

# PROPERTY CASUALTY REINSURANCE

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### Keywords

- [Reinsurance](#)
- [Retrocession](#)
- [Treaty Reinsurance](#)
- [Facultative Reinsurance](#)
- [Quota share](#)
- [Ceding Commission](#)
- [Excess of Loss](#)
- [Per Occurrence](#)
- [Per Risk](#)
- [Aggregate Excess](#)
- [Profit Commission, Swing Rated, Sliding Scale Commission](#)
- [Options](#)

### Property Casualty Coverages

#### Commercial Coverages

- General Liability (GL) - Premises and Operations, Products
- Commercial Auto (CA) - Liability (AL) and Physical Damage (PD, trucking, busses, taxis, etc.)
- Commercial Property (CP) - fire, wind, explosion, business interruption
- Workers Compensation (WC)
- Professional Liability - E&O, D&O, Medical Malpractice
- Specialist - ocean marine, satellite, airplane hull, kidnap and ransom

#### Personal Lines Coverages

- Homeowners - Fire, theft, liability, hurricane, tornado, earthquake
- Auto - liability and physical damage
- Umbrella
- Miscellaneous personal property, boats

### Reinsurance

A **reinsurance** company insures risks assumed by a **primary** insurance company. The reinsurer **assumes** the risk, the reinsured company, or cedent, **cedes** the risk. The primary company **retains** the part of the risk it does not cede.

The reinsurer has a contract with the cedent but not the cedent's clients.

Reinsurance on reinsurance is called a **retrocession**.

### Why do primary companies purchase reinsurance?

- Capacity
- Balance and Diversification
- Stability of Earnings
- Solvency Protection, Catastrophe Protection
- Financial Results Management
- Tap Expertise of Reinsurer

## Treaty vs. Facultative Reinsurance

**Treaty reinsurance** covers a set of subject policies for a given period of time. Subject policies are often defined in terms of lines of business, e.g. "all commercial auto liability policies" or "all homeowners policies".

**Facultative reinsurance** covers a single underlying insured. Unlike a treaty, facultative ("fac") reinsurance is underwritten by the reinsurer one account at a time.

## Quota Share vs Excess of Loss

Under a **Quota Share** reinsurance contract, a fixed percentage of the premiums and a fixed percentage of the losses are ceded to the reinsurer. For this reason, quota shares are called **proportional** reinsurance. The reinsurer typically allows a **ceding commission** to the cedent to cover costs of producing the business. The level of the ceding commission ("cede") is essentially the only pricing variable in a simple quota share deal.

Under an **Excess of Loss** reinsurance contract the reinsurer covers losses in excess of an attachment, so the recovery is not directly proportional to the cedent's loss. Thus Excess of Loss contracts are **non-proportional**. Excess of Loss ("XOL") contracts can cover losses in many different ways.

- Per Risk Excess of Loss: losses excess of an attachment on a per location or per policy basis. Primarily used in property covers.
- Per Occurrence: losses excess of an attachment on a per occurrence basis. An earthquake or hurricane would generally be a single occurrence.
- Aggregate XOL: losses in an excess layer which are in excess of an attachment point.
- Stop Loss: covers the cedents total losses on a book of business over a period of time. Attachment is generally expressed as a percentage of covered premiums.

## Examples

A typical reinsurance program for a small insurance company, or independently run department of a larger company, may look something like:

### Business Written:

- AL, GL, WC and commercial property only
- AL, GL policies have \$1M limits or \$5M limits, mostly \$1M
- Properties generally in \$10-25M range, but some upto \$100M

### Reinsurance Program:

1. Fac on all property policies to bring retention down to \$1M. E.g. on a \$25M property the company would buy a per risk XOL cover of \$24M excess a \$1M retention.
2. Fac on all AL and GL policies to bring retention down to \$250,000. E.g. on a \$1M policy the company would buy a \$750,000 excess \$250,000 per occurrence XOL cover.

3. Fac \$9.75M excess \$250,000 on all WC policies. (WC is written without policy limits, though claims in excess of \$5M are very rare.)
4. A per occurrence property catastrophe treaty covering \$45M excess \$5M.
5. A 50% quota share on the retained liability lines with a 30% ceding commission.

## Pricing: the Actuary's Role

### Insurance Pricing

Rating Method	Regulation	Flexibility	Applies to
Manual Rating + schedule credits/debits + experience credits/debits	Highly regulated by State	Low	Personal Lines Small Commercial Medium Commercial
Loss Rating	Essentially unregulated	High	Large commercial, unusual risks, reinsurance

Manual rating creates rates for statistical classes and uses very objective criteria to determine rates. Actuarial involvement is in setting the rates (for all insureds). No involvement in individual account pricing.

Experience and schedule credits/debits give the underwriters more flexibility in determining a rate. Actuarial involvement tends to be in setting underlying manual rates and designing procedures for experience rating.

Loss Rating: scope for actuarial involvement in individual account pricing (each treaty or certificate for reinsurance).

### Reinsurance Pricing: Treaty Quota Share

What is the loss ratio? What are reinsurer's expenses? What is the ceding commission?

### Reinsurance Pricing: Fac XOL

See Exhibit 1.

### Reinsurance Pricing: Treaty XOL

Two key differences with Fac XOL:

1. Do all the underlying risks **expose** the treaty? For example, primary company writes \$500,000, \$1M and \$2M policy limits. A treaty \$1M excess of \$1M would only be exposed by the \$2M policy limits---which may account for a relatively small proportion of the premium. Problem is more pronounced for property.
2. Rate is determined as a percentage of the underlying premium. On most of the risks covered, the reinsurer doesn't actually know what the ceding company will charge! Introduces a big pricing risk for reinsurers (see last night's talk).

Treaties often contain complicated policy terms which make pricing difficult. The following give an example of some of the more common features:

- A **sliding scale** commission: the ceding commission paid to the ceded varies inversely with the loss ratio on the ceded business. The lower the loss ratio the more commission is paid to the cedent, as a reward for producing good business.
- A **swing rated** treaty charges a premium equal to some multiple of losses, but with a minimum and a maximum premium due. This provides needed protection to the cedent while keeping the "out-the-door"

- price as low as possible.
- With an **aggregate annual deductible** on an XOL cover, the cedent agrees to pay losses in the excess layer upto a certain threshold. Again, this lowers the upfront cost to the cedent.

To price all of these special features requires knowing the probability distribution of aggregate losses or **aggregate loss distribution**. Determining aggregate distributions is a central question in actuarial science and is usually addressed in a course on Risk Theory. For an excellent survey of computing aggregate loss distributions see [Wang](#).

## Connection to Options

The payments on an excess of loss reinsurance contract or a primary insurance policy with a deductible are similar to the payoff from a call option (the right to buy). For these reasons option pricing techniques are sometimes mentioned as applicable to reinsurance pricing. However, there are some very important differences between insurance and reinsurance on the one hand and options pricing on the other. See my paper [Mildenhall](#) for a more in-depth discussion.