particularly effective in the analysis of mixed data. The optimized version of Fast K-Prototypes offers enhanced scalability and reduced computation time, making it an effective tool supporting the management of overdue receivables (Kim 2017, p. 3).

1.1. Fast K-Prototypes Model

In the presented research, a modified K-Prototypes method, called Fast K-Prototypes (Kim 2017), was used. Data segmentation allows for a deeper understanding of the specifics of overdue insurance receivables, supporting precise debt collection strategies. High-risk receivables require intensive measures, such as enforcement by bailiffs, whereas low-risk receivables can be addressed through simpler actions, such as automatic reminders. Such a division can also support the process of resource allocation, enabling a focus on segments with the highest potential for debt recovery.

The objective function of the basic K-Prototypes algorithm aims to minimize the total dissimilarity measure between data points and centroids, which represent the centers of clusters in high-dimensional space. It is represented by Equation 1:

Equation 1. Cost Function of Model K – Prototypes

$$F(U,Q) = \sum_{l=1}^{k}\sum_{i=1}^{n} u_{i,l}\, d(x_i, q_l)$$

Source: prepared based on Z. Jia, L. Song (2020, p. 2)

where $U = [u_{i,l}]$ is the matrix representing the assignment of points to clusters, Q denotes the set of centroids for each cluster. In turn, the value $d(x_i, q_l)$ represents the difference between the point x_i and the centroid q_l, and the method of estimating this measure is presented in Equation 2:

Equation 2. Measure of dissimilarity

$$d(x_i, q_l) = \gamma \sum_{s=1}^{p} \delta(x_{i,s}, q_{l,s}) + \sum_{s=p+1}^{m} \sqrt{(x_{i,s}^N - q_{l,s}^N)^2}$$

Source: prepared based on Z. Jia, L. Song (2020, p. 2)

where p is the number of categorical variables, $m - p$ is the number of quantitative variables, and a $x_{i,s}$, $q_{l,s}$ – represent the values of the variable s at the point x_i, in the centroid q_l, respectively. The parameter γ (*gamma*) plays a key role in the K-Prototypes algorithm, balancing the impact of categorical and numerical variables on the clustering process. Higher values of γ increase the significance of categorical

variables, whereas lower values enhance the influence of numerical variables. The dissimilarity measure analyzes mixed data by dividing the differences into qualitative (Hamming) and quantitative (Euclidean) components (Sroka 2021, p. 49).

The K-Prototypes algorithm initializes centroids using the mean values of quantitative variables and the modal values of qualitative variables. Each point is assigned to a cluster based on the minimization of the cost function F(U,Q) (Huang 1998, p. 291–292). Subsequently, the value of each centroid is updated. The literature suggests that the K-Prototypes algorithm can be computationally intensive and sensitive to the initial centroid values, which affects the stability of its results (Kim 2017, p. 1).

For this reason, this study employs the Fast K-Prototypes algorithm, which modifies the distance measure equation by estimating partial distances (Kim 2017, p. 2) and introduces the parameter γ (*lambda*), equivalent to the *gamma* parameter from the basic formula of the algorithm (Equation 1). This algorithm minimizes the distance between objects and cluster centroids, reducing the need to calculate distances for all variables (quantitative and qualitative). The maximum difference between centroids in the quantitative variable space is used as a criterion for excluding certain calculations. The key assumptions include dividing data into qualitative and quantitative variables and estimating partial distances. Additionally, centroids are iteratively updated and the cost function, defined as the difference between an observation and its cluster centroid, is minimized. The partial distance estimation considers selected variables, which allows for reducing unnecessary calculations when the differences between centroids are sufficiently large to eliminate the need for further analysis of assigning points to clusters. The Fast K-Prototypes method is sensitive to initial conditions, such as the distribution of centroids, the value of the λ parameter, or the number of clusters. Therefore, the analysis using this method can be computationally more demanding. In this study, the issue of sensitivity to initial conditions was addressed by testing various parameter configurations, which enabled the achievement of stable and reliable results.

1.2. Application of clustering in the insurance and banking sector

Cluster analysis methods have been developed since the 1960s, supporting various fields, such as banking, insurance, and marketing. Although the contexts of these sectors differ, their common denominator is data segmentation, which allows for more efficient customer and risk management, streamlines operational processes and improves financial results.

In the insurance sector, clustering methods enable the tailoring of products to specific customer needs and enhance the efficiency of the management of insurance portfolios (Wen, Gao, Xiao 2021, p. 271). These methods enable the segmentation of customers based on their characteristics without requiring prior class labels. Furthermore, segmentation can be used as a preliminary stage for more advanced

predictive analyses, enhancing their precision by providing homogeneous segments. This flexibility and the ability to analyze nonlinear relationships make cluster analysis a key tool for optimizing risk management strategies and personalizing offers in the insurance sector (Jamotton, Hainaut, Hames 2024, p. 27–28).

The literature on credit scoring also highlights the use of similar methods (Jadwal et al. 2019, 2017). Similarly to insurance, where clustering helps mitigate the risk of fraud, in credit scoring it enhances the assessment of bank customers and identifies their likelihood of default (Caruso et al. 2020, p. 5). The literature highlights the broad applications of clustering, including its use in assessing credit risk and forecasting repayments (Idbenjra, Coussement, De Caigny 2024, p. 2). However, it should be noted that in the context of credit scoring and credit risk management, these methods are most often employed to achieve goals different from those of the typical predictive models (Bijak, Thomas 2012, p. 2434–2435). Cluster analysis methods are most often the initial stage, preparing the database for proper modeling.

Managing overdue receivables requires considering both the specificity of assets and their heterogeneity. Clustering, as a method for identifying hidden patterns, can prove invaluable in this context. In the case of non–performing loans, clustering enables the grouping of receivables based on similar features, such as the age of the debt or the type of collateral (Arutjothi, Senthamarai 2022, p. 88). This allows for a more accurate estimation of losses (LGD) and the calibration of models in compliance with accounting standards, such as IFRS 9 (European Central Bank 2017, p. 68). This, in turn, allows for the adjustment of debt collection strategies, improves the accuracy of repayments forecasting, and enables a more precise valuation of receivables portfolios, which is essential for both primary and secondary creditors.

Based on the literature review, it is worth noting that there is a research gap in the application of clustering methods, such as Fast K-Prototypes, to the analysis of overdue receivables. With the continuous development of machine learning methods, new solutions are being introduced to streamline segmentation processes, including those related to overdue receivables. The application of the Fast K-Prototypes method to receivables from the insurance sector, where customer segmentation is a popular practice, seems particularly interesting.

2. Methodology of the research conducted

2.1. Characteristics of the research set

Segmentation of receivables from motor insurance recourse claims was performed using data from a Polish debt collection company. The research sample comprises of 2,376 receivables acquired in portfolios between 2012 and 2023. The initial nominal value of the portfolios was PLN 7,418,378.64. During the research period, a total of PLN 1,264,319.60 was repaid. As of December 31, 2023, the current balance of receivables amounted to PLN 16,161,073.71.

The data collected included both information available at the time of the receivables acquisition and selected information regarding the receivables servicing process as of December 31, 2023.

The following quantitative variables were selected:

- nominal value at the time of acquisition (*nominal_value*),
- the ratio of costs incurred up to the moment of acquisition to the initial nominal value (*costs_initial_value*),
- costs incurred by the secondary creditor during the recovery of the receivables (*creditor_costs*),
- amount repaid after acquiring the receivable (*amount_repaid*),
- current debt balance as of December 31, 2023 (*current_balance*),
- recovery rate,
- the period of debt collection by the secondary creditor (*portfolio_period*),
- the ratio of costs incurred by the secondary creditor to the value of the amount repaid (*cost_efficiency*),
- number of bailiff repayments (*bailiff_repayments*),
- number of voluntary repayments (*repayment_debtor*),

and categorical variables:

- gender,
- type of debtor (individual, business)
- age of the debtor at the time the enforcement title was obtained by the original creditor in the ranges <18;24), <25;34), <35;44), <45;54), <55;64).

During the initial stage of the analysis, receivables were examined in terms of their repayment capacity. For this purpose, a variable representing the percentage of total repayment of receivables was introduced (Equation 3):

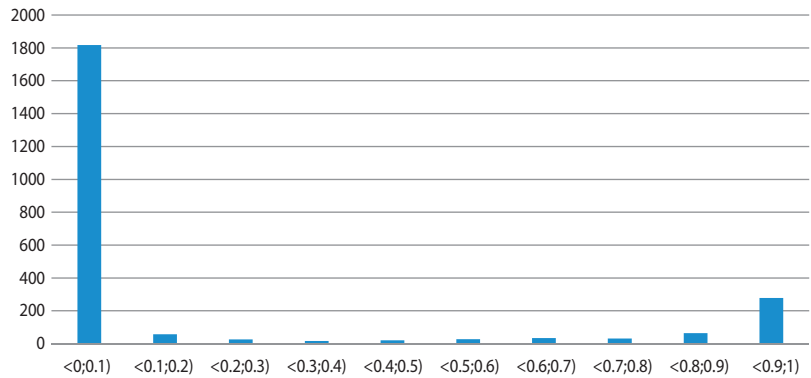
Equation 3. Synthetic Variable Recovery Rate

$$Recovery\ rate = \frac{Amount\ paid\ back}{Initial\ debt + costs\ incurred + accrued\ interests}$$

Source: W. Starosta (2020, p. 196).

The analysis of the *recovery rate* variable (Figure 1) revealed a significant asymmetry in its distribution, which confirms the assumption that overdue insurance receivables are challenging to service and carry high credit risk.

Figure 1. Analysis of the Recovery rate in cases



Source: own study based on data from one of the debt collection companies operating on the Polish market.

The literature defines credit risk as the risk of default by the debtor (Hull 2018, p. 52). Accordingly, the relationship between the recovery rate variable and the credit risk specific to the analyzed receivables can be presented using Equation 4:

Equation 4. Estimation of credit risk specific to receivables

$$Credit\ risk = 1 - Recovery\ rate$$

Source: prepared based on Hull (2018, p. 52).

Further analysis of Figure 1 reveals that, although there are more cases in which repayment has been made (1298) compared to the number of cases without any repayment (1078), a high percentage of non-repayment can still be observed in the dominant part of cases in the range <0;0.1). This highlights a significant number of cases in which the repayment rate was less than 10% of the nominal value of the receivable. Such a distribution may affect the segmentation outcome; therefore, it is expected that the obtained clusters will not be of equal size.

The study sample was analyzed based on selected quantitative variables. The analysis of Table 1 indicates a low nominal value in the cases. However, significant differences between the median and the mean, along with high standard deviation suggest considerable variability.

A similar relationship can be observed for costs incurred prior to the portfolio's sale by the original creditor. The median value suggests that these costs account for approximately 30% of the nominal value of the receivable at the time of the transaction.

Table 1. Basic statistics for the variables studied

Variable name	Mean	Median	Deviation
Initial_name_value	2 867.26	939.76	7,028.49
Initial_costs	1,003.69	322.93	3 797.16
Costs_initial_value	0.36	0.33	0.23
Costs_creditor	1 828.51	630.56	3 758.48
Amount_paid	962.29	22.95	2,668.95
Number_of_payments	3.16	1.00	7.92
Balance_current	8,934.27	1 402.77	25,540.83
Recovery_rate	0.31	0.03	0.41
Portfolio_period	7.53	10.00	4.68
Payment_bailiff	2.23	1.00	5.86
Payment_debtor	0.92	0.00	5.04

Source: own study based on data from one of the debt collection companies operating on the Polish market

Financial data as of 31.12.2023 indicate a significant increase in the nominal value due to accrued interest and debt collection costs. The high efficiency of enforced debt collection is also evident from the significant number of bailiff repayments. Nevertheless, despite the high mean recovery rate in the data sample (31%), the median value for this variable is approx. 3%, which suggests a very high probability of default, given that the median duration of debt collection process (*portfolio_period*) is 10 years. Initial results confirm the assumption that as a result of clustering, one group may significantly outnumber the others.

2.2. Research plan and methodology

This research was designed based on the article presenting the Fast K-Prototypes method (Kim 2017) and a review of the literature on non-hierarchical cluster analysis methods. The research was conducted using the R environment and the Excel spreadsheet. Figure 2 illustrates the course of activities carried out during the research.

The preliminary data analysis was one of the key stages of the study, as it allowed for understanding the specificity of the data, enabling the identification of the key quantitative and categorical (qualitative) variables. During the study, observations with missing data were removed.

Figure 2. Presentation of the research process

Source: own study based on M. Walesiak (2008, p. 45).

Subsequently, using data visualization and principal component analysis (PCA), the database's dimensionality was determined, and outliers were identified based on the Mahalanobis distance (Hubert, Debruyne 2010, p. 38). These observations were removed. In the next step, correlation (Pearson's coefficient) and multicollinearity of quantitative variables [variance inflation factor (Welfe 2018, p. 39, 149)] were analyzed. The correlation analysis was performed using the Pearson coefficient (Welfe 2018, p. 39). In addition, the ANOVA test was used to examine the impact of qualitative variables (Wu, Hu, Zheng 2021, p. 5407) on the *Recovery_rate* variable.

The initial data analysis was completed by normalizing quantitative data using the min-max method (Walesiak 2008, p. 45). Categorical variables were transformed into separate levels, which allowed the algorithm to correctly calculate the measure of dissimilarity between observations (Kim 2017, p. 4).

The next step was to build the Fast K-Prototypes model, as described in Section 1.1. In the Fast K-Prototypes algorithm, the centroids of categorical and numerical variables were randomly selected, and the distances were calculated for both types of variables. The algorithm minimized the objective function, where the lambda parameter (λ) balanced the influence of quantitative and qualitative variables. Observations were assigned to clusters with the smallest distance from the centroids. The centroids were updated in each iteration. To find the optimal model, different configurations of the *k* and *lambda* parameters were tested.

The range for the *k* parameter was set at <2;6> to limit the computational complexity (Kaminskyi, Nehrey 2021; Caruso et al. 2020). In turn, the *lambda* parameter was tested in the range of <0.1;2> (Kim 2017, p. 4). After the segmentation was completed, the quality of the results was evaluated using the cost value of the objective function and the indicators presented in Table 2.

A review of the literature suggests that the distribution of observations across groups may be uneven in the banking or insurance sector (Jadwal et al. 2022; Kaminskyi, Nehrey 2021; Abolmakarem, Abdi, Khalili-Damghani 2016). Taking into account the specificity of overdue receivables from the insurance sector, the number of observations in the sample, as well as the data structure presented in section 2.1, it was decided that segmentation would be considered effective if the average value of the Mean Silhouette Score is higher than zero and the clusters differ in terms of average credit risk levels and rates of return.

Table 2. Presentation of performance evaluation measures for the FAST K- Prototypes algorithm

Indicator name	Equation	Description
Calinski-Harabasz Index (CH)	$CH = \frac{\frac{SSB}{k-1}}{\frac{SSW}{n-k}}$	*SSB* – sum of squared distances between clusters *SSW* – intra-cluster variance. Higher CH index values indicate better clustering quality, due to high separation between clusters (*SSB*) or low intra-cluster variance (*SSW*).
Mean Silhouette Score	$S(i) = \frac{b(i) - a\ (i)}{\max(a(i), b(i))}$	$a(i)$ – average distance of observation *i* to points in the same cluster. $b(i)$ – average distance of observation *i* to points in the nearest neighboring cluster The indicator value lies within the range <-1;1>. The higher the indicator values above zero, the better the point is assigned to the cluster.
Dunn index	$D = \frac{min_{i \neq j} d(C_i, C_j)}{max_k \Delta(C_k)}$	$d(C_i, C_j)$ – distance between clusters *i* and *j*, $\Delta(C_k)$ – maximum distance between two points in a cluster. The higher the value of this indicator, the better the quality of the segmentation.

Source: own study based on M Walesiak M. (2008, p. 8).

3. Analysis of the study results

This part of the article presents the research findings on the effectiveness of using the Fast K-Prototypes algorithm for segmenting receivables from the insurance sector. Particular attention is given to the impact of the selection of algorithm parameters on the segmentation results. The following section presents the segmentation of the research sample under the optimal parameter scenario and highlights key observations from applying this method to the segmentation of overdue receivables.

3.1. Description of the research process and analysis of segmentation quality

During the initial data analysis, outliers (41) were identified and removed. The elimination of these observations improved the quality of further analyses and clustering results.

In the next step, a correlation analysis of categorical variables was performed, the Variance Inflation Factor was calculated and the ANOVA test was performed. Based on the initial analysis, the variables *portfolio_period* and *debtor_type* were removed from the set. The correlation analysis of variables showed strong correlations between the *recovery_rate* variable and the remaining variables related to the

debt collection process (*amount repaid*, *bailiff_payment* and *debtor_payment*). The remaining variables had statistically significant results.

After completing the variable selection, the algorithm was initiated. Using the Fast K-Prototypes algorithm, the results presented in Table 3 were estimated. The table presents the values of segmentation quality indicators for different configurations of the number of clusters (*k*) and the *lambda* parameter.

Table 3. Analysis of segmentation quality using FAST K-Prototypes method

k	lambda	Mean Silhouette	Dunn Index	Cost function	CH Index
2	0.1	0.198	0.00000403	1294.22	15.91
2	0.3	0.196	0.00000403	1505.51	16.21
3	0.1	0.151	0.00000403	1291.62	10.24
3	0.5	0.002	0.00000403	1559.15	6.83
4	0.3	0.026	0.00000403	1458.81	10.71
5	0.7	-0.053	0.00000403	1545.42	6.75
6	0.5	-0.077	0.00000403	1442.03	5.98

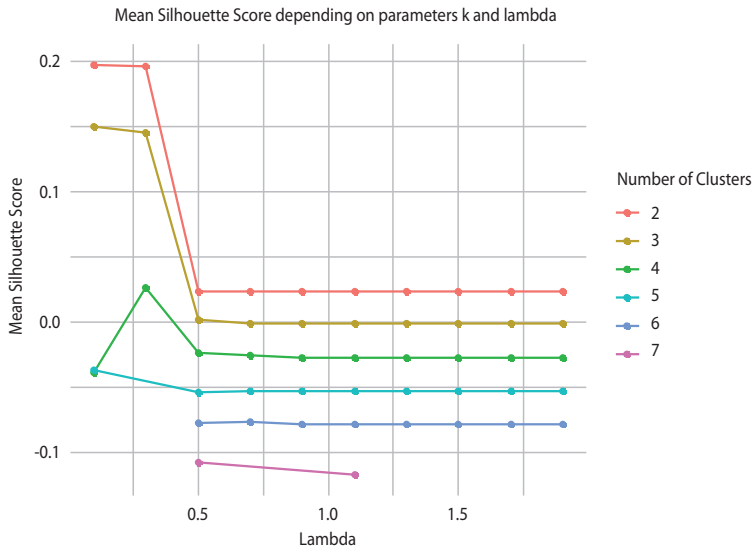
Source: own study based on own research.

The analysis of the clustering efficiency measures indicates that the optimal division was achieved with two clusters and the *lambda* parameter of 0.1. This was confirmed by the highest value of the Mean Silhouette coefficient and the low value of the cost function. This conclusion is further supported by the analysis of Figure 3 presenting the values of the Mean Silhouette Score for various configurations of the number of clusters (*k*) and the *lambda* parameter.

For a larger number of clusters (e.g., 5 or 6) the index values are negative and close to zero, suggesting that cluster boundaries may overlap. This aligns with the observations in the table, where the Mean Silhouette index values were much lower for these configurations.

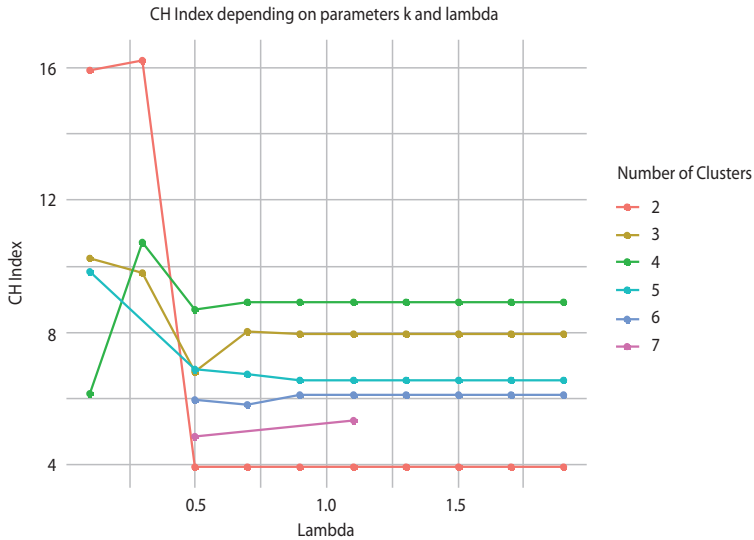
Further analysis of Table 3 reveals that the optimal CH index was achieved for the configuration of 4 clusters and the lambda parameter equal to 0.3. Based on this value, it can be concluded that the highest internal consistency and separation between clusters was achieved for this set of parameters. It can also be observed that the highest CH index value was obtained for the scenario with two clusters and *lambda* parameter set to 0.1. However, as the *lambda* parameter increases, the CH index value decreases, indicating a deterioration of the clustering quality, as shown in Figure 4.

Figure 3. Mean Silhouette Score Value Analysis



Source: own study based on own research in the R environment.

Figure 4. CH Index Analysis



Source: own study based on own research.

A higher number of quantitative variables in the sample favors lower values of the *lambda* parameter, thereby reducing their impact on the cost function. Lambda values also significantly affect the stability of the Dunn index. The analysis results indicate that it takes the same values for all parameter sets, which may also suggest a low level of separation between clusters. The analysis of segmentation quality indices using the Fast K-Prototypes method indicates that the model assigns greater weight to diverse variables; however, further elimination of outliers may be necessary in this regard.

3.2. Segmentation analysis for the optimal scenario

In the subsequent part of the study, results were generated for the scenario of parameters *k* and *lambda*, which was characterized by the best indicator values (2; 0.1). The analysis was carried out for selected variables in relation to the *Recovery_rate*: *balance_current* and *efficiency_cost*. The clustering analysis began with an assessment of the average values of the *Recovery_rate* variable and the corresponding average values of credit risk.

The values of Mean Silhouette indices presented in Table 4 indicate that the first cluster exhibited significantly lower segmentation efficiency compared to the second cluster. This may suggest greater heterogeneity of observations or indicate the presence of outliers in this group. As assumed at the beginning of the study, the clusters differ in terms of the number of assigned observations.

Table 4. Analysis of segmentation results using the Fast K-Prototypes method

Cluster number	1	2
Mean Silhouette	–4%	22%
Number of observations	908	1427
Average recovery rate	21.44%	16.69%
Median value of the recovery rate	0.00%	0.00%
Standard deviation	37.05%	33.46%
Minimum recovery rate	0%	0%
Maximum recovery rate	100%	100%
Medium credit risk	78.56%	83.31%

Source: own study based on own research

The observed average recovery value in the first cluster exceeded the threshold estimated for the second cluster. However, it should be noted that the median value for both clusters is 0%, indicating that most observations in both sets are associated with similar credit risk. A higher level of variability of the rate of return and credit risk is also observed in the first cluster (low Mean Silhouette level, high standard deviation). The preliminary analysis of the performed segmentation suggests that the first cluster contains observations with a higher repayment potential, but more diversified features compared to the second cluster. In turn, the second cluster is characterized by greater homogeneity and stability; however, the average credit risk estimated for this group is correspondingly higher.

In order to formulate conclusions for effective receivables management, the analysis was supplemented by examining the cost efficiency in cases, defined as the ratio of costs incurred by the secondary creditor to the amount repaid (Table 5).

Table 5. Cost Efficiency Index Analysis

	Cluster 1			Cluster 2		
Current balance	**L**	**RR**	**CR**	**L**	**RR**	**CR**
0	478	19%	81%	756	15%	85%
(0; 0.2>	214	21%	79%	321	13%	87%
>0.2	216	27%	73%	348	23%	77%
Grand total	908			1 425		

Source: own study based on own research.

In the case of cost efficiency, the trend of the credit risk observed in cases is similar. As the indicator increases, the credit risk decreases. An increase in the cost efficiency indicator signifies, on the one hand, that the case was repaid, and on the other hand, that the costs incurred by the secondary creditor represented a certain percentage of this repayment. In the first cluster characterized by a higher repayment potential, the higher costs incurred lead to these cases generating a lower average credit risk. In the second cluster, however, despite a similar upward trend in the recovery rate with increasing costs, the profitability of these cases is relatively lower.

In the context of managing overdue receivables, the results from Tables 4 and 5 provide insights into the overdue receivables portfolio from the insurance sector. Since the debt collection process aims to maximize the recovery rate, it can be concluded that the resources allocated to receivables in the first group are utilized more efficiently than those in the second group. This means that enforced debt collection measures should be implemented for these cases. In contrast, the rate of return indicator in the second cluster assumes a relatively higher value for cases where no costs were incurred. In such a situation, it would be worth considering the implementation of amicable debt collection measures for these cases.

Summary

The results of the conducted research confirm the hypothesis that the effectiveness of overdue receivables segmentation using the Fast K-Prototypes method depends on the appropriate selection of parameters and the quality of the input data. The highest segmentation quality indicators were observed for two clusters and a low *lambda* value. This means that the Fast K-Prototypes method requires precise adaptation to the characteristics of the data set. Moreover, understanding the specificity of the data through the principal components analysis (PCA) and the examination of collinearity and correlation between variables enhances the quality of this cluster analysis method. Such conclusions highlight that effective application of the method requires careful preparation of data, parameter optimization, and testing of various parameter scenarios for the data set.

At the same time, applying the Fast K-Prototypes method to segment overdue receivables from the insurance sector enabled the division of the analyzed data set into two groups with differing average rates of return, and consequently different average credit risk indicators. This indicates that despite low cluster separation quality indicators and a relatively homogeneous data set (a large percentage of unpaid cases, the same basis for the claim), the Fast K–Prototypes method divided the analyzed data set in line with initial expectations, into a group with a lower recovery rate potential and a higher level of credit risk, and a group with a lower level of credit risk and a higher profitability. Such division into clusters with varying profitability is also confirmed in the literature (Caruso et al. 2020, p. 5). Based on the segmentation, it was possible to formulate conclusions about the efficiency of the debt collection process in these groups. The group identified during research, with a higher potential rate of return and a lower credit risk indicator, appears to be more profitable in the context of judicial and enforcement debt collection. In contrast, the group with higher credit risk exhibited lower cost efficiency, indicating that the expenditure on debt collection may not yield proportional benefits. Based on the conducted research and analyses, a general conclusion can be drawn that recourse receivables from the insurance sector are characterized by high credit risk. The specificity of overdue receivables from the insurance sector is associated with the high legal complexity, which results in a prolonged debt collection process and a lower rate of return. This is further confirmed by the low percentage of closed (paid) cases in both groups, which suggests challenges in promptly fulfilling the creditor's claims. Based on this, a general observation can be made that for the original creditor, the sale of such claims is effective from the perspective of asset management and risk mitigation, as it helps to reduce costs.

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Miscellanea

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From enforcement to dissolution. The unexpected final chapter of "the life" of "a life" insurance company

Abstract

The purpose of this article is to argue and discuss the reasons and the context of Eurovita 2023 enforcement and final expected dissolution, the pros and cons of the solution scheme designed and implemented, potential alternatives in similar situations as well as – finally and, as usual, most important – lessons learned from the whole story. The interest and the approach of the analysis are essentially presented from the economic, financial and business perspective. The deep cause of the crisis was the combination of a financial turmoil – a fast and sudden increase in interest rates in a situation of unbalanced asset and liability management – plus the governance of Eurovita. The selected solution has been ad hoc, overall fit to the situation, tailor-made, and even creative. The Italian taxpayer – at last – has not been hit at all by the implemented solution and this was not to be taken for granted.

Keywords: insurance, crisis, Eurovita, failure, life insurance, crisis management, resolution

JEL Codes: G22, H12

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The article expresses the private thoughts and views of the Author and should not be identified with the position of the institutions with which the Author is professionally associated.

Od egzekucji do rozwiązania. Nieoczekiwany ostatni rozdział „życia" firmy ubezpieczeniowej „na życie"

Streszczenie

Celem tego artykułu jest przedstawienie argumentów i omówienie przyczyn i kontekstu upadłości Eurovita w 2023, a także ostatecznego oczekiwanego rozwiązania sytuacji kryzysowej, zalet i wad opracowanego i wdrożonego rozwiązania, potencjalnych alternatyw w podobnych sytuacjach, a także – na koniec, choć być może jest to kwestia najistotniejsza– wniosków wyciągniętych z całej historii. Zainteresowanie i podejście do analizy są zasadniczo przedstawione z perspektywy ekonomicznej, finansowej i biznesowej. Głęboką przyczyną kryzysu było połączenie zawirowań finansowych – szybkiego i nagłego wzrostu stóp procentowych w sytuacji niezrównoważonego zarządzania aktywami i pasywami – oraz sposobu zarządzania Eurovita. Wybrane rozwiązanie było doraźne, ogólnie dopasowane do sytuacji, dostosowane do indywidualnych potrzeb, a nawet kreatywne. Włoski podatnik – nareszcie – w ogóle nie został dotknięty wdrożonym rozwiązaniem i nie można tego było brać za pewnik.

Słowa kluczowe: ubezpieczenie, kryzys, Eurovita, porażka, ubezpieczenie na życie, zarządzanie kryzysowe, rozwiązanie

Kody JEL: G22, H12

Introduction

Eurovita was an insurer founded in 1989 and based in Milan, Italy. It was an important player on the Italian life and medical insurance market providing life insurance policies, index-linked and unit-linked insurance policies, multi-branch products, pension products and products for companies (Preqin 2024). On December 31st, 2017, Eurovita, as an insurer selling its products through bank channels, merged with two other companies acquired by Cinven (its final owner) in 2016 and 2017. These two entities were OMWI (main field of activity was selling life insurance through financial advisors) and ERGO Previdenza (mostly acting through insurance agencies as distributor).

The purpose of this article is to argue and discuss the reasons and the context of Eurovita 2023 enforcement and final expected dissolution, the pros and cons of the solution scheme designed and implemented, potential alternatives in similar situations as well as – finally and, as usual, most important –lessons learned from the whole story. The interests and the approach of the analysis are essentially presented from the **economic, financial and business perspective**.

The source of data and information has mainly been public documents, journals and even market information. The analysis is prepared by the active and involved observer of the Eurovita's events – what brings additional value to the research. This privileged viewpoint enables the understanding of the dynamics of the crisis of this company.

The structure of the article is the following. The starting point is a brief, high-level description of the trigger moment and dynamics of the enforcement. Then the article goes back to a synthetic description of the main moments in the history of Eurovita and of the business model of the company, providing the background for the descriptions of triggers and dynamics.

Then the story moves to the peculiar situation of 2022 for life insurance companies, after the very rapid, sudden but (only partially, to be fair) unexpected increase of interest rates in the European Union, including in the eurozone. The change in interest rates regime can be considered as the trigger of the path towards the dissolution of the company.

Then the article investigates, identifies and discusses the real deep causes of the Eurovita's problems, which – in this specific context – have created the dynamics towards the end of the life of the company.

The following step is to illustrate the relevant features of the solution found, also in comparison to the identified alternatives.

Then the conclusion was presented, including some evidence and lessons learned from the story and from the analysis performed, arguing about the Guarantee Fund for life insurance companies and the role it could have in the future.

1. The trigger moment

It was January 31st, 2023, and for the first time in the history of Italian insurance market, a fully licensed life insurance company was enforced. It was obviously the first time this dissolution happened under Solvency II regime (SII). This must be clearly remarked, because several features of SII regime are relevant in the determination of the outcome, including the calculation of capital (e.g., mass lapse in the standard formula model) and the role of the Board of directors[1]. In particular, the total balance sheet full mark-to-market mechanism of SII showed clearly the potential insolvency of the company in case of a strong – and maybe expected, in the given situation – increase of the surrender rate.

On the other hand, in non-life businesses this kind of crisis situations is not abnormal and has happened a few times in Italy, but it is obvious that life business is a completely different matter. **Life business deals also with savings of the people.** Transformation of the way how the life insurance business is performed has been relevant in the last decade, also for technological reasons (Swiss Re 2015). In Italy, in the last 30 years with the birth of bancassurance, it has become an important and popular way to save money with medium term horizon and at the same time with low/very low risk appetite.

[1] On the topic of life insurance under Solvency 2, more information can be found in P. Marano and M. Siri (2018), in particular in the contributions of Van Hulle and Battista, Paltrinieri.

From some points of view, a life insurance company is not completely different from a commercial bank. In fact, savings of the customers are on the liability side both of the bank and of life insurance company. Both liabilities are liquid, although certainly to a different extent. Above all, liabilities are dependent on the behaviour of the customer, because shifts in the dynamics of surrender or in the withdrawal of deposit changes the economic value of these liabilities.

Customer behaviour in terms of surrender changes across time and sometimes suddenly, being a function of shocks and policies. Even when applying the most sophisticated models – e.g., stochastic ones – it is difficult to figure out the concrete evolution of liabilities in any scenario, particularly when there is a change in the regime or policy. This point will be articulated more.

When there is a potentially huge problem of financial stability of the life insurance company (even only perceived, what matters in a context of asymmetric information), the incentive to withdraw own money – at value not in line with marking to market, in particular at higher value – is huge for the average customer. If the contract was signed indirectly, using an intermediate company in the retail market like a bank (in this case working as a distributor and consultant of the customer, and offering also other financial products), under given financial conditions the probability that the customers will decide to surrender is higher and, in any case, high in absolute terms.

With the enforcement action implemented towards Eurovita (at the beginning communicated as only temporary), the top management and the board of the company were pushed out of their duties. At the same time, a commissioner was nominated by the national competent authority (the supervisor, IVASS). The enforcement was regularly prolonged. The first periods of enforcements were very short, then extended to one year when the solution was found and had "only" to be implemented.

On the one hand, this situation was the result of the missing capitalization of the shareholder. On the other hand, the prolongation of the enforcement was due to the failure to sell the company to a new shareholder, credible enough to be approved by the relevant authority.

"Big Ben" – the supervisor in this case – declared time to solve the critical issues found and contested to the company, which had been assessed to be enough. After a few days, another very important decision was taken. That was to stop for several months any surrender options for any policyholder, considering that surrenders would accelerate in a disruptive way if nothing was decided.

Such a decision was taken for the first time in the history. Transforming capital losses (resulting from the accounting valuations) into real (realized) ones would have potentially destroyed the company and in principle not 100% of liabilities could be honoured, considering the market value of the assets of the company and the great financial uncertainty in terms of interest rates' dynamics. This decision – which is believed to be unavoidable – did not come without cost, as obvious. Uncertainty was

growing and trust in the final successful solution was not complete and taken for granted by observers and players, until the final agreement was signed off.

This circumstances opened a complex phase of several months when the solution was searched for, with a main unavoidable target: **saving 100% of the current and forecasted liabilities in front of the customer**. Nobody had to lose his money (capital and interests), neither small nor big clients. This was important also for the distributors and for their reputation in the eyes of the customer. But this was considered essential for the good reputation of the whole insurance industry and to avoid surrenders in the whole insurance system, involving also other companies.

The coordinator and arranger of the solution was the Commissioner – in this case a well-known and respected executive coming from the industry (not a lawyer), who was nominated by IVASS according to the Italian and European insurance law (IVASS, 2023). **Reputation risk – and its potentially catastrophic implications – and trust is clearly the intangible asset at the core of the full event.**

2. Going back – brief history of the company and its business model

Eurovita was a pure life insurance company, created as independent platform for medium and small distributors like regional and local banks – at the beginning only for Casse di Risparmio, a typical old Italian banking institution. In brief, the business model of Eurovita can be described as an independent and open platform of life insurance products for medium and small distributors. This is one of the three macro business models in bancassurance – much more about those models in Battista (2013). The other models are joint ventures and captives. Joint ventures and captives are equity-based agreements and therefore, in principle, have a longer-term view, which is usually connected with a more stable outlook.

Like any other models, distribution agreements and open platform models are applicable in specific situations and do not make sense to others. Overall, it is the only solution for small distributors which cannot invest equity in insurance companies.

The specific feature of Eurovita was the specialization in the model of distribution agreements. For a small bank, the choice is between the engagement with an open platform or the brand of a big insurance company for which bancassurance is one of the businesses, not the most relevant and without any specific focus.

Essentially ex-post, this model was widely criticized as one of the main drivers of the failure. Some of the most important Italian insurance top executives – at the beginning of the crisis – argued against the inherent risk for the bank of working with small players.

Ex ante, the main point of weakness of the model was the instability of the relationship between partners (insurance company from one side and banks from the other side).

This model has several advantages for the bank, which are believed not to be problematic per se, if (and only if):

- distribution network is diversified, and relationships are long-term and well-managed,
- the product mix is well balanced and specific products well designed,
- asset and liability management (ALM) strategies are properly managed,
- finally, the behaviour of the shareholders respects industry standards and fully understands the reputational risks of letting a retail life insurance company alone in the difficult moments.

Otherwise, we should conclude that only an equity-linked distribution platform or big players can manage the surrender risk in stressful situation. This however is pricey and limits the offering of "with profit" products on the market. Also, the absence of surrender penalties in many Eurovita products (like in the case of similar products on the whole market) is not a key element in this case. When there is a strong crisis of trust or the difference between returns on various financial products is high, a small penalty cannot make the difference in the behaviour of the customers or in the financial impact for the company. For sure, small penalties can make sense in case of profit products, at least for some years. It seems that nobody can argue in favor of going back to '80s and products with big penalties, which are reduced and would reduce so much the value for money for the customers. The conclusion is not that products or business models are the relevant part of the crisis.

Let's consider ALM, which is a critical topic in life insurance (for wider analysis, Alfonsi, Chercali, Infante 2019; Paci 2017). In terms of nominal unrealized capital losses, several other insurance companies had a situation not so different from Eurovita – this is the view of the market observers but also numbers coming from 2022 and 2023 financial statements. This situation did not trigger any serious stability problem and was managed with their own network.

Shareholders' structure and behaviour are key in these cases and this is the real difference between Eurovita and situation of other companies in the life insurance industry. Established in 1990, Eurovita experienced different change of governance along his history and the tensions experienced during the financial crisis 2009–2012 were relevant, both in economic terms and for the stress to the governance. Shareholders were not engaged with the future of the company anymore.

After the financial crisis, the appetite for pure life insurance capital from industrial players was fairly limited at least in Italy, in the moment where demand of customers for guaranteed product became more and more relevant. The role of private equity (PE) was key for several years, providing the capital not available through the traditional industrial channels.

Only several years later – when interest rates suddenly went up after Covid and its inflationary wave – industrial players went back to have appetite for capital invested in life insurance. This was the reason for which PE had the concrete possibility to take ownership of the Eurovita company in 2014, following the idea to create a platform for life insurance, what had already happened in the similar world of asset management.

The company was sold to a second PE fund, managed by Cinven, in 2017, as part of the consolidation of the life industry. No industrial players showed any appetite for the capital of the company. The PE fund tried to exit from the investment in 2021, when the consolidation process was perceived as finished. However, the value of the offer was not in line with expectations and therefore the sale was postponed. Still in 2021 the company appeared to be a potentially profitable investment. This suggests that **the trigger of the crisis should be linked to the financial regime's change, i.e. the change of interest rates**. The rush up of the interest rates created a lot of volatility and the capital deficit (resulting from changes in the valuations of assets in balance sheets).

The increase in interest rates was partially unexpected, but the ALM was extremely poor. On the one hand, the problematic low return on German and French bonds, on the other the matching of ex ante synthetic duration but not of flows turned out to be main contributors to the situation.

In fact, the weight of long-term bonds with low rates created a situation of capital losses (like for higher return with similar duration) and – at the same time – low current and expected return. The return on the low-risk assets, like BTPs (it. *Buoni del Tesoro Poliennali*[2]), was higher.

In any case, ALM could have been much better, but it will never be a magic mechanism, because liabilities change also when financial or policy regime changes. Pure exact matching is a myth in life insurance, particularly under stressful situations. Even if there is matching ex ante, ex post it is very difficult to maintain.

Several players in the market had a similar financial position to Eurovita, even though its capital losses were higher and, most importantly, expected financial rewards were lower, also essentially lower compared to the market.

The real structural difference between Eurovita and the other market players was the reputation and commitment of the shareholder. Cinven, the only shareholder of the company since 2017, decided not to inject money at all and in any case, in spite of the fact that this money was relevant in relation to the equity invested in the company but not so huge in comparison to the private equity fund size. The idea behind this decision was to put a "stop-loss mechanism" to the investment in the equity of Eurovita, so that it would have not caused other costs – implicit assumption was that no reputation risk was emerging.

2 Bonds issued by the Italian government.

But the mediatic impact has been huge and at least partially unexpected, not only in Italy but also in other countries. Even both the Economist and Financial Times (FT) pointed out this event as a key moment for the retail financial services industry. The event which was in principle small and had happened "in the periphery" of Europe.

Financial Times, more than others, dedicated more than just one article to the evolution of the story and to the role of PE in life insurance (FT, March 2024). Also, IMF has investigated the role of PE fund in the life insurance industry (IMF, 2023).

Other European regulators reacted. For example, an ongoing Cinven transaction in Germany was blocked. Finally, the person who managed the deal was pushed out of the fund, according to press news which ultimately was confirmed. **Valuation of the emerging reputational risk proved to be completely wrong.** The effects of the decision have gone well beyond the specific deal and transaction.

When people's savings are at risk, the only way to sustain the company is selling in a proper way to reasonably respected shareholders. **Walking away is neither acceptable nor possible.**

Reputation risk has proved to be one of the most tricky (and, at the same time, holistic or global) features of the insurance industry. It is not embedded in the models, at least not completely, and it is a typical qualitative and intangible risk. However, it can be catastrophic.

Media coverage, but particularly flows of information among regulators – in Europe and beyond – have been the drivers of the mounting tensions. It is not necessary to create an insurance union (similar to, e.g., banking union) to create this reputation effect. The current integration of the world is enough and is here.

3. The crisis solution's framework

First, we must underline that the process of enforcement is still managed completely at national level in the insurance industry, in a context where supervision is not unique/integrated, as in the banking sector where Italy is part of the banking union (what results that some supervisory and crisis resolution functions are transferred to the pan-European level).

After the temporary period of enforcement and of surrender freezing, long period of discussion and negotiations, the final solution was found – the ultimate agreement is a complex document full of details. The solution entails the following, most important key features:

- closure to new business of Eurovita brand "forever",
- involvement of all major Italian financial groups (biggest companies participate in the final solution, the other invited to join for minor part refused),
- creation of the new legal entity (name chosen Cronos, implying time is key and limited) and transfer of the whole portfolio of contract from Eurovita to Cronos,

- breakup of the company and destination of the portfolios to the major Italian insurers involved (Assuming quick reopening of the surrenders after the transfer),
- liquidity impact of the surrenders guaranteed "and paid" by the bank,
- immediate injection of capital to keep the solvency ratio up during the whole liquidation process.

The assessment must be done in a holistic way, because the elements of the deal are obviously interconnected. In the following lines, the framework is presented and analyzed step by step.

Eurovita will never open to new business anymore. This looks obvious and new business would be impossible to be continued. Nobody had the appetite to save the company by itself. There was, however, the interest for the whole market to resolve the whole crisis situation. The inclusion of new shareholders could have been as large as possible, without making the negotiation table unmanageable.

The injection of capital to restore solvency from one side and the change of governance to restore the trust from the other also could not happen within Eurovita. This is due to existence of some undesired and unfair liabilities (like sanctions or also to a certain extent subordinated loan) and due to the potential responsibility in case of default. Therefore, it was impossible for the most important group in the country to inject money into Eurovita. Therefore, a new company was created and authorized by IVASS (obviously in a very quick time). A clear example can show an *ad hoc* nature of the solutions in this field. One hundred per cent of the portfolio was transferred to Cronos, in the "Eurovita shell company" remained "undesired liabilities" and responsibilities' charges for the previous governance activities – more than 8 million euros of overall sanctions. Subordinated loans were bought back by Cinven, at the pricing on average well below one hundred percent of its face value, but well above zero – according to market information.

IVASS sanctions were the biggest ever imposed on an insurance company. The reason of these sanctions – rather high and unprecedented in the history of Italian insurance – were "… serious deficiencies in the governance, management and control of financial risks, as well as, until the 2020 financial year, in the calculation of the Best Estimate Liabilities; deficiencies in the assessment of current and prospective solvency risk and in the definition of the Risk Appetite Framework and late implementation of the remediation plan, launched following a previous inspection by the same supervisory institution." (it. *"… gravi carenze nel governo, gestione e controllo dei rischi finanziari, nonché, sino all'esercizio 2020, nel calcolo delle Best Estimate Liabilities; carenze nella valutazione del rischio di solvibilità attuale e prospettica e nella definizione del Risk Appetite Framework e tardiva implementazione del piano dei rimedi, varato a seguito di precedente ispezione dello stesso istituto di vigilanza."*).

The justification refers to a mix of governance and ALM deficiencies, essentially and in other words, in line with what was argued in this article.

Moving to the first pillar of the rescue plan, any new shareholders – the "white knight" – should have taken a part of the portfolio of insurance contracts and related assets. Obviously, equal to the others. Equal in terms of what? Considering that shareholders have injected their own funds, equal in terms of own funds seems the most appropriate answer. But other criteria are also relevant in the breakup. First, it is easier to move portfolios of homogeneous products and not portfolios of mixed products. This scope of the transfer changes essentially the "one off" cost of migration.

On the other hand, distributors want absolutely their policy with the same company, and this impacts the cost of managing across the residual life of the portfolio. In any case, it is obvious that five IT migrations involving complex IT machines are not a simple and easy game. They are expected to be finalized in 2025, and Cronos will therefore finish his life. The shortest the life, the more successful the project of resolution.

One fundamental consequence of passing the insurance portfolios to Cronos was the reopening of surrenders, which overall were suspended by IVASS for several months. In Eurovita, this would have been impossible without an immediate run, materializing the unrealized loss (hundreds of millions). The reopening was successful, surrenders were in line with expectations and only a bit higher than the counterfactual (that is in the absence of any policy intervention).

The liquidity impact of the surrenders guaranteed by the bank is the key innovative pillar of the agreement. There was no appetite for surrender risk on the reinsurance side, nor availability to give own balance sheet to save Eurovita. In addition to this, as a distributor bank could influence the pace of surrenders, therefore an incentive to slow surrenders was essential.

The agreement on this point is complex and, obviously, not fully public. But the key essence is simple: bank being the distributor of the product finances the surrenders, and this avoids the necessity to sell bonds to pay surrenders realizing losses which will be absorbed in the years with a probability close to 1 – due to the nature of government bonds of the depreciated assets.

The overall agreement turns out to be expensive for the bank, as much as surrenders are relevant and fast. According to several bankers, this makes a relevant part of the cost of Eurovita bail out in charge to the banks. However, it should be assessed that this cannot be regarded as a penalty, according to the wrong view of the responsibility of the distributor. It is the price of interest in the deal and even the result of harsh negotiations, where the interest of the banks was much more sensitive than the interest of the insurance industry. That is sure, liquidation would have been a huge reputational problem for distribution as much as for the life insurance industry, in particular without any certainty for years to recover at least the capital invested. It would be also very difficult to manage in a local context, i.e., in the context of the national market dominated by the banks.

For life insurance industry the Eurovita crisis was for sure not an easy event to manage, but the main players are very different "animals" from Eurovita and would leverage on that without huge problems.

The following step was the injection of capital to keep the solvency ratio of Cronos at the appropriate level during the liquidation. This is the upfront cash cost of this rescue deal for the shareholders of Cronos.

Biggest companies take the piece and according to rumours other players were also invited to join for minor part of the deal, but all refused. One of these companies decided to join, but its share in the deal should be limited to only ten percent. The only solution found has been to divide the residual 10% among the other four players. This is further evidence that the appetite for not sending the Eurovita in liquidation was (much) bigger for the banks that for the insurance companies and the cost of this is reflected – as natural – in the final equilibrium price of the deal. This proves also that the details and mechanics of the negotiations were not strongly influenced by the supervisor.

Final step was the dissolution of the "Eurovita shell company", quasi empty after the whole process, through the declaration by IVASS of "Liquidazione coatta amministrativa", which is the typical default procedure for banks and insurance company in the Italian law.

4. Alternative theorical paths to solve the Eurovita crisis

What were the alternatives? Were there the alternatives to the pure liquidation? Was it possible to make liabilities safe at least in principle, also keeping – which was unfeasible – surrenders blocked for some years – considering the existing huge capital loss and the liabilities unmatching?

The first one is obvious and is the bail out from the Italian State, having in mind that 100% of the Eurovita's customers were Italian savers and citizens. This would be complicated by European State aid regime. This problem could be overcome, but the other two drivers would have made bailouts impossible. From one side Italian public finance condition and the resolution law at European level for banks.

How can you save a life insurance company when the resolution of banks is going in a completely opposite direction and when political pressure could make it difficult to inject public money into private companies? For these reasons, bailout was never on the table and under the discussion, neither as a last resort option.

The second alternative solution was the acquisition by an industrial player, i.e., the competitor. Price would simply mirror also the capital increase needed to restore the proper solvency ratio (with the buffer in line with the volatility of the ratio itself).

The appetite of insurance players was close to zero at that moment, due to huge surrender risk and also relevant capital requirements of the company on a standalone basis. The change in ownership would have been possible with the bank guarantee, but the bank guarantee was conceivable only within the breakup solution, otherwise it would have been an advantage/subsidy for a specific insurance group.

The third solution was the acquisition from another PE fund. According to the market information, there was an intense negotiation between Cinven and another important PE fund, obviously in the weeks before the enforcement. But the solution was not found for the same reason: surrender risk was huge, and this made the price highly negative for a fund and not acceptable for the seller.

The traditional solutions were therefore not available: saving by State from one side, acquisition by any player from the other side. The surrender risk was not manageable per se at that moment for Eurovita. And for a life insurance companies with a lot of profit scheme – Italian style but also others – it is very difficult to make a fair valuation in a volatile interest rate environment.

In addition, when there is any exogeneous intervention or structural change of rules, this is the typical situation which in economic literature is known as Lucas critique (Lucas 1983).

This concept was developed by Nobel Laureate Robert Lucas in relation to policymaking actions, but its application may be much wider, including any structural change of the current dynamics.

When a fundamental exogenous shift occurs, behaviour of rational actors' changes, based on their (rational) expectations, in very different ways than models founded on historical data could suggest.

Therefore, applying this model in the Eurovita context, we could not know the ending point on the surrender dynamics of any change of governance through external acquisition, particularly in an unprecedented situation like this one.

5. The Guaranteed Fund framework

Any scheme must be tailored to the specific situation to be a sustainable solution. Therefore, the Guaranteed Fund is certainly not the magic solution to an idiosyncratic crisis.

The Fund scheme has been established by Italian Parliament at the end of 2023, still not working (as of the end of 2024). The process of the constitution is still at the beginning. It will be funded by life insurance companies with an injection of money proportional to their amount of premiums collected.

Let's assume that the Fund was active at the time of Eurovita crisis. Confidence could be restored immediately. A solution had to be found and resolution with insolvency would be out of possibilities.

It is never only and purely a matter of injecting money into the company. What happens next, after the capital increase?

A set of comprehensive actions has been prepared in the remediation plan, as required by IVASS.

Therefore, **a Guaranteed Fund makes sense if and only if it is a transaction cost reduction mechanism and a trust enabler**. This makes things easier and increases confidence that a solution will be found, because it is in the mission of the Fund established by the law and financed by life insurance companies, based on the amount and mechanism defined by the Law.

We could then assume that there is one negotiator at the table – which represents all the companies – instead of several players, each of them in general represented by more than one person (typically CFO, chief legal officer and so on). Time has been quite long. The process was not easy in the Eurovita case but the observers never had the perception that a solution would not be found, activating the liquidation of the company.

In any case, the Guaranteed Fund would have probably split the company afterwords, no big change in the aftermath of the solution. Maybe shareholders structure would have been different, but it is very hard to say. Possibly, there would have been a change in the process and in the confidence that a solution would have arrived, sooner or later. But it is believed that the solution to break up with the financial guarantee of the intermediaries would have been some of the same.

Simply reopen surrenders – reestablished the proper solvency ratio but within Eurovita – without a final change of control and structural solution could trigger the run of the customers in any case. Bearing all the losses would have been unnecessary and unreasonable for the Fund.

Conclusions and lessons for the future

After the analysis performed in this paper, **we could conclude that the deep cause of the crisis is the combination of financial turmoil – fast and sudden increase in interest rates in a situation of unbalanced ALM – plus the governance of Eurovita**, i.e. PE ownership, not per se but without any strong commitment and with a complete misperception of regulatory and reputational risk.

The liquidity crisis was avoided by the procedure started by the supervisor.

The reason for the sudden and unexpected situation was therefore structural, not contingent on a random event. The crisis was simply triggered by the well-known

dynamics of interest rates – which was possible but not to be given for granted – which have impacted the described asset and liabilities profile of the company.

At the end, the solution found has been ad hoc, overall fit to the situation, tailor-made, even creative, turning out to become an example to look at in similar undesired situation in other relevant markets. The Guaranteed Fund scheme per se is the facilitator of a successful process, but not sufficient. It covers only some elements which proved to be necessary to solve the crisis.

We can also argue that the result of the procedure should be in line with the current IRRD draft, European directive on resolution in insurance. Public interest in the sense of the draft of Insurance and Reinsurance Resolution Directive (IRRD) and resolution objectives, i.e., collective interest of policyholders, maintaining financial stability and protecting public funds[3], has been widely considered in the liquidation process and overall reached.

Transaction costs have been rather high in terms of effort, long timing and opportunity cost – completely missed new business for several of the banks involved. An established Fund could decrease them, even though the cost of keeping reserves unallocated and unexploited for an indefinite long time must not be underestimated.

Banks that had distributed the Eurovita's products had the biggest interest in solving the problem, but no specific fault can be put on them. The opinion that the choice of selling Eurovita product was wrong is complete nonsense. Distributors cannot be blamed, on the basis of the law and also of business common sense, for choosing a – at that time – successful company in the market.

Credibility of life insurance sector has been protected and this has been in the interest of companies which have created the solution scheme named Cronos. After a complex 2023, 2024 evidence looks like again a good year with positive net flows and increasing premiums.

Any systemic crisis – in any case unlikely, due to the limited size of Eurovita – has been certainly avoided.

The Italian taxpayer – at last – has not been hit at all by the solution found. Not a standard and obvious outcome, even though fully in line with the spirit of European bail-in policy. It has not been remarked enough.

From another point of view, it goes too far concluding that PE is never a good owner for insurance companies. There are a lot of different examples in the world and, also in Italy, of successful PEs' shareholdings in insurance companies. Also, the previous PE adventure with Eurovita was more than successful, in terms of the business and of the standard of governance.

[3] On this see the BFG document (2024).

The position of the International Monetary Fund implies that the topic is interesting and not trivial. It will definitely be analysed again in the future and in different economic contexts.

The Guaranteed scheme therefore could work in terms of transaction costs, even though it would create some opportunity costs – as always money could be used for alternative needs.

Overall, in this moment of the resolution process, we can reaffirm that the scheme has been a success for the Italian insurance system, even though with the costs and the limitations described and analysed in the article.

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Reviews

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Review of the book:
Ryszard Pukała, *Ubezpieczenie w finansowaniu skutków ryzyka start-upów* [*Insurance in financing the effects of start-up risk*], CeDeWu, Warsaw 2021

Ryszard Jerzy Pukała, a professor at the Cracow University of Economics, is the author of numerous scientific publications in the fields of finance and risk management. His publications focus on topics such as risk management in enterprises, financing business activities, and instruments supporting the financial stability of economic entities. The monograph *"Insurance in Financing the Effects of Start-up Risk"* represents a continuation of his previous works, offering a new perspective to the discussion on risk management in innovative enterprises.

The scope of the author's scientific research includes the analysis of financial and insurance mechanisms that support enterprises at various stages of their development. Emphasis is placed on the specific needs of startups, which, due to their nature – lack of stable revenue sources, high market uncertainty, and limited resources – are more exposed to risk than traditional enterprises.

The considerations presented in the dissertation are organized into four chapters, preceded by an introduction and concluded with a summary. Each chapter ends with concluding remarks that highlight the key points in a clear and concise bullet-point format, enhancing the clarity and coherence of the argumentation.

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In the introduction, the author outlines the primary research objective and presents the associated research hypotheses. The main aim of the study is to identify the types of risks faced by startups and explore the potential application of insurance methods in managing these risks and financing their consequences, tailored to the various stages of startup development.

It is worth noting that the considerations presented in the monograph are not limited to theoretical analyses. The author bases his conclusions on empirical research involving representatives of startups as well as experts from the financial and insurance industries. This approach allows the monograph to combine a theoretical perspective with practical insights, providing readers with a comprehensive understanding of the topics discussed.

First and foremost, the author deserves recognition for addressing an issue of significant importance to both academia and economic practice. Risk is an inherent aspect of startup operations, and its effective management is crucial for their survival and growth. The author successfully demonstrates that insurance can be one of the key tools supporting the development of startups.

In the first chapter, the author introduces the fundamental concepts related to innovation and startups, establishing a solid theoretical foundation for subsequent discussions. The chapter is well-structured, with clearly delineated subsections guiding the reader through key aspects of innovation. These include definitions of innovation, innovative activities, and innovative enterprises (referred to by the author as "innovative firms"), culminating in a discussion of innovation creation models. The author focuses on two key models: the STI model (Science, Technology, Innovation), which is based on R&D investment, and the DUI model (Doing, Using, Interacting), which emphasizes learning through relationships and interactions with research institutions, customers, and suppliers.

Highlighting the significance of startups for the economy, the author also outlines the major categories of their socio-economic impact. In the next subsection, titled *The Essence of Start-Ups as Innovative Enterprises*, the author presents a comprehensive overview of startup definitions, emphasizing both their distinctive characteristics and lesser-known attributes associated with their operations. Additionally, the chapter includes an insightful analysis of the similarities and differences between startups and micro or small enterprises, to which startups are often compared. This comparison enhances the understanding of the unique nature of startups in contrast to traditional businesses.

The subsection titled *Life Cycles of a Start-Up* offers a comprehensive overview of various approaches to defining the stages of startup development. The author provides a detailed description of the following development models: customer-based, product-based, investment-based, operational, and product-operational. This chapter integrates elements of management and economics, giving it a broad context and enhancing its value for both scholars and practitioners. The introduction

of business models and their relationship to innovation highlights the practical application of these considerations.

The review of support mechanisms for startups in Poland is particularly noteworthy, especially in the context of the business ecosystem and its key components. The author focuses on the definition of the startup ecosystem based on theoretical frameworks and relevant literature. Emphasis is placed on the role of business support institutions, such as accelerators, technology hubs, investment funds, and technology transfer centers. The author discusses the specific characteristics of the Polish startup support ecosystem, including existing support mechanisms[1]. However, the analysis lacks a critical perspective on their effectiveness. Do programs like *Scale Up* truly lead to sustainable growth and innovation? Are there any limitations to these solutions?

The subsection on startup financing leaves something to be desired. The author, citing M. Krawczyk, notes that the financial market offers enterprises a wide range of funding opportunities. However, the topic of new technologies, which significantly influence the development of financing sources, seems to be addressed only superficially. Digital financial instruments, such as ICOs (Initial Coin Offerings) and STOs (Security Token Offerings) (Cegielska 2023, p. 231), are notably absent from the discussion. Moreover, while the author emphasizes the importance of traditional bank loans (Koleśnik 2018, p. 246), which are more suitable for established businesses than for startups, there is no reference to a fundamental alternative source of capital such as crowdfunding (Cegielska 2024). This topic is merely mentioned in a diagram, but without further elaboration in the text.

Similarly, the role of family offices, which are increasingly important in startup financing, seems to be overlooked. According to M. Kozińska (2020), family offices are a crucial component of the financial market, particularly in supporting startups and innovative ventures. Family offices provide long-term capital, which stands in contrast to traditional forms of financing such as bank loans or venture capital funds. Their investments are more flexible and often prioritize the quality and innovation of projects.

In the second chapter, the author focuses on analyzing risk in the context of startup operations and the methods for managing it. Both the theoretical aspects of risk and the results of the author's own research are presented, providing a comprehensive understanding of the issue.

The author succinctly outlines various approaches to defining risk and offers a unique definition tailored to the specific characteristics of startup activities. Key elements related to risk in startups are discussed in an accessible manner, particularly in the context of different stages of their development (e.g., the vision, formation, validation, scaling, and maturity stages). This approach allows for

[1] P. Kuszewski emphasizes that, to enhance the effectiveness of innovation support, it is essential not only to fund research but also to facilitate communication between researchers and startups. Source: Kuszewski (2022, p. 82–92).

a better understanding of risk and its role as a factor that determines the growth of startups. The author also emphasizes the important relationship between income and risk in startup activities.

It is worth highlighting that the second chapter includes highly engaging results from the author's own research. The author identifies key risk areas and conducts an analysis and classification of risks based on their significance for startup founders, which could serve as an intriguing area for further research.

The author presents the results of a conducted survey aimed, among other things, at analyzing various approaches to risk management in start-ups depending on the stage of a start-up's develoment. A key point in the chapter is the emphasis on the benefits of well-identified risk categories and the effective implementation of preventive measures, which are highly advantageous for a start-up's long-term success.

The author examines risk management in startups from three perspectives: functional, subjective, and operational. Each perspective is thoroughly described, with particular emphasis on the importance of the decision-making phase within the functional framework, viewed from the standpoint of startup risk management.

It seems however that the chapter should be expanded by concrete examples or case studies that could illustrate the theoretical concepts presented. Such examples would help readers better understand how different approaches to risk management work in practice.

Additionally, the language used is at times complex and requires familiarity with specialized terms in risk management and finance. This could pose a challenge for beginner entrepreneurs, potentially limiting the chapter's accessibility to a broader audience.

The second chapter offers an engaging exploration of risk management in startup operations, particularly focusing on how risk evolves at different stages of a startup's development. Its strength lies in its practical approach and reliance on empirical research, which enhances the credibility of the presented arguments. However, the chapter could be further enriched by including more case studies and a more detailed discussion of available risk financing instruments. Its educational value would also benefit from the use of simpler language and greater attention to the needs of startup founders during the earlier stages of their ventures.

Overall, the second chapter is a valuable contribution to the literature on risk management in startups, though certain areas would benefit from minor elaboration to fully align with the expectations set in the introduction.

The third chapter focuses on the use of insurance as a risk transfer tool for startups. This chapter can be split into two distinct parts. The subject of the first two subchapters is the use of insurance by companies and factors that impact willingness to use insurance. Discussion in this part also covers broader aspects of risk-taking such as adverse selection, moral hazard, and behavioral aspects of insurance use.

Although the author focuses on startups, most of the discussion in this part of the third chapter is applicable not only to startups but to companies in general.

In the second part of the third chapter, the author describes and discusses a survey conducted on the sample of 202 startups. The goal of the survey is to verify how startups perceive the usefulness of insurance in its operations, what is a scope of insurance purchased by startups, and what factors make startups decide not to purchase insurance coverage. This part of the third chapter presents new and interesting data on how startups perceive the usefulness of insurance and what are key barriers to broader use of insurance by companies developing its business model. Although the author uses simple statistical tools, mostly descriptive statistics, the presented results paint an interesting picture of risk perception by startup managers. The key takeaway from this chapter is the lack of insurance use by over 50% of startups. This can be explained by lack of property that can be insured or the unwillingness of startup founders to use scarce resources to pay for an insurance while funds can be better used to finance growth and development of the company. Nevertheless, startup managers are aware of risks that can be insured and how they can impact operations of their companies. The lack of insurance often stems from a different set of priorities of startup managers compared to those managing more established entities.

Some aspects of the discussion in the third chapter could be more developed. Firstly, the author focuses on Polish startups. Comparing those results to similar studies, if only they exist, from other markets could provide interesting perspective on differences between startups in other countries. Another possible direction of extending the scope of the third chapter could be providing an in-depth look into cases studies of specific startups and their approach to insurance products. Given that several new companies perceive regulations as an unnecessary burden, it would be interesting to specifically look at the use of civil liability insurance by new companies trying to innovate in highly regulated industries – fintechs in banking and insurtechs in insurance.

The chapter is a comprehensive study of issues related to risk insurance in startups. It is particularly valuable for managers of young companies and for insurance companies that would like to better adapt their products to the needs of innovative enterprises. Despite a few shortcomings, such as the lack of international comparisons or case studies, the chapter offers many practical tips and in-depth analyses, making it a valuable contribution to the risk management literature.

The chapter is a valuable study for people interested in risk management in startups, especially in the context of insurance. The results of the research and the author's analyses are well justified and supported by relevant statistical data. Guidance on how to use insurance as a risk management tool can be particularly helpful for decision-makers in startups and for insurance companies developing offerings aimed at this sector. The chapter deserves praise for its substantive approach and wide range of analysis, but further inclusion of practical examples could increase its utility value for non-scientists.

The fourth chapter is devoted to the evaluation and proposal of modification of existing insurance solutions to adapt them to the specifics of startups. The author clearly points out that startups, due to their high innovation, high dynamics and unpredictability, require more flexible and more adapted risk financing tools. The possibilities of modifying insurance methods are discussed, taking into account different phases of development. As a result, it provides practical tips for startups in different market and financial situations. Considering aspects such as captive insurance, micro-insurance or common funds shows the diversity of potential solutions.

The chapter is based on research conducted among startup decision-makers. The data presented in the tables and charts are convincing and illustrate well the current needs and limitations of startups.

The author points out that traditional insurance products often do not meet the needs of startups, due to their dynamic nature and the complexity of the services and products offered. It is therefore advisable to develop more flexible and innovative solutions that could more effectively respond to the changing needs of the market.

The chapter could be enriched with specific examples of the application of these models in practice, which would increase its value for practitioners. While the author mentions some limitations and challenges, such as a lack of knowledge among startups or insufficient flexibility for insurers, more detailed analysis of how these barriers can be overcome would be appreciated. The chapter focuses mainly on solutions in Poland, not considering potential inspirations from international markets.

The author paid particular attention to the specificity of startups as entities operating in conditions of high uncertainty. However, whether all the proposed insurance instruments could be equally effective in different sectors of the economy remains unaddressed. This leaves room for further research. As a result of the conducted analyses, the author diagnosed that the key challenge for startups is to adapt the available financial instruments to their specific needs and capabilities. In the conclusions of the analyzed monograph, the author comes to the conclusion that insurance can significantly increase the financial stability of startups and support their development, provided that it is properly adapted to the nature of their business.

The modern economy is in a phase of dynamic technological, social and market changes, which requires flexibility, creativity, and adaptability from enterprises. Process automation, the development of artificial intelligence and the Internet of Things are just some of the factors influencing the need to redefine business strategies.

Startups, as an exceptionally dynamic and innovative group of enterprises, play a key role in the process of economic transformation. Their success depends largely on their ability to identify risks that may limit their development and on the implementation of appropriate tools to manage these risks. The author emphasizes that effective mitigation of financial, market and technological risks requires not

only appropriate actions for the enterprises themselves, but also the support of external institutions.

One of the key conclusions is to point to the need to better tailor insurance offers to the specific needs of startups, which are often not reflected in traditional insurance models. The author draws attention to the differences in motivations and approach to risk management depending on the stages of startup development, which requires more flexible and individualized solutions.

The conclusion of the monograph also emphasizes the importance of cooperation between startups and external entities, such as investment funds, business accelerators or insurance companies. The author argues that the development of mutual funds and other innovative methods of risk finance can play an important role in increasing the resilience of startups to changing market conditions.

The monograph ends with a positive message regarding the role of startups as the engine of the innovative economy, at the same time drawing attention to the challenges related to their functioning in a dynamically changing environment.

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Report from the conference "EKF Insurance: sales, innovations, risk" (October 2–3, 2024) – discussion on selected parts

On October 2–3, 2024, the second edition of the „EKF Insurance: sales, innovation, risk" conference took place in Warsaw. The event was organized at the headquarters of the Warsaw Stock Exchange and gathered leaders of the insurance industry, representatives of regulatory institutions, scientific communities and experts in technology and strategic consulting. The conference was organized by the Center for Strategic Thoughts in cooperation with Deloitte, which was the main partner, and PZU as a strategic partner. This event became a platform for the exchange of thoughts and experiences on the current challenges and the future of the insurance market.

Conference Objectives

The main objective of the conference was to identify key threats and challenges facing the insurance sector and to determine the directions of its development. In the face of the dynamically changing economic and political environment, topics such as climate change, systemic risks, cyber risk and deglobalization became key points of the conference debates. The organizers emphasized that the conference was not only intended to discuss the current situation, but also to propose specific solutions for the insurance industry.

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Program and topics

The conference was divided into several thematic blocks, each of which was dedicated to a different aspect of the functioning of the insurance sector. During the event, lectures, debates and discussion panels were held, which allowed participants to deepen their knowledge on the most important trends and challenges.

Opening speech

Krystian Wiercioch, Deputy Chairman of the Polish Financial Supervision Authority, recalled during his opening speech that despite the growth of Polish GDP and the increasingly better macroeconomic and social situation, the rate of growth of insurance premiums in Poland is lower than the rate of GDP growth. As he pointed out, basic insurance education and product standardization are essential for the development of the insurance market. He emphasized the advantages of standardization, noting that it is not an easy process and would require the cooperation of all participants of the insurance market.

Redefining the value of insurance

Kai-Uwe Schanz from The Geneva Association, during his presentation entitled "Redefining the value of insurance" drew attention to new risks, which are systemic in nature and often non-diversifiable. According to Kai-Uwe Schanz, claims management, asset management and public-private partnerships will gain importance in the future in the activities of insurance companies. The issues raised in the presentation were then discussed.

"The Role of Insurance in a Fragmenting World"

Kai-Uwe Schanz and Marcin Warszewski, partner at Deloitte, took part in the discussion. It was titled "Role of insurance in a fragmenting world". During the discussion, it was emphasized that the fragmentation of the world results, among others, from the trade war between the United States and China. This also affects the global insurance sector because it means less cooperation and weaker resilience. These circumstances will also affect the Polish insurance sector, among others, by increasing competitive pressure and possible consolidation.

Discussion participants pointed to the following possible factors limiting unfavourable trends:

1) public-private partnerships,
2) the state expanding the catalogue of compulsory insurance,

3) application of premium subsidies,
4) activities in the area of taxes (e.g. tax relief or other tax incentives),
5) creating insurance awareness campaigns sponsored or co-sponsored by the state.

Presentation of the EKF Research and Deloitte report: Analysis of key factors influencing the development of the insurance market in Poland in a three-year perspective

The report presented after the discussion described the most important opportunities and threats for the insurance market. The following were indicated as opportunities:

- demographics (ageing society and increasing demand for pension and health insurance),
- digital transformation (optimization of processes and reduction of operating costs) and
- infrastructure investments.

The greatest threats were identified as:

- market overregulation (implementation of regulatory projects and adjustment to changes in legal regulations often takes place at the expense of development research and significantly increases the operating costs of insurance companies),
- cyber risk,
- the geopolitical situation and the risk of economic crisis,
- demographic risk – an ageing agent network and a lack of interest in the industry among the younger generation.

Market Perspective – Opportunities and Threats – Debate

The debate was attended by:

- Jurand Drop, Undersecretary of State, Ministry of Finance
- Prof. Ilona Kwiecień, Head of the Department of Insurance, Wrocław University of Economics
- Artur Olech, President of the Management Board, PZU SA

The debate was led by Cezary Szymanek, deputy editor-in-chief of the Rzeczpospolita daily. The panelists described how extreme events such as floods, the COVID pandemic or the war in Ukraine change the way societies think. They emphasized that the insurance industry can show its role in the face of such events by properly educating society.

The panelists also focused on the development opportunities for the insurance sector, giving examples of public-private partnerships in Romania and Albania, where solidarity catastrophe insurance exists and, due to its universal nature, is very cheap.

The impact of the state's caring role on the insurance sector was also addressed. As indicated by the research conducted by the Economic University in Wrocław, the state's caring role has a negative impact on the willingness to insure and causes a lack of willingness to insure even for a low amount.

Insurance as a response to key social challenges

During the session, Jarosław Mastalerz, CEO of PZU Życie SA, took the floor. The discussion was led by Eugeniusz Twaróg, deputy editor-in-chief of Puls Biznesu. The most important issues were healthcare, including the risk that Poland may soon face a shortage of doctors, medical personnel, and infrastructure. Insurers, in turn, can use their experience in data processing and support prevention and early diagnostics.

Risk Management and Product Innovation

During the debate on management and product innovation, it was recalled that the greatest climate risks for the Polish market are floods and hurricanes. Additionally, the frequency and severity of catastrophic events are increasing worldwide, and risks once considered insignificant are becoming significant (e.g. hailstorms in Italy). In turn, in life insurance, the key factor is the increase in mortality risk – which is also related to climate change, as it is often associated with heat. The participants of the debate also discussed the problem of reinsurance in the context of very dynamic, "point" climate events.

Health insurance – quo vadis

The second day of the conference began with a series of parallel debates. The debate on health insurance was dominated by the topic of prevention and coordinated patient care. The panelists cited data that showed that about 50% of susceptibility to illness depends on lifestyle, i.e. factors such as diet, sports or sleep. In Poland, 37% of deaths are still caused by heart disease, which is twice as much as in the European Union. The panelists had no doubt that medical packages are currently a mandatory element of employee benefits and employers cannot afford not to offer such a benefit. The need for coordination and ensuring data compatibility in the systems of insurers, medical service providers and the National Health Fund system was emphasized.

Climate Risks and Their Impact on the Insurance Sector

One of the key topics of the conference was climate change. Experts drew attention to the need to introduce new risk assessment models that would take into account the increasing frequency and intensity of natural disasters. Discussions also included issues related to infrastructure adaptation and investments in renewable energy sources as a way to minimize climate risks.

Market and regulations

The discussion on regulations in the insurance market was dominated by data on the number of newly created legal acts, with the emphasis being placed on the fact that new regulations are primarily the result of changes or new regulations in EU law and the need to adapt Polish legal acts to them. Representatives of the insurance market emphasized that in the event of any changes in regulations, cooperation between the industry and the regulator is beneficial.

Customer interest from the perspective of various market participants

During the debate on pro-customer solutions in insurance products, the topic of product standardization returned. The representative of the Financial Ombudsman proposed minimal standardization of retail products for individuals, which would concern the scope of protection and exclusions. Examples of such products that should be easy to standardize include AC, home insurance or health insurance. In such cases, insurance companies could build competitive advantages based on additional products, quality of service or innovation. According to the representative of the Office of Competition and Consumer Protection, standardization should apply not only to products, but also to product documents. The documents should be simple, short and accessible. Standardization should also apply to tied sales, such as bancassurance. The Polish Insurance Association emphasized that standardization can only apply to certain frameworks, because there is a risk of allegations of restricting competition and collusion. The Polish Insurance Association also reminded that it has about 70 members, so any work on standardization will not be easy.

Is there a climate for changing insurance – a debate of CEOs (Nationale-Nederlanden, Compensa, Allianz, PZU)

The 2nd edition of the insurance EKF was concluded with a debate of the presidents, in which the following took part:

- Paweł Kacprzyk, President of the Management Board, Nationale-Nederlanden TU na Życie SA

- Marcin Kulawik, President of the Management Board, TUiR Allianz Polska SA
- Artur Olech, President of the Management Board, PZU SA
- Anna Włodarczyk-Moczkowska, President of the Management Board, Compensa TU SA, VIG

The debate was led by Maciej H. Grabowski, President of the Management Board of the Center for Strategic Thoughts. The debate participants predicted further market consolidation and its transformation. As noted, customers expect "Netflix" in insurance, which requires transformation, modification of the product and service offer, as well as investment in data and its personalization. The message and communication must be clear and transparent, especially if companies want to reach the younger generation with their offer. The importance of "contextual insurance sales" was emphasized, i.e. the purchase of insurance should appear on the customer's life path as if by the way, and not as a separate event.

As noted, investments in transformation may be significant and it will be harder for small entities to afford them. According to the participants of the discussion, consolidation will apply not only to insurance companies but also to distributors.

Summary

The "EKF Insurance: Sales, Innovation, Risk" conference confirmed that the insurance sector faces many challenges, but at the same time has the potential to adapt to the changing environment. The event was not only a place for exchanging knowledge and experiences, but also an inspiration to take action for the development of the industry and its transformation.