D. A. TSENOV ACADEMY OF ECONOMICS – SVISHTOV

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POSSIBILITIES FOR REDUCING THE CEDING COMPANY'S PROPERTY INSURANCE PAYMENTS IN THE CONTEXT OF ITS REINSURANCE PROGRAMME

AUTHOR'S ABSTRACT

of dissertation for awarding of educational and scientific degree "Doctor" in the scientific field "Finance, Money Circulation, Credit and Insurance (Insurance and Social Security)"

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The dissertation consists of 229 pages, including: title page – 1 page; table of contents – 5 pages; introduction – 5 pages; main text (three chapters) – 186 pages; conclusion – 2 pages; declaration of originality and authenticity – 1 page; bibliography – 6 pages (74 sources), and 22 appendices. To support the presentation, 34 tables and 13 figures have been included.

The dissertation work has been discussed and proposed for defence in accordance with the procedures outlined in the Law on the Development of the Academic Staff in the Republic of Bulgaria by the Department of Insurance and Social Security at the D. A. Tsenov Academy of Economics in Svishtov.

The defence will take place on 12 September, 2024 (Thursday) at 1:30 p.m. in the Rectorate Conference Hall of D. A. Tsenov Academy of Economics – Svishtov.

All materials related to the defence shall be available at the Department of Doctoral Studies and Academic Staff Development.

I. GENERAL CHARACTERISTICS OF THE DISSERTATION THESIS

1. Relevance of the topic

The peculiarities of risk development in property insurance necessitate that insurance companies explore various methods to neutralise the negative consequences of its occurrence, which could compromise their ability to fulfil their obligations to the insured. A widely practiced approach in this regard is the sharing of this risk with reinsurers by entering into various types of reinsurance contracts. Long-standing practice and traditions in reinsurance relationships demonstrate that issues related to unfavourable deviations from expected claims payments are more successfully resolved not through individual reinsurance contracts, but through the application of a more comprehensive approach, namely the establishment of a reinsurance programme. In the context of reducing claims payments and assuming a portion of them by reinsurers, the most crucial foundational element in the reinsurance programme is the correct definition of the "ceding company's retention"[1]. Thanks to it, it becomes possible to quantify all significant potential losses, which form the basis for determining the maximum amount of claims that the insurer can pay without experiencing serious difficulties.

2. Object and subject of research

The object of the study is claims payments made by the insurance company in property insurance and the means to reduce them by establishing appropriate retention limits, within the context of constructing a reinsurance programme.

The subject of the study is the existing and commonly applied reinsurance coverages in property insurance, focusing on their utilisation and combination

[1] In reinsurance relationships, the insurer is referred to as the "cedant". In this sense, later in the author's abstract, the terms "cedant" and "insurer" should be considered synonymous.

methods aimed at reducing the insurer's payout size resulting from adverse risk developments.

3. Research thesis

The defended research thesis in the dissertation is as follows: through correctly defined retention, within the context of an established reinsurance programme, there exists significant potential to reduce payments and optimise the results of an insurance company operating in the field of property insurance.

4. Purpose and tasks of the dissertation thesis

The primary ***purpose*** of the dissertation is to use data and specific examples from insurance and reinsurance practices to delineate opportunities for optimising payments made by the ceding company in property insurance within the framework of its defined retention, which is a component of its reinsurance programme.

Achieving the set objective requires fulfilling the following key ***research tasks***:

- clarifying the essence, characteristics, and types of property insurance;
- outlining the dynamics and trends in the development of the property insurance market and reinsurance operations in Bulgaria, and identifying the potential need for additional reinsurance protection for specific types of insurance policies;
- analysing the methods and forms of reinsurance protection used in property insurance;
- outlining some opportunities to reduce the size and adverse deviations of payments within the insurance pool in property insurance through reinsurance.

5. Research methodology

To address the research tasks, achieve the goal, and substantiate the research thesis, the following methods have been utilised: historical method, logical method, comparative method, methods for collecting primary information, analysis and synthesis method, inductive and deductive methods, and statistical methods for data processing. The calculations are based on official statistical information extracted from publications of the Financial Supervision Commission, as well as adjusted with approximate values from internal company data.

6. Scope of the research

The research in the dissertation is focused on defining the issues related to reducing payouts made by insurers. The focus of the study is on exploring opportunities to optimise these payments in property insurance within the framework of the defined retention, which constitutes a part of the reinsurance programme.

The current presentation does not claim to be comprehensive. It is objectively impossible to encompass all paths and methods for reducing payments by the ceding company in property insurance within the context of its reinsurance programme in a single presentation. However, this does not prevent us from identifying some key approaches that we believe can benefit insurers in overcoming challenges related to reducing the size of due indemnities. In this way, the main goal of the dissertation will be achieved, the research thesis will be substantiated, and the set tasks will be resolved.

7. Approbation of the dissertation

The dissertation work has been discussed at meetings of the Department of Insurance and Social Security at the D. A. Tsenov Academy of Economics in

Svishtov. Parts of the research have been presented at scientific forums and published in specialised scientific journals.

II. STRUCTURE AND CONTENT OF THE DISSERTATION

The dissertation consists of an introduction, three chapters, and a conclusion. The total length of the introduction, the three chapters, and the conclusion is 194 pages. The exposition includes 34 tables and 13 figures.

The dissertation also includes a declaration of originality and authenticity, as well as a bibliography.

The dissertation work is structured as follows:

INTRODUCTION

Chapter one: Property insurance and its place in the insurance market in Bulgaria

1. The nature, characteristics, and types of property insurance policies

1.1 The nature and characteristics of property insurance

1.2. Main types of property insurance

1.2.1. Insurance of land vehicles (other than railway rolling stock)

1.2.2. Insurance of railway rolling stock

1.2.3. Insurance of aircraft

1.2.4. Insurance of ships

1.2.5. Insurance “Goods in transit”

1.2.6. Industrial fire insurance

1.2.7. "Fire and other hazards" insurance

1.2.8. Technical insurances

1.2.8.1. Machinery breakdown insurance

1.2.8.2. Business interruption insurance

1.2.8.3. Construction and erection risks insurance

1.2.9. Agricultural insurances

1.2.10. Property damage insurance

1.2.11. Animal insurances

2. Peculiarities in the adjustment of claims and determination of compensation in property insurance

2.1. Adjustment of claims for insurance of land vehicles (other than railway rolling stock)

2.2. Adjustment of claims for insurance of railway rolling stock

2.3. Adjustment of claims for insurance of aircraft

2.4. Adjustment of claims for insurance of ships

2.5. Adjustment of claims for insurance "Goods in transit"

2.6. Adjustment of claims for industrial fire insurance

2.7. Adjustment of claims for fire and other hazards insurance

2.8. Adjustment of claims for technical insurances

2.9. Adjustment of claims for agricultural insurances

2.10. Adjustment of claims for property damage insurance

2.11. Adjustment of claims for animal insurances

3. The state and development of the market for insurance and reinsurance operations in property insurance in Bulgaria

3.1. Condition of the Bulgarian Property Insurance Market for the period 2018-2022 from the perspective of reinsurance relationships

3.2. Using the "Coefficient of Variation" as a tool for analysing the Property Insurance Market and its potential need for additional reinsurance protection

3.2.1. Theoretical foundations and definitions

3.2.2. Analysis of the results

Chapter Two: Reinsurance as a means to equalise risk outside the insurance pool

1. Essence of reinsurance

1.1. Historical information on the existence of reinsurance relations

1.2. Reinsurance – essence, functions and advantages

2. Types, methods and forms of reinsurance protection

2.1. Defining the concepts of types, methods and forms in reinsurance

2.2. Types of reinsurance

2.3. Methods of reinsurance

2.3.1. Proportional reinsurance

2.3.2. Non-proportional reinsurance

2.4. Forms of proportional reinsurance

2.4.1 Quota share reinsurance

2.4.2. Surplus reinsurance

2.4.3 Combined quota share and surplus reinsurance

2.5. Forms of non-proportional reinsurance

2.5.1. Excess of loss reinsurance

2.5.2. Varieties of excess of loss reinsurance

3. Reinsurance programme of the insurance company

3.1. The essence, objectives, and advantages of the reinsurance programme

3.2. Organisation and development of the reinsurance programme

Chapter Three: Guidelines for minimising adverse payment deviations in property insurance pools in the context of an established reinsurance programme

1. The insurer's retention as an element of the reinsurance programme of the ceding company

1.1. Essence and objectives of self-retention

1.2. Factors affecting the amount of self-retention

2. Options for determining retention under different forms of reinsurance

2.1. “Probability of insolvency" in determining the retention of the cedant in proportional reinsurance

2.1.1. Determining the optimal retention of the cedant in quota share reinsurance

2.1.2. Determining the optimal retention of the cedant in surplus reinsurance

2.2. "Reinsurance requirement" with retention in the case of proportional reinsurance

2.3. "Cedant’s Priority" in non-proportional reinsurance

3. Other options for reducing the insurer's payments within its retention

3.1. Determining the insurance maximum

III. BRIEF SUMMARY OF RESEARCH CONTENTS AND RESULTS

INTRODUCTION

The introduction of the dissertation is developed within a volume of five pages and includes justification of the relevance and significance of the topic. It defines the object and subject of the study and formulates the research thesis. The main aim is outlined, tasks for its accomplishment are formulated, and the research methodology is presented.

Chapter one: Property insurance and its place in the insurance market in Bulgaria

The first chapter of the dissertation work is developed within a scope of 58 pages and is structured into paragraphs as follows:

Paragraph 1. The nature, characteristics, and types of property insurance policies consists of two sub-paragraphs:

1.1. The nature and characteristics of property insurance;

1.2. Main types of property insurance.

The first sub-paragraph defines the essence and characteristics of property insurance. The sub-paragraph defines the scope of objects covered, including buildings, machinery, vehicles, finished products, goods in warehouses and stores, livestock, agricultural crops, goods in transit vehicles, etc. The risks included in the insurance contract, for which the insurer is liable to compensate damages, encompass events such as: fire, lightning, explosion, flood, earthquake, hail, heavy rain, theft, vandalism by unknown individuals, etc. The place of property insurance is also outlined, according to the statutory classification specified in the Insurance Code.

The second sub- paragraph, in the context of the necessity for reinsurance protection regarding property insurance, highlights the classification published on

the Financial Supervision Commission's website, which will be further used in the study, namely: insurance for land vehicles (other than rail rolling stock); insurance for goods in transit; industrial fire insurance; fire and other hazards insurance; technical insurance; agricultural insurance; theft, robbery, vandalism insurance; and animal insurance**.** At the same time, in the sub-paragraph, attention is paid to the main characteristics of the above-mentioned property insurance policies, such as the object of the insurance, covered and excluded risks, sum insured, insurance premium, etc.

Paragraph 2. Peculiarities in the adjustment of claims and determination of compensation in property insurance consists of eleven sub-paragraphs. Through a unique "generalised form of representation", by adopting the most essential parts from the general terms of property insurance policies offered on the Bulgarian insurance market, the sub-paragraph outlines the most significant aspects related to the occurrence of the insured event, the resulting actions of the insured and the insurer, the determination of the insurance indemnity, and so forth.

Paragraph 3. The state and development of the market for insurance and reinsurance operations in property insurance in Bulgaria is structured into two sub-paragraphs and examines the condition of the Bulgarian insurance market for property insurance during the period 2018-2022 through the prism of reinsurance relationships and the use of the "coefficient of variation" as a means to analyse the market of property insurance policies when determining their potential need for additional reinsurance protection.

The first sub-paragraph begins with tracing over the years the development of property insurance in Bulgaria within the context of reinsurance relationships. During the period 2018-22, a number of findings and trends have been identified regarding: the share of property insurance policies compared to

other insurance types under the "Non-life Insurance" category; premium income from property insurance; relative share of ceded premiums in the premium income of property insurance; claims paid out for property insurance; share of reinsurers in claims paid for property insurance; the ratio of commission income and participation in results compared to ceded reinsurance premiums for contracts placed with reinsurers for property insurance.

The second sub-paragraph is dedicated to the use of the "coefficient of variation" as a tool for analysing the property insurance market when determining their potential need for additional reinsurance protection. As a basis for defining this necessity, the coefficient of variation of insurance indemnities, the coefficient of variation of the loss ratio, and the coefficient of variation of the probability of occurrence of an insurance event for individual property insurances are used.

In summary of the points presented in the first chapter, the following **conclusions** have been drawn:

First. The scope of property insurance encompasses objects of various nature and purpose. All these objects are exposed to an exceptionally wide range of risks, arising from natural events, human activities, risks related to the normal functioning and operation of the properties themselves, and more.

Second. Due to the exposure of some insured objects to substantial losses, insurance companies offering property insurance policies use the services of reinsurers to balance their future payments. This is referred to as "reinsurance protection". In this way, they manage to reduce the likelihood of being unable to meet their obligations to the insured.

Third. Thanks to the information published by the Financial Supervision Commission, it becomes possible to introduce an additional alternative for analysing the potential need, which we have defined as the "necessity for reinsurance protection". This need can be determined by calculating the following: the coefficient of variation of paid indemnities, the coefficient of

variation of the loss ratio, and the coefficient of variation of the probability of occurrence of an insurance event (probability of a loss). The results of the calculations, exceeding 30% of the variation of the attribute, indicate which types of property insurance have a greater need for reinsurance protection. This would help to "smooth out potential payment peaks", leading to better balancing of the outcomes related to risk development.

Fourth. Regarding the coefficient of variation of paid indemnities across the entire insurance market, due to reasons such as: extremely small volume of concluded insurances (in most cases, fewer than 100 insured objects) and uneven distribution, exceptionally high dispersion percentages are observed in three types of insurance policies. Results such as those for insurance of railway rolling stock – 132.64%, insurance of aircraft – 119.68%, and insurance of ships – 115.31%, necessitate heightened attention either due to increased need for additional reinsurance protection or adjustment of existing reinsurance agreements.

Fifth. The calculated coefficients of variation of the loss ratios for individual property insurances during the period 2018-2022 show the highest degree of dispersion around the average results for insurance of railway rolling stock (104.99%), insurance of aircraft (107.49%), and insurance of ships (81.32%). These results could indicate the need to take measures to balance the outcomes of the insurances through reinsurance.

Sixth. Regarding the coefficient of variation of the probability of occurrence of an insurance event, the most unfavourable results are observed in insurance of railway rolling stock (112.10%) and animal insurances (114.00%). These two insurances, along with aircraft insurance (94.06%), have the highest need for potential additional reinsurance protection.

Chapter Two: Reinsurance as a means to equalise risk outside the insurance pool

The second chapter of the dissertation is developed in a volume of 57 standard pages and is structured in three paragraphs as follows:

Paragraph 1. Essence of reinsurance, with two subparagraphs:

1.1. Historical information on the existence of reinsurance relations

1.2. Reinsurance – essence, functions and advantages

The first subparagraph examines the emergence and development of reinsurance as a successful opportunity for "transferring" partially or fully assumed risks from insurers. The subparagraph traces an extensive historical period - from the earliest records of reinsurance dating back to the mid-14th century, to the establishment of the first fully reinsurance company, the Cologne Re (1842).

The second sub-paragraph is dedicated to the essence of reinsurance, its functions, and the advantages it provides to insurance companies. Reinsurance itself, which can be seen as a kind of "insurance" for insurers, serves for the broader distribution of risks. Through reinsurance, part of the risks assumed by insurers are covered, thereby reducing their exposure to liquidity problems or even the threat of financial collapse due to a significant loss. As risks with high sums insured and high exposures can be reinsured, primary insurers can achieve more homogeneous pools.

The primary function of reinsurance, respectively of a concluded reinsurance agreement, *is to reduce the risk associated with insurance claims, thereby reducing the size of the related claim payments.* At the same time, several other functions can be summarised, leading to a series of advantages and benefits for insurers such as: smoothing out results, transferring risk, providing expertise and experience, potential to increase the size of portfolios, guaranteeing claims settlement, easing capital requirements, enhancing insurer capacity, stabilizing incurred losses, limiting fluctuations in annual results, protection against catastrophic events, etc.

Paragraph 2. Types, methods, and forms of reinsurance protection is developed in five sub-paragraphs:

2.1. Defining the concepts of types, methods and forms in reinsurance

2.2. Types of reinsurance

2.3. Methods of reinsurance

2.4. Forms of proportional reinsurance

2.5. Forms of non-proportional reinsurance

Due to the vast diversity in specialised literature related to the differentiation and characterisation of various types, methods, and forms of reinsurance, ***the first sub-paragraph*** is dedicated to defining the concepts of types, methods, and forms in reinsurance.

Factors such as long-term practice, accumulated experience, and the dynamics of individual reinsurance markets are the reasons for the existence of various types, methods, and forms of reinsurance. In reinsurance practice, and even in specialised reinsurance literature, no strict distinction is made between the various concepts. Moreover, when comparing two classifications, one may encounter both certain differences in their differentiation and some degree of overlap.

In connection with the need to clarify the nature and mechanisms of reinsurance protection, the dissertation employs a classification according to which "***the types, methods, and forms*** of reinsurance, as a result of their historical development, can be differentiated according to their legal concept and the method (technology of conclusion)".

According to the aforementioned classification, from a legal perspective, based on the rights and obligations associated with the cession and assumption of responsibilities and/or losses, reinsurance is subdivided into the following ***types***: facultative, facultative-obligatory, obligatory-facultative, and treaty reinsurance.

According to the concept based on the technology of conclusion, there are proportional and non-proportional ***methods*** of reinsurance. In turn, the proportional and non-proportional methods of reinsurance are divided into separate ***forms*** of reinsurance protection. According to proportional distribution of rights and obligations under the reinsurance contract, the forms of reinsurance are divided into quota share, surplus reinsurance, and combined quota share and surplus reinsurance. In non-proportional reinsurance, the main forms are "Excess of Loss" and "Stop Loss".

The second sub-paragraph outlines the characteristics, advantages, and disadvantages that different types of facultative, facultative-obligatory, and treaty reinsurance bring to insurers.

In ***facultative*** reinsurance, the insurer cedes and the reinsurer accepts all or part of the risk. Facultative reinsurance is negotiated separately for each individual risk or object being reinsured. Insurers resort to this type of reinsurance in connection with: individual risks that are not covered by their current reinsurance contracts; amounts exceeding the monetary limits of their reinsurance contracts; unusual risks.

One of the most significant advantages of facultative reinsurance lies in the ability of the insurance company to perform ongoing selection of risks, retaining those with a lower probability of adverse events based on historical statistics, while offering the remaining risks for reinsurance. Facultative reinsurance is convenient for covering objects and risks that are not included in current reinsurance coverage.

One of the disadvantages of facultative reinsurance is the higher costs associated with negotiating and maintaining the contract due to individually accepting each risk. The ability to individually assess each reinsured risk, however, increases the likelihood that the reinsurer can determine the contract price that fully reflects the risks involved. A disadvantage is also the fact that placing the liability takes time.

According to the characteristics of ***facultative-obligatory reinsurance***, the insurance company has the opportunity, but not the obligation, to cede a portion of the liabilities to the reinsurer. The reinsurer, on the other hand, is obligated to accept portions of the liabilities offered to it. Typically, such reinsurance relationships arise when the insurer (cedant) and the reinsurer are part of a common holding structure.

The advantages for the cedant are expressed in: the ability to choose which liabilities to retain entirely (and thus retain the entire premium income) and which to cede; the automatic nature that reinsurance coverage provides; the possibility of balancing the cedant's overall insurance portfolio, etc. The disadvantages that mainly concern the reinsurer include: the difficulty in balancing the reinsurance portfolio; unevenness in the cessions received; the risk of only receiving cessions for "liabilities or risks with poor quality"[2], etc.

In the case of ***treaty reinsurance***, also called automatic or current, the insurance company is obliged to cede to the reinsurer, established under a reinsurance contract, a part of the size of the insured objects, and the reinsurer is obliged to accept (reinsure) this part. This type of reinsurance, most commonly used in practice, is appropriate to apply in cases where the insurance portfolio consists of a sufficient number of objects eligible for reinsurance.

The third sub-paragraph is dedicated to reinsurance methods, specifically proportional and non-proportional reinsurance.

The fundamental principle underlying proportional reinsurance is based on the presumption that the insurance premium and potential losses are divided between the reinsurer and the cedant in the same proportion as the obligation (also referred to as liability or sum insured) is shared. The reinsurer agrees to adhere to the same coverage terms mentioned in the insurance policy, a practice known in reinsurance as "following the fortunes".

[2] "Liabilities or risks with poor quality" are those where the likelihood of an insurance event occurring is very high.

In case of non-proportional reinsurance, the reinsurer agrees to pay compensation to the insurer (cedant) for losses that exceed a predetermined monetary amount specified by the reinsurer, resulting from risks associated with the covered portfolio. The reinsured retains the entire amount up to this specified monetary limit, while the reinsurer pays for losses exceeding this limit.

The fourth sub-paragraph examines the essence, mechanism of operation, advantages and disadvantages of proportional reinsurance forms – quota share reinsurance, surplus reinsurance, and combined quota share and surplus reinsurance.

In quota share reinsurance, the reinsurer agrees to reinsure a fixed portion (proportion) of all risks assumed by the cedant (insurer), sharing proportionally in all losses and receiving in return the same proportion of all direct (original) insurance premiums, reduced by the agreed reinsurance commission payable to the reinsurer by the insurer. The main advantage of quota share reinsurance is its simplified operational mechanism. Other advantages can also be mentioned such as: the cedant is automatically protected against risks included in the contract terms; its use by newly established companies lacking accumulated experience; when entering new territories or insuring new risks without statistical data; applicable to a group of objects with homogeneous characteristics; used to enhance the cedant's Solvency II requirements; absence of adverse selection against the reinsurer; enables the reinsurer to obtain a more balanced portfolio; offers higher compensation to the cedant for covering its initial expenses (i.e. acquisition and administration expenses) through corresponding commissions from reinsurers; highest commission rate for the cedant; reduces absolute potential for loss, but does not affect the relative change in technical risk, etc.

Long-term practice in using quota share reinsurance has shown that it also has some *drawbacks*, such as: the cedant lacks the flexibility to adjust its retention for different objects insured under the quota share agreement and cannot change/improve its risk profile; there is less protection against large losses and

accumulation of numerous individual losses resulting from a single event; due to the proportional nature of the reinsurance contract, the coefficient of variation of payments remains unchanged; the cedant is required to cede even the smallest liabilities instead of retaining the premium income collected for them entirely for itself.

In surplus reinsurance, the insurance company may retain the entire premium for insured objects that fall within its own retention scope. The amount of the insurer's retention is called the "line", and the reinsurer's liability (the surplus) is measured in the number of lines.

The advantages of the surplus reinsurance treaty can be summarised as follows: better risk equalisation for the cedant's pool; providing the cedant with the ability to insure larger objects by increasing its insurance capacity through the purchase of a second or third surplus treaty; allowing the cedant to retain the premium income for smaller objects entirely for itself; offering reinsurance protection against large individual losses; and improving the cedant's solvency margin, calculated as the ratio between available equity and retained premium income.

The disadvantages of applying surplus reinsurance can be summarised as follows: increased administrative expenses related to managing the reinsurance contract; potential for imbalance in the reinsurance pool, as the cedant will retain the "good" risks and transfer only the less desirable ones; less protection against fluctuations in the area of small and medium-sized risks, as these risks usually remain within the self-retention, leading to the accumulation of many individual losses from a single event.

In quota share-surplus reinsurance, there is a combination of the quota share reinsurance contract and the surplus reinsurance contract. Such treaties are particularly suitable for newly established companies that cannot offer a sufficiently balanced portfolio to obtain a surplus contract providing automatic coverage for the large risks they may periodically need to insure. On the other

hand, from an administrative perspective, it is time-consuming and expensive to arrange separate facultative reinsurance for each large risk.

In this type of agreement, a disadvantage for the reinsurer is the lack of incentive for the ceding insurer to exercise underwriting discipline and insure "good quality risks"[3], while the insurer may object to transferring an unnecessarily large portion of its gross premium income to the reinsurer.

The fifth sub-paragraph directs attention to forms of reinsurance – "Excess of Loss Reinsurance" and its varieties.

Excess of Loss reinsurance can be used to address issues related to risk accumulation and catastrophic risks. In Excess of Loss reinsurance, the boundary that determines the portion of the loss assumed by the cedant, known as the "priority (deductible)", and the portion of the loss assumed by the reinsurer, known as the "layer", is called the first excess point. In a reinsurance contract, multiple reinsurers can participate. The boundary of their portions of the loss will be determined by successive excess points.

The advantages of an Excess of Loss reinsurance contract from the cedant's perspective can be highlighted in several ways. Firstly, the cedant receives protection only against large losses that could strain its financial capabilities. Secondly, since the reinsurer is not liable for more frequent small losses that fall below the bottom limit of the Excess of Loss reinsurance, the ceding company retains a higher share of its gross premium income for itself. Thirdly, administrative expenses are significantly lower for both parties. As *disadvantages*, the following can be noted: it primarily provides protection against "severity of loss"; the low priority amount leads to higher administrative costs; there is no commission for the cedant; under a reinstatement clause, the cedant may be required to pay an additional premium if losses occur during the year.

[3] "Good quality risk or liability" – a risk or liability with a low probability of occurrence of an insured event.

Excess of Loss reinsurance is applied in the forms of *"Working cover"* (also known as reinsurance *"per risk"*) and *"Catastrophe Cover"* (also known as reinsurance *"per event"*).

The reinsurance agreement *"Working cover"* limits the insurer's payments for each individual damaged insured object. It protects cedants against any single loss that exceeds the value, which they have decided to retain on their own (the deductible). The reinsurer covers the "excess" for each loss that exceeds the cedant's deductible. The insurance company is not protected from the accumulation of multiple individual losses resulting from a single event. The implemented "Working cover" by the cedant could bring several advantages, such as: reducing losses and consequently decreasing the indemnity from a single large loss event; retaining small losses entirely on its own (thus retaining the entire premium income); balancing (within the deductible) the results of large, individual losses in terms of size. At the same time, there are also some drawbacks, including: large fluctuations in the cedant's financial results; inability to protect against the accumulation of individual losses caused by a single event.

"Catastrophe Cover" provides reinsurance protection above the cedant's deductible in the event of accumulated losses from a single event and involving multiple affected objects, such as losses accumulated as a total sum from the occurrence of an event like earthquake, hurricane, flood, hailstorm, fire, etc. In catastrophe cover, it is crucial to precisely define the term "event", including aspects such as the moment of occurrence, duration, number of affected objects, and others. *The advantages* of applying this type of reinsurance cover are mainly revolve around effective protection against the accumulation of multiple single losses from one event and the possibility of applying it simultaneously under several types of property insurance.

Paragraph 3. ***Reinsurance programme of the insurance company*** in the second chapter of the dissertation is structured into two sub-paragraphs:

3.1. The essence, objectives, and advantages of the reinsurance programme

3.2. Organisation and development of the reinsurance programme

In ***the first sub-paragraph***, the focus is on the essence, objectives, and advantages of the reinsurance programme.

In the course of their operations, insurance companies require a combination of several reinsurance contracts to meet their needs. This combination of reinsurance contracts is called a reinsurance programme. Different insurers use different combinations of reinsurance contracts for various purposes.

The primary objective of the reinsurance programme is related to controlling fluctuations in claim payments and the instability these fluctuations cause, particularly in the absence of homogeneity and the absence of a large number of insured objects. In the process of developing the reinsurance programme, by means of the careful definition of its most important element – the self-retention (the amount of responsibility for one's own account), the transfer of risks and the limitation of losses, respectively reducing the amount of claim payments, the sedant can improve the structure of its portfolio and thereby mitigate fluctuations in claim payments and stabilise its operational results.

Having a well-established reinsurance programme provides several *advantages for insurers*, such as: reducing the size of claim payments; better risk classification; diversification of assumed risks; increasing the cedant's capacity; improved coverage; lower expenses; risk sharing; potential for product line sales; financial results management; transferring investment risk; providing high-quality services, etc.

The second sub-paragraph is dedicated to the organisation of the reinsurance programme. According to Gabrovski, "the organisation of the reinsurance programme... involves several stages during which direct insurers and reinsurers, using suitable insurance and reinsurance techniques, based on available statistical information, determine their own participation in risk

distribution and the corresponding financial resources"[4]. He points out the inevitable fundamental principles associated with the preparation and conclusion of reinsurance contracts, namely: analysis of the insurance and reinsurance composition and assessment of the risk situation; selection of appropriate reinsurance coverage; determination of the self-retention and structuring of the cessions; insurance and reinsurance calculation; placement of liabilities on the reinsurance market; conclusion and maintenance of reinsurance contracts.

The development of the reinsurance programme is influenced by several factors, the most important of which are: risks/objects and losses; the financial condition of the company and its capital needs for growth; behaviour of competitors; the situation in the insurance market; the presence of legal, economic, or political factors that could significantly impact the business and change the requirements of reinsurers towards insurers; the current situation with reinsurers under the existing reinsurance programme of the insurer; the need for professional assistance and expertise provided by the reinsurer, etc.

In summary of the discussion presented in the second chapter, the following **conclusions** have been drawn:

First. The primary reason why direct insurers use reinsurance is to protect themselves against the risk of incurring losses that could lead to serious financial difficulties and potential insolvency. Reinsurance can be viewed as a mechanism that insurers use to obtain protection against some or all risks associated with the insurance policies they have taken out. From the insurer's perspective, this is the best way to reduce the size and fluctuations of claim payments and to achieve homogeneity in sums insured.

[4] Gabrovski , R. , *Osnovi na prezastrahovaneto / Basics of reinsurance.* Svishtov: Academic Publishing House "Tsenov"2006.

Second. Insurers may seek reinsurance coverage due to several other reasons such as: reducing instability in the results of insurance activities caused by catastrophic risks; increasing insurance capacity; facilitating the introduction of new types of insurance; entering new markets; using the expertise of reinsurers related to market knowledge; establishing an appropriate level of risk diversification, etc.

Third. In reinsurance practice, and even in specialised reinsurance literature, there is no strict distinction made between the individual concepts. In relation to the need for their clarification, a classification has been adopted according to which the types, methods, and forms of reinsurance, resulting from their historical development, could be distinguished based on their legal concept and the method (technology) of conclusion.

From a "legal standpoint", according to the rights and obligations related to ceding and assuming liabilities and/or losses, reinsurance is divided into types: facultative, facultative-obligatory, obligatory-facultative, and treaty reinsurance.

According to the "method of conclusion", there are proportional and non-proportional methods of reinsurance. In turn, proportional and non-proportional methods of reinsurance are divided into distinct forms of reinsurance protection. According to the proportional distribution of rights and obligations under the reinsurance contract, the forms of reinsurance are divided into quota share, surplus reinsurance and combined quota share and surplus reinsurance. In non-proportional reinsurance, the main forms are "Excess of Loss" and "Stop Loss".

Fourth. The main purpose of the reinsurance programme is to control fluctuations in the payouts, addressing the instability these fluctuations cause, particularly in the absence of homogeneity and a large number of insured objects. By carefully reinsuring risks and limiting losses, thereby reducing the size of payouts, the cedant can improve the structure of its portfolio. This approach can help mitigate fluctuations in payouts and stabilize the results of its operations.

Fifth. Determining the appropriate level of self-retention for the insurer is

of particular importance to the success of the reinsurance programme. Determining its optimal size in order to reduce payout amounts and minimize adverse deviations within the insurance portfolio itself is crucial for achieving positive outcomes for the insurance company.

Chapter Three

Guidelines for minimising adverse payment deviations in property insurance pools in the context of an established reinsurance programme

The third chapter of the dissertation is developed in a volume of 67 standard pages and is structured in three paragraphs as follows:

Paragraph 1. The insurer's retention as an element of the reinsurance programme of the ceding company is structured in two subsections:

1.1. Essence and objectives of self-retention;

1.2. Factors affecting the amount of self-retention.

In ***the first subparagraph***, the essence and objectives of the self-retention of the insurer are theoretically examined. In practice, it is difficult to define the concept of "self-retention of the insurer". B. Benjamin, in "General Insurance", states that "in principle, under the conditions of scientifically based pricing and reserve formation, the larger the premium income, the higher the self-retention limit, as the magnitude of relative dispersion is smaller, which leads to a reduced need for reinsurance".[5] According to Klaus Gerathewohl, "there is no ideal and correct self-retention, and it should be noted that every self-retention must be considered in the context of the specific situation in which it is applied".[6] According to Pohl and Iranya, "Self-retention, when applied to reinsurance, is the amount of risk that the reinsured (i.e., the cedant) is willing to cover from their

[5] Benjamin, B. *General Insurance.* Hainemann. 1977.

[6] Gerathewohl, K. *Reinsurance, Principles and Practice* (Том I). Karslruhe: Verlag Versiherungswirtschaft e. V. 1980.

own account for each policy, object, or group of objects. This is the portion of the risk that is insured (assumed) and not ceded to the reinsurer".[7]

The issues related to defining and establishing the limits of an insurer's self-retention are also discussed in specialised scientific literature in Bulgaria. Veleslav Gavriyski points out: "...direct insurers must determine for each of their risk groups... the so-called 'retention limit'".[8] This retention limit is equal to the maximum sum insured for a single object, established in accordance with the reinsurance capabilities of the insurer. The issues of self-retention have also been studied by B. Keremedchiev, Hr. Draganov, R. Gabrovski, Y. Andreev, and others.

The purpose of determining self-retention in property insurance is to conduct research and provide a quantitative characterisation of all significant potential losses. Based on this assessment, it is decided how much maximum amount, in accordance with this potential, the insurance company is willing to pay. From a pragmatic standpoint, the greater the demand placed on the reinsurance programme of the insurance company, the smaller its absolute self-retention size will be. The less balanced an insurance portfolio is, the greater the demands placed on its reinsurance programme will be.

In the second subparagraph, the main factors influencing the size of self-retention are outlined. They are categorised as "A" and "B" factors.

"A" factors are the elements that are crucial in determining the actual value of the retention by the reinsured. These include: the cedant's capital, free reserves, liquid assets, and the cedant's gross premium income.

"B" factors can be viewed as "supporting factors" to the "A" factors. It is necessary for the cedant to consider them alongside the "A" factors when making a reasoned decision regarding the amount of self-retention. These factors include, but are not limited to: conditions in the reinsurance market; the nature and quality

[7] Pohl, S., & Iranya, J. (2018). *The ABC of Reinsurance.* Karlsruhe: VVW GmbH.2018.

[8]Gavriyski,V. *Prezastrahovane / Reinsurance*. Svishtov.1963.

of the cedant's original business; regulatory requirements imposed by the regulatory authority.

Paragraph 2. Options for determining retention under different forms of reinsurance is structured in three sub-paragraphs:

2.1. “Probability of insolvency" in determining the retention of the cedant in proportional reinsurance

2.1.1. Determining the optimal retention of the cedant in quota share reinsurance

2.1.2. Determining the optimal retention of the cedant in surplus reinsurance

2.2. "Reinsurance requirement" with retention in the case of proportional reinsurance

2.3. "Cedant’s Priority" in non-proportional reinsurance

In this paragraph, using appropriate information and well-selected mathematical and statistical tools, specific approaches have been proposed that could potentially address issues related to optimising the cedant's self-retention size and reducing the amount of its payments.

In the first sub-paragraph, the approach of "Probability of Insolvency" is examined in determining the cedant's self-retention in proportional reinsurance, based on the ***"probability of the insurer reaching insolvency (illiquidity)"***, i.e., the amount of reserve fund[9] and safety loading available to the insurance company may not cover the total amount of claims collectively at any given moment. The approach was developed by the Swiss Reinsurance Company (Swiss Re), but gained publicity in specialised literature thanks to the textbook by Ratko Vujovic, "Risk Management and Insurance".[10]

The second subparagraph is dedicated to another alternative through which the optimal self-retention of the cedant can be determined, namely the

[9]In the development, the terms "reserve fund" and "reserve for security" are used interchangeably with the same meaning.

[10] Vujovic, R. *Upravljanje rizicima i osiguranje.* Beograd: Univesitet Singidunim. 2009.

"reinsurance requirement", which represents a technical opportunity to balance the outcomes of risk exposure by reducing the cedant's sensitivity to financial loss. The reinsurance requirement is determined by multiplying three factors: *the potential fluctuations in indemnities, the "financial weakness" coefficient, and the coefficient that expresses the degree of "risk aversion"*. It is necessary to calculate it both for defining the overall retention for the entire insurance pool and for the retention of individual types of insurance within the pool.

The third sub-paragraph focuses on determining optimal self-retention in non-proportional reinsurance, specifically on establishing the "cedant's priority". Defining its size for each type of property insurance is of particular importance, as ultimately it affects the insurer's final result, influenced by the development of risk. In the dissertation, a relatively simplified approach to determining the cedant's priority was examined, introduced into practice by Swiss Re. This approach consists of a set of rules (ratios) whose outcomes are intended to fall within recommended limits.[11] Its use brings several advantages, such as: simplifying the process of calculating the cedant's priority size; leveraging data largely sourced from the insurer's balance sheet and income statement; and adhering to predefined, recommended limits for the ratios used in the calculations.

Paragraph 3. Other options for reducing the insurer's payments within its retention is structured in two sub-paragraphs**:**

3.1. Determining the insurance maximum

3.2. Combining reinsurance contracts

In the first sub-paragraph, the essence and specifics of determining the insurance maximum are examined. This refers to the largest amount of sum

[11] Schmutz, M. *Designing Property Reinsurance Program.The Pragmatic Approach.* Zurich: Swiss Re Publishing.1999.

insured that an insurance company can undertake responsibility for without compromising its financial stability and without increasing its average relative risk. Adhering to these calculated sizes for individual property insurances will prevent conditions that would allow for increasing the dispersion of the sum insured around the average one. It will also avoid increasing the overall payment fluctuations.

The second subparagraph presents ways in which various types of reinsurance contracts can be combined to create what is known as "two-tier" reinsurance protection, leading to:

- reducing the amount of claims paid by the cedant for a single object (when combining *Working cover "Excess of Loss per risk" after surplus reinsurance and when combining Working cover "Excess of Loss per risk" after quota share reinsurance);*

- reduction of the absolute amount of indemnities paid by the cedant for one event (when combining *Working cover "Excess of Loss per risk" and Catastrophe cover "Excess of Loss per event");*

- stabilisation of the cedant's results in terms of the "loss ratio" on an annual basis (by combining *a Stop Loss reinsurance contract and a proportional reinsurance contract*).

In summary of the points presented in the third chapter, the following **conclusions** have been made:

First. The retention of the insurance company is an extremely important element of its reinsurance programme for property insurance. Precisely established and justified retention limits, based on sufficient risk statistics and appropriately selected mathematical and statistical tools, allow the insurer to reduce fluctuations in the results of the insured portfolio and, consequently, reduce the amount of indemnities paid.

Second. The nature of self-retention in property insurance can be directly dependent on the chosen form of reinsurance – proportional or non-proportional.

In the context of using a potential form of proportional reinsurance, suitable solutions could be related to the "probability of insolvency" and the "reinsurance requirement".

Third. One of the ways to determine the maximum retention of the insurer is based on the "probability of the insurer reaching a state of insolvency", meaning the sum of the reserve fund and the safety loading available to the insurance company may not be sufficient to cover the total amount of claims in pool at any given time. This "probability of insolvency" can be successfully applied to both forms of proportional reinsurance – quota share and surplus reinsurance.

Fourth. "The reinsurance requirement" represents another opportunity to define retention and balance the results of risk exposure by reducing the cedant's sensitivity to financial loss. It is calculated when determining the retention for the entire insurance portfolio or for individual policies, and it represents the product of three variables: the potential fluctuations in indemnities, the "financial weakness" coefficient, and the coefficient that expresses the degree of "risk aversion".

Fifth. Among the many complex processes and stages for determining the cedant's share of losses in non-proportional reinsurance, the Swiss reinsurance company publishes and recommends a system that consists of a set of rules (ratios), the results of which should fall within recommended limits. Thanks to it, a "well-trodden path" of clearly defined steps is provided, leading towards calculating the "Cedant’s Priority", a size that would not jeopardize the balance of the cedant's payments.

Sixth. Considering the calculated amounts of "insurance maximum", i.e., the largest sum insured that an insurance company can assume without compromising its financial stability across individual property insurances, will not lead to increasing the dispersion of the sum insured amount around its average. The fluctuations in total indemnity payments would also not increase.

Seventh. The primary goal of combining different reinsurance methods, and thereby combining different types of reinsurance contracts, is to enable the insurer to construct an optimal programme that largely protects the cedant's retention from sharp fluctuations in indemnity payments. Combining individual reinsurance contracts to reduce payments within the insurer's retention is indeed a correct step in this direction.

CONCLUSION

In conclusion, the main findings and research results have been presented in a summarised form. The proposed approaches for defining the optimal retention level for cedants and reducing the amount of indemnities paid by them represent a logical culmination of the study. These approaches stem from the systematic organisation, synthesis, and the author's interpretation of a substantial body of theoretical-methodological and empirical information. They hold significant potential to enhance outcomes related to risk management and reinsurance activities in individual property insurance.

IV. DECLARATION OF ORIGINALITY AND AUTHENTICITY

Regarding the procedure for acquiring the educational and scientific degree "Doctor" in the scientific specialty of "Finance, Monetary Circulation, Credit, and Insurance (Insurance and Social Security)", I declare:

1. The results and contributions in the dissertation work on the topic **“POSSIBILITIES FOR REDUCING THE CEDING COMPANY’S PROPERTY INSURANCE PAYMENTS IN THE CONTEXT OF ITS REINSURANCE PROGRAMME"** are original and have not been borrowed from studies and publications in which the author did not participate.

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

3. The results obtained, described, and/or published by other authors are duly and thoroughly cited in the bibliography.

Svishtov PhD student:……

20 June 2024 /Radka Vasileva/

V. REFERENCE ON SCIENTIFIC AND SCIENTIFIC-APPLIED CONTRIBUTIONS IN THE DISSERTATION

The present work, in all its distinct parts, provides various contributions rooted in the following aspects:

1. Based on the analysis of published data from the Financial Supervision Commission regarding the state of the property insurance market in Bulgaria, an additional opportunity for the introduction and analysis of a potential "need for reinsurance protection" has been proposed. This need is identified and substantiated by calculating the coefficients of variation for: indemnities paid, loss ratio, and probability of occurrence of an insurance event for each individual property insurance.

2. Clarification of the essence of reinsurance, its types, methods, and forms, as an appropriate means to reduce the size and fluctuations in indemnity payments for property insurance and to ensure homogeneity of insured sums.

3. Defining the essence of the cedant's retention within the framework of the established reinsurance programme, as a successful attempt to quantitatively assess all critical potential losses. This helps the insurance company evaluate how much it can cover without compromising its financial results.

4. Various approaches have been proposed for calculating retention, facilitated by appropriately selected mathematical and statistical tools. These approaches enable the cedant to reduce fluctuations in results within the insurance portfolio and consequently decrease the size of indemnity payments.

VI. LIST OF PUBLICATIONS BY THE DOCTORAL CANDIDATE ON THE TOPIC OF THE DISSERTATION WORK

I. Articles:

1. **Vasileva, R.** "Claims Handling Expenses as an Integral Part of the Analysis of Property Insurance Results in Bulgaria", Annual Almanac "Scientific Research of Doctoral Students", Book XVIII, Volume 15, 2022.

2. Vasilev, V., Erusalimov, R., Paneva, A., Ninova, V. Iliev, N., **Vasileva R.** "State of Competitive Envinronment of the Life Insurance Market in Bulgaria for the Period 2012-2021", DOI: https://doi.org/10.19275/RSEPCONFERENCES208

3. **Vasileva, R.** "Applying the "Insurance Maximum" in Determining the Insurer's Retention. An Example from the Bulgarian Property Insurance Market", e-journal "Dialog" ISSN:1311-9206, Issue1, 2023.

4. Vasileva, R. "The coefficient of Variation as a Possibility for Market Analysis and Determination of the Need for Reinsurance Protection in Property Insurance in Bulgaria", Annual Almanac "Scientific Research of Doctoral Students", Book XIX. Volume 16.2023. (to be published)

II. Reports:

1. **Vasileva, R.** "Development of Property Insurance in Bulgaria through the Prism of Reinsurance Relations" – Proceedings of the International Scientific and Practical Conference "Sustainable Development and Socio-Economic Cohesion in the 21st Century – Trends and Challenges", November 8-9, 2021, Svishtov, Academic Publishing House "Tsenov," Volume 1, ISBN 978-954-23-2067-8 (print).

VII. REFERENCE FOR THE FULFILLMENT OF THE MINIMUM NATIONAL REQUIREMENTS IN CONNECTION WITH THE PROCEDURE FOR AWARDING OF EDUCATIONAL AND SCIENTIFIC DEGREE "DOCTOR"

by PhD student Radka Ivanova Vasileva (PhD № d020221215)

Indicators	Points
Group of indicators A. Indicator 1. Dissertation for awarding of the educational and scientific degree "doctor"	
Possibilities for Reducing the Ceding Company's Property Insurance Payments in the Context of its Reinsurance Programme	50
The dissertation has been discussed and a procedure for its defense has been opened	
Group of indicators D. *Sum of indicators from 4 to 10*	
7. Articles and reports published in non-refereed peer-reviewed journals or published in edited collective volumes	
Vasileva R. "Development of Property Insurance in Bulgaria through the Prism of Reinsurance Relations" – Proceedings of the International Scientific and Practical Conference "Sustainable Development and Socio-Economic Cohesion in the 21st Century – Trends and Challenges", November 8-9, 2021, Svishtov, Academic Publishing House "Tsenov," Volume 1, ISBN 978-954-23-2067-8 (print).	10
Vasileva, R. "Claims Handling Expenses as an Integral Part of the Analysis of Property Insurance Results in Bulgaria", Annual Almanac "Scientific Research of Doctoral Students", Book XVIII, Volume 15, 2022	10
Vasilev, V., Erusalimov, R., Paneva, A., Ninova, V. Iliev, N., **Vasileva R.** State of Competitive Envinronment of the Life Insurance Market in Bulgaria for the Period 2012-2021", **DOI:** https://doi.org/10.19275/RSEPCONFERENCES208	1.6

Vasileva, R. "Applying the "Insurance Maximum" in Determining the Insurer's Retention. An Example from the Bulgarian Property Insurance Market", e-journal "Dialog" ISSN:1311-9206, Issue 1, 2023	10
Vasileva, R. "The coefficient of Variation as a Possibility for Market Analysis and Determination of the Need for Reinsurance Protection in Property Insurance in Bulgaria", Annual Almanac "Scientific Research of Doctoral Students", Book XIX. Volume 16.2023. (to be published)	10
Total number of points scored - sum of indicators from 4 to 10	***41.6***
Required number of points – sum of indicators from 4 to 10	30

20 June 2024

Svishtov PhD student: Radka Vasileva