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A B S T R A C T

of a dissertation for the award of scientific and educational degree "doctor" on the doctoral program "Finance, money circulation, credit and insurance (Finance)" on the topic of:

Increasing the value of the insurance company through reinsurance as a capital management tool

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Dissertation abstract on:
Increasing the value of the insurance company through reinsurance
as a capital management tool

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CONTENT OF THE ABSTRACT

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I. General characteristics of the dissertation work

1. Relevance of the topic

The relevance of the problem developed in the dissertation is related to the rapidly growing impact of reinsurance in the activities of insurance companies. A world without insurance and insurance without reinsurance, both would be unthinkable in the context of current global economic processes. Reinsurance as a capital management tool has been studied and researched by economic science, but its application and comparability with other capital and financial instruments is too lightly affected by science, and is directly subject of current interest for every insurance company and indirectly for all levels from insured persons, regulatory authorities, investors, and even at the level of the national economy.

Reinsurance is one of the main risk transfer tools – a tool that allows insurers to balance their results and loss ratios and to compete with larger players in the market. By reducing the risk and transferring part of it to reinsurers, the insurance company achieves the required level of solvency without having to raise new capital or approach to financial instruments. A larger amount of capital for any company is a buffer against contingencies, but the optimal level of capital balances between security and efficiency. Capital management is a fundamental unit in the toolkit of financial management. Without a solid knowledge of capital and capital policy, it is difficult to manage any company in the right direction, even more so when it comes to a financial institution such as an insurance company.

2. Object and subject of the research

The object of the dissertation work and under the focus of the research are the company's assets and capital, in particular the fixed and long-term ones, equity, the insurance portfolio and, above all, the reinsurers' share, both in assets and in liabilities. Capital management is at the core of the financial and investment decisions of every modern management team and determines their long-term success. Therefore, the dissertation also examines models for optimizing the capital management, assessment of the current state and development of science and good practices to date, and we will try to predict upcoming changes based on observed trends in the insurance sector. The main problem that we will consider through the prism of the cost of capital and the cost of reinsurance and subject of the scientific work are the ways to increase the value of the insurance company by improving the capital structure using optimal levels of reinsurance.

3. Research thesis

The main thesis of the dissertation is that by optimizing the levels of reinsurance and in most cases by purchasing additional reinsurance, an increase in the value of the insurance company can be achieved as a result of lowering the regulatory capital requirements for available own funds and/or capital reliefs and reducing the need to raise additional equity capital or subordinated debt.

4. Purpose and tasks of the dissertation work

Among the main purposes of the study is to describe and synthesize knowledge and theoretical models on the subject. To explore the current status and trends in reinsurance products. To prove the hypotheses about the advantages and benefits of reinsurance over the additionally raised capital. In this regard, several key tasks are set, among them a comparison and benchmarking of types of capital and reinsurance and their impact. Analysis of an insurance portfolio and the effect of reinsurance on the final technical result. Determining of parameters for evaluation and measurement of the efficiency of the insurance activity and of the reinsurance products in relation to the needs and capital requirements of the company. Offering options for optimizing the reinsurance program and increasing the solvency of the insurance company.

5. Methodology and scope of the study

The methodology on the basis of which dissertation work has been carried out is founded on a number of scientific research methods such as: deductive method, method of analysis and synthesis, descriptive statistics and historical method, comparative analysis with schematic illustration and tabular presentation, as well as established statistical tools.

The subject of risk management as key to insurance development and integration into capital management strategy is explored in detail. In order to make a full and relevant analysis we will pay attention to both the accounting and the regulatory perspective in capital valuation. We cannot analyze the insurance business without also describing the vital function of risk management as a fundamental process and priority for all parties involved.

We show practically how a careful analysis of the fundamental economic principles underlying the insurance business can be useful in identifying mechanisms by which insurance companies can create value. The understanding and application of these principles goes beyond the limits of purely scientific development and intellectual excellence, it is a prerequisite for better strategic management of an insurance company. The most important thing in this case is not focusing on the investment activity of an insurance company, but the skills of creating a business and its development through effective capital management, which ultimately allows them to create value and increase wealth for their shareholders.

6. Structure and content of the dissertation

The dissertation was developed in compliance with the requirements of Art. 27, para. 2 of the Regulations for the Implementation of the Law on the Development of the Academic Staff in the Republic of Bulgaria. It consists of an introduction, an exposition in three chapters, a conclusion and a bibliography. The study was developed in a volume of 173 standard pages. 36 figures and tables are presented in the main text of the study. The references bibliography contains 97 sources, incl. 18 from representatives of the Faculty of Finance, a total of 74 sources in English, 23 in Bulgarian. In terms of content, the dissertation is structured as follows:

Introduction:
Chapter I: Methodological foundations of capital and risk management in an insurance company

1. Capital management in the company - theoretical foundations
    - 1.1. Nature and capital structure
    - 1.2. Sources and levels of capital
    - 1.3. Cost of capital
    - 1.4. Creating and measuring value in the insurance company
    - 1.5. Capital management and optimization strategy
2. Regulatory approach in financial analysis of the insurance company
3. Risk management in the insurance company and risk transfer
    - 3.1. Risk - Nature and Assessment
    - 3.2. Risk management - types of risks, hedging, transfer, diversification
    - 3.3. Integrating risk management and capital management
4. Moral hazard and the impact of principal-agent conflict
    - 4.1. Essence and concept
    - 4.2. Cost of conflict – agency costs
    - 4.3. Moral Hazard in Insurance

Chapter II: Reinsurance as a strategic tool for the management of assets and liabilities of an insurance company

1. Essence, origin, philosophy
2. Types of reinsurance and coverage parameters:
    - 2.1. Traditional reinsurance - standard contracts
    - 2.2. Non-traditional reinsurance – alternative structured solutions
3. Reinsurance as a capital management method

Chapter III: Designing an Optimal Reinsurance Program

1. The added value of reinsurance
    - 1.1. Key performance indicators and value creation indicators
    - 1.2. Impact of reinsurance on insurance company value
    - 1.3. Economic evaluation of the added value of reinsurance
2. Models for valuation of reinsurance products
3. Optimizing the reinsurance structure to increase the value of the insurance company
    - 3.1. Analysis of needs and opportunities
    - 3.2. Preparation of sample model
    - 3.3. Assessment of the risk and the necessary capital for its coverage
    - 3.4. Calculating the cost of capital and estimating the required reinsurance coverage
    - 3.5. Structure optimization

Conclusions and recommendations:
Cited and used sources of information and scientific literature

7. Practical applicability

The research compares equity with additional subordinated hybrid debt and reinsurance on a number of indicators such as price/cost, risk transfer, counterparty risk,

liquidity, impact on available capital and regulatory capital requirements affecting capital structure, opportunity for economic growth, smoothing and stabilization of financial result compared to individual reporting periods, which is also among the main purposes and goals of reinsurance. Practical aspects of the benefits of reinsurance for the capital adequacy and financial condition of insurance companies are indicated. The peculiarities of financial analysis of an insurance company and the different points of view towards the company's capital are also considered.

II. Synthesized presentation of the dissertation work

The relevance and significance of the development for theory and practice are presented in the introduction of the dissertation. The main research thesis is formulated. The object, subject and purpose of the dissertation are indicated. The research tasks are defined and developed both theoretically and in practice to prove our thesis and reach to a conclusion.

Chapter I: Methodological foundations of capital and risk management in an insurance company

1. Capital management in the company - theoretical foundations

The optimal capital structure leads to maximization in the market assessment of the value of company shares. On the other hand, the market value of a firm's common stock is an expression of the present value of expected future dividends. In order to influence the market valuation of company shares, the management team has three tools at its disposal: developing the effect of financial leverage; changes in the stream of expected future dividends; changes in capital return requirements. It is generally accepted that the optimal financial structure requires that the company's long-term and medium-term indebtedness does not exceed the size of its own capital. (Захариев А. ,., 2010) Achieving positive financial results and economic growth for any insurance company is largely determined by a set of techniques and tools for the rational use of capital. The effectiveness of this process depends on both the volume and the composition and structure of capital.

For the purposes of this study, the company's capitals can be classified not only by their degree of demand, but also by their sources and according to the corresponding level required from a regulatory perspective.

As the main sources of capital, we can distinguish:

- Capital markets – equity or debt participation, hybrid forms of subordinated debt
- Sale of assets
- Reinsurance
- Securitizations – hybrid derivative instruments

According to the required level of capital, we can distinguish:

- Equity (accounting, shareholder) capital – the actual level indicated in the company's accounting reports
- Regulatory capital – the level that the supervisory regulatory authority deems necessary to set aside.

- Economic capital - the level that the management of the company thinks is necessary to maintain and cover the risks taken (Boller P. , 2001), which in turn can be classified as:
    - Economically modified capital (EMC) - available adjusted capital level with impairment of reserves, unrealized capital flows from investment activity and deferred tax liabilities.
    - Risk-based economic capital (RBC) – the theoretical level required to cover the main underwriting and investment risks according to the relevant risk capacity.

In this framework, reinsurance solutions (whether traditional or structured) are positioned as an effective capital optimization method, affecting both available capital and required capital. The insurance business is inherently extremely conservative, even more so when it comes to capital levels in the context of increasingly stringent regulations.

The cost of capital is like kind of a barrier below which the company loses its value and above which it creates added value. Determining the cost of capital correctly is a complex task that depends on a number of variables such as the company's capital structure, discount factors, the effect of taxation and the cost of the used capital sources.

Reinsurance has a centuries-old history as a capital management tool. The use of reinsurance products in this way and their supply capacity is growing more and more worldwide. Literally every single reinsurance contract to a certain extent contains within itself the corresponding level of capital leverage and contains within itself characteristics of contingent capital. Increasingly, reinsurance is seen as an important tool for managing the company's capital.

In practice, the following regularity/pattern is often observed in changes in solvency ratios. To achieve the set target level of solvency and capital adequacy, the reduction of the level of the capital requirement, where the level of reinsurance plays a key role, instead of applying to a direct increase of own capital funds, has proven to have a greater effect.

The ever-changing economic environment of modern times requires a review and analysis of the basic guiding principles. For the insurance industry, this means that we need to refocus on the fundamental mechanisms of value creation. A first step in the process is asking and answering two basic questions, namely how value is created and how it can be measured. The measurement of economic value allows the pricing of insurance products to calculate and include the relevant value creation objectives. Moreover, although not easy to implement, this principle makes it possible to synchronize employee reward and incentive schemes with value creation. In this way, the interests of shareholders and employees will be even more uniform and closer, limiting the effect of principal-agent conflict. In addition, we can say that the measurement of economic value allows strategic capital and risk management decisions to be assessed in terms of the likelihood and ability to increase the value of the company.

Value creation in insurance is primarily due to the insurer's comparative advantage in raising debt capital, which is large enough to offset its comparative disadvantage in investing. Thus, the question arises how high is the cost of borrowing funds through insurance. This is similar to determining the economic value of an insurance contract. Here, economic value corresponds to the funds required to cover all future costs, including costs of covering

damages incurred, as well as the alternative costs associated with owning risk capital based on the lost profits from the next best opportunity.

Insurers that create the most shareholder value are those that identify and capitalize on the best business opportunities and have the lowest production costs and achieve the highest operational efficiencies. There are three important prerequisites for achieving these levels. First, a good understanding of the value creation process allows clear identification of competitive advantages and unambiguous allocation of responsibilities to specific functions in the organization. At the same time, this should be complemented by a framework for measuring value creation both on an overall basis and for specific activities and responsibilities. And in order for shareholders to have adequate expectations for good decision-making by the management team, it is imperative to create an incentive system that aligns the interests of management with those of shareholders in creating value.

Risk transfer to the financial and reinsurance markets can also be used effectively whenever the cost of taking on risk is higher than the cost of transferring risk. The evaluation of most risk and capital management strategies is complicated by the fact that they inevitably involve a balance or trade-off between risk and return. For example, investing in shares may save tax costs and lead to higher returns, but it may also involve taking on more risk and therefore incurring more capital costs. The ability to quantify the trade-off between risk and return in company value is a critical ingredient to effective risk and capital management.

An insurer's capital management strategy is critical to the long-term financial sustainability of its business. In highly competitive markets for insurance premiums and investment returns, capital is expected to achieve a fair rate of return, but the amount of available capital determines the level of solvency of the insurer.

In the modern economy, the most critical convergence is between finance and insurance, or more specifically between corporate finance and risk management. In order to focus on analyzing and assessing risk for the company, you must also be able to analyze how it raises its capital and vice versa. Many of the financial products and services offered by insurers and other participants in the derivative capital markets are increasingly similar and closer to each other in their nature and application aspects. It is precisely because of the similarities and similarities between them that the term convergence is used. By choosing the right mix of capital instruments and risk management products that give access to capital at the best possible price, we can maximize the value of the company. Insurance and equity instruments are increasingly similar as they are increasingly designed to help companies reduce the cost of capital or redeploy capital more efficiently on a risk-weighted basis. In the scientific literature on the matter, it is assumed that financial management should pursue no other goal, namely the maximization of the value of the company. Corporate financial management is aimed at creating value for the company's owners or shareholders (Prodanov, 2012).

All this leads to the following conclusions:

1) Managerial financial analysis is applied by financial managers in their daily management activities, which are related to investment (capital budgeting) and financial decisions

2) The risk assessment and analysis serve to provide the information base for solving the optimization tasks that pose the above management problems
3) The optimal solution of the financial and investment problem cannot be achieved without their integration into a single criterion related to the maximization of company value.

2. Regulatory approach to insurance company financial analysis and impact of reinsurance

The series of economic crises over the past few decades has necessitated the need for insurers and supervisors to take action and fundamentally improve their risk and capital control and management systems. It is financial crises that stress and test risk management systems throughout the financial industry. The volatility of the capital markets combined with the unusual levels of interest rates, induced bankruptcies and turmoil have made the management of risk and capital in insurance companies an extremely laborious and delicate matter in recent years. But that's what history is for, to learn from it. Through these financial upheavals, the banks have definitely managed to get through and overcome more painlessly than the insurers, and the reason for this may lie in a lesson learned well earlier and at a much higher cost. Solvency II has key role for both the insurance industry and consumers. It is a harmonized, transparent and risk-based supervisory regime. During the previous Solvency I regime, insurance companies were not required to implement risk management, and national regulators did not receive adequate information about the risks and management issues faced by companies. This became even more evident with the outbreak of the financial crisis. The regime strengthens the protection of the consumers of insurance products by introducing risk management and requiring market valuation of insurers' assets and liabilities.

Compared, the two directives can also be analyzed according to their different perspective towards the company's balance sheet, namely an accounting and economic perspective that reflects the fair market value and provides additional buffers to protect the company's solvency. A key difference is precisely the perspective of assessing assets and liabilities. Rather than book value, for risk assessment purposes, an economically oriented fair market valuation is more important. The fundamentally different nature and characteristics of assets and liabilities causes a number of problems that insurers and their supervisors face. Although two opposite sides of the same coin, assets and liabilities have direct and indirect relationships with each other that influence risk assessment. It is therefore necessary that the measurement of risk on both sides of the balance sheet be as commensurable and comparable as possible.

Through the transfer of risk, insurance companies protect business entities from all sectors of the real economy against loss of assets or income. The insurance sector in most developing and developed economies is of increasing weight in the financial industry and of increasing importance to the economy (Yang, Li, Tapon, Francis and Sun, Yiguo, 2006). Insurance companies are one of the major institutional investors, with an increasing weight in capital market (Sharpe, 2000) and real estate market.(Проданов С. , Икономиката и застрахователния пазар в България, 2020)

3. Risk management in the insurance company and risk transfer

Risk management aims to optimize and improve the company's results, its operational efficiency, corporate governance, adequacy and adaptability to market cycles and unforeseen events, reduction of the cost of capital, better spread and hedging of risk, greater protection for consumers and increasing the wealth of shareholders, as well as last but not least reducing the probability of bankruptcy and insolvency (Pablo Duran Santomil, 2020). On the one hand, insurance companies offer protection against most risks to their clients, but on the other hand, insurers themselves also need protection and risk management related to their activity.

Risk management is a structured, continuous and evolving process - in the sense that there are separate stages, part of this process, a clear division of duties of people working on risk management inside and outside the insurance company, and a constant search for possible new dangers and appropriate risk management methods. The focus is on the risk of the insurance company as an possibility of losses occurrence and its management through methods aimed at reducing, controlling and financing the risk.

Basically, risk management clarifies in the identification, analysis and taking of appropriate measures by the respective company. First, the risk can be avoided – by risk withdrawal/risk avoidance. In terms of insurance, in some cases, the avoidance of risk by the insurer is possible and desirable, but this cannot be its main objective, because by nature it is called upon to provide protection against risk. Or in other words, the purpose of insurance is to accept and manage risk. The insurer generally assumes responsibility for the consequences of the risk and, respectively, retains the risk - this is its activity. The retention of the risk by the insurance company should be carried out within well-founded limits. Otherwise, immeasurable liability is assumed. It should also be applied to aggregate accumulations that have proven persistently positive risk development. The retention of the risk by the insurer is done by avoiding co-insurance, reinsurance, ceding in an insurance pool, personal participation of the insured - the franchise/retention, the possibility of excluding risks and objects from the policy coverage and other transfers. A key question is what and how much to retain as a liability by the company and what, how much and how to transfer, transfer into liability.

Insurance companies have the following risk transfer techniques: co-insurance, reinsurance, insurance pool and alternative financial transfer. Transfer or risk transfer, means transferring of responsibility for damages caused as a result of the occurrence of the risk. Co-insurance is the oldest and pre-reinsurance form of risk transfer and distribution outside the insurance aggregation in space, time and nature. It is a form of insurance in which at least two or more insurers participate to provide insurance protection for a given object or objects at the same risk and for the same interest (Гаврийски, 2001). The transfer of risk through co-insurance is an essential risk management tool of the insurance company, as there are cases where the company is unable to assume the relevant insurance liability, i.e., does not have the necessary insurance capacity. Therefore, co-insurance is also defined as an allocation procedure where the insured risk is distributed among two or more insurance companies, each of them assuming responsibility for part of the risk and having an obligation directly to the general insured. Unlike co-insurance, which is generally applied within individual national markets, reinsurance is a spread of risk on an international scale. Reinsurance is the transfer or ceding of part of the liability of the insurer (cedent) in relation to different types of

insurance or classes of business (portfolios) to other insurance companies and/or professional reinsurance companies.

Reinsurance is an extremely effective method of risk management for the insurance company and, respectively, an important factor for the insurer's financial condition. It refers to one of the most essential functions of reinsurance, namely balancing the negative actual deviations of losses from expected ones in connection with the development of the risk. This function is also defined as balancing the insurance portfolio, which means reducing the technical risk of the insurer. This is especially true for catastrophic risks and small insurance pools. At the same time, it should be emphasized that the large liabilities of the insurer are usually reinsured. Reinsurance must also be a proven necessity (Андреева, 2010). It is possible that a certain accumulation of risks is not reinsured, which is an indicator that it is in good financial condition for a relatively long period. Conversely, if an aggregation has excessive reinsurance coverage - very low self-retention, a quota share contract, no profit-sharing clause and other restrictive reinsurance measures, then there is a signal for the presence of a danger of possible financial difficulties for this aggregation. Basically, the less solvent insurer strives for excessive reinsurance (Doff, 2007).

Capital management and risk management are two sides of the same coin. But on the other hand, both in theory and in practice, corporate finance treats them separately. Capital management focuses on ensuring an optimal capital structure - the combination of equity and debt that minimizes the cost of capital. This is where the main task before the financial director lies. However, risk management concerns the roles of the risk manager and the treasury manager, who work separately in the insurance sector and in the banking sector or capital markets and analyze the operational and financial risks of the company. Intuitively, everyone associates capital and risk, however, due to the multiple forms and sources of capital combined with rapidly evolving risk management techniques, it is natural to treat them as two different topics to some extent.

The topic we cover is very complex and requires a deeper look at financial theory and modern practice, we try to make the analyzes in an accessible and understandable way for anyone with basic knowledge in the field of finance, and there are several new concepts, on the other hand, many of the techniques and models we cover would also be interesting to experienced financial experts in the insurance sector.

The convergence of insurance and capital markets offers significant opportunities for financial institutions. The demand for new hybrid products is primarily due to the ever-increasing focus on maximizing company value and shareholder wealth and moving from traditional risk management autonomously from each other to integrated risk management models. The process of convergence is stimulated by increasingly strict accounting and regulatory requirements, by the emergence of new risks such as terrorism and cyber risk, as well as by the ever-increasing concentration of risk exposure to catastrophic risks (Cummins D. J., 2005). And on the other hand, the process is accelerated with the help of advances in information technology.

The future development of these new possibilities is in custom designed, strictly individualized advanced solutions and services according to the customer's needs. For this purpose, several still existing barriers that complicate the process must be overcome, namely - regulatory and accounting requirements, ignorance and not particularly popular of new

opportunities, lack of widely accepted models for pricing and reporting. Consequently, the result will be a more liquid and dynamic financial market that will enable global diversification of risks, securitization of portfolios and substantial risk transfer that will optimize the capital structure and reduce the need for otherwise expensive equity capital for companies.

4. Moral hazard and the impact of principal-agent conflict

The phrase "moral hazard" was originally coined in the insurance industry literature more than a century ago, when probability theory had yet to develop to describe a positive interdependence between having insurance and the occurrence of an insured event. The inclusion of the word "moral" in the phrase "moral hazard" has a powerful rhetorical character that has been used mostly by insurers to influence the public's attitude to claims for benefits. In contrast, economists treat moral hazard as an idiom that has little, if anything, to do with morality. Since then, the economic science has utilized the term "moral hazard" to address the role of incentives in a wide range of principal-agent relationships. For this relationship to work properly, the agent must be competent enough to make the right decisions at the right time, but if the agent has different interests that are not the same as the principal's, mutual agreement does not work well. The existence of information asymmetry in the relationship between the employer and the employees is the main reason for the existence of the principal-agent conflict. The modern concept of moral hazard implies more than correlational dependence and includes a causal relationship that insurance changes the behavior of the insured and causes damage.

Among the possible conflict situations and relationships described in the literature are those between Insurers and insured and insurers and reinsurers - Moral hazard is present in all insurance transactions, including reinsurance. Insurers select a portfolio of risks to be underwritten by reinsurers. In addition, the primary insurance policy negotiates the terms of the contract with the insured, including what safety and loss mitigation techniques should be required as a condition of insurance. When claims arise, the insurer settles those claims with its policyholders – the insureds. Each of these activities is costly to the insurer, but each can affect the frequency and severity of claims. If the insurer is heavily reinsured, the reinsurer benefits from the loss reduction, but the majority of the costs are still on the account of the insurer. To deal with this conflict of incentives, reinsurance has negotiated controls. Since many principal-agent conflicts are resolved subsequently, through ex post settlement, reinsurance contracts can also be evaluated on a performance or retrospective basis (Doherty N. A., 2002). Thus, the reinsurance premium for each contract year will be affected by the previous year's losses and may be further adjusted. In addition, long-term and intermediary relationships are common in reinsurance. A fundamental principle in reinsurance is "follow the fortunes", or in other words, the reinsurer follows the fate of the reinsured. This puts the insurer's (reinsured's) reputation to the test, which further encourages it to undertake loss controls.

It is impossible to resolve agency conflict, but there are mechanisms that are used to significantly reduce the effects of this problem. The purpose of these mechanisms is to rationalize the action of agents so that there is a close relationship between their actual and expected actions. This reduces the gap between management actions and the realization of the interests of the principals.

A basic postulate in the insurance case is that the insurance itself does not change the probability of an adverse event occurring, but can only mitigate its financial consequences. However, there are also concepts in economic theory that insurance can actually affect and change the probability of adverse events occurring, through a phenomenon known as the principal-agent problem (Baker, 1996). A problem that inherently increases the likelihood of adverse events occurring due to the incentives and motives of the insured persons themselves (Heimer, 1985). When a person is insured, he is more relaxed and less cautious to avoid or prevent an accident, illness, theft, fire, road accident or any other type of loss, thus not directly but indirectly increasing the incidence of damages. Insurance itself also has a direct effect on increasing the probability of occurrence of adverse insured events by incentivizing insured persons to cause harm and damage for which they are insured themselves and subsequently to be financially compensated for it. In practice, this essential characteristic of insurance can be compared to the principle of operation of a pawn shop, in which a person can receive cash for the things he owns.

In the scientific literature, moral hazard is also described as bad character and also as a matter of making rational decisions in response to incentives, and possibly therefore less moral (Heimer, 1985). Or to put it another way, moral hazard describes precisely these immoral motives. On the other hand, insurance by its nature has a social character and a form of mutual assistance that requires collective responsibility (Stone, 2003). Insurance is among the main mechanisms and tools of modern society, through which a number of problems and risks are managed to a certain extent by man and, above all, by collective actions and behavior.

Chapter II: Reinsurance as a strategic tool for the management of assets and liabilities of an insurance company

1. Essence, emergence, philosophy

Reinsurance itself is a form of insurance. From a legal point of view, a reinsurance contract is a type of insurance contract, with the relevant attributes and clauses. Since the establishment of the first professional reinsurance company (CologneRe - "Kölnische Rückversicherungs-Gesellschaft") in 1846. So far, reinsurance has plaid a major role in the reduction and transfer of risk for insurance companies, especially for catastrophic events. Risk transfer is carried out in three main ways - diversification, hedging and insurance. Not coincidentally, the concept of risk management itself arose from insurance academic community. With hedging, risk can be reduced and even eliminated, while with insurance, risk can be eliminated, but the possibility of making a certain profit remains. Although insurers can significantly reduce insurance risk through diversification and risk management, significant residual risk remains and insurer payments are too contingent and stochastic in nature. One of the most important tools for managing insurance claims risk is reinsurance.

The development of the insurance and reinsurance industry reflects the main trends in the industrial and commercial revolutions of the last 700 years. At its core, reinsurance is insurance for insurance companies. Only by sharing some of their risk with reinsurers is it possible for primary insurers to offer cover against the increasingly high and accumulated risks we face today and at the same time keep prices at affordable levels. Reinsurers provide coverage against all types of risks worldwide. Risks are transferred from individuals and companies through primary insurers to the reinsurer. Reinsurance allows reinsured ones to reduce their risk exposure and solvency capital requirements. Capital relief allows insurers to

write more business, which predicts economic growth and helps create financial stability, which is a key business built on trust.

Reinsurance is a tool that allows smaller insurers to compete with larger competitors on the market by transferring risk and achieving leverage and capital relief. In order to achieve the necessary solvency level, insurers could increase their capitalization by raising new capital or by reducing risk by transferring part of it to reinsurers. Thus, reinsurance acts as a substitute for capital, and the purchase of reinsurance should reduce the cost of capital (Hoerger, 1990).

Reinsurance itself can be characterized by three main functions:

- Capacity – possibility to work with higher limits and risk exposures, competing with larger insurers
- Stabilization - of the results of the activity, overcoming the risk of volatility and extremely high and difficult to predict losses.
- Management of financial results - positive effect on a number of financial indicators applied in the financial analysis of the insurance company.

Here it is important to point out a less formal but essential function of the reinsurance relationship, namely the possibility of obtaining management advice and know-how, either from the reinsurers themselves or even from the intermediary broker under the respective contract.

In evaluating the benefits and costs of a given reinsurance coverage or an entire reinsurance program, the cedant must consider not only the direct costs versus the benefits of the coverage of eventual losses, but also the reinsurance functions we described above. A major consideration should be the reinsurer's financial stability and reputation – will the reinsurer be able to quickly pay claims and claims; will the reinsurer still be active to pay out claims made and settled in 5-10 years. Another key feature in the evaluation may be the additional services provided by the reinsurer and/or broker.

2. Types of reinsurance and coverage parameters:

It is no coincidence that reinsurance is said to be a catalyst for economic growth. Reinsurers absorb volatility and extraordinary shocks, provide a valuable capital resource for the real economy and support risk prevention. As institutional investors, reinsurers provide long-term capital in the economy and create incentives for risk-appropriate behavior. By reducing the risk and transferring part of it to reinsurers, the insurance company achieves the required level of solvency without having to raise new capital or resort to other more expensive and less efficient financial instruments. According to the needs and risk profile of the insurance company and the standard or internal solvency assessment model used, the accurate and efficient choice of the right reinsurance product also depends.

The established types of reinsurance are optional and mandatory according to the volume of risks, and according to the principle of coverage they are quota (proportional) and non-proportional. Despite the variety, they all have the same basic purpose, namely to limit the risk of the insurance portfolio and protect it from volatility and financial shocks.

There are many types of reinsurance instruments, but if we were to classify them all into several categories based on key parameters and indicators, it would look like this:

According to the volume of risks taken:

- Facultative - certificates – the oldest original form of reinsurance, case by case, risk by risk
- Obligatory -treaties

According to the principle of coverage:

- Proportional (proportional, pro rata – quota share, surplus)
- Non-proportional (non-proportional, excess of loss - per risk, aggregate, stop loss)

According to the method of recording the risks assumed and reporting the events that occurred:

- Contracts covering policies concluded during the period (Risk-Attaching)
- Contracts covering events occurring during the period (Loss-occurring)

According to the degree of specialization and the degree of risk transfer:

- Standard treaties
- Structured solutions (structured advanced solutions)
- Financial reinsurance (fin re) - reinsurance capital transactions)

Each of these types of reinsurance contracts is purposefully designed to meet specific needs of the insurance company. In most practical cases, the reinsurance protection of an insurance portfolio is not limited to one type of reinsurance, but is organized through a combination of several protection methods to structure a reinsurance program. There is no universal solution for achieving maximum efficiency, but in the right combination and by structuring a comprehensive reinsurance program, optimal results can be achieved.

If we can characterize the key parameters for each type of reinsurance coverage, then we can describe them as general, valid for the insurance contracts themselves, and specific ones, characteristic of the reinsurance contracts.

General parameters:

- Covered risks
- Exceptions
- Contract period
- Territorial scope
- Coverage limit
- Premium

Characteristic parameters:

- retention or ceding ratio,
- layers,
- single and aggregate limits,
- refunds,
- commission,
- reinsurance margin
- specific clauses such as: indexation clause, offset clause, definition of occurrence, for notification of insurance event, for termination of the contract, arbitration clause
- special acceptance

Function versus contract type	Quota share	Surplus	XL per Risk	CAT XL	Aggregate Stop Loss
	PROPORTIONAL		NON-PROPORTIONAL		
Direct financing effect	VERY EFFECTIVE	VERY EFFECTIVE	INEFFECTIVE	INEFFECTIVE	INEFFECTIVE
Increased risk capacity	NOT THAT EFFECTIVE	VERY EFFECTIVE	VERY EFFECTIVE	INEFFECTIVE	INEFFECTIVE
Increased premium capacity	VERY EFFECTIVE	VERY EFFECTIVE	INEFFECTIVE	INEFFECTIVE	INEFFECTIVE
CAT coverage	NOT THAT EFFECTIVE	NOT THAT EFFECTIVE	INEFFECTIVE	VERY EFFECTIVE	NOT THAT EFFECTIVE
Stabilization of the result	NOT THAT EFFECTIVE	NOT THAT EFFECTIVE	VERY EFFECTIVE	VERY EFFECTIVE	VERY EFFECTIVE

Table 1. Degree of efficiency of specific key functions for each of the main types of reinsurance contracts.

In proportional reinsurance coverage (proportional, pro rata – quota share, surplus), unlike non-proportional contracts (excess of loss), the main function is the financing effect. Unlike proportional contracts, non-proportional ones have different functions and parameters in their nature. It is no accident that in an optimal reinsurance program these two main types of contracts are structured in such a way as to complement each other and to extract maximum benefits.

For an insurance company, having adequate protection depends in many ways on how its reinsurance program is designed. Using the characteristics of the insurer's portfolio risk profile, the reinsurer and/or intermediary broker can often offer and recommend a specific type of contract. But very rarely only one type of contract can meet and cover all the needs of the assignor even for a specific line of business. The main purpose of combining different types of reinsurance is to allow the creation of an optimal program that meets the specific and tailored needs of the company. Each individual type of reinsurance coverage has both advantages and disadvantages. By combining them, they can complement each other and get the most out of their properties. For the purposes of accounting and correct assessment of the impact of the reinsurance program, it is necessary to accurately and clearly distinguish the effect of the contracts, to avoid misunderstandings about which contract applies first.

Traditional reinsurance products focus on protection against severe extremely high risks, providing the option of supplementing coverage with typically one or two reinstatements. However, based on historical data, business experience and especially with loss occurrences and claims, both insurers and reinsurers see the need to protect against the frequency of events, not just against their size.

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Dissertation abstract on:
Increasing the value of the insurance company through reinsurance as a capital management tool

In today's economic conditions of constant improvement, insurers and reinsurers are looking for solutions to optimize their business processes, more choices, re-use of coverage capacity and we will probably see in the near future new reinsurance instruments, modifications more conditional in nature and with reusable options.

For all other cases where traditional reinsurance treaties are not enough, the new hybrid evolved forms of contracts are emerging, called structured solutions or tailor-made for the specific company and its goals and opportunities. They allow a personalized approach according to the specific situation and structuring of the reinsurance program exactly according to the specific needs of the company. By combining the advantages of various reinsurance and even financial instruments, they help to more effectively manage not only the risk, but also the company's capital.

The convergence of financial and insurance (reinsurance) markets continues to change the practices of both traditional markets. This led to the creation, improvement and development of a new class of assets – the hybrid financial-insurance instruments. The key driving factor in this convergence process is the increasing focus and priority on maximizing the value of shareholders and companies as a whole. Among the main factors with a direct impact on this process, we can point out market imperfections, the ever-increasing accumulation of risks and the growth of aggregated exposures over time, and of course regulatory, tax, accounting and legislative changes.

In order to justify and highlight the advantages of the convergence between banking and insurance financial services, we will look at some of the modern innovative products applicable today. For research purposes, we will divide products into two main categories:

- Alternative risk transfer – evolution of traditional reinsurance instruments
- Derivative instruments with an exotic underlying asset - insurance-linked securities (ILS)

Alternative risk transfer instruments do not so much expand the base of available capital beyond the existing insurance and reinsurance markets, while insurance-linked securities allow access to the entire global capital market. Undoubtedly, alternative solutions fulfill their key and valuable function in the market, but as this essential distinction between the two categories suggests, insurance-linked securities are the next level in evolution. They are charged with enormous potential to transform the market for risk management tools beyond insurance and reinsurance to develop a new class of assets to be traded on global capital markets (Cummins D. J., 2005).

The market for alternative risk transfer instruments can in turn be divided into two sub-categories:

  - Instruments that complement or overlap with the insurance and reinsurance markets – such as corporate models of self-insurance, captive insurance
  - Products that extend or adapt conventional reinsurance contracts to cover new risks or supplement existing ones, but in innovative ways.

It is no coincidence that the main purpose of such financial solutions is their use as a source of additional conditional capital, and not risk transfer, which in turn has a positive effect on the price of the coverage itself, which is lower compared to coverage with a more

substantial risk transfer. Perhaps one of the most significant arguments in favor of securitization over traditional reinsurance is that very large losses can be absorbed much more easily in a multi-trillion-dollar capital market than in a multi-billion-dollar insurance market, especially when those risks are typically not are strongly and directly related to market returns.

3. Reinsurance as a capital management method

Reinsurance as a tool for managing the company's capital has been studied and researched by economic science, but its application and comparability with other capital and financial instruments is too lightly affected by science, and is directly the subject of current interest for every insurance company and indirectly for all levels from insured persons, regulatory authorities, investors, and even at the level of the national economy. Reinsurance has a centuries-old history. The use of reinsurance products in this way as a tool for strategic capital management and their supply capacity is growing more and more worldwide. Literally every single reinsurance contract to a certain extent contains the corresponding level of capital leverage and has the characteristics of a type of contingent capital.

Reinsurance is one of the main risk transfer tools – a tool that allows insurers to balance their bottom lines and compete with larger players in the market. By reducing the risk and transferring part of it to reinsurers, the insurance company achieves the required level of solvency without having to raise new capital or resort to financial instruments. In order to achieve the set target level of the coverage ratio, the reduction of the level of the capital requirement is proven to have a greater effect, where the level of reinsurance plays a key role, instead of resorting to a direct increase of own capital funds.

More reinsurance means a lower level of retention, or in other words, taking smaller risks at the expense of the insurer and ceding a larger share to the reinsurer. Less reinsurance is the exact opposite, namely that the insurer bears higher levels of risk entirely at the expense of its capital.

INDICATORS	EQUITY	HYBRID (SUBORDINATED) DEBT	REINSURANCE
Price	High	High	Low-medium
Period	Permanent	5-10 years	Changeable
Opportunity for economic growth	Yes	Yes	Yes
Increase in total capital	Yes	Yes	Yes
Capital increase - level 1	Yes	No	Yes
Optimizing the capital structure	No	No	Yes
Counterparty risk	No	No	Yes
Transfer of risk	No	No	Yes
Stabilization of the financial result	No	No	Yes
Leverage	Reduction	Raise	Reduction
Dilution of price/earnings per share ratio	Yes	No	No

Liquidity	Yes	Yes	It depends on the type of reinsurance
Reduction in capital requirements	No	No	Yes
Solvency Capital Ratio (SCR)	↑	↑	↑↑

Table 2. Comparison between reinsurance, equity and subordinated debt.

In the table above, we have compared the main characteristics and degree of impact of own, borrowed and reinsurance capital. Even at first glance, the advantage of reinsurance as a capital instrument clearly stands out.

Attention should be paid to the two main levers for managing the coverage ratio, namely – the increase in available capital (own funds) or the decrease in the level of required capital. The choice of the most correct approach, method and tool for managing the level of solvency is entirely in the hands of the management team. In order to achieve the necessary solvency, insurers could increase their capitalization by raising new capital or by reducing risk by transferring part of it to reinsurers. Thus, reinsurance acts as a substitute for capital, and purchasing reinsurance should reduce the cost of capital (Hoerger, 1990). Solvency II is based not so much on rules as on principles. In other words, the regime states what must be done, but not how to achieve it. Therefore, there is no universal solution or universally valid recipe, but managers must carefully analyze the cost and impact of each of the tools they can use to increase the financial stability and value of the company they manage.

Chapter III: Designing an Optimal Reinsurance Program

1. The added value of reinsurance

Even within the insurance sector when evaluating companies that underwrite different types of business such as life, property, liability, surety, motor, aviation, marine, etc. – the key factors that drive the prices of individual shares can vary dramatically. While no KPI should be considered individually, certain ratios provide more distinct criteria depending on the type of stock. For example, popular valuation models such as price-earnings (P/E) ratios and dividend yield valuation are not as relevant to insurance businesses as they are to other types of businesses. In this regard, we can outline several key criteria, indicators (KPIs) to consider when evaluating an insurance company, taking into account the effect of reinsurance, namely:

1. Net Earned premium:
- Intended to protect insurers from abnormally high risk and represents the gross earned income of insurance policies, taking into account the dynamics in premium reserves, less any reinsurance costs. As reinsurance costs can and do vary depending on the company's risk appetite.

2. Cost ratio:
- The share of net premium earned needed to cover business acquisition, underwriting, and liquidation costs is a measure of how effectively management manages its insurance business. In today's highly competitive insurance market, insurers must constantly strive to optimize these costs.

3. Loss ratio:
- The sum of the direct and indirect costs of insurance claims arising from events occurring under assumed risks. The loss ratio helps reveal the insurer's skills as a methodical and decent underwriter and how well it manages to properly balance cost and risk to ensure profitability over time. One of the functions of reinsurance is precisely to stabilize the results of the activity, to limit the volatility of extremely high and difficult to predict losses.

4. Combined ratio:
- This is achieved by summing the cost and damage coefficients. With a combined coefficient below 100%, it means that the insurer realizes a positive technical result, or in other words, it works at a profit from its insurance activity (without taking into account the effect of the investment activity). The lower the ratio, the less dependent the insurer is on investment income to offset any insured losses.

5. Coverage of capital requirements (SCR and MCR coverage ratio):
- In accordance with the regulatory framework, the Supervisory Authorities strictly observe the coverage of capital adequacy requirements by insurance companies to ensure that they can operate and fulfill their obligations to the insured even when they face unexpected losses. On the one hand, the coverage of capital requirements should be as much as possible and higher than 100%, but on the other hand, companies with too high a level of coverage will miss the opportunity to achieve a higher return from investing these capitals.

6. Price/book ratio:
- Due to the extremely high unpredictability and difficult predictability of insurers' financial results, the price/book value ratio is more appropriate than indicators such as price/earnings, for example. The price/book value ratio reveals the value of the company in the event of bankruptcy if the business is completely liquidated and the liabilities are paid off. With a ratio equal to 1, shareholders can expect to recover no more than the book value of the assets. With a ratio higher than 1, the degree of exposure to market risk is revealed. To calculate the price/book value ratio, we need the stock price at the last market close, which we divide by the book value per share from the last reported quarter. In this way, the direct dependence and interrelationship of the indicator with the return on equity (ROE) can also be traced.

7. Insurance margin (float):
- Refers to the non-technical transaction profits that insurers make with the cash they acquire from premiums invested for the period between premium payment and claim payment. The final insurance profit is calculated by summing the non-technical result of financial operations and investment activity together with the technical result of underwriting activity. After calculating the insurance profit and dividing it by the net premium earned, we can get the so-called underwriter margin or float.

The great Warren Buffett devotes a key space and focus to "float" in his annual letters to the shareholders of "Berkshire Hathaway", one of the most read documents in the financial sphere. In its circulation in 2000, it described the term float as cash that we have available and can invest, but do not own. For most insurers, the cost of a float is usually a few percentage points. However, Berkshire Hathaway's insurance operations are so well managed that the historical cost of float is actually positive, meaning that the Company is basically getting money to dispose of other people's money. If we have to make a comparison again

with the banking sphere, then this situation is completely analogous in nature to negative interest rates on deposits.

Reinsurers provide stability to insurers, and they in turn provide capital to the real economy. The value that reinsurers create for primary insurers who cede their risks is relatively well understood. But only recently has the value of reinsurance to society as a whole become more widely recognized and appreciated. The increasing frequency and magnitude of major catastrophic disasters, whether natural or man-made, increasingly highlight the key role that reinsurers play as a buffer protection mechanism for global economies against sudden shock or stress scenarios.

Reinsurers are among the world's largest institutional investors in stocks, bonds and other asset classes, providing the long-term capital needed by the economy, giving companies the funds, they need and the opportunity to grow and prosper. When insurers underwrite new business, they take on additional risk. Their ability to book a business is limited by two main factors, namely the cost of acquiring that business and the amount of their capital. When an insurer reaches its capital limit, it can either raise more capital or seek capital relief. Alternatively, of course, it could stop writing new business or reduce existing business. Reinsurance offers insurers the opportunity to transfer parts of their business for a price, thereby freeing up capital and allowing them to write more business. Capital relief is particularly useful for life insurance companies, where initial statutory reserves, solvency capital requirements and commissions can many times exceed the first year's premium for newly enrolled business. Reinsurance alleviates this strain on capital by helping insurers fulfill their role of providing protection and savings to the end consumer.

Since the introduction of Solvency II in 2016. to date, we have observed a trend towards capital optimization among European insurers and reinsurers. This trend is completely logical, since the new regulatory framework allows European insurers and reinsurers to rely instead on the so-called hard capital (equity), soft forms of capital such as expected profit in future premiums (EPIFP), letters of credit issued by banks, which on average have a lower rating than reinsurers, and net deferred tax assets.

As we already know, reinsurance affects the gross amount of own funds, due to the cost of coverage and the impact of reinsurance recoveries, while reducing the risk margin. At the same time, reinsurance also reduces the gross amount of Solvency Capital Requirement due to the transfer of risk and reduction of the company's net risk exposure. As a result, the solvency ratio will improve, as the possible reduction in the capital requirement is usually much greater than the reduction in own funds, depending of course on the credit rating of the reinsurer.

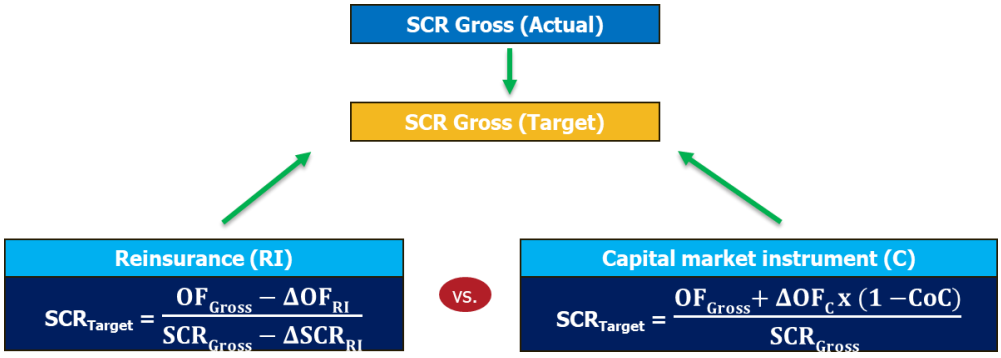

Figure *1. Comparison between reinsurance and capital instruments to optimize Solvency Capital Requirement*

In comparison, capital markets instruments increase the solvency ratio by increasing own funds. However, this capital increase will be reduced by the cost of these instruments themselves. It is important to note that the capital increase using such instruments is usually for a longer period than with alternative reinsurance contracts. In many cases, they are for a period of up to 10 years. For comparability, we assume that we have spread the total cost of a capital market instrument over the entire term and calculated the annual cost as the change in equity multiplied by the cost of capital. Therefore, for reinsurance to be (at least) as cost-effective from the ceding company's point of view, the cost of reinsurance must be lower than the reduction in equity

The value that an insurer's decision to purchase reinsurance brings to a company can only be measured on the scale of that company's individual goals. While this may seem like an obvious statement at first glance, in fact, many companies struggle with potentially conflicting corporate goals. In the specific case for the purposes of the study, the main task is to maximize the market value of the company. This is a commercial objective that is fundamental to most public companies.

Among the main advantages of reinsurance over other types of raised capital is its location in the capital structure. It is very difficult to determine its exact location because reinsurance permeates and extends throughout the capital structure. It's everywhere, but nowhere to be pinpointed. Practically, many reinsurance structures act to either generate or de-leverage and so can be tailored to a company's already developed policies. One way to reduce the capital requirement under Solvency II is by optimizing the reinsurance coverage to reduce the net retained risk exposure and hence the Solvency Capital Requirement.

2. Models for valuation of reinsurance products

Reinsurance is initially accompanied by an expense representing the cost of risk reduction. But it also frees up risk-based capital, because of the reduced risk exposure to the occurrence of potential damages. Since risk-based capital is inherently part of the company's own funds, the cost of capital for underwriting risk will also be reduced.

The transfer of risk from part of the written business enables the insurer to take more and bigger risks in other lines of business, where the eventual profit would be higher. With the help of reinsurance, the freed volume of capital, which is not bound to cover the already transferred risk, can be used to realize growth, expansion of certain lines of business or even be returned to shareholders or borrowers.

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A key point in valuation of reinsurance instruments is the reversal of investment cash flows and returns from them. The investment or amount of reinsurance recoveries are contingent and payable in the event of the occurrence of the relevant insured loss events, while the return or in other words the reinsurance premium is due and payable in advance regardless of any conditions. On the other hand, the behavior and cyclicality of the reinsurance markets are also not at all identical to those of the capital markets. Unlike debt and equity securities issued by large insurance companies, reinsurance may be offered by a small number of sellers and the market may be very narrow. For some classes and types of reinsurance, there may even be only one or only a few sellers, meaning that there is virtually no mechanism by which the analysis and scrutiny of thousands of investors can drive the reinsurance price to its "fair" value.

Therefore, with the help of corporate finance techniques, a methodology can be developed for the economic evaluation of the purchase of reinsurance. An important clarification that we need to make is that for our research, the main goal of the company is to increase its market value. A company can do this by maximizing the net present value (NPV) of operations at its weighted average cost of capital (WACC). Reinsurance can affect not only operating cash flows, but also the cost of capital itself. The very idea and framework of NPV-analysis brings together valuation issues around earnings stability and capital allowances and is suitable for both short and long insurance lines of business.

The value of an insurer's decision to purchase reinsurance can only be measured by and on the scale of that company's individual development goals. While this may seem like an obvious statement at first glance, in fact, many companies have difficulty clearly articulating specific, potentially conflicting corporate goals. While reinsurance involves an upfront payment for a promise to pay contingent upon eventual losses, equity and debt is the exact opposite, where funding is provided up front and returns are contingent. Thus, reinsurance takes on the role of a true substitute for capital.

In practice, one often comes to the dilemma and finding a balance between two models of evaluation and determination of the fair tariff rate, namely *exposure or experience based rating of premiums*. Performance-based analysis essentially revises the company's historical data, reflecting its current state, to predict possible losses for the future reinsurance contract. The aim is to prepare an objective and realistic forecast of losses under a future reinsurance contract, calculating the final amount of the reinsurer's share in potential losses, divided by the volume of the predicted reinsurance premium concerning the relevant contract. However, this is a forecast that is based on the so-called "burning cost" or the actual final price or cost to the reinsurer under the contract. To get this cost, we need to calculate the reinsurer's share of the claims (paid and outstanding) and divide it by the reinsurer's paid premiums (total current and equalization contributions) based on historical data. The indicator "burning cost" is key and fundamental to this analysis, with its help historical data is extrapolated to a future period of time.

3. Main stages in the process of optimizing the reinsurance structure to increase the value of the insurance company

Reinsurance is a continuous business process in constant transformation. Gone are the days when reinsurers' tools were limited to what is now called "traditional" reinsurance. Alternative risk transfer, structured or financial reinsurance are no longer fashionable

expressions, they have become a common language between insurers and reinsurers. We are now able to build on the analysis of the impact of reinsurance on financial results by including assets, allowing analysis of the entire insurance cycle. Analysis of the overall performance of the insurance company using modern models and techniques for asset and liability management (Asset Liability Management) and dynamic financial analysis (Dynamic Financial Analysis). And one of the key aspects of the asset-liability management model is optimizing the reinsurance program to maximize return on capital and minimize volatility in operating results.

In the following graph, we illustrate the very practical process of concluding, managing and renewing a reinsurance contract, describing each of the stages and accompanying activities, coordination and cooperation between different departments in the company.

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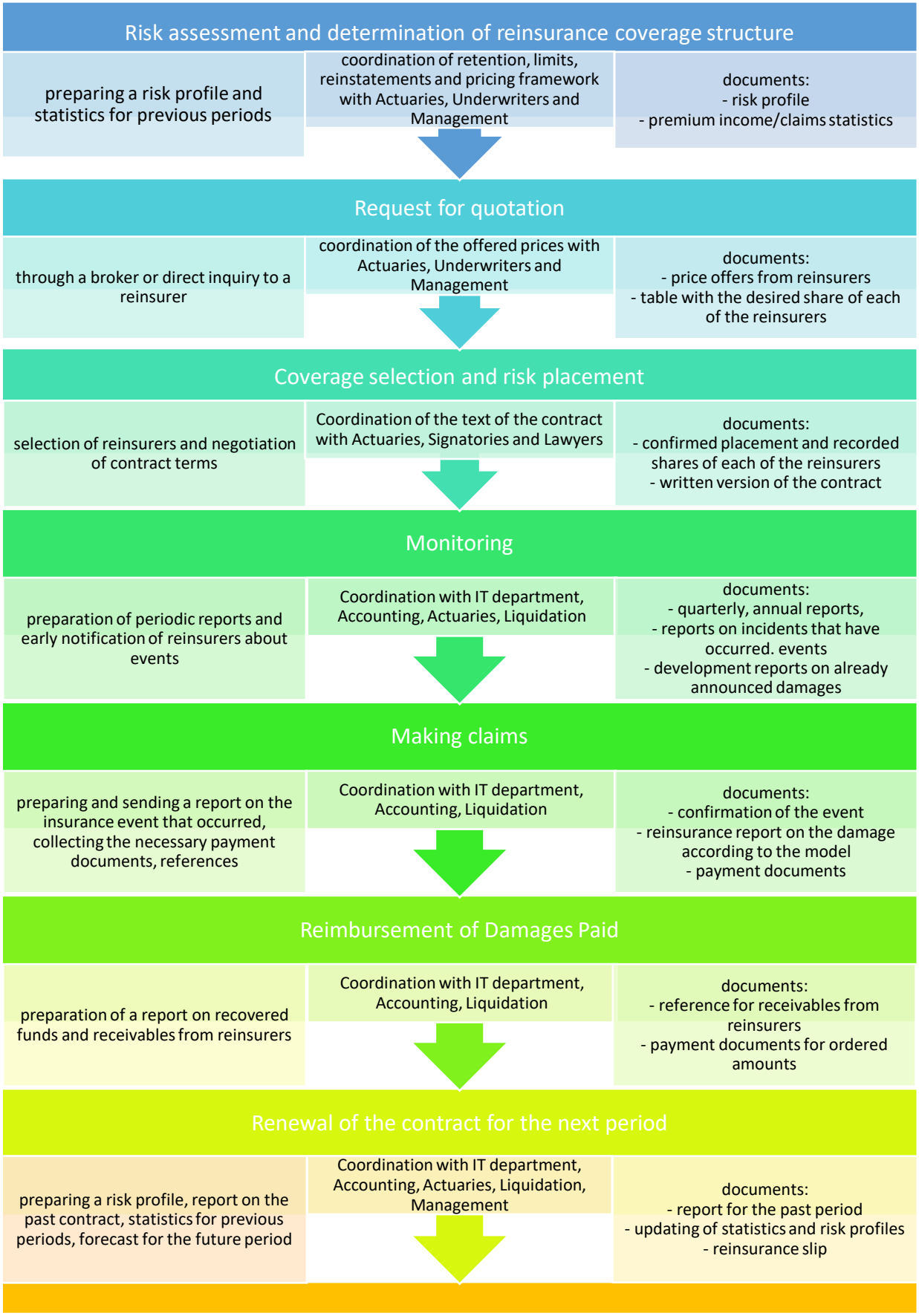

Figure 2. Process of concluding, managing and renewing reinsurance contracts

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Dissertation abstract on:
Increasing the value of the insurance company through reinsurance as a capital management tool

The modern reinsurance manager must be able to balance many different interests in his work. The most serious and important among them are the requirements for risk and return set by the owners of the company, and the requirements for the expectations of the insured person for the security of their coverage. The problems of choosing accurate performance indicators and the ever-increasing number of available reinsurance and equity instruments increasingly complicate the decision-making process.

A change in the reinsurance program, combined with an appropriate adjustment in the use of risk-based capital for other purposes, such as investment activity, can create added economic value: greater returns at the same levels of risk, or maintaining the levels of return, but at a lower risk. To this end, we will systematize specific steps to restructure an existing reinsurance program to achieve optimal results.

- *Analysis of needs and opportunities*

If reinsurance is to be used as a tool to stabilize and/or improve financial results, its objectives and the acceptable level of risk must be specified in relation to specific items in the balance sheet, the income statement (P&L), the statement of equity capital (ECS), or the cash flow statement (CFS).

Making a forecast of the probability of the outcome of insurance activity or net premiums earned requires the development of adequate valuation models. But even with adequate models, it presents a real challenge for most experts to make a decision by looking at the distribution of gross and net technical operating results for different reinsurance programs. Choosing the measures of risk (variance) and return (median) that most closely reflect management intent is critical to creating the most appropriate reinsurance program for the particular situation and type of business.

- *Development of a reinsurance impact assessment model*

Once the objectives are formulated, the next step is to construct a model to quantify the risk and assess the impact of a given reinsurance program. At the heart of the model is the assessment of insurance underwriting risk. This is the component of the company's total risk on which the reinsurance program has the greatest and most direct impact.

Each loss also has an inherent time payment pattern that determines when actual payments are expected to occur on registered claims. It is necessary to forecast premiums and their collectability over time, as well as the potential of not reaching the estimated amount. Nevertheless, the volume of premiums should be related to the risk exposure and such dependencies should be included in the model.

- *Assessment of the risk and the necessary capital for its coverage*

Now that we have a model in hand, it's easy to determine the risk. And by concretely determining the possible losses from the occurrence of the risks and the probability of their occurrence, considering the interrelationships between the risks, prioritizing the risks and deciding on an approach - which risks will be "accepted" and against which risks management methods will be sought and limitation. If we can summarize and briefly describe the whole process, after the capital needs of the company have been identified, analysis and selection of the relevant methods and tools to be implemented and as a result to assess what part of the risks to retain and what part of them transferred. What is interesting in this case and key

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to this integrated analysis is the extremely effective application of reinsurance, both in risk transfer and in the need for contingent capital to cover the transferred risks.

- *Calculating the cost of capital and estimating the required reinsurance coverage*

What is the cost of equity to be provided? This is the return that shareholders expect from their investment. One traditional way to estimate this cost of equity is the capital asset pricing model (CAPM), which states that the investor expects a risk premium above the risk-free rate, which is tied to the overall market return and the diversification effect of the investment. Since the insurance company's venture capital is invested and yields a return, the true cost of using equity as venture capital is the difference between the cost of equity capital and the company's return on investment.

- *Structure optimization*

Risk managers and even CEOs of most insurance companies have clear opinions about the risk appetite of the company they manage. But in very rare cases there is an analysis of the dependence and impact of the structure of the reinsurance program directly on the indicators of risk appetite and vice versa. There should be a clear interrelationship between the two.

Comparing the findings from the simulations and the previously stated objectives of the reinsurance program, we clearly see that there is room for improvement:

  - The company is currently buying too much reinsurance overall relative to its risk tolerance level. There is a large amount of economically adjusted capital that is currently "unutilized" and therefore available for use as venture capital.
  - Regarding the smoothing of the annual results of the insurance activity (technical result), the current structure is still ineffective due to the disproportionate nature of the types of contracts. Further improvements in this direction can be achieved through the use of alternative or financial mechanisms for proportional risk transfer.
  - There is untapped potential for portfolio diversification.

As a result of these observations, we can derive the following recommendations:

  - Reducing the amount of disproportionate reinsurance for lines of business where reinsurance is not capital efficient. Take more risk in each sector - the impact on the overall portfolio will be very small.
  - Use the diversification inherent in the portfolio by combining reinsurance coverages from different lines of business into one contract.
  - Stable annual results through the negotiation of new multi-year contracts with properly calculated risk transfer and financial characteristics.

The combination of effective reinsurance with a correct judgment of risk appetite and levels of deductibles and an optimal capital structure brings a higher level of protection against large difficult-to-predict losses and at the same time a higher return on equity.

Optimizing reinsurance means optimizing the structure of reinsurance contracts and the correct combination and complementing of contracts in a comprehensive program. On the other hand, the optimization of the structure of the contracts and the program is

expressed in changing the main parameters of the contracts, namely – limits, deductibles, refunds, covered risks, exceptions, commission, etc. Most importantly, limits and deductibles should be adjusted based on the specific objectives and capabilities of the insurance company in the context of current market conditions and capital requirements constraints.

We can express the added value of reinsurance as a trade-off, as a balance between a loss in terms of income and expenses and a gain in terms of solvency capital requirements, since most often (not always), reinsurance has a negative impact on the financial result, but a positive impact on the level of available capital.

The first to touch on the problem of reinsurance optimization were Karl Bork and Kenneth Arrow, and from the 60's of the last century until today, the theories on this problem not only multiply but also develop(Borch, 1960) (Arrow, 1963). Initially, the problem was considered only from the side of the insurer and for a specific contract and instrument of its reinsurance policy, instead of a comprehensive analysis of the reinsurance program and the interaction of the various contracts between them. In order to cover the moral hazard, it assumes, the reinsurer aims, when pricing the coverage sought, to set a premium amount sufficient and greater than the increase in risk it will assume. On the other hand, for the contract to be acceptable and attractive to the insurer, the premium under it must be lower than the reduction in risk as a result of its transfer. Integrating the two conditions into a simplified inequality, it would look like this - The increase in risk to the reinsurer must be less than the contract premium, which in turn must be less than the decrease in risk to the insurer or with others. In other words, the increase in risk to the reinsurer must be less than the decrease in risk to the insurer. For the purposes of solving and implementing this equation, the conditions of both parties and the moral hazard protection inherent in this type of relationship must be considered.

Although well known in the scientific literature, the main limitations of this model are often overlooked by analysts, namely:

- Prevention of moral hazard
- Diversification of risk for the reinsurer
- Achieving a balance between price and ceded risk for the insurer

From the point of view of the reinsurer, by signing the coverage contract, he will improve his financial situation and at the same time achieve a reduction in the overall global risk with correct pricing of a premium correctly accounting for the assumed risk. The insurer, for its part, will achieve a relief of its capital requirements in an amount greater than that of the liability under the reinsurance contract, which will allow it to be more adaptable in its pricing policy and be more competitive in the market.

Conclusion

From what has been said so far and taking into account these important considerations, we confirm the thesis that by optimizing the levels of reinsurance and in most cases by purchasing additional reinsurance, an increase in the value of ZK can be achieved as a result of lowering the regulatory capital requirements for available own funds and/or capital relief and reduce the need to raise additional equity capital or subordinated debt. The reinsurance manager has an extremely valuable role in incorporating reinsurance capital into the firm's funding structure in a way that improves the technical bottom line. Among the main

advantages of reinsurance over other types of raised capital is its location in the capital structure. It is very difficult to determine its exact location because reinsurance permeates and extends throughout the capital structure. It's everywhere, but nowhere to be pinpointed. Reinsurance is a unique tool for managing profitability, volatility and solvency of the company - three key financial parameters on the basis of which all management decisions must be made. That is why reinsurance must be tied to the company's key performance indicators. To gain maximum benefit, the focus must shift from looking at coverage for single risks or events to looking at the whole portfolio, at the reinsurance program as a whole and the interactions of the different contracts between them.

The value of an insurer's decision to purchase reinsurance can only be measured by and on the scale of that company's individual development goals. While this may seem like an obvious statement at first glance, in fact, many companies have difficulty clearly articulating specific, potentially conflicting corporate goals. While reinsurance involves an upfront payment for a promise to pay contingent upon eventual losses, equity and debt is the exact opposite, where funding is provided up front and returns are contingent. Thus, reinsurance takes on the role of a true substitute for capital.

A reinsurance program can be structured in many ways so that it can be tailored to the specific needs and goals of an insurance company. However, debt equity instruments are not as flexible, and this cannot be valued in cost of capital models. One of the key aspects of the asset and liability management model is precisely the optimization of the reinsurance program to maximize the return on capital and minimize the volatility of operating results.

Literally every single reinsurance contract to a certain extent contains the corresponding level of capital leverage and has the characteristics of a type of contingent capital. In today's economic conditions of constant improvement, insurers and reinsurers are looking for solutions to optimize their business processes, more choices, re-use of coverage capacity and we will probably see in the near future new reinsurance instruments, modifications more conditional in nature and with reusable options. It is these complex structured multi-year/multi-peril reinsurance products that represent the evolution in reinsurance from conventional annually renewable contracts to those that protect the reinsured against a wider range of risks.

If we can summarize the most important things about these new forms of reinsurance with a focus on achieving financial effects and capital management, it is the opportunities to create additional free assets, improve profit recognition and increase the quality of capital. In other words, planning with greater certainty and/or lower risk through available financing at a competitively acceptable price. Reinsurance is a process, a business in constant transformation. And every single professional business assessment requires a complex systematic approach and research of the company's activity at several levels, starting from the underwriting activity, through actuarial calculations and financial accounting information, liquidation practices and reaching reinsurance and risk management techniques.

III. Directions for future research work on the topic

The final results of the conducted dissertation research provide very good and diverse perspectives for conducting additional studies on the problems addressed in the dissertation

work. The main prerequisite for them is the presence of a relatively small number of in-depth theoretical and empirical studies on the specific matter of optimizing the reinsurance program and its impact on the value of the insurance company. Therefore, it is possible to add new perspectives to the academic debate and practical decisions in the field of capital management and reinsurance.

IV. Reference for the scientific and scientific-applied contributions in the dissertation work

On the basis of the studies, analyzes and summaries made in this dissertation, the following more important results and scientific contributions that the author has reached in the research process can be deduced:

- The relevance of the issue in the context of modern regulatory requirements and regimes of accounting of the insurance activity is substantiated.
- The research compares equity with additional subordinated hybrid debt and reinsurance on a number of metrics such as cost, risk transfer, counterparty risk, liquidity, impact on available capital and regulatory capital requirements affecting capital structure, opportunity for economic growth, smoothing and stabilization of financial result compared to individual reporting periods, which is also among the main purposes and goals of reinsurance.
- Practical aspects of the benefits of reinsurance for the capital adequacy and financial position of insurance companies are indicated.
- The peculiarities of financial analysis of an insurance company and the different points of view towards the company's capital are considered.

V. List of PhD student's publications

Bohosyan, Vahan. Reinsurance as a risk management tool. Scientific report for the conference "The Economy of Bulgaria - 30 years after the beginning of the changes" dedicated to the 75th anniversary of the Union of Scientists in Bulgaria. Also published in print.

Bohosyan, Vahan. Reinsurance as a strategic capital management method. Scientific report presented at the Doctoral Scientific Session 2020.

Bohosyan, Vahan. Assessment of the impact and development of industrial logistics parks. Scientific report for Scientific Conference "Logistics and Public Systems" 2021 organized and conducted by Vasil Levski National Military University.

Bohosyan, Vahan. Moral hazard and impact of principal-agent conflict in insurance. Scientific report presented at the Doctoral Scientific Session 2021.

VI. Reference for compliance with the national requirements under the Regulations for the Application of the Law on the Development of the Academic Staff in the Republic of Bulgaria

National requirement in number of points: 30
Number of papers published in non-refereed journals with scientific review, or published in edited collective volumes: 3
Number of points for the author: 40

VII. Declaration of originality and authenticity

The 172-page dissertation under the title "Increasing the value of the insurance company through reinsurance as a capital management tool" is the author's own scientific production. It uses author's ideas, texts and visualization through graphs, diagrams, tables and formulas, complying with all the requirements of the Law on copyright and its related rights by properly citing and referring to someone else's author's thought, as well as data, including:

1. The results achieved in the dissertation work and contributions made are original and are not borrowed from research and publications in which the author has no participation.

2. The information presented by the author in the form of copies of documents and publications, personally compiled references, etc. corresponds to objective truth.

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Date 06.01.2023 **PhD student: …….**
/ Vahan Ahasi Bohosyan/