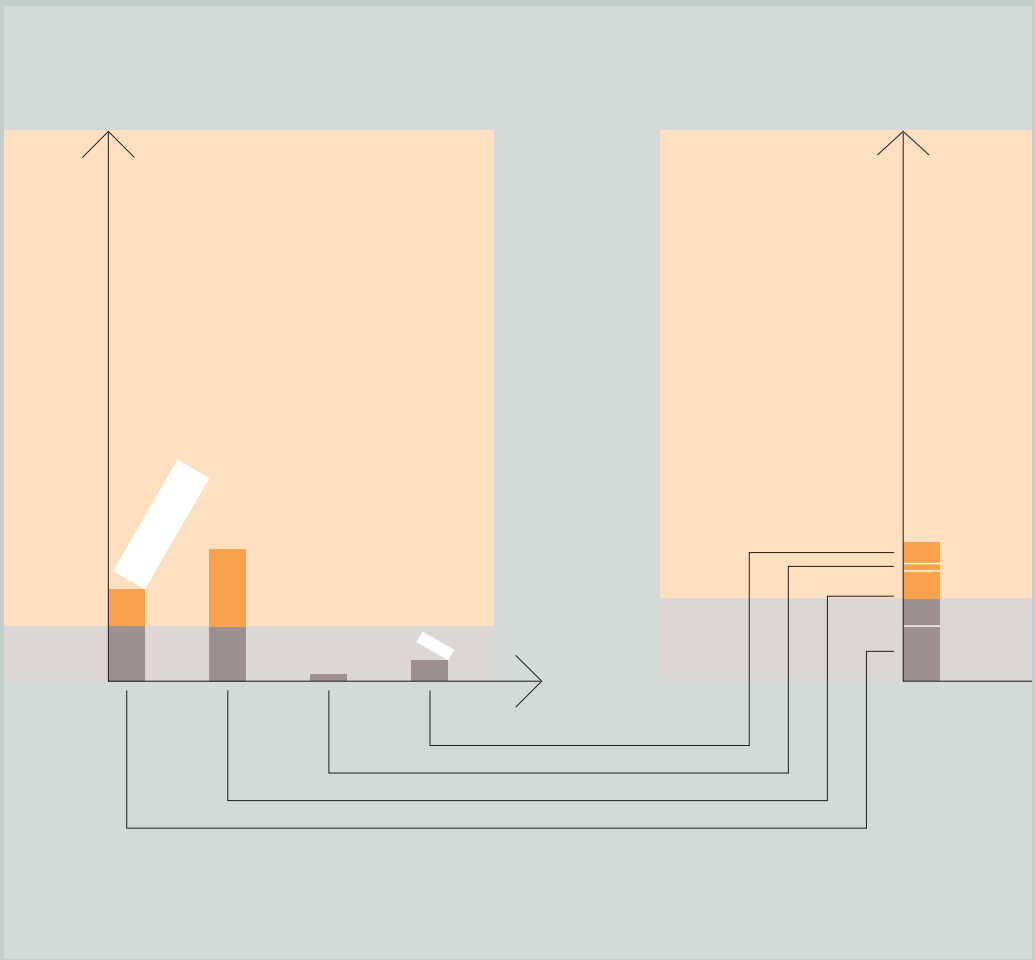
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Proportional and non-proportional reinsurance

Proportional and non-proportional reinsurance

The main differences between these two types of reinsurance cover – a discussion with specific examples

Contents

		Page
1	**Current situation in the insurance industry**	5
2	**Reinsurance**	6
	Reinsurance treaties	6
	Obligatory reinsurance treaties	6
3	**Proportional reinsurance**	7
	Quota share reinsurance	7
	Surplus reinsurance	8
	Model of a fire portfolio (Example 1)	9
	Quota share reinsurance using Example 1	10
	Liability in the retention and limit of liability of the surplus	10
	Cession	11
	Summary of product features of surplus reinsurance	12
4	**Accounts in respect of obligatory proportional reinsurance treaties**	13
	Premiums to the reinsurers (Example 2)	13
	The pro rata temporis method	13
	The 24ths method (Example 3)	13
	The 8ths method (Example 4)	14
	The blanket method (“half” system)	14
	An “earned premium” accounting example (Example 5)	15
	The breakdown of claims	15
	A “claims incurred” accounting example (Example 6)	15
5	**The price of proportional reinsurance**	17
6	**Comparison of results between gross, surplus and retention** (Example 7)	18
7	**Summary of obligatory proportional reinsurance**	19

8 Non-proportional reinsurance 20
Definition of loss terms in non-proportional reinsurance (excluding stop loss treaties) 20
Loss per risk (WXL/R, examples 8, 8.1 and 8.2) 20
Loss per event (WXL/E, examples 8.3 and 8.4) 22
The accumulation loss (CatXL, Example 8.5) 24
The reinsurance programme based on the example of risks X, Y, U and V (Example 9) 24
Summary of the non-proportional reinsurance covers WXL/R, WXL/E and CatXL 26
Stop loss reinsurance 26
Survey of non-proportional reinsurance products 26

9 Portfolio aspects for non-proportional reinsurance 27
Differences between classes of business 27
Size in absolute terms 27
Ratio of claims burden to retained premium 27
Information for the reinsurer 27

10 Claims settlement in the case of non-proportional reinsurance 28
Per risk excess of loss 28
Per event catastrophe excess of loss cover 28
Facultative reinsurance 28
Date of loss 28
Payment 28
Information to the reinsurer 29
Claims handling at the reinsurer's 29
Stability clause (Indexation clause) 29
Co-reinsurance: the insurer's participation/share in the cover 29

11 Calculating the price 30
Price commensurate with risk 30
The reinsurance price 30
Types of excess of loss premiums 31
Premium payment methods 32

12 Summary of obligatory non-proportional reinsurance 33

1 Current situation in the insurance industry

The direct insurer's stock of risks, ie the portfolio, is characterised by a finite number of risks. These risks vary in nature and size, and the claims experience is fortuitous, as the example of a fire portfolio clearly illustrates: the risks are varied and also differ in size. The claims experience is heavily influenced by:

– major losses affecting individual risks;
– major losses (accumulation losses) arising from one event, each major loss being made up of many individual losses;
– the high frequency of many small losses;
– changes in the structure of a risk (owing to changes in, amongst other things, the economic, technological, political and social environment).

Unless appropriate measures are taken, a portfolio will therefore be unbalanced. A direct consequence of a lack of balance is that results go up and down. Depending on their size, fluctuations in the course of results will affect values which are vital to the company, such as solvency, liquidity and the continuity and/or stability of results. One of the insurer's corporate goals is therefore to restrict fluctuations in the results to within certain limits. There are generally three ways of doing this: self-restriction, coinsurance and reinsurance.

Self-restriction

For the portfolio to absorb the fluctuations, the direct insurers must set their acceptance limits at a correspondingly low level, writing only small and very small shares in order to achieve a portfolio which is as homogeneous as possible. The possibilities for acquiring business are restricted as a result. However, the direct insurers also thereby limit their opportunities for growth in markets with competition, since their competitors can write business with higher acceptance limits. Insurers who opt for self-restriction will therefore remain small in absolute terms.

Coinsurance

Insurers opting for the coinsurance route must come to an agreement with selected competitors and also divulge information about their customers. In addition, insurers organised in a coinsurance arrangement must take special care to ensure that the assumption of risk arranged in this way does not result in any disadvantages for their insureds. In practice, the principle of coinsurance is chosen above all for special and/or very large risks.

2 Reinsurance

Where insurers opt for the third method, they are said to purchase reinsurance cover. Insurers may use reinsurance cover for different purposes, for instance to reduce their commitment to a single major risk, to cover catastrophe risks like those arising from the natural hazards of earthquake or flood, for example, or to protect themselves against major variations in the loss experience of entire portfolios. Insurers and reinsurers agree between themselves the reinsurance solution which meets the insurers' specific needs, with account also being taken of the insurers' market opportunities. Their position in the market should be strong and outwardly independent, without insureds being aware of the reinsurers.

Reinsurance treaties

The specific needs of insurers are as varied as the reinsurance solutions. They may be assigned to the newer financial reinsurance business, to traditional reinsurance treaty business or to combinations of the two. The two types of reinsurance cover dealt with in detail in this publication form part of traditional reinsurance treaty business. As the name indicates, the insurers and the reinsurers arrange a *reinsurance treaty*. Where the subject-matter of the treaty is a policy or an individual risk, this is known as "facultative reinsurance". The insurer cedes part of the risk to one or more reinsurers and is therefore known as the "cedent". As the word "facultative" implies, the cedent may offer the risk, or part of it, for reinsurance, ie it may offer the business if it wishes. The reinsurers, for their part, are at liberty to accept or reject the offer.

With obligatory reinsurance, a treaty is arranged for the reinsurance of a specific portfolio, with risks being ceded automatically for the entire portfolio within the terms of the treaty. Cedents do not have to decide whether or not to cede each individual risk but undertake to cede the entire portfolio. Nor do the reinsurers have to go through an individual acceptance procedure, since they are contractually bound to accept the entire portfolio.

To sum up: for the reinsurance of individual risks, facultative treaties are arranged, while for the reinsurance of entire portfolios, obligatory treaties are arranged.

Obligatory reinsurance treaties

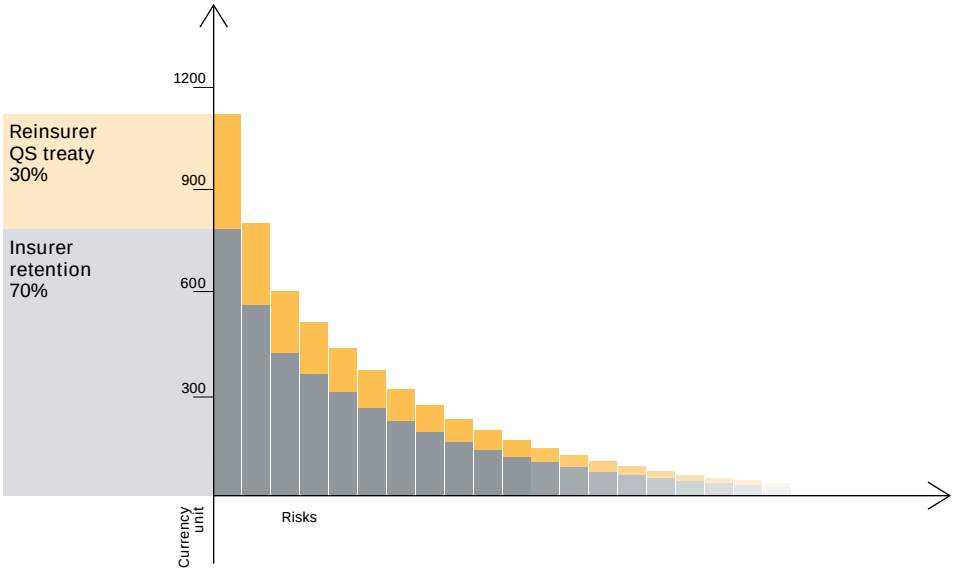
In order to explain these two types of cover – proportional and non-proportional reinsurance – in more detail, in this publication we will confine ourselves to *obligatory treaties*. However, both types of cover are also to be found with respect to facultative treaties. Depending on the class of insurance, one or the other type of cover prevails. Combinations of both types of cover also often result in good reinsurance solutions.

3 Proportional reinsurance

The *proportion* is the central product feature of proportional treaty reinsurance. What is specifically involved here is the proportion which the treaty limit of the relevant reinsurance cover bears to the individual original risk ceded. The term used here is “proportionality principle”. In fire insurance, liability is defined as the total sum insured (maximum liability based on the full value) or as the highest estimated loss (eg Estimated Maximum Loss or Maximum Possible Loss). In third party liability business the liability is determined to be the limit of compensation required to rectify a loss. This compensation limit is defined independently of the insured object and the corresponding total value. Besides the proportionality principle the product “proportional treaty reinsurance” is associated with another feature: the direct insurers cede the risks at the original conditions agreed between them and the policyholders. The reinsurers are therefore involved in the risk under the same terms and conditions as the direct insurers.

Quota share reinsurance

With this product, the proportion is defined as a fixed, invariable percentage which is generally applied to the entire portfolio of risks as the quota share ceded to reinsurance. The exceptions are risks which exceed the amount of the quota share limit. An absolute quota share limit of this kind is agreed because the quota share reinsurance could otherwise be too unbalanced, and the reinsurers would no longer know their maximum liability per risk. With risks for which the quota share limit is not high enough, the percentage is reduced in the ratio “quota share limit : original risk”. The cedent’s liability

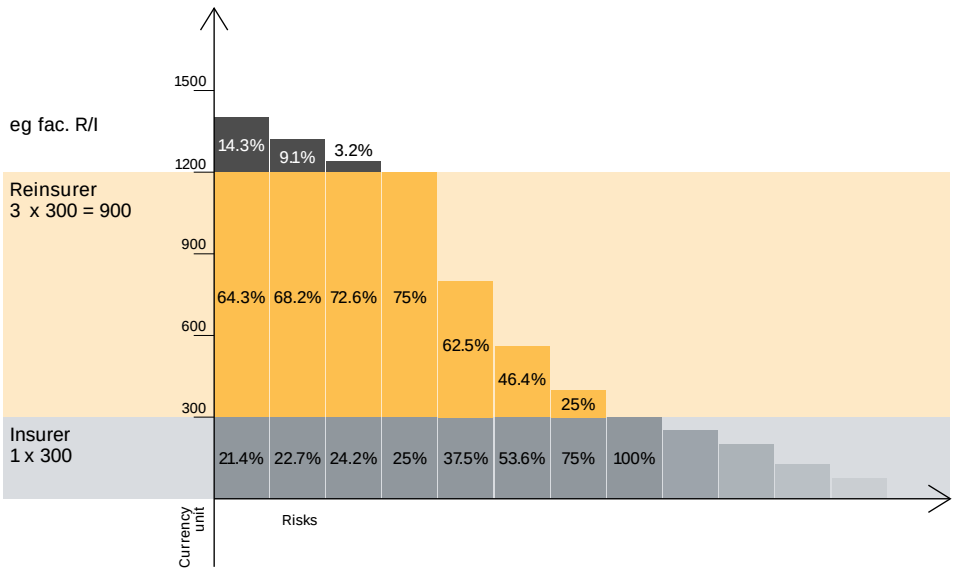


on any one risk is therefore reduced by the defined percentage as the quota share ceded. Or rather, to be more exact, the liability, the premiums and the losses are reduced by the same percentage. Normally, the cedent keeps the same standard retention on each risk (eg 70%) and consequently cedes to reinsurance a percentage which is always the same (eg 30%). Quota share reinsurance is simple to administer. For a portfolio in which no individual risks exceed the quota share limit, the cession may be effected on an all-inclusive basis. For insurers, the same proportion does not produce an improved ratio between peak liabilities and premium income. In other words, their liabilities arising from a portfolio of risks cannot be homogenised. On the other hand though, the absolute variation in claims experience can be reduced. The effect achieved is an improved ratio between the direct insurer's potential or actual loss and its guarantee funds – in short, improved solvency.

Surplus reinsurance

This product allows variable percentages for the retention and for business ceded to reinsurance, depending on the size of the individual risk. As can be seen below, compared to quota share reinsurance the system of surplus reinsurance is more complex and the administration more expensive.

For a start, the liability in the cedent's retention is defined as a fixed amount. Risks within this amount are retained by the insurer in full for its own account. Only risks on which the cedent's liability exceeds the amount of the retention are ceded to reinsurance, cession being effected on the basis of the ratio "portion of liability over and above the retention : overall liability". The percentage for cession varies depending on the size of the overall liability.



As an example, the following simplifications apply: the portfolio is divided into certain size classes; the portfolio in question is a fire portfolio; a single retention of 20 million applies, irrespective of the nature of the risk (unlike normal practice whereby retention amounts are graded according to the risk, in fire insurance the amounts essentially vary according to the probability of fire breaking out and spreading, and also according to the concentration of values); the uniform retention amounting to a sum insured of 20 million per risk corresponds to roughly 1% of the gross premium or 1.4% of the retained premium:

Model of a fire portfolio (Example 1)

Line	Average sum insured per risk in millions	Number of policies	Gross premium per class in millions	Retained premium		Ceded premiums	
				%	in millions	%	in millions
1	0.70	250 000	175.00	100.0%	175.00	–	–
2	1.90	150 000	285.00	100.0%	285.00	–	–
3	3.80	70 000	266.00	100.0%	266.00	–	–
4	7.00	30 000	252.00	100.0%	252.00	–	–
5	13.00	11 000	185.90	100.0%	185.90	–	–
6	25.00	4 000	140.00	80.0%	112.00	20.0%	28.00
7	47.00	2 400	169.20	42.6%	72.00	57.4%	97.20
8	75.00	1 200	144.00	26.7%	38.40	73.3%	105.60
9	120.00	510	104.04	16.7%	17.34	83.3%	86.70
10	170.00	260	79.56	11.8%	9.36	88.2%	70.20
11	240.00	120	54.72	8.3%	4.56	91.7%	50.16
12	390.00	70	54.60	5.1%	2.80	94.9%	51.80
13	640.00	25	35.20	3.1%	1.10	96.9%	34.10
14	1 100.00	15	41.25	1.8%	0.75	98.2%	40.50
15	Total	519 600	1 986.47	71.6%	1 422.21	28.4%	564.26

Discussion of Example 1

Line 1: The 250,000 policies with an average sum insured of 0.7 million each fall within the insurer's retention. A surplus reinsurance is not required.
Line 7: 2,400 policies with an average sum insured of 47 million:
The retained liability of 20 million corresponds to 42.6% of 47 million. The insurer retains 42.6% in the retention and cedes the rest, ie 57.4%, to the surplus reinsurance.

Notwithstanding Example 1, in practice a portfolio can contain a great many different large risks, the retention and thus the reinsured portion being determined for each risk where the liability for the risk exceeds the retained liability.

Once the retained portion and the reinsured portion have been determined for all the risks, the retained and surplus premiums can be calculated in proportion to the liability. Although the limit of liability for the retention in the example is limited to 1% of the gross premium (ie 20 million = 1% of 1,986.47 million), the surplus reinsurance makes it possible for no more than 28.4% of the premiums to be ceded to reinsurance.

The example also shows how the surplus reinsurance eliminates the peaks in the portfolio for the insurer, thus providing its portfolio with a certain homogeneity. Such successful reinsurance requires amongst other things suitable organisation and adequate resources in the management of the direct insurer, in particular for underwriting control and administration.

Quota share reinsurance using Example 1

As already mentioned, with pure quota share reinsurance the administrative work involved is simpler and the premium ceded is greater than with surplus reinsurance. In Example 1, quota share reinsurance results in the following picture:

Assumption: The gross limit is fixed at 100 million. For all risks with original liability in excess of 100 million (sum insured), the insurer arranges facultative reinsurance or coinsurance for the portions in excess of 100m. The gross premium now therefore comes to 1,796.65m compared with total gross premium of 1,986.47m in Example 1. Where the limit of liability remains unchanged for the retention of 20m (corresponds to 1.1% of the new gross premium of 1,796.65m), the insurer must reinsure a share of 80%, its retained share being 20%. This leaves the insurer with a premium of 359.33m for the retention (20% of 1,796.65m), making the "maximum retained liability : retained premium" ratio relatively unfavourable for it.

On balance, the conclusion to be drawn from the example is that – especially in fire – pure quota share reinsurance is hardly sufficient as the only reinsurance.

Liability in the retention and limit of liability of the surplus

Coming back now to surplus reinsurance, we show below how this can be designed to be affordable for cedents and reinsurers alike.

The reinsurer's liability on any one risk must be in a certain proportion to the premiums which the cedent cedes to reinsurance.

In practice, the limit of liability of the surplus reinsurance is always expressed as a multiple of the limit of liability under the retention (cedent's maximum

retained liability). The multiples fixed may vary considerably depending on the market and the class of business. In Example 1 the limit of liability of the surplus is set at 14 times the maximum retained liability. This means that the cedent has an automatic capacity of 300m on any one risk, ie its maximum retention (20m) plus the surplus reinsurance (14 x 20m), making 15 x 20m. On risks with a sum insured in excess of 300m, the cedent must look for additional cover in respect of the surplus amount, for example through facultative reinsurance. In Example 1 the premium ceded for the surplus reinsurance cover per risk of 280m (from the gross premium from all classes with average sums insured) works out at 502.96m. The premium corresponding to the portion of the sums insured which exceeds 300m amounts to 61.3m. This premium compares with a limit of liability of 800m (1,100m for the portfolio class with the highest sums insured, less 300m as the automatic capacity). How this portion in excess of the surplus reinsurance's limit of liability is reinsured forms part of the actual design of the reinsurance programme. Questions like the following then arise: Can the automatic capacity of 300m be increased? Is a second, separate surplus reinsurance possible? What are the advantages and disadvantages of the possible variants?

In practice, the limit of liability under the retention is also graded into lower retained liabilities according to the type of risk. Surplus reinsurance thus takes account of the fact that the direct insurer does not need to assume the same amount of liability under the retention in respect of a joiner's workshop as it does in respect of a residential building. The maximum cession remains limited to a constant multiple of the retained liability, however. If in Example 1 the retained liability should be 10m instead of 20m (for an unchanged surplus with 14 times the retained liability), the insurer might cede a maximum of 140m of the liability on an original risk (14 x 10m) and not 280m (14 x 20m). Its automatic capacity (retention and surplus) is accordingly reduced from 300m to 150m.

Cession

Cessions made to surplus reinsurance always involve the original risk. Just how cessions are made in practice may be explained with the help of Example 1: Risk X is originally insured for a sum insured of 200m. The direct insurer chooses a retention of 15m, making its automatic capacity 225m (15m plus 14 times this retained liability). It therefore cedes 185m to its surplus, which represents 92.5% of risk X. The retention of 15m corresponds to 7.5%. Risk Y is insured for a sum insured of 300m. The retention is again 15m. In line with the constant maximum multiple of its retained liability, the insurer can cede 210m (14 x 15m) to its surplus. This means that 70% of Risk Y is ceded, 5% being retained by the insurer as the retention on its surplus. The insurer either assumes liability for the remaining 25% or seeks additional reinsurance for it. 92.5% of the premium for Risk X and 70% of the premium for Risk Y is thus ceded to the surplus reinsurer. In the event of a loss, the insurer recovers 92.5% in respect of Risk X and 70% in respect of Risk Y.

Summary of product features of surplus reinsurance

– The liability per original risk is decisive for determining the liability under the surplus reinsurance and that under the retention.

– In fire insurance, the liability per original risk is defined as the sum insured (maximum liability based on the full value) or as an estimate of the maximum loss (eg EML or MPL), whereas in the accident and liability classes of business it is defined as an amount of indemnity.

– Cessions are effected individually per original risk. The scale or extent to which the original risk may be ceded from a reinsured portfolio of risks is defined in the relevant surplus reinsurance treaty.

4 Accounts in respect of obligatory proportional reinsurance treaties

Premiums, losses and reinsurance commission are the three most important values in the periodic statements of account exchanged between the insurers and the reinsurers. To illustrate the accounts for a surplus reinsurance, Example 1 is expanded to include the following figures:

(in millions)	Gross business	Reinsurance	Retention
Premium written	1 986.47	564.26	1 422.21
Premium earned	1 931.43	548.63	1 382.80
Losses entered	1 165.39	312.36	853.03
Costs	633.27	197.49	435.78
Profit	132.77	38.78	93.99

Premiums to the reinsurer (Example 2)

Under obligatory proportional reinsurance treaties, the reinsurers are basically entitled to their share of the original premiums.

If the annual period of cover of all policies coincided with the cedent's accounting year, the premiums would be earned at the end of the accounting year. In practice, however, it is more common for the annual periods of cover of policies to differ from the accounting year. Consequently, at the end of the accounting year, a reserve has to be set up for policies whose annual period of cover has not yet expired.

Example 2
Accounting year 1 January to 31 December
Period of cover of policy X: 1 July to 30 June
On 31 December, the first half of the period of cover ends. This means that 50% of the premiums have been earned on 31 December, and 50% have to be set aside or "reserved".

The pro rata temporis method

With this method, the precise reserve can be determined by calculating the reserve individually per policy. This method is expensive and therefore rather uncommon in practice.

The 24ths method (Example 3)

This method – which approximates the pro rata temporis method – is based on a portfolio in which the policy expiries each month are fairly evenly distributed. This means that policies from the same month expire in the middle of the month. The decisive factor for accounting is the premium written each month. An accounting year is made up of 24 half months. On 31 December, that is to say at the end of the accounting year, 23/24ths of the January premium will have been earned, and 1/24th will have to be reserved. Similarly, on 31 December, 21/24ths of the February premium will have been earned and 3/24ths will have to be reserved. An example of this method is given below:

Month	Monthly premium in millions	Earned premium Fraction	Earned premium Amount in m	Premium reserve Fraction	Premium reserve Amount in m
January	70.77	23/24ths	67.82	1/24ths	2.95
February	74.83	21/24ths	65.48	3/24ths	9.35
March	68.58	19/24ths	54.29	5/24ths	14.29
April	58.69	17/24ths	41.57	7/24ths	17.12
May	55.37	15/24ths	34.61	9/24ths	20.76
June	45.25	13/24ths	24.51	11/24ths	20.74
July	43.54	11/24ths	19.96	13/24ths	23.58
August	32.15	9/24ths	12.06	15/24ths	20.09
September	31.42	7/24ths	9.16	17/24ths	22.26
October	28.26	5/24ths	5.89	19/24ths	22.37
November	27.84	3/24ths	3.48	21/24ths	24.36
December	27.56	1/24ths	1.15	23/24ths	26.41
Total	564.26		339.98		224.28

The 8ths method (Example 4)

The more approximate procedure using the eighths method involves less work, being based on the quarterly premium written. On 31 December, 7/8ths of the premium written in the first quarter has been earned and 1/8th has to be reserved. An example of this method is given below:

Quarter	Quarterly premium in millions	Earned premium Fraction	Earned premium Amount in m	Premium reserve Fraction	Premium reserve Amount in m
1 Jan – 31 Mar	214.18	7/8ths	187.41	1/8th	26.77
1 Apr – 30 Jun	159.31	5/8ths	99.57	3/8ths	59.74
1 Jul – 30 Sep	107.11	3/8ths	40.17	5/8ths	66.94
1 Oct – 31 Dec	83.66	1/8ths	10.46	7/8ths	73.20
Total	564.26		337.61		226.65

If we compare Examples 3 and 4, we see that the differences between the results obtained with the two methods are not great.

The blanket method ("half" system)

This method is often used in practice, though technically it is not quite perfect. The blanket method is based on the assumption that policy expiries are spread evenly over the accounting year. At the end of the accounting year, 50% of the premium written is reserved accordingly. However, the assumption that policies are evenly distributed over the accounting year often does not correspond to reality.

An "earned premium" accounting example (Example 5)

The premium reserve, less reinsurance commission for the accounting year, is deducted from the original premium written. The premium reserve less reinsurance commission from the end of the previous year is then added, as the period of cover which had not yet expired at the time will have ended in the meantime. The result below the line gives the earned premium. If the written premium has increased, the earned premium will be smaller than the written premium, since the previous year's reserve was smaller than that for the current accounting year. In Example 5 the premium reserve is based on the 24ths system.

Example 5, in millions	
Ceded premium written in the accounting year	564.26
plus	
Premium reserve for previous year after deduction of 35% reinsurance commission (35% of 200.25)	+ 130.16
minus	
Premium reserve for the accounting year after deduction of 35% reinsurance commission (35% of 224.29)	– 145.79
Ceded reinsurance premium earned for the accounting year	= 548.63

The breakdown of claims

Claims occurring in an accounting year are not all paid in the same accounting year. For those which have not yet been settled, the direct insurer must set up a reserve. On the other hand, during the accounting year the insurer will pay claims from previous years for which reserves were set up at the time. The claims payments effected during the accounting year are therefore made up of payments in respect of claims arising during the accounting year and also of claims from previous years.

A "claims incurred" accounting example (Example 6)

At the end of last year there was a reserve for outstanding claims. This reserve for the previous year is reduced (provided the reserve was sufficient) to the extent of these claims being paid during the course of the accounting year. The previous year's reserve is subtracted from the paid claims. The reserve for claims outstanding at the end of the accounting year (from the accounting year and previous years) is added to the paid claims.

Example 6, in millions	
Paid claims for the accounting year	261.86
plus	
Reserve for outstanding claims at the end of the accounting year	+ 188.95
minus	
Reserve for outstanding claims at the end of the previous year	– 138.45
Claims incurred for the accounting year	= 312.36

With quota share reinsurance, the claims run parallel for gross (ie the portfolio before reinsurance), reinsurance and retention, because the quota share is fixed uniformly for the entire portfolio.

With surplus reinsurance, the loss profile for gross, reinsurance and retention can be quite different. Risks which are smaller than the retention are not ceded. Risks which are greater than the retention are ceded according to the size of the risk. The smaller the risk, the greater the cedent's relative retention in surplus reinsurance; the greater the risk, the smaller the cedent's relative retention in surplus reinsurance. The situation is similar when dividing a loss according to the risk.

5 The price of proportional reinsurance

The price which the direct insurer pays can be derived from the reinsurance commission. This is used by the reinsurer to pay back a part of the original premium ceded. How is the reinsurance commission determined?

If the original risk premiums are sufficient, the reinsurance commission is determined on the basis of the fact that the direct insurer has expenses (eg acquisition costs) which the reinsurer does not. Whether the reinsurance commission more than covers or fails to cover the cedent's expenses will depend on the quality of the business ceded.

With increasingly flexible original rates and conditions, reinsurers increasingly have to assess for themselves what an individual reinsurance contract may cost them in terms of losses. To this effect the reinsurer calculates the reinsurance price per treaty. This is made up of the pure premium, expenses and loadings. Whether the original rates are at a level commensurate with the risk and the costs involved, and also the design of the insurer's original covers and conditions are therefore decisive. The reinsurance treaty conditions are also important, in particular the amount of the retention and the amount of the reinsurance liability. The more reliable and the better the information on the insurer's underwriting and portfolio supplied to the reinsurer, the more well-founded will be the risk premium determined by the reinsurer for smaller and medium-sized losses and, depending on the portfolio, for major and catastrophic losses. In the absence of good-quality information, reinsurers have to apply higher loadings.

The amount of premium the reinsurer can pay back in the form of reinsurance commission can be seen when comparing the technically calculated reinsurance price and the premiums ceded. The smaller the reinsurance price, the greater the reinsurance commission; the greater the reinsurance price, the smaller the reinsurance commission. As a consequence even treaties and treaty years are conceivable for which the reinsurer is unable to make repayments or might even be required to demand a negative reinsurance commission. In the latter case the premium ceded is smaller than the reinsurance price.

Where reinsurers pay a reinsurance commission, for accounting purposes this constitutes an expense. For insurers, a positive reinsurance commission from the reinsurer forms a contribution towards their expenses. An example of this is Example 1 expanded to include the following figures:

Insurer's total acquisition and administration costs, gross	633.27
35% reinsurance commission on ceded premium of 564.26	– 197.49
Total acquisition and administration costs for retention	= 435.78

6 Comparison of results between gross, surplus and retention (Example 7)

If we compare the figures from Example 1, we see that the claims experience and thus the course of the results for gross, surplus reinsurance and retention can be quite different:

Example 7

	Gross in millions	Surplus reinsurance in millions	Retention in millions
Premium written	1 986.47	564.26	1 422.21
Premium reserve from previous year	+ 739.55	+ 130.16	+ 609.39
Premium reserve for accounting year	– 794.59	– 145.79	– 648.80
Premium earned	= 1 931.43	= 548.63	= 1 382.80
Claims paid	– 1 285.38	– 261.86	– 1 023.52
Claims reserve from previous year	+ 833.44	+ 138.45	+ 694.99
Claims reserve for accounting year	– 713.45	– 188.95	– 524.50
Claims incurred	= – 1 165.39	= – 312.36	= – 853.03
Costs	– 633.27	– 197.49	– 435.78
Profit	+ 132.77	+ 38.78	+ 93.99

7 Summary of obligatory proportional reinsurance

The essential features are:

– A proportional part of the liability per original risk is reinsured.

– With quota share reinsurance:
  a) The proportional part is defined as a fixed percentage of the liability per original risk. The percentage is the same for all the original risks in a specific portfolio.
  b) The ratio between the retained liability per original risk and the retained premium remains unchanged. The limit of liability, premiums and losses are reduced in the same proportion for the retention.

– With surplus reinsurance:
  a) The proportional part is fixed depending on the size of the liability per original risk. The percentage can be defined specifically for each original risk.
  b) The part of the original risk which exceeds the retained liability is reinsured, the reinsurance being limited by a contractually fixed multiple of the retained liability.
  c) All the original risks on which the liability does not exceed the retention remain within the retention.
  d) The ratio between the retained liability per original risk and the retained premium is improved. Peak liabilities are reduced by means of reinsurance. Peak risks are much less numerous than relatively small risks, however.

– The price is determined primarily by the nature and composition of the insurer's reinsured business. The price is expressed in the size of the reinsurance commission. The higher the price, the lower the reinsurance commission. The lower the price, the higher the reinsurance commission.

8 Non-proportional reinsurance

Unlike proportional reinsurance, which is based on original liability and proportional cession, with non-proportional reinsurance it is the amount of loss and the cover, which is limited in amount, which are to the fore. We therefore also talk of "excess of loss reinsurance". The essential subjects of the contract are:

– one or more classes of business from which losses are reinsured;
– a fixed limit – the "deductible" – up to the amount of which insurers bear all losses for their own account;
– a limit of cover – the so-called "layer" – up to the amount of which the reinsurer pays portions of claims above the deductible.

Non-proportional reinsurance offers insurers another way of cutting probable claim peaks back to the level of retention they find acceptable. The fact that the distribution of claims and the distribution of liabilities in an insurance portfolio differ is of relevance here. The occurrence and amount of a loss are fortuitous, with varying degrees of probability. As far as the period of time is concerned, basically only the losses occurring during the agreed period of the contract are covered. In reinsurance jargon one therefore talks of "years of occurrence". Unlike proportional reinsurance, non-proportional reinsurance cover is separate from the original portfolio and therefore from the terms of the original policies and from the original premiums. For this reason, no reserves for premiums and losses are carried forward from one contract period to the next.

Definition of loss terms in non-proportional reinsurance
(excluding stop loss treaties)

A claims payment under an insurance cover is conditional upon an insured loss event having taken place. The loss occurrence may vary, depending on the class of business and the insured peril. The amount of the loss and the way it is made up may accordingly also vary. For example, a single large building burning to the ground constitutes a major loss for the insurance industry – but so does a large number of small and ultra-small losses caused by a windstorm. In reinsurance, excess of loss cover must therefore also be designed differently according to the various types of losses encountered in the individual classes of business.

Loss per risk
(WXL/R, Examples 8, 8.1 and 8.2)

Where insurers seek to limit the loss on any one risk by way of excess of loss (XL) reinsurance, the reinsurance cover must be designed on a per risk basis which means that each loss is regarded separately per risk. Where an event affects several risks, this will also result in several losses for the excess of loss reinsurance. What we then have is a "working excess of loss cover per risk", or WXL/R for short. "Working" because the cover is triggered by a loss on a single risk and is therefore exposed per risk. This type of excess of loss cover is used above all in fire reinsurance. The following example illustrates how it can also be used in combination with proportional reinsurance:

Example 8

The direct insurer cedes to reinsurance, on a proportional basis, risks on which the liability exceeds 50 million. Its proportional reinsurance amounts to 14 times 50 million; ie a maximum of 700 million. It is prepared to pay all losses on any one risk up to 5 million itself and goes to the reinsurer for the following per risk excess of loss cover: 45 million in excess of 5 million on the retained liability under its proportional reinsurance cover of 50 million. The insurer thus wishes to protect its retained liability per risk of 50 million by means of a WXL/R of 45 million in excess of 5 million per risk. In so doing, it knows that it will, for example, bear a loss of 5 million per risk itself if the liability on the risk does not exceed 50 million. If, on the other hand, the liability on the risk does exceed 50 million, the excess portion is reinsured on a proportional basis. In this case, the direct insurer is entitled to recover part of the loss from the surplus to the extent of the proportional cession.

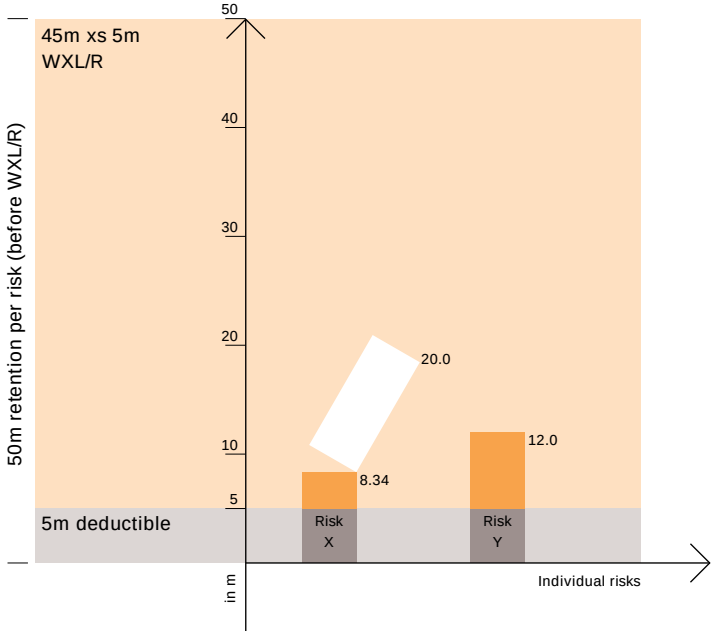
Losses (in millions)

Risk X: Sum insured 120; gross loss 20

Loss within the proportional reinsurance:	$20 \times {}^{70}/_{120} = 11.66$
Loss within the retention (before WXL/R):	$20 \times {}^{50}/_{120} = 8.34$

Risk Y: Sum insured 40; gross loss 12

Loss within the proportional reinsurance:	$12 \times {}^{0}/_{40} = 0$
Loss within the retention (before WXL/R):	$12 \times {}^{40}/_{40} = 12$



Loss of the proportional reinsurer

Loss of the WXL/R reinsurer

Loss within the insurer's net retention (after WXL/R)

Example 8.1
Assumption: Risk X with a liability (sum insured) of 120m has suffered a loss of 20m. The retained liability is 50m. The retention corresponds to 41.7% of the liability. The remaining 58.3% is ceded under proportional reinsurance. Consequently, for the excess of loss cover 41.7% of 20m is taken into account, ie 8.34m. The excess of loss reinsurer pays 3.34m, while the insurer bears 5m itself.

Example 8.2
Assumption: In the same event, Risk Y with a liability of 40m has also suffered a loss of 12m. The liability is less than 50m. The insurer has not ceded any of Risk Y on a proportional basis. The excess of loss reinsurer pays 7m, while the insurer bears 5m itself.

Although both the losses affecting Risk X and Risk Y can be attributed to the same event, the direct insurer must itself bear the deductible of 5m per risk twice. On the other hand, the reinsurer also grants the per risk excess of loss cover twice where two or more covers have been agreed.

Loss per event
(WXL/E, examples 8.3 and 8.4)

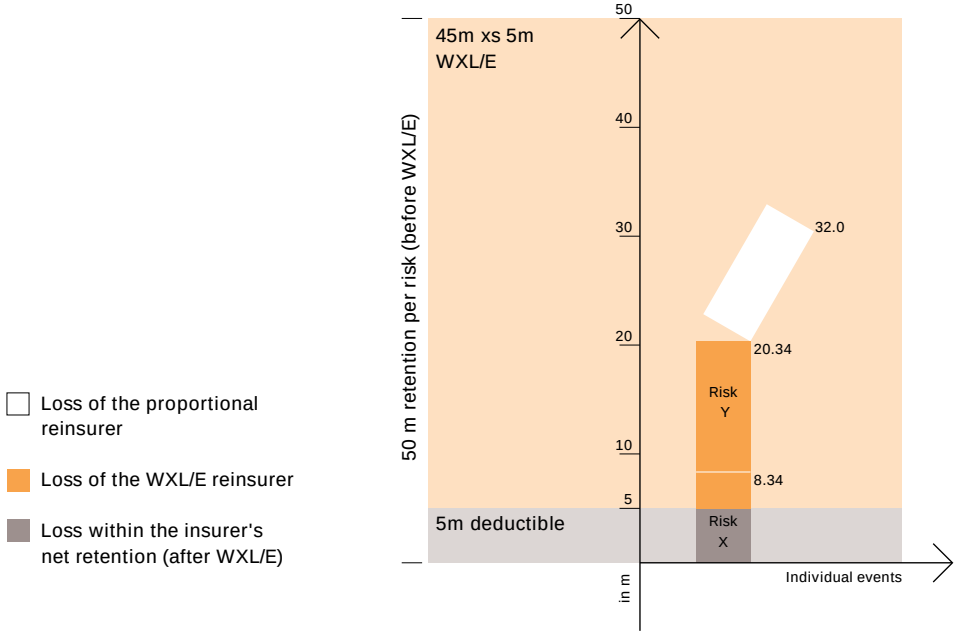
Where the insurer tries to limit the loss per event by means of excess of loss reinsurance, it is then interested in an actual "per event cover". This provides it with claims settlement irrespective of the number of possible risks affected by the loss. Whether the insurer arranges a per risk or a per event excess of loss makes a considerable difference, especially for classes of business with a significant accumulation potential. The maximum loss for the insurer's account will often be limited not only per risk but also per event (accumulation). In this case the cover is a "working excess of loss cover per event" or WXL/E. The following figures in Example 8 illustrate the differences in the way the WXL/R and WXL/E covers operate:

Example 8.3
The loss for Risk X comes to 8.34m after proportional reinsurance. The loss for Risk Y amounts to 12m. If the excess of loss has been arranged on a per event and not a per risk basis, the insurer bears 5m and the reinsurer pays 15.34m.

In this example, the insurer receives a bigger contribution to the loss from the reinsurer with a per event cover than with a WXL/R cover. The conclusion that the WXL/E cover generally offers the insurer better protection is false, however. Simple examples show that a per risk cover can also lead to higher contributions to losses from the reinsurer. This is because where an adequate number of large risks are affected by sufficiently large losses from one and the same event, the insurer with a WXL/E cover in fact runs the risk of having bought insufficient reinsurance cover.

Losses (in millions)
Risk X: Sum insured 120; gross loss 20
Loss within the proportional reinsurance 11.66;
within the retention 8.34

Risk Y: Sum insured 40; gross loss 12
Loss within retention 12



Example 8.4
If a further risk, Risk Z, with a liability of 50m, is added to the preceding example, it becomes clear that the WXL/E cover does not generally offer the insurer better protection than the WXL/R cover. Risk Z has suffered a total loss of 50m arising out of the same event. The overall loss from this event, before application of the excess of loss reinsurance, therefore amounts to 70.34m (8.34m + 12m + 50m). If the excess of loss cover is defined on a per event basis, the reinsurer pays exactly 45m; with a per risk excess of loss cover, on the other hand, the reinsurer pays 55.34m (3.34m + 7m + 45m).

This example illustrates how important the definition of the cover is for the reinsurer too: the price payable for the reinsurance cover is heavily dependent on this definition. It is therefore in the interests of insurers and reinsurers alike to reach an agreement which is clear for both sides when arranging a contract.

In the property classes of business in particular, considerable importance has to be attached to the difference between WXL/R and WXL/E cover. In the third party liability class of business on the other hand, most covers are arranged on a per event basis, as the risk is either indefinable or difficult to define (third party claims for compensation in the absence of an insured object with corresponding full value).

The accumulation loss (Cat XL, Example 8.5)

For the property classes of business in particular, reinsurers also design per event excess of loss covers which provide special protection against accumulation losses. These covers must be designed in such a way that they cannot be affected by one loss on one risk. Cover of this kind is known as "catastrophe excess of loss cover" or "CatXL" for short. The following figures are based on Example 8:

Example 8.5
Assumption: The insurer decides to buy per risk excess of loss cover for 45m in excess of the deductible of 5m per risk. It also wishes to limit its maximum liability per event in the case of an accumulation to 7.5m. For this purpose, the reinsurer provides it with a per event catastrophe excess of loss cover for 42.5m in excess of the deductible of 7.5m per event.

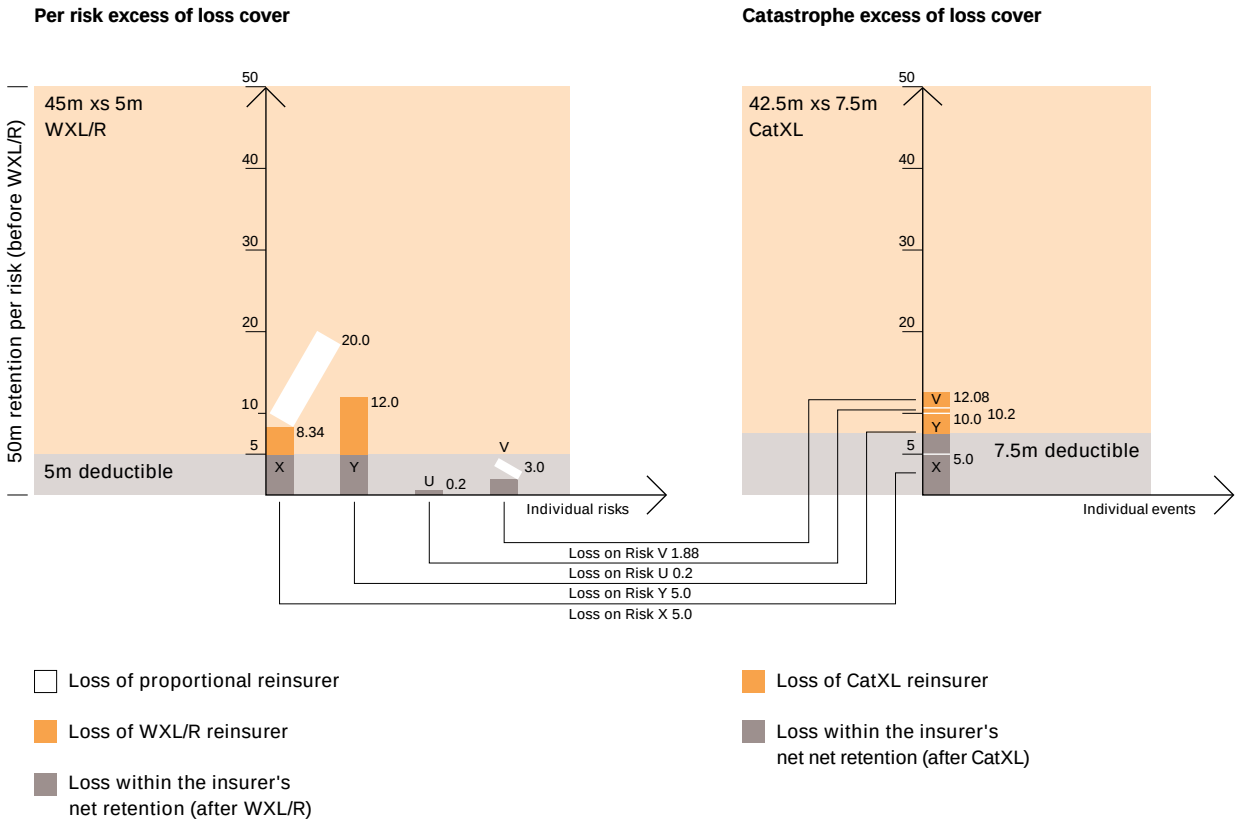
The reinsurance programme based on the example of risks X, Y, U, and V (Example 9)

Example 9
Assumption: the four risks are affected by the same loss occurrence.

The reinsurance covers:

Surplus:	Maximum liability under the retention: 50m; Contractual liability 700m (14 x 50m)
WXL/R:	Layer 45m; deductible 5m
CatXL:	Layer 42.5m; deductible 7.5m

in millions	Original liability	Gross loss	Prop. RI cover	Retention after prop. RI	WXL/R cover	Net after WXL/R
Risk X	120.00	20.00	11.66	8.34	3.34	5.00
Risk Y	40.00	12.00	0.00	12.00	7.00	5.00
Risk U	10.00	0.20	0.00	0.20	0.00	0.20
Risk V	80.00	3.00	1.12	1.88	0.00	1.88
Total gross loss		35.20				
Total prop. RI cover			12.78			
Total retention after prop. RI				22.42		
Total WXL/R cover					10.34	
Total net loss after WXL/R						12.08
CatXL cover						4.58
Net loss for the insurer after reinsurance						7.50



To sum up, Example 9 shows the following relationships:

– The catastrophe excess of loss cover can only come into operation if there is an accumulation event.
– With proportional reinsurance cover, the liability per risk for the retention can be limited to 50m.
– With the per risk working excess of loss cover of 45m, over and above a deductible of 5m on any one risk, the loss of any one risk for the net retention can be limited to 5m.
– At 5m, the highest possible loss for any one risk for the net retention lies under the per event catastrophe excess of loss deductible of 7.5m. The catastrophe excess of loss can therefore only come into operation where there is an accumulation event, and not just in respect of a single risk.

Summary of the non-proportional reinsurance covers
WXL/R, WXL/E and CatXL

– The term "loss event" needs to be defined in every excess of loss reinsurance treaty. The definition depends on the number of risks affected by a loss which are to be counted together.
– The per risk excess of loss cover protects against large major losses involving any one risk. This cover comes into operation whenever there is a loss affecting a single risk; this is why it is also known as a “working excess of loss”.
– The per event excess of loss cover, regardless of the number of risks affected, is geared to accumulations and provides protection against accumulations of losses affecting several risks. If an excess of loss cover is already triggered from a loss on one individual risk, it is termed WXL/E. If it is only triggered through losses on several risks, it is known as a CatXL. The cover must therefore be designed in such a way that it is not triggered by a single loss on a single risk. Such accumulations are true catastrophes – hence the name “catastrophe excess of loss”.

Stop loss reinsurance

Another form of non-proportional reinsurance is “aggregate excess reinsurance” or “stop loss cover”. Stop loss reinsurance is very specific and is used above all in particular classes of business (for example in hail or crop insurance). Typical here is a definition of event which is extended such that all the losses in a year of occurrence are taken into consideration. The deductible and the non-proportional reinsurance cover are fixed each year, mostly as percentages of the retained premiums written. Compared with other non-proportional reinsurance products, stop loss cover basically provides insurers with the most comprehensive protection for the business in their retention. It cannot be used to guarantee a profit for the insurer, however, as the purpose of the cover cannot be to relieve the insurer of the entrepreneurial risk. Stop loss cover can nevertheless be a useful solution where the insurer is looking for protection against a real threat to its existence as a result of an accumulation of negative influences in the same year of occurrence. The product must be designed accordingly. In particular, the reinsurer makes considerable demands as regards the balance of the portfolio which is to be covered.

This balance is achieved through combining proportional reinsurance with per risk and/or per event excess of loss covers. The stop loss or aggregate excess reinsurance cover is therefore generally applied only to the net net retention, ie to the liability remaining with the insurer once adequate reinsurances have been arranged elsewhere.

Survey of non-proportional reinsurance products

– The per risk working excess of loss (WXL/R) gives protection against losses on any one risk.
– The per event catastrophe excess of loss cover (CatXL) gives protection against losses on any one accumulation event.
– The per risk and per event excess of loss (WXL/E) is a combination between a WXL/R and a CatXL cover.
– The aggregate excess (stop loss) cover limits the burden of loss from the net net retention each year.

9 Portfolio aspects for non-proportional reinsurance

Differences between classes of business

Not every portfolio is suitable to the same extent for non-proportional reinsurance, the suitability varying from one class of business to the next. The composition of a personal accident portfolio, for example, ought to be much more homogeneous than a fire portfolio. A personal accident portfolio will accordingly be more suited to direct non-proportional reinsurance than a fire portfolio. Where the portfolio of risks is more heterogeneous, a certain degree of homogeneity must first be achieved by means of proportional reinsurance. In the fire class of business, for example, it is scarcely possible to cover a fire portfolio adequately with only excess of loss covers. The liabilities are therefore reduced beforehand by means of surplus reinsurance. The extent to which an individual gross portfolio needs to be made more homogeneous depends above all on the relevant portfolio structure.

Size in absolute terms

The absolute size of a portfolio also determines its suitability for non-proportional reinsurance. Depending on the class of business, the reinsurer can provide for different minimum sizes for the portfolio.

Ratio of claims burden to retained premium

Non-proportional reinsurance must be designed so that it covers only relatively few large losses. The ratio of the claims burden to the retained premium under an excess of loss cover is of great importance. The higher the ratio, the less affordable the price of the cover will be for the insurer.

Information for the reinsurer

Thanks to the reinsurer's knowledge of the direct insurer – including information on its portfolio and portfolio policy as well as risk aversion and financial strengths – the reinsurer can produce a risk profile and design a tailor-made cover comprising proportional and non-proportional reinsurance.

10 Claims settlement in the case of non-proportional reinsurance

For the following aspects of claims settlement, it is assumed that the excess of loss covers are defined per risk, per event and per year.

The reinsurer pays that part of the insured loss which exceeds the deductible. Consequently, only the excess losses are of interest to the reinsurer. Where a loss exceeds the priority or a certain contractually agreed portion of the deductible, the insurer then notifies the reinsurer of that loss as quickly as possible. To this end, the individual contract must clearly set out what the reference basis is for determining the loss.

Per risk excess of loss

The direct insurer has purchased a WXL cover to protect his retention following surplus treaty reinsurance: Where a working excess of loss cover on the retention after surplus reinsurance is involved, the insurer must deduct from the gross loss amount that portion which is covered by the surplus. This so-called “ultimate net loss” is then reported to the reinsurer.

Per event catastrophe excess of loss cover

The direct insurer has purchased a CatXL cover: Where the reinsurance cover has been arranged to protect the retention or the net retention after proportional reinsurance and per risk working excess of loss cover, the insurer must deduct that part of the gross loss amount which is covered by the two last-mentioned types of reinsurance. The insurer then reports these to the reinsurer.

Facultative reinsurance

The direct insurer has purchased facultative reinsurance cover for a single risk: To calculate the ultimate net loss the insurer must deduct the facultatively covered part from the gross loss amount.

Date of loss

The date of loss is decisive for the cover in respect of an excess loss. If the date of loss lies within the year of occurrence (and within the contractually agreed conditions), the loss is covered by the excess of loss reinsurance.

Payment

It is rare for a loss to have already been paid at the time when it is reported. The reinsurer pays its share only when the direct insurer also pays. The direct insurer regularly supplies the reinsurer with a statement of amounts already paid and amounts still outstanding.

Information to the reinsurer

The insurer informs the reinsurer regularly – at least once a year – of the development of individual excess losses up until their final payment. The time taken for settlement can vary, depending on the class of business. For example, fire losses are usually finally settled after about two years, whereas personal accident/third party liability claims can take several years.

Claims handling at the reinsurer's

Claims handling proceeds step by step, much as it does with direct insurance. The reinsurer handles each loss individually. Excess losses are recorded per year of occurrence and not per accounting year, as is usual in proportional reinsurance for the property class of business. The reinsurer therefore does not know the final burden of excess losses per year of occurrence until all the excess losses in a year of occurrence have finally been paid.

Stability clause (Indexation clause)

In many classes of business, a stability clause is nowadays agreed between the insurer and reinsurer for times with rising inflation rates, thereby allowing the claims burden increased by inflation to be divided more fairly between the insurer and the reinsurer. The limit of cover and deductible are indexed.

Co-reinsurance: the insurer's participation/share in the cover

Having a share in the excess of loss cover means that the insurer will also be interested in a clean claims settlement whenever a loss exceeds the deductible. The reinsurer takes account of such an insurer's participation when calculating its prices.

11 Calculating the price

The reinsurer generally calculates the premium, ie the price for granting non-proportional cover for a specific time, for a year of occurrence (ie for the excess of loss treaty year). This means that the excess of loss premium is independent of the period of cover of the original policies in the portfolio covered. Consequently, at the end of the year of occurrence the excess of loss premium has been earned in full. The reinsurer does not set up any reserves on the premiums written. The price is calculated independently of any premiums ceded in advance on a proportional basis.

Price commensurate with risk

Determining a price commensurate with the risk requires that the reinsurer is able to assess his claims expectation or the loss potential for his cover. In practice, a wide variety of methods are used for this purpose. There is no standard preference for specific methods among reinsurers, and this partly explains the widely differing prices charged by different reinsurers for the same excess of loss cover. Using the relevant information from the insurer, the reinsurer analyses the portfolio which is to be covered and draws up a risk profile. This is the desired starting situation for a reinsurer who is seeking to carry out a well-founded assessment of the excess of loss risk. The method using the loss profile from the past – ie experience rating – has its weaknesses in that it does not take sufficient account of constant change: the chance nature of losses in the past, inflation, changes in the portfolio structure and technological developments are only a few of the factors which greatly reduce the value of the loss profile from the past in estimating the claims expectation. The exposure rating method is therefore based on the loss potential. Unlike with experience rating, here it is no longer the losses which have actually occurred that are decisive, but the losses which are to be expected on the basis of the specific portfolio.

The reinsurance price

The overall technical reinsurance price is the sum of the following elements:

Risk premium

As described in the preceding section, the risk premium is the average claims burden expected from a reinsurance contract. Averaged over a good many years, the reinsurer will pay this amount back to the insurer again in the form of losses.

Contingency loading

The risk premium is an estimated value. Even if the reinsurer estimates this value correctly on average, there will still be deviations in individual cases. As the insurer tends to choose the most favourable offer, a reinsurer will become the leader mainly where it has underestimated the risk premium. This results in the risk premium being too low throughout the reinsurer's portfolio. In order to offset this effect, the reinsurer will ask for a contingency loading.

Fluctuation loading

"Taking on fluctuations" is certainly one of the shortest definitions of the basic function of reinsurance (see Section 1 of this publication). The reinsurer secures appropriate capital backing for the fluctuation taken on and must pay interest on the portion of its capital required for this. The fluctuation loading is therefore the actual price for the reinsurance – in short, the contribution to the profit from the reinsurance business. The bigger the fluctuation taken on, the higher will be the fluctuation loading which the reinsurer demands. Put fairly simply, this fluctuation potential is expressed by the ratio of "claims expectation to excess of loss cover".

Expenses

The expenses include the reinsurer's internal administration expenses, but also any external costs such as brokerage or taxes.

Types of excess of loss premiums

The reinsurer usually sets the excess of loss premium as a fixed premium rate of the written premiums for the entire business covered. Expenses are disregarded here and are not subtracted from the original premiums. Premiums ceded under proportional reinsurance do have to be deducted, however, if the excess of loss covers the insurer's retained liability after proportional reinsurance. The amount of premium remaining is known as the "gross net premium income" or GNPI. Where the retained liability is fixed at 50m, for example, all the retained premiums must be taken into account. These also include the premiums on risks for which the original liability is smaller than the retained liability. For a WXL/R of 45m in excess of 5m per risk, the premium basis for the XL premium rate is calculated as follows:

All gross premiums for all risks	4 780.5m
less portion of premium for risk with original liability over 50m ceded proportionally.	1 088.0m
GNPI	3 692.5m

Depending on the class of business and the constancy of the claims burden under the excess of loss, the premium can also be fixed as a variable rate with a minimum and maximum. The total of excess losses is expressed as a percentage of the GNPI. The XL premium rate is calculated by adding a loading. This is applied to the GNPI, completed and limited by minimum and maximum premium rates. Several different kinds of variable premium systems are available, but how commonly used they are varies depending on the class of business.

Premium payment methods

As is customary in insurance business, the direct insurer too owes the XL premium at the start of the year of cover (year of occurrence or treaty year). In practice, the reinsurer normally makes provision for a minimum premium and a deposit or advance premium as fixed amounts. The absolute amounts of both premiums are generally set at 80-90% of the estimated XL premium for the year of occurrence and are usually of the same size. At the end of the year of occurrence, the minimum premium is adjusted, the agreed XL premium rate being multiplied by the underlying premium actually written. If the amount obtained from this at the end of the year of occurrence is less than the minimum premium, the insurer pays the minimum premium. Payment is considered as completed if the same fixed amount has been arranged for deposit or advance premiums and minimum premiums. If the effective premium is higher than the minimum, the insurer pays the difference to the reinsurer.

12 Summary of obligatory non-proportional reinsurance

– The loss and not the liability of original risks is considered.
– The portion of losses which exceeds the agreed deductible is covered up to the limit of the layer.
– The covers are arranged on a year of occurrence basis. The decisive factor is whether the date of loss falls in the treaty year or not.
– The price is essentially made up of the claims expectation and the fluctuation loading.
– The price is generally set as a fixed premium rate of the underlying original premiums written.
– The underlying original premiums written are the premiums remaining for the retention after any other reinsurance has been deducted (in short: GNPI, if proportional reinsurance has been arranged beforehand).

The functions of the three main types of excess of loss are as follows:
– Protection against losses for any one risk with the per risk excess of loss cover (WXL/R).
– Protection against losses for any one accumulation event with the per event catastrophe excess of loss cover (CatXL).
– Limitation of the claims burden from the retention for any one year with the aggregate excess (stop loss) reinsurance cover.

Notes

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