ALM - Reinsurance

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Course Program

- Basic interest rate theory
- Interest rate risk management
- Stochastic term structure models
- Risk measurement
- `Reinsurance and insurance-linked securities`
- Mean-variance analysis for ALM

Contents of the chapter

- Reinsurance contract types and form of recovery
- Reinsurance premium calculation
- Commutation and finite reinsurance
- Accounting of reinsurance transactions
- Risks to be aware of in connection to reinsurance

Glossary

- **Ceded (reinsurance ceded)** - refers to the portion of risk that a primary insurer passes to a reinsurer.
- **Loss Ratio** - the losses an insurer incurs due to paid claims divided by the earned premium
- **Combined ratio** - the sum of incurred losses and expenses, divided by the earned premium.
- **Estimated Maximum Loss** - the maximum loss that an insurer would be expected to incur on a policy. Represents the worst-case scenario for an insurer, provided that there is no failure of existing safeguards, such as fire sprinklers or flood barriers.

Reinsurance Type

- `Proportional` reinsurance
  - Quota share
  - Surplus (variable quota share)
- `Non-proportional` reinsurance
  - Excess of loss
  - Stop loss
- Reinsurance contracts can be compared with `Over-the-Counter (OTC) derivatives`,
- the ‘underlying’ being the ceding company’s claims.

Form of recovery

- `Proportional reinsurance` means that the reinsurer pays a percentage share of every claim from the insured risks.
  - The percentage may be the same for all risks or vary with the size of the risk.
- `Non-proportional reinsurance` means that the reinsurer pays that part of every claim, or claim event, that exceeds an agreed threshold.
  - Normally the liability of the reinsurer is limited.

Properties of reinsurance forms

- `Quota share` reinsurance is risk sharing, for example if the reinsured does not have enough own capital.
- `Surplus` reinsurance is sharing only large risks.
- `Excess of loss` (XL) reinsurance covers the part of each claim (or event) that exceeds the threshold. For instance €10M xs €5M.
- `Stop loss` works like XL but on the year's total claim cost. Often expressed in **loss ratios** `(claims/earned premiums)`. For example 100% xs 100%.
- Most insurers combine proportional insurance, with non-proportional reinsurance of the remaining risk

Premium calculation - proportional reinsurance

- Reinsurance premium is:
  - The reinsurer's `share of the gross premium` of the reinsured risks,
  - less ceding commission,
  - plus/minus adjustment of commission, e.g by a sliding scale,
  - plus/minus a profit commision

Premium calculation - non-proportional reinsurance

- Reinsurance premium is:
  - actuarially calculated ‘minimum & deposit premium’,
  - plus an exposure-based adjustment at the end of the year,
  - plus ‘reinstatement premium’ after reinsurance claims.

Duration of proportional reinsurance contracts

- Short-tailed lines are often accounted on a `clean-cut` basis, i.e., with commutation of the reinsurer's liability a few years after the underwriting period.
- Long-tailed lines are always accounted on a `run-off` basis, i.e. with no commutation of the reinsurer's liability before (almost) all claims are settled.
- Valuing the reinsurer's remaining liability is far from easy.

Commutation

- Commutation means `releasing the reisurer` for his remaining liability in return for a `cash payment`. Literally, commutation amounts to exchanging a paper asset for a cash asset.
- For the primary insurer it may be better to receive the cash rather than waiting for the claims to be settled.
- The risk is in undervaluing the reinsurer's share of the outstanding liabilities, i.e. receiving less than the true value or the reinsurance asset.
- For the reinsurer, the risk is inverse, i.e. paying too much.

Valuating the reinsurer’s remaining liability

- Have the `reported but not settled` claims (RBNS) been assessed correctly?
- If reported claims change, will it be on reinsured risks or other risks?
- Will unreported claims be reported on `reinsured risks`?
- The tradition of analysing outstanding claim estimates by accident year.
- Complex and opaque reinsurance conditions and wordings.
- Exclusions, limitations, loss corridors, sunset clauses, etc.

Finite reinsurance

Finite reinsurance is when `the insured finances its own risk` over time.

- There are two main forms:
  - Pre-financing - the insured makes a “deposit” with the reinsurer.
  - Post-financing - the insured “borrows” from the reinsurer.
- There are rules as to when a contract ceases being reinsurance and must be treated as a `financial instrument` (deposit or debt).

Accounting of reinsurance - Assets

- Financial assets
- Reinsurers’ share of premium provision
- Reinsurers’ share of outstanding claim provision
- Receivables from reinsurers
- Other assets

Accounting of reinsurance - Liabilities

- Gross premium provision
- Gross outstanding claim provision
- Payables to reinsurers
- Other liabilities

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Equity = Assets - Liabilities
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Reinsurance turns accounting upside down

- When accounting for reinsurance transactions it is important to remember that:
  - Reinsurance premium is an outlay - `liability`.
  - Reinsurance recoveries are an uncertain income - `asset`.
- Prudent accounting indicates that:
  - Reinsurance premium should be recognized immediately.
  - Reinsurance recoveries should be recognized only when they are reasonably certain to materialize.

Risks connected to reinsurance - I

- Counterparty risk
- Exclusions
- Sunset clauses
- Loss corridor
- Estimated Maximum Loss (EML) understated
- Adjusted premiums
- Limited reinstatements
- Misunderstood contracts

Risks connected to reinsurance - II

- Risks from `exclusions`:
  - Most reinsurance contracts have exclusions.
  - Asbestos liability, acts of terrorism, acts of war, etc.
  - Beware if the exclusions are for risks that the contract should cover, e.g. pharmaceutical liability reinsurance that excludes `all known side effects`.
  - Such contracts can be used as `window dressing`: the skill of decorating shop windows so that they look attractive to people going past.

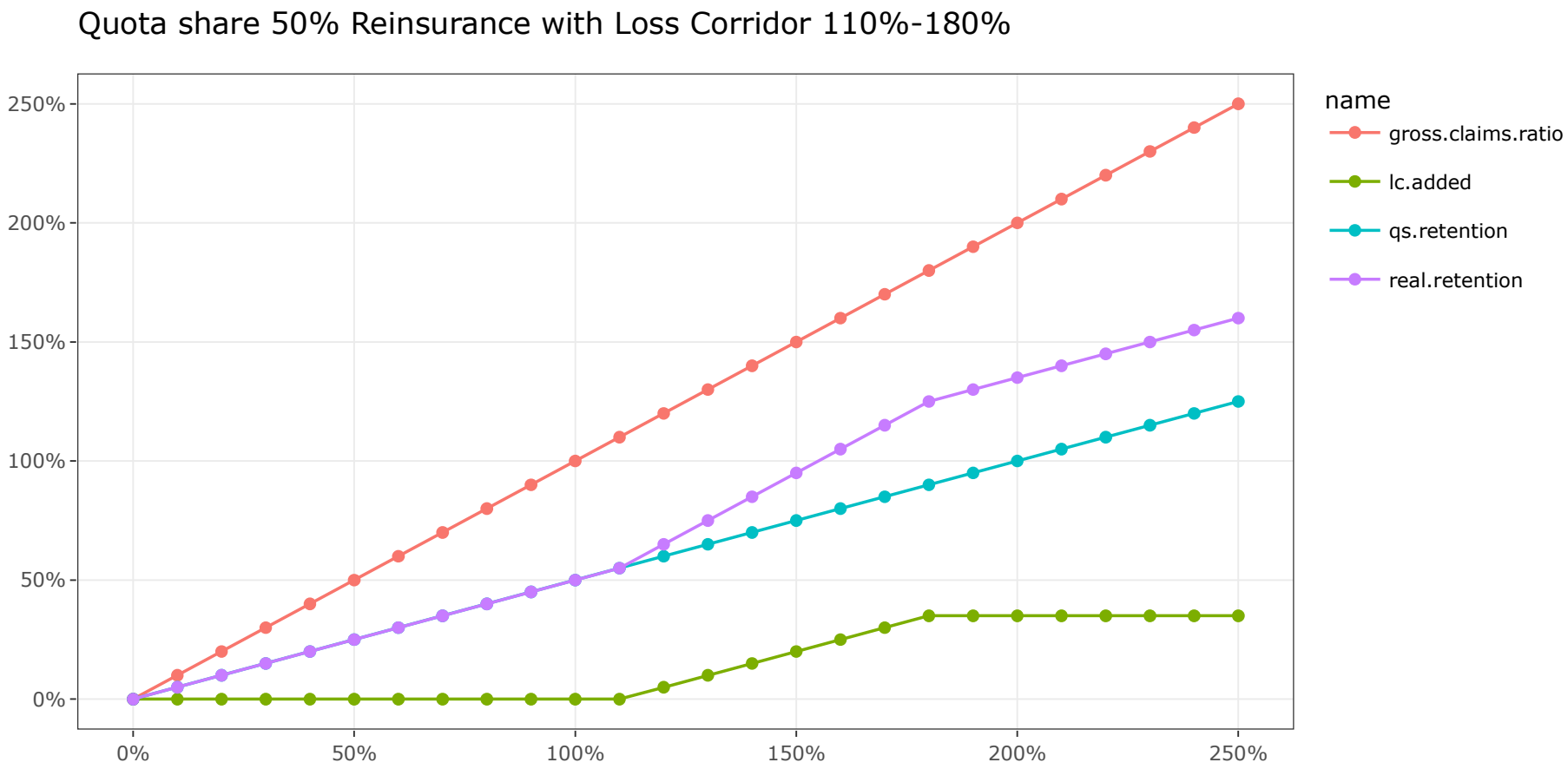
Risks connected to reinsurance - III

- Risks from `sunset clauses`:
  - A sunset clause means that a claim must be reported to the reinsurer `within a limited number of years` (5 or 7) in order to be covered.
  - The problem is not the Incurred But Not Reported claims (IBNR). Most claims are reported quickly.
  - The problem is the RBNS: opened and reopened claims.
  - A short sunset clause can severely reduce the value of the reinsurance cover.

Risks connected to reinsurance - IV

- Risks from `Loss Corridor` clauses:
  - Normally associated with quota share contracts.
  - Typical loss corridor clause: *"In the case that the combined ratio is 110% or more, the reinsured shall be liable for all further losses under this treaty until a combined ratio of 180% is reached."*
  - This means that the reinsured would be effectively providing stop loss cover for the reinsurer's share.
  - Could also be seen as a premium adjustment or a commission adjustment.

Loss Corridor Example



Risks connected to reinsurance - V

- Risks from `EML understated`:
  - A company must understand the EML (estimated maximum loss).
  - Losses that exceed the limit that most contracts have (also quota share contracts) are normally `not covered` by reinsurance.
  - Unlimited Motor Third Party insurance.

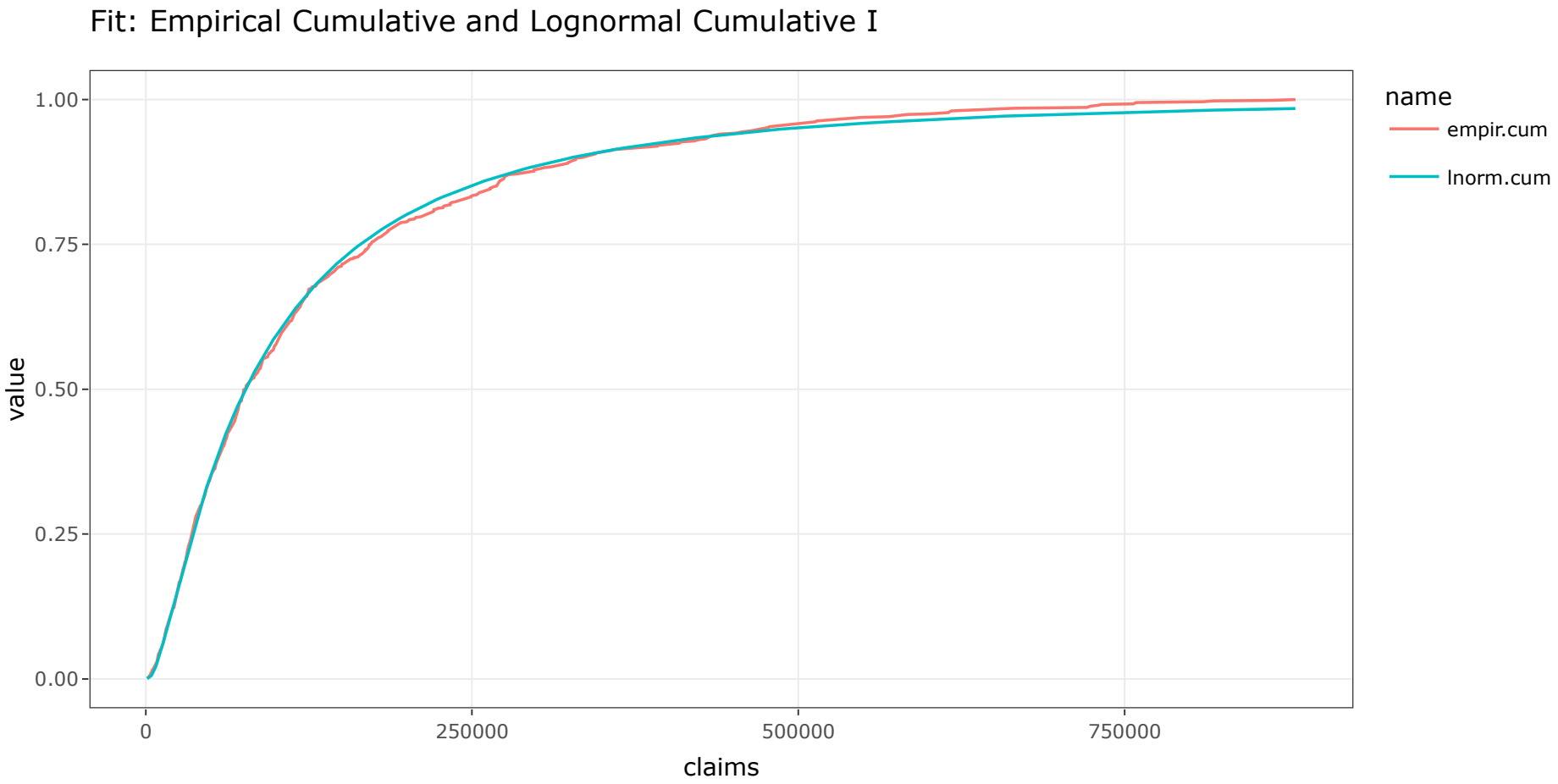
Risks connected to reinsurance - VI

- Example: A company had a stop loss 150% xs 100% for Workers' Compensation insurance and deemed it perfectly safe…
  - …until it turned out that the loss ratio was 1400%. Fortunately they had rich sponsors.

Risks connected to reinsurance - VII

- Risks from `Adjustment Premium`
  - Premium that will be demanded in the future for the reinsurance cover to be valid.
  - Typical case: Adverse Development Cover (ADC) for a run-off, that says that a premium will be due if the development is worse than a certain amount.
  - For the accountant, the adjustment premium may be “out of sight and out of mind”.
  - If a company wants to take credit for the cover, it must take a charge for the adjustment premium.

Example - Lognormal fit to a set of Worker Compensation claims



Example - QS Reins. with LC and XL

We simulate a WC portfolio with the following assumptions:

- The number of claims of each policy follows a `Poisson` distribution, so by the `Central Limit Theorem`, the number of claims of all policies follows a Normal distribution.
- The claim severity follows a Lognormal distribution.
- Alternatively, we can resample from the original observed claim severities.
- We consider a `quota-share` reinsurance with a `loss corridor` clause and also an `excess of loss` clause.