Direct Your Learning

2

Types of Reinsurance and Reinsurance Program Design

Educational Objectives

After learning the content of this assignment, you should be able to:

- Describe the types of pro rata reinsurance and excess of loss reinsurance and their uses.
- Describe finite risk reinsurance and other methods that rely on capital markets as alternatives to traditional and nontraditional reinsurance.
- Describe the factors that should be considered in the design of a reinsurance program.
- Given a case, identify the reinsurance needs of an insurer and recommend an appropriate reinsurance program to address those needs.

Outline

Types of Reinsurance and Reinsurance Program Design

2

TYPES OF REINSURANCE

Each reinsurance agreement negotiated between a primary insurer and reinsurer is unique because its terms reflect the primary insurer's needs and the willingness of reinsurers in the marketplace to meet those needs. Several forms of reinsurance have been developed to serve the functions of reinsurance and to help insurers meet their goals.

The two types of reinsurance transactions are treaty reinsurance and facultative reinsurance. These types can be further categorized based on the manner in which the primary insurer and the reinsurer divide the obligations under the reinsurance agreements. The principal approaches that reinsurers use to allocate losses are broadly defined as pro rata reinsurance and excess of loss reinsurance. These types of reinsurance reflect how the primary insurer and reinsurer will share premiums, amounts of insurance, and losses.

The exhibit shows the types of reinsurance and their relationships, and augments the description of the subcategories of pro rata and excess of loss reinsurance. In practice, a reinsurance agreement might contain several of the various types of reinsurance agreements to meet the specific needs of a primary insurer. Unlike primary insurance contracts, reinsurance agreements are not standardized. See the exhibit "Types of Reinsurance."

Pro Rata Reinsurance

Under **pro rata reinsurance**, or proportional reinsurance, the primary insurer cedes a portion of the original insurance premiums to the reinsurer as a reinsurance premium. The reinsurer usually pays the primary insurer a ceding commission for the loss exposures ceded. The ceding commission reimburses the primary insurer for policy acquisition expenses incurred when the underlying policies were sold. In addition to policy acquisition expenses, insurers incur **loss adjustment expenses**. Loss adjustment expenses that can be related to a specific loss are usually shared proportionately by the primary insurer and the reinsurer.

The amount of insurance, the premium, and the losses (including loss adjustment expenses) are divided between the primary insurer and the reinsurer in the same proportions as the risk. For example, if the reinsurer covers 60 percent of the liability for each loss exposure the primary insurer insures, then the reinsurer would be entitled to 60 percent of the policy premiums and would be responsible for 60 percent of each loss. The amount of the ceding

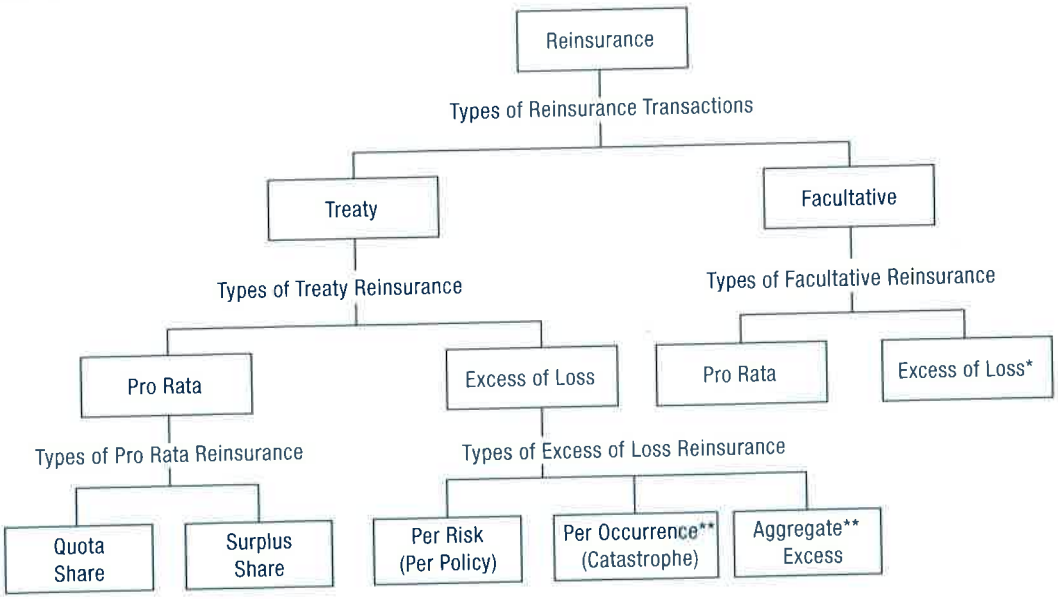
Pro rata reinsurance

A type of reinsurance in which the primary insurer and reinsurer proportionately share the amounts of insurance, policy premiums, and losses (including loss adjustment expenses).

Loss adjustment expense (LAE)

The expense that an insurer incurs to investigate, defend, and settle claims according to the terms specified in the insurance policy.

Types of Reinsurance



* Excess of loss reinsurance written on a facultative basis is always on a per-risk or per-policy basis.

** Per occurrence and aggregate excess of loss reinsurance relate to a type of insurance, a territory, or the primary insurer's entire portfolio of in-force loss exposures rather than to a specific policy or a specific loss exposure.

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commission paid to the primary insurer is usually negotiated and is taken from the reinsurance premium remitted to the reinsurer. When the ceding commission is a fixed percentage of the ceded premium with no adjustment for the primary insurer's loss experience, it is referred to as a **flat commission**.

Flat commission
A ceding commission that is a fixed percentage of the ceded premiums.

The reinsurance agreement may also include a **profit-sharing commission**, or profit commission, which is negotiated and paid to the primary insurer after the end of the treaty year if the reinsurer earns greater-than-expected profits on the reinsurance agreement. The profit-sharing commission percentage is predetermined and applied to the reinsurer's excess profits; that is, the profits remaining after losses, expenses, and the reinsurer's minimum margin for profit are deducted. Profit commission is also called "contingent commission" because its payment is contingent on the reinsurance agreement's profitability.

Profit-sharing commission
A ceding commission that is contingent on the reinsurer realizing a predetermined percentage of excess profit on ceded loss exposures.

Sometimes, as an alternative to the flat commission and profit-sharing commission, the ceding commission initially paid to the primary insurer may be adjusted to reflect the actual profitability of the reinsurance agreement. This type of commission is called a **sliding scale commission** and could result in the commission being lower than the commission initially paid.

Sliding scale commission
A ceding commission based on a formula that adjusts the commission according to the profitability of the reinsurance agreement.

Pro rata reinsurance is generally chosen by newly incorporated insurers or insurers with limited capital because it is effective in providing surplus relief. Its effectiveness results from the practice of paying ceding commissions under pro rata treaties, a practice not common under excess of loss treaties.

Pro rata reinsurance can be identified as either quota share or surplus share. The principal difference between them is how each one indicates the primary insurer's retention.

Quota Share Reinsurance

The distinguishing characteristic of **quota share reinsurance** is that the primary insurer and the reinsurer use a fixed percentage in sharing the amounts of insurance, policy premiums, and losses (including loss adjustment expenses). Quota share reinsurance can be used with both property insurance and liability insurance but is more frequently used in property insurance.

Quota share reinsurance
A type of pro rata reinsurance in which the primary insurer and the reinsurer share the amounts of insurance, policy premiums, and losses (including loss adjustment expenses) using a fixed percentage.

For example, an insurer may arrange a reinsurance treaty in which it retains 45 percent of policy premiums, coverage limits, and losses while reinsuring the remainder. Such a treaty would be called a "55 percent quota share treaty" because the reinsurer accepts 55 percent of the liability for each loss exposure subject to the treaty.

Most reinsurance agreements specify a maximum dollar limit above which responsibility for additional coverage limits or losses reverts to the primary insurer (or is taken by another reinsurer). With a pro rata reinsurance agreement, that maximum dollar amount is stated in terms of the coverage limits of each policy subject to the treaty. For example, a primary insurer and a reinsurer may share amounts of insurance, policy premiums, and losses on a 45 percent and 55 percent basis, respectively, subject to a $1 million maximum coverage amount for each policy.

In addition to a maximum coverage amount limitation, some pro rata reinsurance agreements include a per occurrence limit, which restricts the primary insurer's reinsurance recovery for losses originating from a single occurrence. This per occurrence limit may be stated as an aggregate dollar amount or as a **loss ratio** cap. The per occurrence limit diminishes the usefulness of pro rata reinsurance in protecting the primary insurer from the effects of catastrophic events. Primary insurers exposed to catastrophic losses usually include **catastrophe excess of loss reinsurance** in their reinsurance programs.

Loss ratio
A ratio that measures losses and loss adjustment expenses against earned premiums and that reflects the percentage of premiums being consumed by losses.

Catastrophe excess of loss reinsurance
A type of excess of loss reinsurance that protects the primary insurer from an accumulation of retained losses that arise from a single catastrophic event.

The exhibit shows how the amounts of insurance, policy premiums, and losses would be shared between a primary insurer and a reinsurer for three policies subject to a quota share treaty. See the exhibit "Quota Share Reinsurance Example."

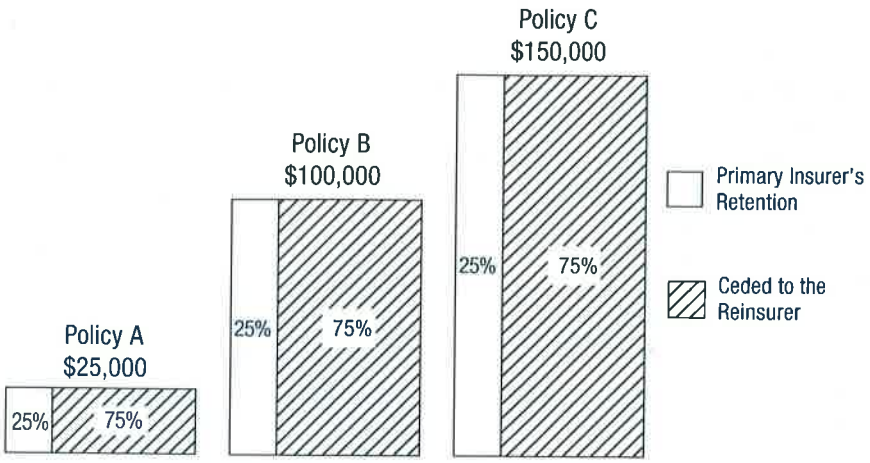
Quota Share Reinsurance Example

Brookgreen Insurance Company has a quota share treaty with Cypress Reinsurer. The treaty has a $250,000 limit, a retention of 25 percent, and a cession of 75 percent. The following three policies are issued by Brookgreen Insurance Company and are subject to the pro rata 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 Quota Share Treaty

	Brookgreen Insurance Retention (25%)	Cypress Reinsurance Cession (75%)	Total
Policy A			
Amounts of insurance	$6,250	$18,750	$25,000
Premiums	100	300	400
Losses	2,000	6,000	8,000
Policy B			
Amounts of insurance	$25,000	$75,000	$100,000
Premiums	250	750	1,000
Losses	2,500	7,500	10,000
Policy C			
Amounts of insurance	$37,500	$112,500	$150,000
Premiums	375	1,125	1,500
Losses	15,000	45,000	60,000



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These observations can be made about quota share reinsurance:

- Because the retention and cession amounts are each a fixed percentage, the dollar amount of the retention and the dollar amount of the cession change as the amount of insurance changes. On policies with higher amounts of insurance, the primary insurer will have a higher dollar retention.
- Because the primary insurer cedes a fixed percentage under a quota share treaty, even policies with low amounts of insurance that the primary insurer could safely retain are reinsured.
- Quota share treaties are straightforward because of the fixed percentage used in sharing premiums and losses. The primary insurer can combine premium and loss amounts and determine the amounts owed to the reinsurer in premiums and owed by the reinsurer in losses.
- Because the primary insurer and the reinsurer share liability for every loss exposure subject to the quota share treaty, the reinsurer is usually not subject to adverse selection. The loss ratio for the reinsurer is the same as that of the primary insurer for the ceded loss exposures.

One type of quota share treaty, a **variable quota share treaty**, has the advantage of enabling a primary insurer to retain a larger proportion of the small loss exposures that are within its financial capability to absorb, while maintaining a safer and smaller retention on larger loss exposures.

Variable quota share treaty

A quota share reinsurance treaty in which the cession percentage retention varies based on specified predetermined criteria such as the amount of insurance needed.

Surplus Share Reinsurance

The distinguishing characteristic of **surplus share reinsurance** is that when an underlying policy's total amount of insurance exceeds a stipulated dollar amount, or line, the reinsurer assumes the surplus share of the amount of insurance (the difference between the primary insurer's line and the total amount of insurance). Surplus share reinsurance is typically used only with property insurance.

Surplus share reinsurance

A type of pro rata reinsurance in which the policies covered are those whose amount of insurance exceeds a stipulated dollar amount, or line.

The primary insurer and the reinsurer share the policy premiums and losses proportionately. The primary insurer's share of the policy premiums and losses is the proportion that the line bears to the total amount of insurance. The reinsurer's share of the premiums and losses is the proportion that the amount ceded bears to the total. For example, if the line is $50,000 and the amount ceded is $200,000, the primary insurer would receive 20 percent ($50,000 ÷ $250,000) of the policy premium and pay 20 percent of all losses, while the reinsurer would receive 80 percent ($200,000 ÷ $250,000) of the policy premium and pay 80 percent of all losses.

The exhibit shows how a primary insurer and a reinsurer would share amounts of insurance, policy premiums, and losses under a surplus share treaty using the same three policies shown in the quota share treaty exhibit. See the exhibit "Surplus Share Reinsurance Example."

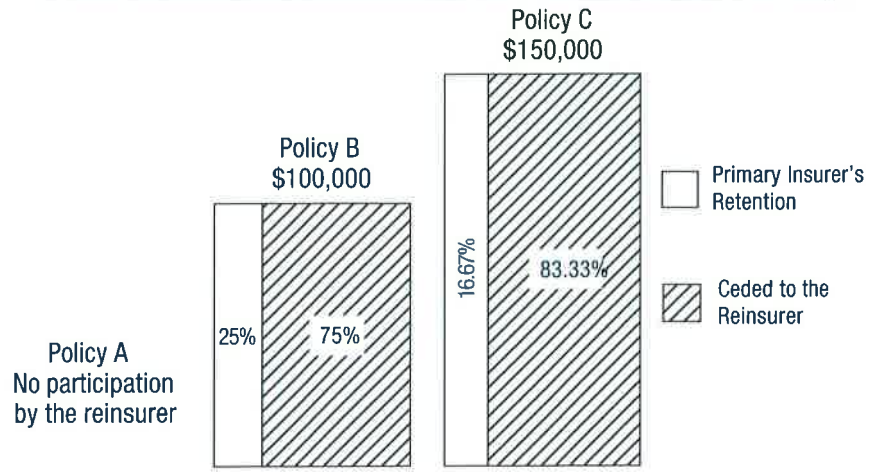
Surplus Share Reinsurance Example

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



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The reinsurance limit—the total limit or capacity—of a surplus share treaty is expressed in multiples of the primary insurer's line. A primary insurer with a nine-line surplus share treaty has the capacity under the treaty to insure loss exposures with amounts of insurance that exceed its retention by a multiple of nine. For example, if the line is $300,000 for a nine-line surplus share treaty, the primary insurer has a total underwriting capacity of $3 million, calculated as the $300,000 line, plus nine multiples of that $300,000 line. In addition to being expressed as a number of lines, the reinsurance limit of a surplus share treaty can also be expressed as an amount of insurance the reinsurer is willing to provide, such as $2.7 million ($300,000 multiplied by nine lines).

These observations can be made about surplus share reinsurance:

- The surplus share treaty does not cover policies with amounts of insurance that are less than the primary insurer's line. Many primary insurers use surplus share reinsurance instead of quota share reinsurance so that they do not have to cede any part of the liability for loss exposures that can be safely retained.
- The amount of insurance for a large number of loss exposures may be too small to be ceded to the treaty but, in the aggregate, may cause the primary insurer to incur significant losses that are not reinsured. For example, many homeowners policies in the same region that do not exceed the primary insurer's line could incur extensive losses from a single occurrence, such as a hurricane.
- Because the percentage of policy premiums and losses varies for each loss exposure ceded, surplus share treaties are more costly to administer than quota share treaties. Primary insurers must keep records and, in many cases, periodically provide the reinsurer with a report called a **bordereau**.
- Surplus share treaties may provide surplus relief to the primary insurer because the reinsurer usually pays a ceding commission for those policies ceded. Loss exposures with amounts of insurance that are less than the primary insurer's line are not reinsured, so a surplus share treaty typically provides less surplus relief than does a quota share treaty.

Unlike the simplified example shown in the "Surplus Share Reinsurance Example" exhibit, many surplus share treaties allow the primary insurer to increase its line from a minimum amount to a maximum amount, depending on the potential loss severity of the exposed limit. For example, Brookgreen Insurance Company's surplus share treaty may allow the company to increase its line on a "superior" loss exposure from $25,000 to $50,000. In this case, the nine-line surplus share treaty would give Brookgreen Insurance Company the large line capacity to insure loss exposures with amounts of insurance as large as $500,000, which is calculated as the $50,000 line plus nine multiplied by the $50,000 line. The primary insurer's ability to vary its line also allows it to retain some loss exposures it may otherwise be required to cede. The flexibility provided by the reinsurer in the surplus share treaty is usually communicated to the primary insurer's underwriters through a **line guide**, or line authorization guide.

Bordereau

A report the primary insurer provides periodically to the reinsurer that contains a history of all loss exposures reinsured under the treaty.

Line guide

A document that provides the minimum and maximum line a primary insurer can retain on a loss exposure.

When the total underwriting capacity of the primary insurer's surplus share treaty is insufficient to meet its large-line capacity needs, the primary insurer can arrange for additional surplus share reinsurance from another reinsurer. When a primary insurer arranges more than one surplus share treaty, the surplus share treaty that applies immediately above the primary insurer's line is referred to as the first surplus. Other surplus share treaties are referred to in the order that they provide additional large-line capacity, such as second or third surplus treaties.

Excess of Loss Reinsurance

Excess of loss reinsurance (nonproportional reinsurance)

A type of reinsurance in which the primary insurer is indemnified for losses that exceed a specified dollar amount.

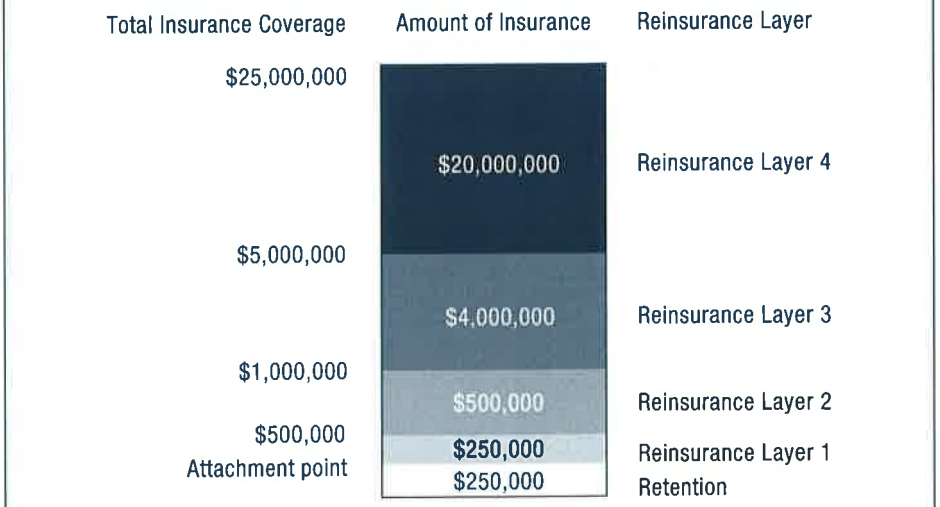
Attachment point

The dollar amount above which the reinsurer responds to losses.

In an **excess of loss reinsurance** agreement, also called "non-proportional reinsurance," the reinsurer responds to a loss only when the loss exceeds the primary insurer's retention, often referred to as the **attachment point**. The primary insurer fully retains losses that are less than the attachment point, and will sometimes be required by the reinsurer to also retain responsibility for a percentage of the losses that exceed the attachment point.

Excess of loss reinsurance can be visualized as a layer, or a series of layers, of reinsurance on top of the primary insurer's retention. See the exhibit "How Excess of Loss Reinsurance Is Layered."

How Excess of Loss Reinsurance Is Layered



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An excess of loss reinsurer's obligation to indemnify the primary insurer for losses depends on the amount of the loss and the layer of coverage the reinsurer provides. The reinsurer providing the first layer of excess of loss reinsurance shown in the exhibit would indemnify the primary insurer for

losses that exceed $250,000 (the attachment point) up to total incurred losses of $500,000. This reinsurer describes its position in the primary insurer's excess of loss reinsurance program as being "$250,000 in excess of (denoted as 'xs') $250,000." The reinsurer in the second layer of the excess of loss reinsurance program would indemnify the primary insurer for losses that exceed $500,000 up to total incurred losses of $1 million, or "$500,000 xs $500,000." Losses that exceed the capacity of the primary insurer's excess of loss reinsurance remain the primary insurer's responsibility unless otherwise reinsured. In the exhibit, loss amounts in excess of $25 million are the primary insurer's responsibility.

Excess of loss reinsurance premiums are negotiated based on the likelihood that losses will exceed the attachment point. The reinsurance premium for excess of loss reinsurance is usually stated as a percentage (often called a rate) of the policy premium charged by the primary insurer (often called the **subject premium** or underlying premium). Therefore, unlike quota share and surplus share reinsurance, the excess of loss reinsurer receives a nonproportional share of the premium.

Subject premium
The premium the primary insurer charges on its underlying policies and to which a rate is applied to determine the reinsurance premium.

Generally, reinsurers do not pay ceding commissions under excess of loss reinsurance agreements. However, the reinsurer may reward the primary insurer for favorable loss experience by paying a profit commission or reducing the rate used in calculating the reinsurance premium.

The primary insurer's attachment point is usually set at a level where claims that are expected are retained. However, if the primary insurer's volume of losses is expected to be significant, an excess of loss reinsurance agreement may have a low attachment point. This type of reinsurance agreement is sometimes referred to as a **working cover**. A working cover enables the primary insurer to spread its losses over several years. The primary insurer and the reinsurer anticipate that profitable years will offset unprofitable ones. Primary insurers selling a type of insurance with which they have little expertise may choose to purchase a working cover until they better understand the frequency and severity of losses that the portfolio for that particular type of insurance produces. Reinsurers typically require a working cover to contain an occurrence limitation of two or three times the reinsurance limit. This requirement prevents the working cover from being exposed to catastrophic events, such as an earthquake.

Working cover
An excess of loss reinsurance agreement with a low attachment point.

Sometimes a **co-participation provision** is contained within an excess of loss reinsurance agreement. The purpose of this provision is to provide the primary insurer with a financial incentive to efficiently manage losses that exceed the attachment point. A co-participation provision is usually denoted by specifying a percentage before the position of its layer. For example, if the fourth layer in the "How Excess of Loss Reinsurance Is Layered" exhibit had a 5 percent co-participation provision, that layer would be specified as "95% of $20,000,000 xs $5,000,000."

Co-participation provision
A provision in a reinsurance agreement that requires the primary insurer to retain a specified percentage of the losses that exceed its attachment point.

In addition to indemnifying losses in a layer of coverage, the reinsurer's obligation may also extend to payment of loss adjustment expenses. Loss adjustment expenses are often a substantial insurer expense, especially for insurance for liability loss exposures. Therefore, excess of loss reinsurance agreements are usually very specific regarding how loss adjustment expenses attributable to specific losses are handled. In rare circumstances, they may be excluded from the reinsurance agreement, but these are the two most common approaches to handling loss adjustment expenses:

- Prorate the loss adjustment expenses between the primary insurer and the reinsurer based on the same percentage share that each is responsible for the loss. This approach is commonly referred to as "*pro rata* in addition."
- Add the loss adjustment expenses to the amount of the loss when applying the attachment point of the excess of loss reinsurance agreement. This approach is commonly referred to as "loss adjustment expense included in the limit."

If loss adjustment expenses are prorated, the primary insurer pays all of the loss adjustment expenses when the loss amount does not exceed the attachment point. If loss adjustment expenses are added to the loss amount, the reinsurer may have to pay a claim in which the loss amount alone does not exceed the attachment point. Primary insurers and reinsurers usually assess the potential for loss adjustment expenses independent of the actual loss potential when negotiating the excess of loss reinsurance agreement. Commonly, reinsurance agreements provide that loss adjustment expenses are prorated for property insurance and most types of liability insurance. However, excess of loss reinsurance covering liability insurance that usually involves substantial litigation often specifies that loss adjustment expenses are added to the amount of the loss when applying the attachment point. For instance, medical malpractice insurance often involves substantial loss adjustment expenses in the form of legal fees even if the claim can be settled with a nominal loss payment or no payment at all.

There are five types of excess of loss reinsurance, each of which usually has a specific use. See the exhibit "Five Types of Excess of Loss Reinsurance."

Five Types of Excess of Loss Reinsurance

1. Per risk excess of loss
2. Catastrophe excess of loss
3. Per policy excess of loss
4. Per occurrence excess of loss
5. Aggregate excess of loss

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Per Risk Excess of Loss

The first type of excess of loss reinsurance is **per risk excess of loss reinsurance**, which is often referred to as property per risk excess of loss and is generally used with property insurance. It applies separately to each loss occurring to each risk, with the primary insurer usually determining what constitutes one risk (loss exposure).

Per risk excess of loss reinsurance

A type of excess of loss reinsurance that covers property insurance and that applies separately to each loss occurring to each risk.

The exhibit indicates how a reinsurer would respond if the primary insurer defined three separate buildings under a per risk excess of loss reinsurance agreement as three separate risks. In this example, a tornado damaged all three buildings in one occurrence. Because each building is a risk, the attachment point and reinsurance limit apply separately to each. The attachment point and reinsurance limit are stated as a dollar amount of loss. See the exhibit "Example of Per Risk Excess of Loss Reinsurance Applying $950,000 xs $50,000."

Example of Per Risk Excess of Loss Reinsurance Applying $950,000 xs $50,000

Building Number	Loss Amount	Primary Insurer's Retention	Reinsurer's Payment
1	$ 500,000	$ 50,000	$ 450,000
2	350,000	50,000	300,000
3	700,000	50,000	650,000
Total	$1,550,000	$150,000	$1,400,000

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Per occurrence limits are commonly included with per risk excess of loss reinsurance agreements. A per occurrence limit restricts the amount that the reinsurer pays as the result of a single occurrence affecting multiple risks. Had a per occurrence limit of $1 million been imposed in the example in the exhibit, the reinsurer would have been responsible for only $1 million of losses (instead of $1.4 million) because the three losses arose out of the same occurrence (the tornado). Catastrophe excess of loss reinsurance is usually purchased in conjunction with per risk excess of loss reinsurance to protect the primary insurer from one occurrence affecting multiple risks.

Catastrophe Excess of Loss

The second type of excess of loss reinsurance is catastrophe excess of loss reinsurance, which protects the primary insurer from an accumulation of retained losses that arise from a single catastrophic event. It may be purchased to protect the primary insurer and its reinsurers on a combined basis but is

more frequently purchased to protect the primary insurer on a net basis after all other reinsurance recoveries are made. Examples of catastrophic events include tornadoes, hurricanes, and earthquakes. Such events, especially major hurricanes, can result in losses totaling billions of dollars.

As with per risk excess of loss reinsurance, the attachment point and reinsurance limit for catastrophe excess of loss reinsurance are stated as dollar amounts of loss. The attachment point is subject to negotiation, but it is usually set high enough so that it would be exceeded only if the aggregation of losses from a catastrophe would impair the policyholders' surplus of a primary insurer. Additionally, losses exceeding the attachment point are usually subject to a co-participation provision.

Loss occurrence clause

A reinsurance agreement clause that defines the scope of a catastrophic occurrence for the purposes of the agreement.

Because the attachment point and reinsurance limit apply separately to each catastrophe occurring during a policy period, the catastrophe excess of loss reinsurance agreement defines the scope of a catastrophic occurrence through a **loss occurrence clause** (sometimes called an hours clause). The loss occurrence clause specifies a time period, in hours, during which the primary insurer's losses from the same catastrophic occurrence can be aggregated and applied to the attachment point and reinsurance limits of the catastrophe excess of loss reinsurance agreement. Such clauses usually specify a time period of 72 consecutive hours (three days) for hurricane losses and 168 consecutive hours (seven days) for earthquake losses. When making a claim against the catastrophe excess of loss reinsurance agreement, the primary insurer can usually choose the date and time when the period of consecutive hours commences to maximize the amount of recovery under the agreement. The exhibit provides an example of the operation of a loss occurrence clause in a catastrophe excess of loss reinsurance agreement and shows how a primary insurer can select the period of coverage to its advantage. See the exhibit "Example of the Operation of a Loss Occurrence Clause in a Catastrophe Excess of Loss Reinsurance Agreement."

In this example, the primary insurer sustains $8 million in losses from a hurricane over a four-day period. The primary insurer has a $6 million xs $1 million catastrophe excess of loss reinsurance treaty with a loss occurrence clause that stipulates a period of seventy-two consecutive hours for a hurricane. In this simplified example, selecting the specific hour of the day that coverage begins is not an issue, and no co-participation provision applies. Given the distribution of losses over the four days, the primary insurer should elect to start the seventy-two-hour period on the second day to maximize its reinsurance recovery.

Payments from the reinsurer to the primary insurer for catastrophe losses reduce the reinsurance coverage limits available for future losses, but catastrophe excess of loss reinsurance agreements often include a provision requiring the primary insurer to pay an additional premium to reinstate the limits of the agreement after a loss. This provision allows the reinsurer to obtain additional premiums and gives the primary insurer confidence that sufficient

Example of the Operation of a Loss Occurrence Clause in a Catastrophe Excess of Loss Reinsurance Agreement

Day	Losses	Period of Coverage Providing Maximum Recovery
1	$1,000,000	
2	1,000,000	
3	2,000,000	← $7,000,000
4	4,000,000	
Total	$8,000,000	

The total losses that could potentially be applied to the reinsurance agreement are $7 million if the seventy-two-hour period starts on the second day, as opposed to $4 million if the period had started on the first day.

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limits are available should another catastrophe occur during the reinsurance agreement's term.

Primary insurers and their reinsurers usually do not anticipate that the catastrophe excess of loss reinsurance will be triggered every year. Catastrophe protection is purchased for the unlikely, but possible, event that may cause unstable operating results or that cannot be absorbed by the primary insurer's policyholders' surplus. A primary insurer's need for catastrophe reinsurance and the amount purchased depends on its catastrophe loss exposures. The exhibit provides an example of how the amount of loss retained by the primary insurer and the amount of loss owed by the reinsurer are determined under catastrophe excess of loss reinsurance. See the exhibit "Catastrophe Excess of Loss Reinsurance Example."

Per Policy Excess of Loss

The third type of excess of loss reinsurance, **per policy excess of loss reinsurance**, is used primarily with liability insurance. The exhibit provides an example of how a reinsurer would respond under a $900,000 xs $100,000 per policy excess of loss treaty. In this example, three separate general liability policies issued by the same primary insurer incur losses from *separate events*. See the exhibit "Example of Per Policy Excess of Loss Reinsurance Applying $900,000 xs $100,000."

Per Occurrence Excess of Loss

Per occurrence excess of loss reinsurance, the fourth type of excess of loss reinsurance, is usually used for liability insurance. It applies the attachment point and the reinsurance limit to the total losses arising from a single

Per policy excess of loss reinsurance

A type of excess of loss reinsurance that applies the attachment point and the reinsurance limit separately to each insurance policy issued by the primary insurer regardless of the number of losses occurring under each policy.

Per occurrence excess of loss reinsurance

A type of excess of loss reinsurance that applies the attachment point and reinsurance limit to the total losses arising from a single event affecting one or more of the primary insurer's policies.

Catastrophe Excess of Loss Reinsurance Example

Brookgreen Insurance Company (Brookgreen) decides to sell earthquake coverage in southern California but wants to limit its losses to approximately $1 million from any one earthquake. Brookgreen conducted a study and estimated that its maximum loss from any one earthquake, given its spread of earthquake loss exposures in southern California, would be $10 million. Brookgreen purchases catastrophe excess of loss reinsurance of 95 percent of $9,250,000 xs $750,000. If Brookgreen were to sustain a $10 million loss from an earthquake, it would retain $1,212,500 and the reinsurer would pay $8,787,500. These figures are calculated as follows:

Step 1—Determination of the loss amount exceeding the attachment point

Amount exceeding the attachment point	=	Amount of loss (subject to the reinsurance limit)	–	Retention
	=	$10,000,000	–	$750,000
	=	$9,250,000		

Step 2—Determination of the co-participation

Amount of co-participation	=	Amount exceeding the attachment point	×	Co-participation percentage
	=	$9,250,000	×	0.05
	=	$462,500		

Step 3—Determination of the amount of loss owed by the reinsurer

Amount owed by the reinsurer	=	Amount exceeding the attachment point	–	Amount of co-participation
	=	$9,250,000	–	$462,500
	=	$8,787,500		

Step 4—Determination of the amount retained by Brookgreen

Amount retained by Brookgreen	=	Retention	+	Amount of co-participation
	=	$750,000	+	$462,500
	=	$1,212,500		

[DA05088]

event affecting one or more of the primary insurer's policies. See the exhibit "Example of Per Occurrence Excess of Loss Reinsurance Applying $4,900,000 xs $100,000."

The exhibit provides an example of how a per occurrence excess of loss treaty applies to the three policies used in the "Example of Per Policy Excess of Loss Reinsurance Applying $900,000 xs $100,000" exhibit. In the exhibit, a $100,000 attachment point applies to the total losses of the policies covering the same event, and there is a $4.9 million reinsurance limit. A per

Example of Per Policy Excess of Loss Reinsurance Applying $900,000 xs $100,000

Primary Insurer has a $900,000 xs $100,000 per policy excess of loss treaty. The table below shows three policies for which Primary Insurer is indemnified by Reinsurer because the amount of loss arising out of each of the policies exceeds Primary Insurer's attachment point.

Policy	Loss Amount	Primary Insurer's Retention	Reinsurer's Payment
1	$ 300,000	$ 100,000	$ 200,000
2	500,000	100,000	400,000
3	600,000	100,000	500,000
Total	$1,400,000	$300,000	$1,100,000

[DA05094]

Example of Per Occurrence Excess of Loss Reinsurance Applying $4,900,000 xs $100,000

Primary Insurer has a $4,900,000 xs $100,000 per occurrence excess of loss treaty. The table below shows how losses are accumulated to determine whether the attachment point has been exceeded. Primary Insurer is indemnified by Reinsurer because the total amount of the loss arising out of all three policies exceeds Primary Insurer's attachment point.

Policy	Loss Amount		Primary Insurer's Retention		Reinsurer's Payment
1	$ 300,000				
2	500,000				
3	600,000				
Total	$1,400,000	=	$100,000	+	$1,300,000

[DA05095]

occurrence excess of loss treaty covering liability insurance usually has an attachment point that is less than the highest liability policy limit offered by the primary insurer.

Clash cover, a type of per occurrence excess of loss reinsurance for liability loss exposures, can be provided for a combination of different types of liability insurance, including auto liability, general liability, professional liability, and workers compensation. Clash cover has an attachment point higher than any of the limits of the applicable underlying policies.

Clash cover

A type of per occurrence excess of loss reinsurance for liability loss exposures that protects the primary insurer against aggregations of losses from one occurrence that affects several insureds or several types of insurance.

For example, a primary insurer could issue a workers compensation policy and a general liability policy with an each occurrence limit of $1 million. To obtain higher limits of coverage for an occurrence that may involve injury to both employees and nonemployees, a clash cover could be purchased in layers. If an explosion results in both workers compensation and general liability claims, the primary insurer would be covered by the clash cover because the claims arise from a single occurrence (the explosion). The clash cover retention is not in addition to the retention of any other applicable per occurrence excess of loss reinsurance; it is net of those retentions.

As another example, Brookgreen Insurance Company (Brookgreen) insures the general liability loss exposure of six contractors working on a single job site. Each of the six contractors' policies has a limit of $1 million. Brookgreen has per occurrence excess of loss reinsurance of $3 million xs $250,000. Brookgreen also has a clash cover of $3 million xs $1 million. An explosion injures employees and nonemployees. The injured parties are awarded damages that total $6 million from the six contractors' policies. The losses from this single occurrence are paid as indicated in the exhibit. See the exhibit "Application of a Clash Cover to One Occurrence Involving Multiple Claims."

Application of a Clash Cover to One Occurrence Involving Multiple Claims

Policy	Damages	Brookgreen Insurance Co. Retention	Per Occurrence Reinsurer	Clash Cover Reinsurer
1	$1,000,000	$ 250,000	$ 750,000	$ 0
2	1,000,000	—	1,000,000	0
3	1,000,000	—	1,000,000	0
4	1,000,000	750,000	250,000	0
5	1,000,000	—	Limit exhausted	1,000,000
6	1,000,000	—	—	1,000,000
Total	$6,000,000	$1,000,000	$3,000,000	$2,000,000

[DA05096]

Brookgreen exhausted its per occurrence excess of loss reinsurance retention ($250,000) with payment of the $1 million loss from Policy 1. The per occurrence excess of loss reinsurer paid the remaining losses until the per occurrence limit of $3 million was exhausted. Brookgreen paid the remaining $750,000 under Policy 4 to fulfill its $1 million retention under the clash cover. The clash cover reinsurer then paid the remaining losses.

Both catastrophe excess of loss reinsurance (for property insurance) and clash cover (for liability insurance) are also referred to as pure risk covers because they are expected to cover only rare events, not common claims covered by other excess of loss treaties.

Clash cover may be useful for types of liability insurance in which loss adjustment expenses are likely to be very high and the underlying per occurrence reinsurance limits include these expenses rather than pro rate them. Examples include professional liability (such as medical malpractice, directors and officers liability, and accountants professional liability) and expenses associated with environmental claims (for example, asbestos and pollution liability). Primary insurers also use clash cover when they want protection from extracontractual damages and excess of policy limits losses.

Extracontractual damages are damages awarded to an insured as a result of an insurer improperly handling a claim. This improper behavior is known as bad faith, and it implies that the insurer has failed to deal fairly with the insured. Damages awarded to an insured for an insurer's bad faith in claim handling are usually not considered to be a loss covered by the underlying policy and therefore are usually not subject to indemnification by a reinsurer unless the reinsurance agreement specifically provides coverage.

Extracontractual damages
Damages awarded to the insured as a result of the insurer's improperly handling a claim.

Excess of policy limits losses result when an insured sues an insurer for failing to settle a claim within the insured's policy limits when the insurer had the opportunity to do so. Excess of policy limits losses are also extracontractual obligations of the insurer but are usually distinguished from extracontractual damages by reinsurers because they are covered losses that, as a result of a mistake of the primary insurer, exceed policy limits. As with other extracontractual obligations, the reinsurance agreement specifies whether excess of policy limits losses are subject to indemnification by the reinsurer.

Excess of policy limits loss
A loss that results when an insured sues an insurer for failing to settle a claim within the insured's policy limits when the insurer had the opportunity to do so.

Aggregate Excess of Loss

The fifth type of excess of loss reinsurance is **aggregate excess of loss reinsurance**. This type of excess of loss reinsurance can be used for property or liability insurance and covers aggregated losses that exceed the attachment point and occur over a stated period, usually one year. The attachment point in an aggregate excess of loss treaty can be stated as a dollar amount of loss or as a loss ratio. When the attachment point is stated as a loss ratio, the treaty is called "stop loss reinsurance." With stop loss reinsurance, the primary insurer's retention may be a loss ratio of 90 percent, and the reinsurer would indemnify losses up to a loss ratio of 120 percent. The reinsurance agreement in this instance would specify the attachment point and reinsurance limit as "30% xs 90% loss ratio." The primary insurer retains responsibility for losses above a loss ratio of 120 percent.

Aggregate excess of loss reinsurance
A type of excess of loss reinsurance that covers aggregated losses that exceed the attachment point, stated as a dollar amount of loss or as a loss ratio, and that occur over a specified period, usually one year.

Aggregate excess of loss treaties are less common and can be more expensive than the other types of excess of loss reinsurance. The treaty usually specifies an attachment point and reinsurance limit that does not result in the pri-

mary insurer earning a profit on the reinsured policies when the policies were unprofitable overall. Most aggregate excess of loss treaties also contain a co-participation provision of 5 to 10 percent to provide the primary insurer with an incentive to efficiently handle claims that exceed the attachment point. See the exhibit "Aggregate Excess of Loss Reinsurance Example."

Aggregate Excess of Loss Reinsurance Example

Brookgreen Insurance Company (Brookgreen) offers liability insurance to a tavern. This general liability policy has an each occurrence limit of $1 million and a general aggregate limit (capping the number of per occurrence dollars the insurer will pay during the policy period) of $2 million.

Brookgreen purchases facultative per occurrence excess of loss reinsurance for this policy in excess of $500,000. This insurance protects Brookgreen against any loss above $500,000 but would not respond to any loss below $500,000. If the tavern suffered three separate losses of $450,000 each, Brookgreen would not recover from the reinsurer even though the total of all losses under the policy during the policy period exceeded $500,000.

Because of concern about aggregation of losses from this and similar loss exposures, Brookgreen decides to purchase a $7 million xs $3 million aggregate excess of loss treaty that is applicable to all of its liability insurance. This treaty further stabilizes losses by indemnifying Brookgreen for accumulations of losses exceeding $3 million. For example, Brookgreen insures a cosmetics manufacturer whose wrinkle cream causes an increase in susceptibility to skin cancer. Brookgreen settles a class action suit brought by customers who used the product for $15 million. Brookgreen's net loss is $8 million (the $3 million retention plus $5 million loss amount that exceeds the $7 million limit).

[DA05097]

Because of the stabilizing effect of aggregate excess of loss reinsurance on a primary insurer's loss ratio, it may be argued that it is the only type of reinsurance needed. However, aggregate excess of loss reinsurance has limited availability. When used, the aggregate excess of loss reinsurer usually expects to pay losses only after the primary insurer has been reimbursed under its other reinsurance agreements.

While a catastrophe excess of loss reinsurance agreement only protects against catastrophe losses (loss severity), an aggregate excess of loss reinsurance agreement provides the reinsured with broader protection. This is because the aggregate excess of loss reinsurance agreement includes catastrophes and unforeseen accumulations of non-catastrophic losses during a specified period (addressing both loss severity and loss frequency).

ALTERNATIVES TO TRADITIONAL REINSURANCE

While the demand for traditional reinsurance continues to evolve as the industry adapts to new economic and regulatory pressures, alternatives to traditional reinsurance have emerged.

Some types of risk, particularly catastrophe risk, cannot always be suitably addressed through traditional reinsurance. Alternatives to traditional reinsurance include finite risk reinsurance and instruments that use the capital market as a source for risk financing, such as insurance-linked securities and various exchange-traded products.

Finite Risk Reinsurance

Finite risk reinsurance is a nontraditional type of reinsurance in which the reinsurer's liability is limited (or "finite") and anticipated investment income is expressly acknowledged as an underwriting component. Because this type of reinsurance transfers a limited amount of risk to the reinsurer with the objective of improving the primary insurer's financial result, it is often called financial reinsurance.

Finite risk reinsurance
A nontraditional type of reinsurance in which the reinsurer's liability is limited and anticipated investment income is expressly acknowledged as an underwriting component.

Finite risk reinsurance can be arranged to protect a primary insurer against a combination of a traditionally insurable loss exposure and a traditionally uninsurable loss exposure. For example, the traditionally insurable loss could be building loss caused by an explosion, while the traditionally uninsurable exposure could be the possibility of loss due to economic variables such as product demand and market competition. It also effectively handles extremely large and unusual loss exposures, such as catastrophic losses resulting from an oil rig explosion or an earthquake.

A finite risk reinsurance agreement typically has a multi-year term (for example, three to five years). This allows the risk and losses to be spread over several years, while being subject to an aggregate limit for the agreement's entire term. With finite risk reinsurance, the primary insurer can rely on long-term protection and a predictable reinsurance cost over the coverage period, while the reinsurer can rely on a continual flow of premiums. Because of these benefits, both the primary insurer and the reinsurer tend to be flexible in negotiating the price and terms.

Finite risk reinsurance premiums can be a substantial percentage of the reinsurance limit (for example, 70 percent). This relationship between premium and reinsurance limit reduces the reinsurer's potential underwriting loss to a level that is much lower than that typically associated with traditional types of reinsurance.

Generally, finite risk reinsurance is designed to cover high severity losses. The reinsurer commonly shares profits with the primary insurer when it has favorable loss experience or has generated income by investing the prepaid

premium. This profit-sharing income can compensate the primary insurer for the higher-than-usual premium for finite risk reinsurance. The reinsurer will not assess any additional premium even if losses exceed the premium.

Capital Market Alternatives to Traditional and Nontraditional Reinsurance

Capital markets have emerged as tools that primary insurers can use to finance risk as an alternative to insurance. Instead of purchasing reinsurance to cover its potential liabilities, the primary insurer uses traded security instruments to finance insurance risk.

Some of the capital market instruments are rooted in the concepts of **securitization of risk** and **special purpose vehicles (SPVs)**, which allow primary insurers to exchange assets for cash. Others are based on **insurance derivatives** or **contingent capital arrangements**.

Although these products are expanding and evolving rapidly, these are among the methods most often used:

- Catastrophe bond—A type of **insurance-linked security** that is specifically designed to transfer insurable catastrophe risk to investors. A bond is issued with a condition that if the issuer suffers a catastrophe loss greater than specified amount, the obligation to pay interest and/or repay principle is deferred or forgiven. As long as catastrophe-related losses do not exceed the specified amount, investors earn a relatively high interest rate and receive a return of their principal. If catastrophe losses exceed the specified loss amount, the interest and/or principal forgone by bondholders is used to pay losses. Catastrophe bonds are typically issued by the SPVs of insurers, large reinsurers, or large corporations for any type of catastrophic insurable risk, such as hurricanes, earthquakes, and other adverse weather and environmental risks.
- Catastrophe risk exchange—A means through which a primary insurer can exchange a portion of its insurance risk for another insurer's. The exchange can be, for example, an Internet-based forum on which risks available for trade are advertised, negotiated, and completed. The insurance risk traded may differ by geographic area, type of property, or cause of loss insured against. A primary insurer with a geographic concentration of loss exposures can use a catastrophe risk exchange to reduce its losses from a single loss occurrence. A primary insurer can also diversify the kinds of property insured to make it less susceptible to heavy losses from a single cause of loss.

Capital market
A financial market in which long-term securities are traded.

Securitization of risk
The use of securities or financial instruments (for example, stocks, bonds, commodities, financial futures) to finance an insurer's exposure to catastrophic loss.

Special purpose vehicle (SPV)
A facility established for the purpose of purchasing income-producing assets from an organization, holding title to them, and then using those assets to collateralize securities that will be sold to investors.

Insurance derivative
Financial contract whose value is based on the level of insurable losses that occur during a specific time period.

Contingent capital arrangement
An agreement, entered into before any losses occur, that enables an organization to raise cash by selling stock or issuing debt at prearranged terms after a loss occurs that exceeds a certain threshold.

Insurance-linked security
A financial instrument whose value is primarily driven by insurance and/or reinsurance loss events.

- Contingent surplus note—A **surplus note** that has been designed so a primary insurer, at its option, can immediately obtain funds by issuing notes at a pre-agreed rate of interest. A benefit of surplus notes is that they increase a primary insurer's assets without increasing its liabilities.
- Industry loss warranty (ILW)—An insurance-linked security that covers the primary insurer in the event that the industry-wide loss from a particular catastrophic event, such as an earthquake or hurricane, exceeds a predetermined threshold. The distinguishing characteristic of this instrument is that its coverage is triggered by industry losses as a whole, rather than only on the primary insurer's losses.
- Catastrophe option—An agreement that gives the primary insurer the right to a cash payment from investors if a specified index of catastrophe losses reaches a specified level (the **strike price**). The catastrophe loss index, such as that provided by Insurance Services Office's Property Claim Services, keeps track of catastrophe losses by geographic region, by cause of loss, and by time of occurrence.
- Line of credit—An arrangement in which a bank or another financial institution agrees to provide a loan to a primary insurer in the event the primary insurer suffers a loss. The credit is prearranged so that the terms, such as the interest rate and principal repayment schedule, are known in advance of a loss. In exchange for this credit commitment, the primary insurer taking out the line of credit pays a commitment fee. A line of credit does not represent any risk transfer; they simply provide access to capital.
- Sidecar—A limited-existence SPV, often formed as an independent company, that provides a primary insurer additional capacity to write property catastrophe business or other short-tail lines through a quota share agreement with private investors. Investors in the SPV assume a proportion of the risk and earn a corresponding portion of the profit on the primary insurer's book of business. The primary insurer charges a ceding commission and may receive a profit commission if the book of business is profitable.[1]

Surplus note
A type of unsecured debt instrument, issued only by insurers, that has characteristics of both conventional equity and debt securities and is classified as policyholders' surplus rather than as a liability on the insurer's statutory balance sheet.

Strike price
The price at which the stock or commodity underlying a call option (such as a warrant) or a put option can be purchased (called) or sold (put) during a specified period.

REINSURANCE PROGRAM DESIGN

A well-planned, well-executed reinsurance program plays a key role in meeting specific primary insurer goals. It can help stabilize loss experience while providing large-line capacity, catastrophe protection, and surplus relief. In a catastrophe, an effective reinsurance program can mean the difference between a primary insurer's survival or failure.

Many kinds of reinsurance exist, and, with rare exceptions, any primary insurer can find a combination of reinsurance agreements that meets its needs. Designing an optimal **reinsurance program** requires careful analysis of a primary insurer's needs, retentions, and reinsurance limits. Assistance in this could come from reinsurers, reinsurance intermediaries, and consultants.

Reinsurance program
The combination of reinsurance agreements that a primary insurer purchases to meet its reinsurance needs.

Factors Affecting Reinsurance Needs

Primary insurers consider several factors to determine their reinsurance needs, all of which interact to increase or decrease a primary insurer's need for reinsurance:

- Growth plans
- Types of insurance sold
- Geographic spread of loss exposures
- Insurer size
- Insurer structure
- Insurer financial strength
- Senior management's risk tolerance

Growth Plans

A primary insurer that expects rapid premium growth is likely to need more reinsurance than a primary insurer that expects premium volume to remain stable or to decrease. There are three reasons for the need for additional reinsurance:

- Rapid growth can cause a drain on a primary insurer's policyholders' surplus. Pro rata reinsurance provides a replenishment of the primary insurer's policyholders' surplus because of the ceding commission paid by the reinsurer to the primary insurer.
- The loss ratio for a primary insurer's new business is likely to be less stable than the loss ratio for its established business, which has undergone renewal underwriting. This instability may be severe if the primary insurer is growing by selling types of insurance that it has not previously sold or by selling in markets in which it has no previous operating experience. For a rapidly growing primary insurer, new insurance sold may constitute a substantial part of total premium volume relative to renewals of existing policies. Consequently, the variability of the loss ratio on the new policies could cause instability in the primary insurer's overall loss ratio. Reinsurance, while not abrogating the total loss amount, limits the amount of this loss to the primary insurer's retention amount.
- Growth often entails expanding into markets with greater coverage requirements. To compete effectively in new markets, a primary insurer may have to offer coverage limits higher than it offered previously or insurance coverages it has not offered before. For example, a primary insurer may decide to enter the segment of the homeowners insurance market in which it must offer a personal umbrella with limits up to $2 million to match its competitors' products. Reinsurance enables primary insurers to provide larger amounts of coverage than they otherwise would be able to provide.

Pro rata reinsurance is the appropriate choice if a rapidly growing primary insurer needs only surplus relief. If the major concern is loss ratio stability or large line capacity, excess of loss reinsurance may be an appropriate choice.

While a primary insurer might reduce its long-term profits by entering into a reinsurance agreement because it has potentially ceded away profitable loss exposures, sacrificing these profits is a short-term strategy that enables the primary insurer to grow and possibly earn greater future profits.

Types of Insurance Sold

The types of insurance that a primary insurer sells are a major determinant of its reinsurance needs. The insurance products offered by primary insurers vary in loss stability, which affects the primary insurer's ability to project loss experience. A reinsurance program must be tailored to the loss characteristics of the insurance that the primary insurer sells.

Generally, primary insurers selling personal insurance need less reinsurance than those selling commercial insurance because personal insurance loss exposures need relatively lower coverage limits. Additionally, personal insurance loss exposures are more homogeneous and subject to fewer severe hazards than commercial insurance loss exposures. Because of the homogeneity among personal insurance loss exposures, the loss experience is usually more stable than that of commercial insurance loss exposures and therefore more predictable. Both personal and commercial insurance loss exposures are subject to catastrophic loss, but primary insurers usually address catastrophe reinsurance needs separately from reinsurance agreements designed only to smooth loss experience fluctuations.

Some types of insurance require a greater commitment of policyholders' surplus (capital) than do others. State insurance regulators use a risk-based capital system to establish an insurer's minimum capital requirements. This system has several components, but it gives the greatest weight to **underwriting risk**; some types of insurance require the insurer to maintain more policyholders' surplus than other types of insurance. For example, medical malpractice insurance is subject to severe losses that are difficult to forecast from past loss experience. A primary insurer selling medical malpractice insurance is therefore required to have sufficient policyholders' surplus to absorb unexpected fluctuations in losses. Using reinsurance that provides surplus relief can help primary insurers reduce demands on their policyholders' surplus.

Underwriting risk
A measure of the loss volatility of the types of insurance sold by an insurer.

The number of different types of insurance a primary insurer sells also affects its reinsurance needs. A primary insurer that sells several types of insurance is more diversified and therefore more likely to have a stable loss ratio than a primary insurer selling only a few types of insurance.

Geographic Spread of Loss Exposures

Another determinant of a primary insurer's reinsurance needs is the geographic spread of its loss exposures. A wide geographic spread may stabilize the insurer's loss ratio and minimize reinsurance needs, especially in property insurance. While no part of the world is completely immune to natural catastrophes, the nature of catastrophe loss exposures differs by geographic area and catastrophes seldom strike all geographic areas simultaneously. Consequently, if a property insurer's insured loss exposures are spread over a wide geographic area, poor loss experience in one area may be offset by good loss experience in another area during a given period.

Geographic diversification is an especially effective tool when property insurance is spread worldwide, but it can still be effective even if diversification is limited to the United States. For example, the West Coast is vulnerable to earthquakes, the South Atlantic and Gulf Coasts are vulnerable to hurricanes, and the middle of the country is vulnerable to tornadoes. However, these natural forces are not usually all at their worst in the same year.

Primary insurers selling property insurance in a single geographic area are especially vulnerable to fluctuations caused by catastrophe losses and need reinsurance to cover such losses. For example, devastating hurricanes that struck the South Atlantic and Gulf Coasts led to the insolvency of several insurers, including some that had been considered financially strong. These insurers had concentrations of loss exposures in the hurricane area and inadequate reinsurance to cover their losses.

Geographic diversification can also stabilize loss ratios for reasons other than limiting losses from natural catastrophe loss exposures. Insurance regulation, laws governing tort liability, law enforcement practices, and other factors affecting property or liability insurance losses vary by geographic area. Adverse changes in these factors in one geographic area may be offset by favorable developments in another if the loss exposures are geographically diverse.

Insurer Size

Insurer size is also an important determinant of reinsurance needs. Typically, small primary insurers need proportionately more reinsurance to stabilize loss ratios than large primary insurers. According to the law of large numbers, actual losses tend to approach expected losses as the number of loss exposures increases. Therefore, the loss ratio of a large primary insurer is likely to be more stable than the loss ratio of a small one even if the mix of business sold is identical.

Insurer Structure

The legal form of a primary insurer may affect its reinsurance needs. For example, stock insurers have more access to capital markets than mutual and

reciprocal insurers. They may consequently be willing to accept less stability in their loss ratios and depend on capital markets to replace the policyholders' surplus depleted by adverse loss fluctuations. This could be risky, however, because the providers of capital may not look favorably on an insurer that has just sustained heavy losses.

Insurer Financial Strength

An insurer that is financially strong needs less reinsurance than a financially weaker one for two reasons. First, it does not need surplus relief to increase its premium capacity. Second, it needs less reinsurance to stabilize its loss ratio. A stronger surplus position enables the primary insurer to absorb more adverse loss ratio variations. The resulting lower reinsurance costs are an added advantage for a financially strong primary insurer.

One aspect of evaluating an insurer's financial strength involves assessing the stability and liquidity of its invested assets. If a primary insurer's strategy is to rely on its policyholders' surplus to absorb abnormal losses, that policyholders' surplus must be invested in assets that are readily marketable and not subject to wide fluctuations in market price. Otherwise, the primary insurer's financial resources may be insufficient to pay losses in a timely manner.

Because common stock may be marketable only at a substantial loss in an unfavorable market, a primary insurer that holds large amounts of it in an investment portfolio needs to be more heavily reinsured than one that holds short-term bonds. However, a large portfolio of long-term bonds could also sustain substantial market losses due to interest rate risk. A primary insurer that invests a large portion of its funds in wholly-owned subsidiaries needs to have a substantial reinsurance program because the stock of subsidiaries is not generally marketable.

Senior Management's Risk Tolerance

The decision of how much reinsurance and what types to buy is made by the primary insurer's senior management. Although the decision may be supported by statistical data and financial models, it usually reflects the senior management's risk tolerance, which is their willingness to assume risk. Senior management must be comfortable with the insurance risk assumed, particularly when setting retentions or changing the reinsurance program.

Senior management must be confident that other stakeholders are comfortable with the adequacy of the primary insurer's reinsurance program. For example, the reinsurance program should reflect the risk tolerance of the board of directors, stockholders, or policyholders in a mutual company. Senior management must be sensitive to those stakeholders' views.

The practical effect of any proposed reinsurance program changes on supervisors and underwriters must also be considered. For example, if treaty reinsurance is used to increase large-line capacity, then individual underwriters must adjust to the higher amounts of insurance that the primary insurer

can now safely offer. If the underwriters are not comfortable with the additional large-line capacity available under the reinsurance treaty, they may continue to purchase facultative reinsurance when they do not need to. Those actions could negate the cost savings of the treaty.

Factors Affecting Retention Selection

The primary insurer's selection of its retention is an essential and sometimes complex step in designing a reinsurance program. Although the retention is based on the primary insurer's financial needs and the types of insurance that the primary insurer sells, it is also negotiable by the primary insurer and the reinsurer. Cost is always a factor in selecting a retention, and the cost of a reinsurance treaty usually increases as the size of the retention decreases.

In addition to cost, four factors are considered when selecting a retention:

- Maximum amount the primary insurer can retain
- Maximum amount the primary insurer wants to retain
- Minimum retention sought by the reinsurer
- Co-participation provision

Maximum Amount the Primary Insurer Can Retain

The first factor to consider in selecting a retention is the maximum amount that the primary insurer can retain. This amount is a function of two aspects: regulatory requirements and the primary insurer's financial strength.

State insurance regulations effectively limit premium capacity to three dollars of net written premiums for each dollar of policyholders' surplus. Large-line capacity is limited by a statutory provision that an insurer cannot retain a net amount for a single loss exposure greater than 10 percent of its policyholders' surplus. These statutes and regulations determine the upper limits of the amount that an insurer can retain. Many conservative primary insurers retain significantly less than those limits, especially the statutory limit of 10 percent of policyholders' surplus.

Subject to the statutory and regulatory limits, a primary insurer's ability to retain loss exposures is also limited by its financial strength. An insurer should not retain loss exposures so large that the losses under a worst-case scenario can threaten its solvency. Determining the loss size that could threaten the primary insurer's solvency involves some judgment. The primary insurer must consider not only the losses within the retention of the possible reinsurance agreement, but also the retentions of closely related reinsurance agreements. For example, in setting the retention of a property per risk excess of loss treaty, potential retained losses under the related catastrophe excess of loss treaty must be considered and vice versa.

Maximum Amount the Primary Insurer Wants to Retain

The second factor to consider in selecting a retention is the maximum amount the primary insurer is willing to retain. Possible maximum retentions are rarely accepted. This may be partly because of the uncertainty of determining how much loss exposure can safely be assumed and partly because of the conservatism of some managers.

In the case of publicly held stock insurance companies, market pressures may keep retentions well below the maximum that the insurer could legally or financially bear. Investors favor insurers that report growing, or at least stable, earnings. A primary insurer that assumes large retentions under its reinsurance agreements risks alienating investors because its earnings are likely to vary widely from year to year.

Minimum Retention Sought by the Reinsurer

The third factor to consider in selecting a retention is that reinsurers sometimes demand a minimum retention as a condition of providing reinsurance. This demand is especially likely for excess of loss treaties, particularly catastrophe treaties. The purpose of the minimum retention requirement is to encourage the primary insurer to implement sound risk control, underwriting, and loss adjustment practices. Occasionally, for profitable pro rata treaties, the reinsurer may seek a lower retention in order to participate more fully in the profitable business.

Co-Participation Provision

The fourth factor in selecting a retention is the co-participation provision, which requires the primary insurer to participate in losses beyond the retention for risk control, underwriting, and loss adjustment reasons previously described.

Factors Affecting Reinsurance Limit Selection

Selecting treaty limits can be as complex as selecting retentions. There are five factors to consider in selecting treaty limits, which vary depending on the kind of treaty involved:

- Maximum policy limit
- Extracontractual obligations
- Loss adjustment expenses
- Clash cover
- Catastrophe exposure

Maximum Policy Limit

The first factor to consider in selecting reinsurance limits is the maximum policy limit sold by the primary insurer. The maximum policy limit sold by the primary insurer may seem like a natural maximum policy limit for a treaty that applies separately to each policy because this practice would ensure coverage for any loss incurred. However, this may not be the most economical way to provide full reinsurance coverage. For example, if a primary insurer has many policies outstanding with limits of $500,000 or less and relatively few with limits between $500,000 and $1 million, setting the treaty limit at $500,000 and relying on facultative reinsurance to provide the remaining protection on the few larger loss exposures may be more economical than setting the reinsurance treaty limit at $1 million.

The limit for a stop loss treaty is stated as a loss ratio. Ideally, the limit should be set at the highest loss ratio that the primary insurer is likely to reach. Cost may force the primary insurer to settle for a lower limit, even if the reinsurer is willing to provide a higher limit.

Extracontractual Obligations

The primary insurer's potential exposure to extracontractual obligations is the second factor to consider in selecting reinsurance limits. If a reinsurance treaty is to provide protection against extracontractual damages and excess of policy limit losses, the reinsurance treaty limit should be substantially higher than the primary insurer's highest policy limit. Damages resulting from extracontractual obligations may be several multiples of the highest coverage limit offered.

Loss Adjustment Expenses

The third factor to consider in selecting reinsurance limits is the potential magnitude of loss adjustment expenses. Loss adjustment expenses can be a significant loss component in per risk and per occurrence excess of loss treaties, depending on the type of underlying policy. Because loss adjustment expenses are generally added to the amount of loss and not pro rated between the primary insurer and reinsurer, loss adjustment expenses should be considered when selecting retentions and reinsurance limits. A primary insurer selling medical malpractice insurance, which has significant loss adjustment expenses, may exhaust the coverage provided by a casualty per occurrence excess of loss treaty with the loss adjustment expenses alone and have no reinsurance available to provide loss indemnification. Consequently, the primary insurer must carefully consider reinsurance limits and add an additional layer of reinsurance to accommodate the loss adjustment expenses.

Clash Cover

The primary insurer's potential exposure to multiple policies responding to the same occurrence is the fourth factor to consider in selecting reinsurance

limits. Clash cover applies when claims from two or more policies arise as a result of the same occurrence. Clash cover limits should be set by considering the highest limits offered by the primary insurer and the perceived likelihood that multiple policies may be involved in a single occurrence.

Catastrophe Exposure

The fifth factor to consider in selecting reinsurance limits is the primary insurer's potential exposure to catastrophe losses. Selecting the limit for a catastrophe treaty is a more complex task than selecting limits for per risk excess of loss treaties because catastrophe losses involve an accumulation of losses arising from a single occurrence. The primary insurer's liability for such losses has no stated limit. The effective limit is set by the number and face amount of policies subject to losses by a single catastrophic occurrence that the primary insurer has in force in a geographic area. In the case of a hurricane, the area affected may cover hundreds of square miles.

Statistics on hurricanes have been collected for many years and show the paths that hurricanes have followed and the wind forces that have been involved. If an insurer has data on the loss exposures that it has previously assumed in a storm area, it can estimate future losses from a hurricane of a given intensity following a specified path. Insurers can do similar analyses for flood and earthquake losses because severe losses from those causes are likely limited to known flood zones and geological faults. Extensive data on the occurrence and intensity of floods, hurricanes, tornadoes, earthquakes, and other natural catastrophes are available from various government agencies such as the National Oceanic and Atmospheric Administration (NOAA) and other industry organizations. **Catastrophe models** that estimate catastrophe losses are also often used to help set treaty limits.

Catastrophe model

A type of computer program that estimates losses from future potential catastrophic events.

REINSURANCE PROGRAM DESIGN CASE STUDIES

The various ways in which the different types of reinsurance can be used to address a primary insurer's business constraints are best illustrated through case studies.

These case studies illustrate how reinsurance programs are applied to specific situations and how combinations of various forms of reinsurance are useful in property and liability insurance. The programs outlined are realistic for the circumstances shown but are not necessarily the only appropriate reinsurance options for the hypothetical insurers.

Two caveats should be considered when reading these cases. First, reinsurance program design is a function of conditions in the reinsurance market and who is developing the program. Second, reinsurance program design is usually based on an in-depth analysis of several factors, such as the primary insurer's

historical loss experience, financial condition, and types of insurance, as well as such subjective factors as senior management's aversion to risk.

The facts presented in these cases may be used to answer these questions:

- What factors lead Atley's reinsurance intermediary to recommend a reinsurance program that includes surplus relief and catastrophe protection?
- Why does Med-Mal's reinsurance intermediary recommend that Med-Mal purchase clash cover?

Atley Insurance Company

Two situations describe how Atley Insurance Company has used reinsurance to meet its objectives.

Situation 1

Atley Insurance Company has developed a program for insuring office condominiums that has proven to be very popular with its producers. One producer in particular has been aggressive in selling this program and is attempting to write accounts that need high property coverage limits. Atley is concerned about the rapid growth of this program and the negative consequences if Atley is unable to accept large accounts.

Atley and its reinsurers developed a reinsurance program that provides both large-line capacity and financing to aid future growth. The program consists of a four-line surplus share reinsurance treaty with Atley retaining $75,000. Two reinsurers participate in the program, each with two lines. Atley's underwriters must arrange facultative reinsurance for accounts with coverage limits that exceed $375,000 (the capacity of the four-line treaty). Atley's reinsurance program has a $1 million per occurrence limit. The exhibit illustrates how coverage limits, premiums, and losses will be shared on two of the accounts written under Atley's office program. The coverage limit of the first account is within the four-line treaty, and the second account exceeds the capacity of the four-line treaty. See the exhibit "Illustration of Situation 1."

Situation 2

Atley is concerned that its existing reinsurance program will not adequately handle its growing catastrophe exposure. Atley amends its reinsurance program by adding a catastrophe excess of loss reinsurance agreement that provides $5 million in excess of $750,000. (Atley's relationship with a facultative reinsurer is sound, and Atley believes it can arrange facultative limits up to $750,000 for almost any account eligible under the office program.) The exhibit includes a substantially larger account and shows how this amended reinsurance program would respond to a catastrophe that affects all three risks. See the exhibit "Illustration of Situation 2."

Illustration of Situation 1

Account With Limits Within the Surplus Share Treaty

The Doctor's Office account has a policy limit of $200,000. Coverage, premiums, and losses would be retained by Atley and shared with its reinsurers as shown below.

Atley Reinsurance Program	Assumption of Liability	Percentage Assumption of Liability
Retention	$75,000	37.5
First Surplus Treaty (2 lines)	$125,000	62.5
Second Surplus Treaty (2 lines)		
Facultative Reinsurance ($750,000 Maximum)		
Total Assumption of Liability	$200,000	100.0

Account With Limits That Exceed the Surplus Share Treaty

The Chesterbrook Office Park account has property coverage needs of $650,000. Because the coverage needs of this account exceed the limits of Atley's surplus share treaty reinsurance program, Atley arranges facultative reinsurance that is also on a surplus share basis. Coverage, premiums, and losses would be retained by Atley and shared by its reinsurers as shown below.

Atley Reinsurance Program	Assumption of Liability	Percentage Assumption of Liability
Retention	$75,000	11.5
First Surplus Treaty (2 lines)	$150,000	23.0
Second Surplus Treaty (2 lines)	$150,000	23.0
Facultative Reinsurance	$275,000	42.0
Total Assumption of Liability	$650,000	100.0*

*This column actually totals 99.5. A primary insurer and its reinsurers would likely determine an exact percentage, but in this illustration we have not.

Assume that Doctor's Office and Chesterbrook Office Park both sustain substantial losses (50 percent) caused by a tornado. Atley's reinsurance program would respond as shown below.

Atley Reinsurance Program	Doctor's Office Account $100,000 Loss	Chesterbrook Office Park $325,000 Loss
Retention	$37,500	$37,375
First Surplus Treaty (2 lines)	$62,500	$74,750
Second Surplus Treaty (2 lines)		$74,750
Facultative Reinsurance		$136,500
Total	$100,000	$325,000*

*This column actually totals $323,375 because it uses the rounded percentages calculated previously.

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Illustration of Situation 2

In addition to the Doctor's Office account and the Chesterbrook Office Park account, Atley writes the Technology Office Complex account for $4 million.

Atley Reinsurance Program	Assumption of Liability	Percentage Assumption of Liability
Retention	$75,000	10.0
First Surplus Treaty (2 lines)	$150,000	20.0
Second Surplus Treaty (2 lines)	$150,000	20.0
Facultative Reinsurance ($750,000 Maximum)	$375,000	50.0
Total	$750,000	100.0
Catastrophe Excess ($5 million × $750,000)	$3,250,000	
Total Assumption of Liability	$4,000,000	

Had the tornado occurred and damaged 50 percent of Technology Office Complex as well, Atley's reinsurance program would have responded as shown below. The catastrophe excess of loss reinsurance applies net after other available reinsurance.

Atley Reinsurance Program	Doctor's Office Account $100,000 Loss	Chesterbrook Office Park $325,000 Loss	Technology Office Complex $2,000,000 Loss
Retention	$37,500	$37,375	$75,000
First Surplus Treaty (2 lines)	$62,500	$74,750	$150,000
Second Surplus Treaty (2 lines)		$74,750	$150,000
Facultative Reinsurance		$136,500	$375,000
Total	$100,000	$323,375	$750,000
Catastrophe Excess ($5 million × $750,000)			$1,250,000
Total	$100,000	$323,375	$2,000,000

Atley's reinsurance program includes a $1,000,000 per occurrence limit. The total losses under the reinsurance program, before the application of the catastrophe excess agreement, are $1,173,375, or $173,375 higher than the per occurrence limit. Atley's reinsurance program provides that the catastrophe reinsurer will include losses that exceed its per occurrence limit. The catastrophe reinsurer in this case will pay $1,423,375 ($1,250,000 plus $173,375).

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Medical Malpractice Insurance Company

Medical Malpractice Insurance Company (Med-Mal) sells medical professional liability insurance for physicians and surgeons in one state. Med-Mal insures physicians and surgeons statewide, but its policy portfolio is concentrated in the state's two largest cities. Its medical professional liability policy has a $1 million limit that applies on a per occurrence and on an aggregate basis.

Med-Mal is concerned about an increase in the number of successful lawsuits against physicians and surgeons in the state. One significant loss for another insurer operating in the same state involved several surgeons who were insured under separate policies with the insurer and were successfully sued for injuries arising from a common incident. Because of this loss and the unfavorable legal environment for medical malpractice insurance, Med-Mal wants to avoid potential catastrophic occurrences in which multiple insureds, with multiple limits of liability, would be involved in the same occurrence.

Med-Mal's reinsurance intermediary recommends per occurrence excess of loss reinsurance of $750,000 xs $250,000 to limit the effect of any one claim. Med-Mal's reinsurance intermediary also recommends that the reinsurance program address the possibility that more than one insured could be sued as the result of a single occurrence, and that extracontractual damages or excess policy limits judgments could be awarded. The reinsurance intermediary suggests clash cover with a $500,000 attachment point (applies to the retention after the per occurrence excess of loss treaty) to restrict the use of the clash cover to occurrences with more than one physician. It also suggests a $5 million limit to recognize the possibility of multiple insured doctors being involved in a common incident and/or the awarding of extracontractual damages or excess policy limits judgments. See the exhibit "Application of Med-Mal's Reinsurance Program."

Application of Med-Mal's Reinsurance Program

Med-Mal must pay a medical malpractice claim involving three surgeons insured under separate policies. The injured parties are awarded damages that total $2 million. The losses from this single occurrence are paid as indicated:

Policy	Damages	Med-Mal's Retention	Per Occurrence Reinsurer	Clash Cover Reinsurer
1	$500,000	$250,000	$250,000	$0
2	500,000	-----	500,000	0
3	$1,000,000	$250,000	Limit exhausted	$750,000
Total	$2,000,000	$500,000	$750,000	$750,000

[DA06163]

SUMMARY

Reinsurance agreements can be categorized as either pro rata (proportional) or excess of loss (nonproportional) reinsurance. Pro rata reinsurance involves the proportional sharing of amounts of insurance, policy premiums, and losses (including loss adjustment expenses) between the primary insurer and the reinsurer. Pro rata reinsurance can be either on a quota share basis or on a surplus share basis. With excess of loss reinsurance, the reinsurer responds to a loss only when the loss exceeds the primary insurer's retention (often referred to as the attachment point).

Finite risk reinsurance is a nontraditional type of reinsurance that can be arranged to protect a primary insurer against large and unusual loss exposures. Although premiums for finite risk reinsurance are typically higher than for other forms of reinsurance, the finite risk reinsurer usually shares profits with the primary insurer when it has favorable loss experience or has generated income by investing the prepaid premium. Organizations also can use capital markets to finance risk as an alternative to insurance and traditional reinsurance, particularly for catastrophe risk financing. Although the number of these products is increasing rapidly, the methods most often used are catastrophe bonds, catastrophe risk exchanges, contingent surplus notes, industry loss warranties, catastrophe options, lines of credit, and sidecars.

Reinsurance program design is a process through which primary insurers analyze their reinsurance needs to develop an optimal reinsurance program that meets their specific goals. In designing a reinsurance program, primary insurers or their reinsurers, reinsurance intermediaries, or consultants compare existing reinsurance agreements with ever-changing needs. To be effective, reinsurance programs must be flexible enough to meet known and anticipated needs. Designing a reinsurance program involves determining reinsurance needs, setting retentions, and setting limits.

Applying a reinsurance program to a specific situation requires understanding many characteristics of the primary insurer, such as its historical loss experience, financial condition, and the types of insurance it sells. Subjective factors such as senior management's aversion to risk must also be understood. A variety of reinsurance programs may be equally effective in a given scenario.

ASSIGNMENT NOTE

1. Definition adapted from Reinsurance Association of America, www.reinsurance.org (accessed June 15, 2010).