



Subject: Non - Life Insurance - PPP

Chapter: Reinsurance

Category: Notes

REINSURANCE

Reinsurance is "insurance for insurance companies", in other words a "second level of insurance." It was not long before the risk of suffering dangerously high losses as a consequence of payments for major claims prompted a need for "reinsurance" among so-called "primary" insurers. The oldest known reinsurance contracts or "treaties" date back to the fourteenth century. The international reinsurance sector has since developed into a highly specialised financial service. Large individual risks and natural catastrophe risks are spread across the entire globe so as to minimise the potential loss for a single company. Reinsurers, for their part, purchase coverage for assumed major risks (retrocessions).

When an insurer transfers a part of risk on a particular insurance by insuring it with another insurer or other insurers, it is called reinsurance. Reinsurance is insuring the same risk.

Every insurer has a limit to the risk that he can bear. If at anytime a profitable venture comes his way, he may insure it even if the risk involved is beyond his capacity which is his retention limit. In such cases, in order to safeguard his interest, he may reinsure the same risk for an amount in excess of his retention limit with other insurers, so that the loss due to risk is spread over many insurers.

Example of reinsurance

Mr. X, a factory owner, approached an insurance company 'A' for an insurance of amount of Rs40 crores. Company 'A'

Has two options. It can reject the risk or accept the risk and share a part of risk with other insurer. In case the company 'A' decides to assume the risk, by retaining Rs. 20 crores worth of insurance with it and seeking assistance of other insurer for excess of his own limit i.e. for the balance 20 crore. The excess for which the company 'A' is approaching the other insurer is called reinsurance.

DEFINITIONS OF TERMS USED IN REINSURANCE

Before going deep into the concept of reinsurance, it is necessary to understand the meaning of the various terms used in it.

1. Direct Insurer

An insurance company which accepts the risk from the proposer and which is solely responsible to the policyholder for the obligations undertaken.

2. Reinsurer

The insurance company which provides reinsurance cover to the ceding company is called the Reinsurer. The offer made by the ceding company is accepted by the Reinsurer. The Re-insurer may be

- a direct insurer, who in addition to accepting direct business, also accepts reinsurance business; or
- a professional reinsurer who accepts only reinsurance business but does not transact direct business.

3. Ceding company

Insurance company that places reinsurance business of the original risk with a reinsuring company; or the original insurer; the insurer who obtains a guarantee (on fire policy).

4. Cession

This is the amount reinsured with the reinsurance i.e., ceded to the reinsurer.

5. Reinsurance policy

The contract of reinsurance; in fire insurance, it is called guarantee policy.

6. Retention

This is the amount retained by the ceding company for its own account i.e., maximum it is prepared to lose on anyone loss. It is also known as '*net limit*' or '*net holding*' or '*net line*'.

7. Surplus

This refers to the difference between the sum insured under the policy issued by the ceding company and its retention.

8. Reinsurance Commission

It refers to the amount paid by the reinsurer to the insurer (ceding office) as a contribution to the acquisition and administration costs. Usually, it is a fixed percentage of premium received by the reinsurer

Why reinsurance?**1. Underwriting Assistance:**

With their diverse books of business, reinsurers can provide the technical expertise cedents need to enter new lines of coverage or to write risks in areas of Canada that the underwriter is not familiar with. This helps cedents to broaden their book of business and expand their underwriting opportunities.

2. Capacity:

Reinsurance allows the cedents to write larger amounts of insurance. This helps solve problems on otherwise quality accounts.

3. Financial:

Reinsurance eases the strain on the cedent's surplus during rapid premium growth. Premiums ceded to reinsurers are not included in the cedent's unearned premium reserve – which is carried as a liability on the cedent's financial statement. As a result, the cedent's premium to surplus ratio is reduced and there is enhanced ability to write business.

4. Stabilization:

Reinsurance helps smooth the cedent's overall operating results from year to year generated by economic, social and natural forces. It protects the cedent's capital and surplus needed for growth as well as a cedent's customers, shareholders and to some extent its employees.

5. Marketing Tool:

Reinsurance expands the cedent's ability to assume risk. This in turn, enhances the cedent's image as a broad based market and a responsive insurer and can add confidence when in an unfamiliar coverage area.

6. Catastrophe Control:

Exposure to natural disasters, such as flooding in Manitoba and earthquakes in British Columbia, jeopardizes a cedent's financial integrity. Reinsurance protects the cedent against a single catastrophic loss or multiple large losses. Reinsurance also affords protection against casualty losses in which multiple insureds can be involved in one occurrence.

7. Withdrawal:

Reinsurance provides a means for the cedent to maintain a class of risk that the company has withdrawn from due to a line of business, geographic area or production source.

CHARACTERISTICS OF REINSURANCE

1. Reinsurance is a contract between the two insurance companies.
2. The original insurer agrees to transfer part of his risk to other insurance company on the same terms and conditions.
3. The fundamental principles of insurance such as insurable interest, utmost good faith, indemnity, subrogation and proximate cause also apply to reinsurance.
4. In the event of fire, the insured is entitled to get the amount of claim only from the original insurer and not from reinsurer.
5. Original insurer cannot insure the risk with a re-insurer, more than the sum assured, originally by the insured.
6. The original insurer should intimate to the reinsurer about the alteration, if any, made in terms and conditions with the insured

Types of reinsurance**Proportional Reinsurance**

Under a proportional reinsurance arrangement, the direct writer (ie the original insurance company)

and the reinsurer share the cost of all claims for each risk. For example, for a particular building insured against fire, the direct writer might retain 75% of the premium and will be liable to pay 75%

of all claims, large or small. The direct writer must pay a premium to effect this reinsurance. The direct writer is sometimes referred to as the direct insurer or even just the insurer.

Proportional reinsurance operates in two forms:

1. With quota share reinsurance, the proportions are the same for all risks.
2. With surplus reinsurance, the proportions can vary from one risk to the next.

Non-proportional reinsurance

Under a non-proportional reinsurance arrangement, the direct writer pays a fixed premium to the reinsurer. The reinsurer will only be required to make payments where part of the claim amount falls in a particular reinsurance layer (eg between £1m and £5m). The layer will be defined by a lower limit, the retention limit (eg £1m), and an upper limit (eg £5m or infinity if the cover is unlimited). Usually, most claims are paid in full by the direct writer.

We will mention two forms of non-proportional reinsurance here:

1. With **individual excess of loss** (XOL) reinsurance, the reinsurer will be required to make a payment when the claim amount for any individual claim exceeds a specified excess point or retention. For example, the reinsurer might agree to pay the excess when any claim from a motor policy exceeds £50,000, but with an upper limit of £2 million.
2. **With stop loss reinsurance**, the reinsurer will be required to make payments if the total claim amount for a specified group of policies exceeds a specified amount (which may be expressed as a percentage of the gross premium).

Proportional Reinsurance Quota Share Reinsurance

The reinsurer pays a fixed proportion of the claim, whatever the size of the claim. if the claim is for an amount X then the company will pay Y where:

$$Y = \alpha X \quad 0 < \alpha < 1$$

The parameter α is known as the retained proportion or retention level; note that the term retention level is used in both excess of loss and proportional reinsurance though it means different things.

Since $Y + Z = X$, we must have $Z = (1 - \alpha)X$. The mean and variance of Y and Z are calculated as follows:

$$\begin{aligned} E(Y) &= \alpha E(X) \\ \text{var}(Y) &= \alpha^2 \text{var}(X) \end{aligned}$$

$$\begin{aligned} E(Z) &= (1 - \alpha)E(X) \\ \text{var}(Z) &= (1 - \alpha)^2 \text{var}(X) \end{aligned}$$

Surplus loss reinsurance

Surplus treaty is a type of proportional or pro rata reinsurance treaty in which the ceding company determines the maximum loss that it can retain for each risk in the portfolio. This amount is called a line. Every risk that provides coverage greater than the retained line is ceded to the surplus treaty on a **proportional basis**, where the proportion varies with the size of the risk (hence the name "surplus"). Surplus share agreements allow the primary insurer to cede a certain percentage of liabilities exceeding a pre-determined retention. The ceded amount can vary from risk to risk. Premiums and losses are received and paid by the reinsurer in the same proportion.

The main difference between a surplus treaty and quota share reinsurance (or standard proportional reinsurance) is that in a quota share the insurer and the reinsurer share in a fixed proportion each and every risk of the portfolio (losses and premiums), for example, 80% of every risk may be ceded to the reinsurer. In a surplus treaty, the ceding company retains a fixed maximum amount for each risk and this amount defines the retained proportion depending on the total size of the underlying policy.

Consider the example :

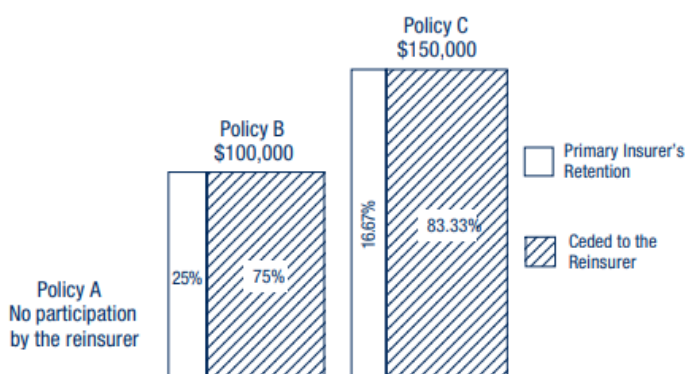
Brookgreen Insurance Company has a surplus share treaty with Cypress Reinsurer and retains a line of \$25,000. The treaty contains nine lines and provides for a maximum cession of \$225,000. Therefore, the retention and reinsurance provide Brookgreen with the ability to issue policies with amounts of insurance as high as \$250,000.

The following three policies are issued by Brookgreen Insurance Company and are subject to the surplus share treaty with Cypress Reinsurer.

- Policy A insures Building A for \$25,000 for a premium of \$400, with one loss of \$8,000.
- Policy B insures Building B for \$100,000 for a premium of \$1,000, with one loss of \$10,000.
- Policy C insures Building C for \$150,000 for a premium of \$1,500, with one loss of \$60,000.

Division of Insurance, Premiums, and Losses Under Surplus Share Treaty

	Brookgreen Insurance Retention	Cypress Reinsurance Cession	Total
Policy A			
Amounts of insurance	\$25,000 (100%)	\$0 (0%)	\$25,000
Premiums	400	0	400
Losses	8,000	0	8,000
Policy B			
Amounts of insurance	\$25,000 (25%)	\$75,000 (75%)	\$100,000
Premiums	250	750	1,000
Losses	2,500	7,500	10,000
Policy C			
Amounts of insurance	\$25,000 (16.67%)	\$125,000 (83.33%)	\$150,000
Premiums	250	1,250	1,500
Losses	10,000	50,000	60,000



Under a regular quota share agreement, the ceding company and the reinsurer would experience the same loss ratio (losses/premium), whereas under a surplus treaty, the reinsurer's experience might be worse than the ceding company's. This is due to the fact that larger risks, for which the reinsurer has a higher share, are often subject to a smaller profit margin.

Non – Proportional Reinsurance

Excess of loss reinsurance

In excess of loss reinsurance, the insurer will pay any claim in full up to an amount M , the retention level; any amount above M will be borne by the reinsurer.

The excess of loss reinsurance arrangement can be written in the following way: if the claim is for amount X , then the insurer will pay Y where:

$$Y = X \quad ; X \leq M$$

$$Y = M \quad ; X > M$$

The reinsurer pays the amount $Z = X - Y$

The insurer's liability is affected in two obvious ways by reinsurance:

- (i) the mean amount paid is reduced;
- (ii) the variance of the amount paid is reduced.

Both these conclusions are simple consequences of the fact that excess of loss reinsurance puts an upper limit on large claims.

The mean amounts paid by the insurer and the reinsurer under excess of loss reinsurance can now be obtained. Observe that the mean amount paid by the insurer without reinsurance is:

$$E(X) = \int_0^{\infty} x f(x) dx$$

where $f(x)$ is the PDF of the claim amount X . With a retention level of M the mean amount paid by the insurer becomes:

$$E(Y) = \int_0^M xf(x)dx + M P(X > M)$$

Now consider reinsurance (once again) from the point of view of the reinsurer. The reinsurer may have a record only of claims that are greater than M . If a claim is for less than M the reinsurer may not even know a claim has occurred. The reinsurer thus has the problem of estimating the underlying claims distribution when only those claims greater than M are observed. The statistical terminology is to say that the reinsurer observes claims from a truncated distribution.

In this case the values observed by the reinsurer relate to a conditional distribution, since the numbers are conditional on the original claim amount exceeding the retention limit.

Let W be the random variable with this truncated distribution. Then:

$$W = X - M \mid X > M$$

This can also be expressed as follows:

$$W = Z \mid Z > 0$$

There may usually be an upper limit of liability of the reinsurers beyond which they will not pay.

Example:

Proposition: Against all public liability insurances, the insurer decides to bear a loss of up to \$100,000 in respect of every loss. The reinsurers agree to bear any balance amount beyond \$100,000. The loss is \$200,000. There is an upper limit of \$80,000.

The recovery under the reinsurance arrangement will be as follows:

Loss: \$200,000. Upper limit:	\$ 80,000
Insurer bears:	\$ 1,00,000
Reinsurer bears:	\$ 80,000
Insurer again bears the	
balance because of the upper limit:	\$ 20,000
Therefore, Insurer bears	\$ 1,20,000
Reinsurer bears	\$ 80,000
	\$ 2,00,000

You should realize that if there would have been no upper limit, reinsurers would have borne \$100,000.

This type of reinsurance arrangement is particularly helpful in cases of big liability insurances and for obtaining protection against catastrophe losses.

Catastrophe reinsurance, per risk reinsurance, per occurrence reinsurance and aggregate excess of loss reinsurance are all categories of excess of loss reinsurance.

- **Catastrophe reinsurance contracts** indemnify the ceding company for all losses in excess of a specified amount resulting from a single catastrophic event;
- **Per risk reinsurance contracts** apply to individual risks (most likely part of a facultative agreement) whereby the reinsurer agrees to assume losses over a pre-determined amount. The primary insurer pays all losses up to that point.
- **Per occurrence reinsurance** are similar to catastrophe reinsurance.
- **Aggregate excess of loss** reinsurance agreements stipulate that the reinsurer will pay ALL primary insurer losses that exceed a specified retention during the contract period. For example, the primary insurer contracts with the reinsurer to insure aggregate losses exceeding \$500 million in the period. The primary insurer is indemnified for all loss payments above that amount (subject to the policy premium).

Stop loss reinsurance

This does not work on aggregate claim basis. It protects the insurer from suffering losses that exceed a certain limit over the course of year. For instance, if an insurance company's total losses exceed 75 percent of its earned premiums, the reinsurer would pay for the losses up to a coverage limit. With stop loss reinsurance, the part paid by the reinsurer is not determined by the aggregate claims of the individual policy, only by the aggregate claims of the whole portfolio. The amount covered by the direct insurance company is called deductible.

Profitability Terms

Net premiums written is the sum of premiums written by an insurance company over the course of a period of time, less premiums ceded to reinsurance companies, plus any reinsurance assumed.

Earned Premium : the premium collected by an insurance company for the portion of a policy that has expired. In other words, the earned premium is what the insured party has paid for a portion of time in which the insurance policy was in effect, but has since expired.

Net Earned Premium : means the net written premium recorded during the experience period, plus the unearned premium reserves at the beginning of the period, minus the unearned premium reserves at the end of the period.

Net Loss ratio :
$$\frac{\text{net claims incurred}}{\text{net earned premium}}$$

Net expense ratio :
$$\frac{\text{expenses}}{\text{net written premium}}$$

Net Commission ratio :
$$\frac{\text{commission}}{\text{net written premium}}$$

Net combined ratio is the sum of loss ratio, expense ratio and commission ratio.

Start date : the date the policy is activated.

End date : the date at which the policy term ends

Policy year : A policy year is based on policies with effective dates in a twelve month period. So, policy year 2019 data are those policies with effective dates between 1/1/19 and 12/31/19.

Accident year : Accident year data is based on accidents that occur within a twelve month period. Thus, accident year 2019 is based on those accidents that occurred between 1/1/19 and 12/31/19.

Reporting year : The year in which claim incurred before is reported to the insurance company.

Net claims incurred : The amount of claims incurred during an accounting period after deducting reinsurance recoveries.

Claims Reported : Claims reported to the company.

Incurred But Not Reported (IBNR) is a type of reserve account used in the insurance industry as the provision for claims and/or events that have transpired, but have not yet been reported to an insurance company.

Incurred Loss Ratio - The percentage of losses incurred to premiums earned.

Reinstatement Clause - When the amount of reinsurance coverage provided under a treaty is reduced by the payment of a reinsurance loss as the result of one catastrophe, the reinsurance cover is automatically reinstated usually by the payment of a reinstatement premium.

Reinstatement Premium - A pro rata reinsurance premium is charged for the reinstatement of the amount of reinsurance coverage that was reduced as the result of a reinsurance loss payment under a catastrophe cover

Profit commission is the commission over and above the ceding commission offered by the reinsurer to the cedant to encourage good quality underwriting and profitability of the treaty, where cedant is the insurance company the reinsurer insures.

Understanding accident year

Take an example, a small general insurance company looks over 5 motor insurance policies . Two policies were initiated in 2015. Other three policies were initiated in 2014, 2016 and 2017 respectively. One of the policy from 2015 group and the policy initiated in 2016 reported a claim in 2017. The policy initiated in 2017 reported a claim in 2020 while the policy initiated in 2016 reported a claim in 2018 and the other policy initiated in 2015 reported a claim in 2019. Specify the policy year and accident year for each policy.