Safe Bank 4(97) 2024

DOI: 10.26354/bb.2A.4.97.2024

Hubert Grochowski*
Hubert.Grochowski@op.pl

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

* Hubert Grochowski – Director, Compensa SA.
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".

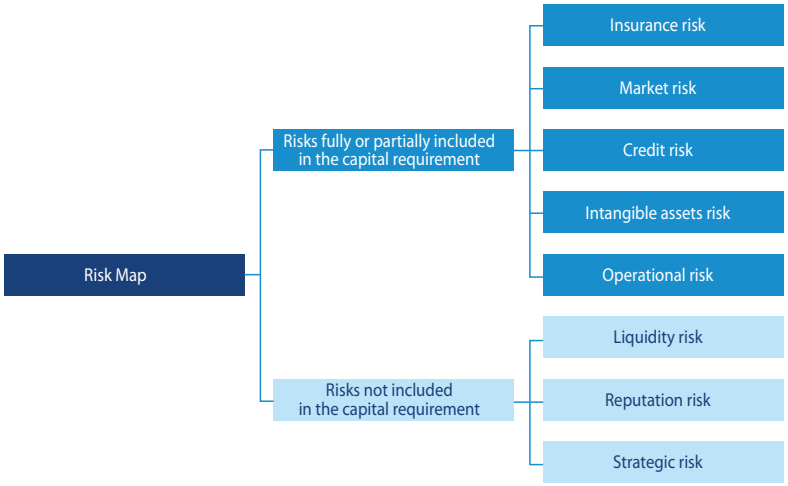
[16] Article 244(3) of the Directive and Article 260(1)(e) of the Delegated Regulation.

[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.

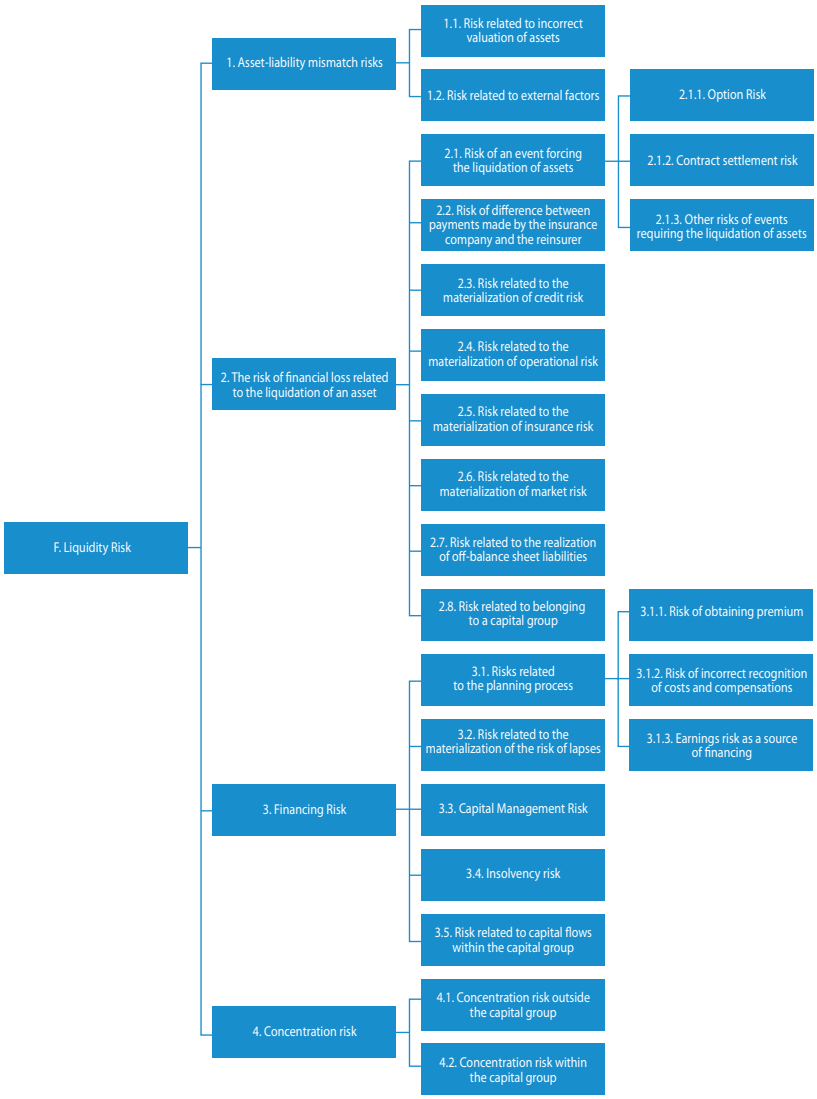
Taking into account the above considerations, the following scheme of liquidity risk modules (Fig. 2) can be proposed, based on the indicated sources of law, regardless of their nature.

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.

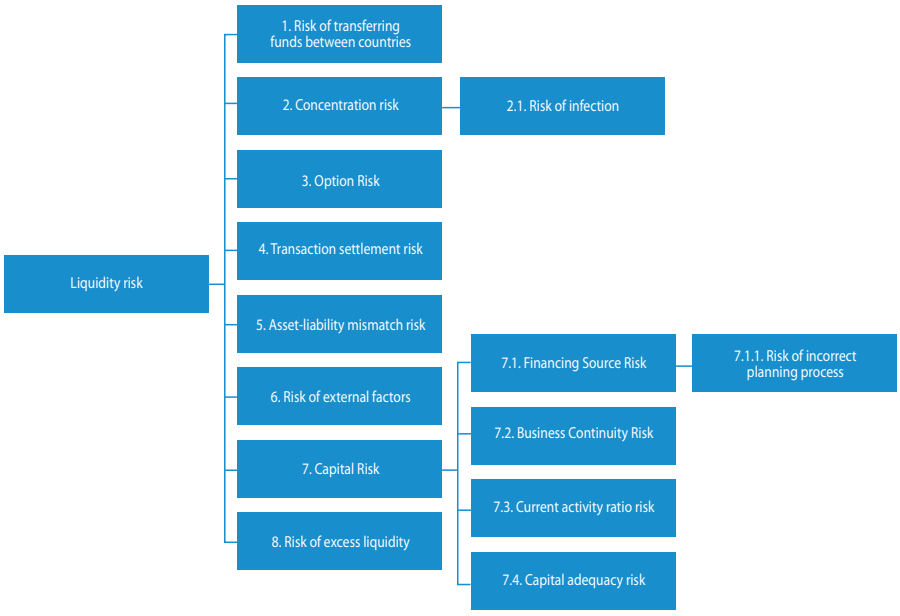
The risk of insolvency is related to a situation when an insurance company cannot obtain funds within its assets to settle its due liabilities. The risk of mismatch between assets and liabilities is a problem of the structure of flows in terms of their value and due dates. The settlement risk, although 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

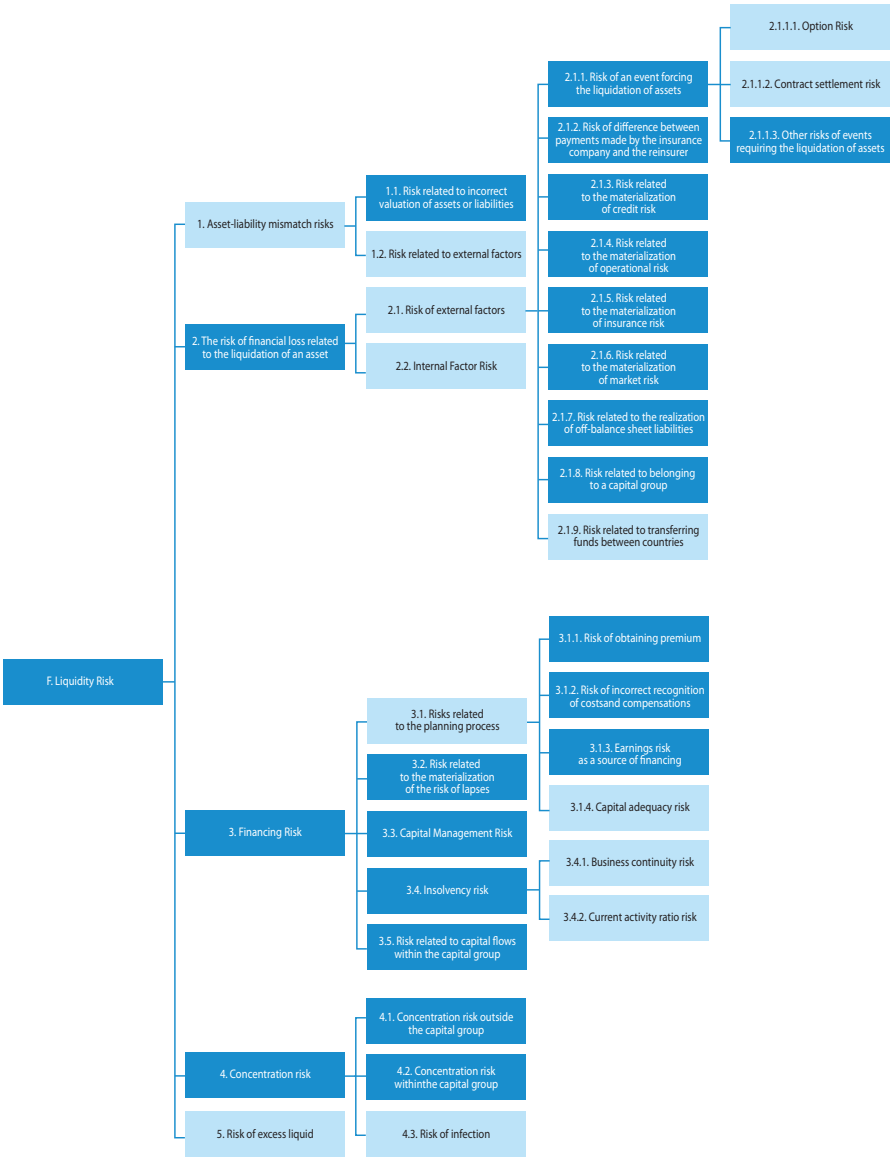
In this article, only two steps of analysis were carried out within the liquidity risk management process, i.e. risk identification and an attempt to catalogue it in the joint risk map of insurance companies. By combining both risk patterns, i.e. resulting from market practice and the previously presented 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.

Bibliography

Act of 11 September 2015 on Insurance and Reinsurance Activities (OJ 2021, item 1130).

AGRO Insurance TUW, *Sprawozdanie o wypłacalności i kondycji finansowej* [*Report on solvency and financial condition*], 2023.

Bannock G., Manser W., *Międzynarodowy Słownik Finansów* [*International Dictionary of Finance*], Warsaw 1992.

CEIOPS, *Draft Commission document on rules relating to the market risk sub-module of the standard formula under the solvency II directive 2009/138/EC*, Brussels 05/05/2010.

Cicirko T., *Zagadnienia podstawowe – Istota płynności finansowej* [*Basic Issues – The Essence of Financial Liquidity*], [in:] Kreczmańska-Gigol K., *Płynność finansowa przedsiębiorstwa, Istota, Pomiar, Zarządzanie* [*Financial Liquidity of an Enterprise, The Essence, Measurement, Management*], Difin, Warsaw 2015.

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, 17.1.2015).

Compensa TU SA VIG, *Sprawozdanie o wypłacalności i kondycji finansowej* [*Solvency and Financial Condition Report*], 2023.

Credit Agricole TU SA, *Sprawozdanie o wypłacalności i kondycji finansowej* [*Solvency and Financial Condition Report*], 2023.

DAS TU Ochrony Prawnej SA w likwidacji, *Sprawozdanie o wypłacalności i kondycji finansowej* [*Solvency and Financial Condition Report*], 2022.

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).

EIOPA, *Annual Report 2020*.

EIOPA, *Consultation Paper on an opinion on sustainability within Solvency II*, 2019.

EIOPA, *Guidelines on the management system*, EIOPA-BoS-14/253 PL.

EIOPA, *Insurance Stress Test 2024 Technical Specificatio*, 29 April 2024.

EIOPA, *Methodological Principles of Insurance Stress Testing – Liquidity Component*, 26 January 2021.

EIOPA, *Report on insurers' assets and liability management in relation to the illiquidity of their liabilities*, 16 December 2019.

FATF, *Financial Action Tack Force, International Standards on Combating Money Laundering and The Financing of Terrorism & Proliferation The FATF Recommendations*, March 2022.

Gąsiorkiewicz L., *Ryzyko finansowe w działalności ubezpieczeniowej* [*Financial risk in insurance activity*], [in:] Monkiewicz J., Gąsiorkiewicz L., *Zarządzanie ryzykiem działalności organizacji* [*Risk management of organization's activity*], CH Beck, Warsaw 2010.

Generali TU SA, *Sprawozdanie o wypłacalności i kondycji finansowej* [*Solvency and Financial Condition Report*], 2023.

Grzywacz J., Jagodzińska-Komar E., *Płynność Finansowa Przedsiębiorstwa* [*Financial Liquidity of the Enterprise*], SGH Publishing House, Warsaw 2021.

Grzywacz J., *Płynność finansowa, jej ocena i możliwości wspierania* [*Financial liquidity, its assessment and possibilities of support*], [in:] Grzywacz J., *Płynność finansowa przedsiębiorstw w Polsce, uwarunkowania, zarządzanie płynnością, ryzyko* [*Financial liquidity of enterprises in Poland, conditions, liquidity management, risk*], Oficyna Wydawnicza SGH, Warsaw 2014.

IAIS, *Application Paper on Liquidity Risk Management*, 29 June 2020.

IAIS, *Insurance Core Principles and Common Framework for the Supervision of Intentionally Active Insurance Groups*, November 2019.

IAIS, *Liquidity metrics as an ancillary indicator, Level 2 document*, 18 November 2022.

IAIS, *Public Consultation on the Development of Liquidity Metrics Phase 1 – Exposure Approach*, 29 June 2020.

Inter Polska TU SA, *Sprawozdanie o wypłacalności i kondycji finansowej* [*Solvency and Financial Condition Report*], 2023.

InterRisk TU SA VIG, *Sprawozdanie o wypłacalności i kondycji finansowej* [*Solvency and Financial Condition Report*], 2023.

Jeleń W., *Zdolność kredytowa a płynność przedsiębiorstwa* [*Creditworthiness and liquidity of an enterprise*], Institute of Finance, Department of Money and Banking, Warsaw 1991.

KNF, *Metodyka badania i oceny nadzorczej (BION) zakładów ubezpieczeń i zakładów reasekuracji* [*Supervisory Review and Evaluation Methodology (BION) of Insurance and Reinsurance Undertakings*], assessment for 2017.

KNF, *Metodyka Oceny BION Zakładów Ubezpieczeń i Zakładów Reasekuracji* [*BION Assessment Methodology for Insurance and Reinsurance Companies*], Warsaw 2011.

KNF, *Metodyka rocznego badania i oceny nadzorczej (BION) zakładów ubezpieczeń i zakładów reasekuracji* [*Methodology for the annual supervisory examination and evaluation (BION) of insurance and reinsurance undertakings*], assessment for 2022.

KNF, *Metodyka rocznego badania i oceny nadzorczej (BION) zakładów ubezpieczeń i zakładów reasekuracji* [*Methodology for the annual supervisory examination and evaluation (BION) of insurance and reinsurance undertakings*], assessment for 2023.

KNF, *Wytyczne dotyczące reasekuracji biernej/retrocesji* [*Guidelines on passive reinsurance/retrocession*], Warsaw 2014.

Kreczmańska-Gigol K., *Płynność finansowa przedsiębiorstwa* [*Financial liquidity of an enterprise*], Difin, Warsaw 2015.

KUKE SA, *Sprawozdanie o wypłacalności i kondycji finansowej* [*Solvency and Financial Condition Report*], 2023.

Kulawiak J., *Płynność finansowa, pojęcie i metody pomiaru* [*Financial liquidity, concept and measurement methods*], Institute of Agricultural and Food Economics, Warsaw 1992.

Kusak A., *Płynność finansowa, Analiza i sterowanie* [*Financial liquidity, analysis and control*], Scientific Publishing House of the Faculty of Management, University of Warsaw, Warsaw 2006.

Link4 TU SA, *Sprawozdanie o wypłacalności i kondycji finansowej* [*Solvency and Financial Condition Report*], 2023.

Lisowski J., Stępień J., *Zarządzanie płynnością zakładu ubezpieczeń w warunkach perturbacji na rynkach finansowych* [*Liquidity management of an insurance company in the conditions of turbulence on financial markets*], Poltext, Warsaw 2013.

Maślanka T., *Płynność finansowa determinantą zdolności kontynuacji działalności przedsiębiorstwa* [*Financial liquidity as a determinant of the ability to continue the enterprise's operations*], CeDeWu, Warsaw 2019.

PIU, Deloitte, *Klimat ryzyka, Jak prewencja i ubezpieczenia mogą ograniczyć wpływ katastrof naturalnych na otoczenie?* [*Risk Climate, How can prevention and insurance limit the impact of natural disasters on the environment?*], 2021.

PIU, *Klasyfikacja ryzyk występujących w działalności zakładów ubezpieczeń w 2017 roku* [*Classification of risks occurring in the activities of insurance companies in 2017*], Warsaw 2018.

PIU, *QIS5-Fifth Quantitative Survey*, PIU Seminar, Warsaw, October 5, 2010.

PIU, *Zrównoważone finansowanie z perspektywy zakładów ubezpieczeń* [*Sustainable financing from the perspective of insurance companies*], 2020.

PKO TU SA, *Sprawozdanie o wypłacalności i kondycji finansowej* [*Solvency and Financial Condition Report*], 2023.

Pluta W., Michalski G., *Krótkoterminowe zarządzanie kapitałem* [*Short-term capital management*], CH Beck, Warsaw 2005.

Presentation by Hannover Re, *Impact of climate change on reinsurance.*

PTR SA, *Sprawozdanie o wypłacalności i kondycji finansowej* [*Solvency and Financial Condition Report*], 2023.

PZU SA, *Sprawozdanie o wypłacalności i kondycji finansowej* [*Solvency and Financial Condition Report*], 2023.

Regulation (EU) 2019/2088 of the European Parliament and of the Council of 27 November 2019 on sustainability-related disclosures in the financial services sector.

Rogowski W., Lipski M., *Płynność finansowa – wybrane zagadnienia* [*Financial liquidity – selected issues*], [in:] Grzywacz J., *Płynność finansowa przedsiębiorstw w Polsce, uwarunkowania, zarządzanie płynnością, ryzyko* [*Financial liquidity of enterprises in Poland, conditions, liquidity management, risk*], Oficyna Wydawnicza SGH, Warsaw 2014.

Rzeczycka A., *Płynność w działalności przedsiębiorstw, zarządzanie i ryzyko* [*Liquidity in business operations, management and risk*], Gdańsk University of Technology, Monograph of the Department of Finance, Gdańsk 2016.

Saltus TU SA, *Sprawozdanie o wypłacalności i kondycji finansowej* [*Solvency and Financial Condition Report*], 2023.

Sierpińska M., Jachna T., *Metody podejmowania decyzji finansowych* [*Methods of making financial decisions*], PWN, Warsaw 2007.

Signal Iduna Polska TU SA, *Sprawozdanie o wypłacalności i kondycji finansowej* [*Solvency and Financial Condition Report*], 2023.

Sokół H., *Ryzyko a płynność finansowa przedsiębiorstwa* [*Risk and financial liquidity of an enterprise*], [in:] Grzywacz J., *Płynność finansowa przedsiębiorstw w Polsce, uwarunkowania, zarządzanie płynnością, ryzyko* [*Financial liquidity of enterprises in Poland, conditions, liquidity management, risk*], Oficyna Wydawnicza SGH, Warsaw 2014.

STU Ergo Hestia SA, *Sprawozdanie o wypłacalności i kondycji finansowej* [*Solvency and Financial Condition Report*], 2023.

TU Europa SA, *Sprawozdanie o wypłacalności i kondycji finansowej* [*Solvency and Financial Condition Report*], 2023.

TUiR Allianz SA, *Sprawozdanie o wypłacalności i kondycji finansowej* [*Solvency and Financial Condition Report*], 2023.

TUiR Warta SA, *Sprawozdanie o wypłacalności i kondycji finansowej* [*Solvency and Financial Condition Report*], 2023.

TUW CUPRUM, *Sprawozdanie o wypłacalności i kondycji finansowej* [*Solvency and Financial Condition Report*], 2023.

TUW PZUW, *Sprawozdanie o wypłacalności i kondycji finansowej* [*Solvency and Financial Condition Report*], 2023.

TUW TUZ, *Sprawozdanie o wypłacalności i kondycji finansowej* [*Solvency and Financial Condition Report*], 2023.

TUW'TUW', *Sprawozdanie o wypłacalności i kondycji finansowej* [*Solvency and Financial Condition Report*], 2023.

Uniqa TU SA, *Sprawozdanie o wypłacalności i kondycji finansowej* [*Solvency and Financial Condition Report*], 2023.

Wędzki D., *Strategie płynności finansowej przedsiębiorstwa* [*Financial liquidity strategies of an enterprise*], Publishing House, Kraków 2003.

Wędzki D., *Strategie płynności finansowej przedsiębiorstwa. Przepływy pieniężne a wartość dla właścicieli* [*Financial liquidity strategies of the enterprise. Cash flows and value for owners*], Oficyna Ekonomiczna, Kraków 2002.

Wiener TU SA VIG, *Sprawozdanie o wypłacalności i kondycji finansowej* [*Solvency and Financial Condition Report*], 2023.

Zdrowie TU SA, *Sprawozdanie o wypłacalności i kondycji finansowej* [*Solvency and Financial Condition Report*], 2023.