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
- Retrospective cover

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.

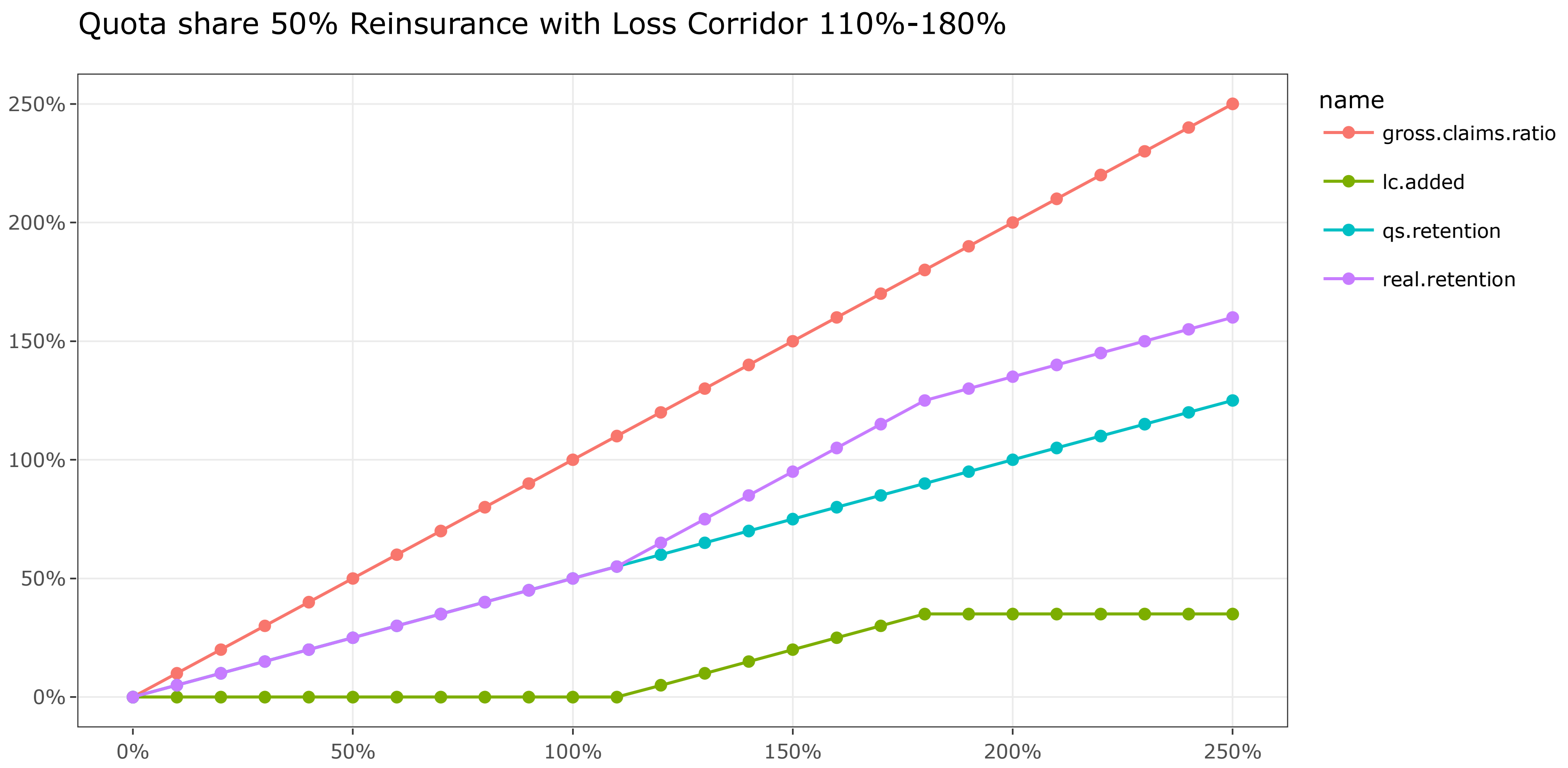
Risks connected to reinsurance - III

- 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.

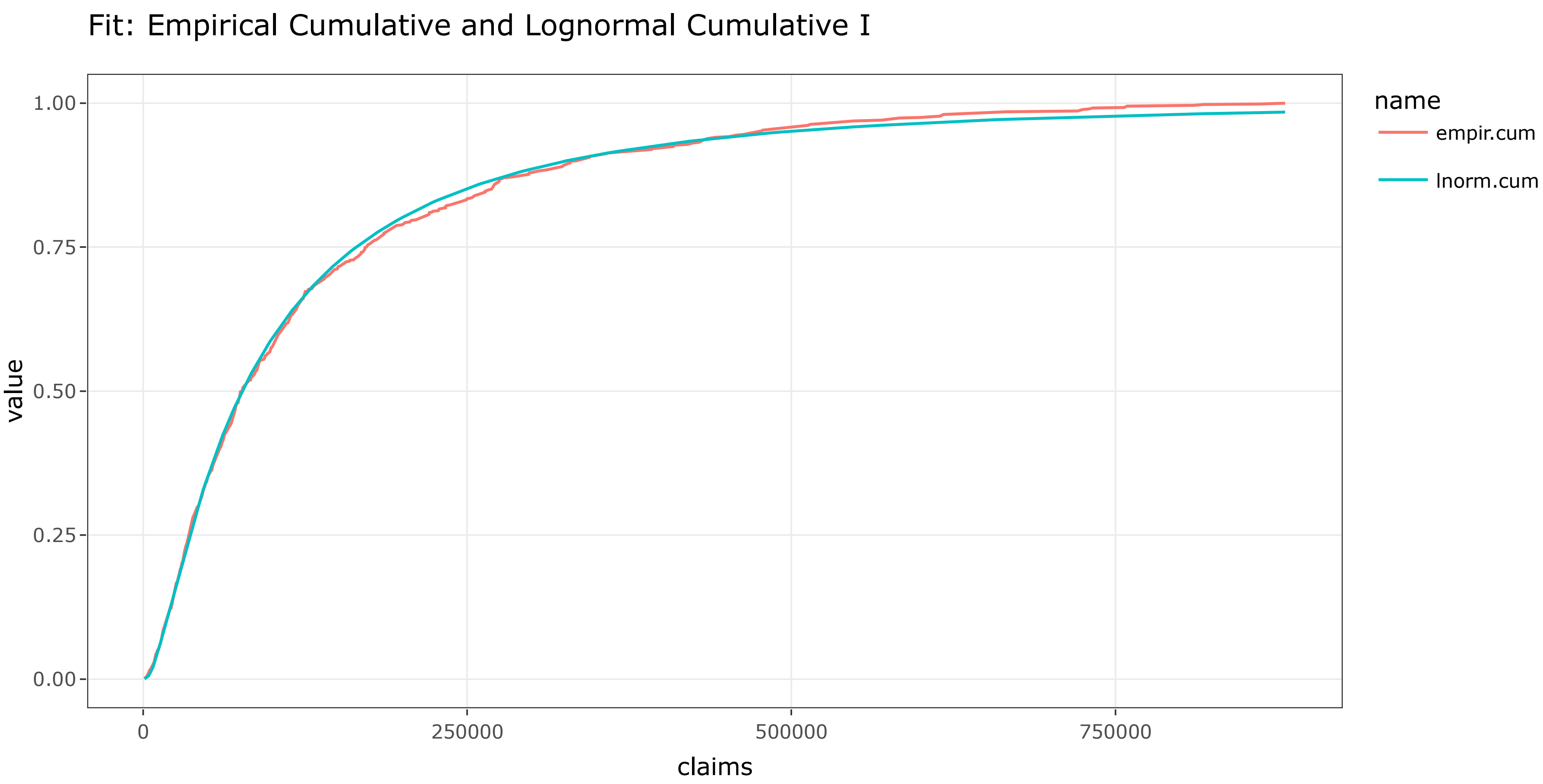
Risks connected to reinsurance - VI

- 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 `50% quota-share` reinsurance with a `loss corridor` clause (120% xs 180%) and also an `excess of loss` clause (priority 100k, limit 400k, loading 25%).

Retrospective Cover

Sometimes companies are looking to protect a run-off portfolio:

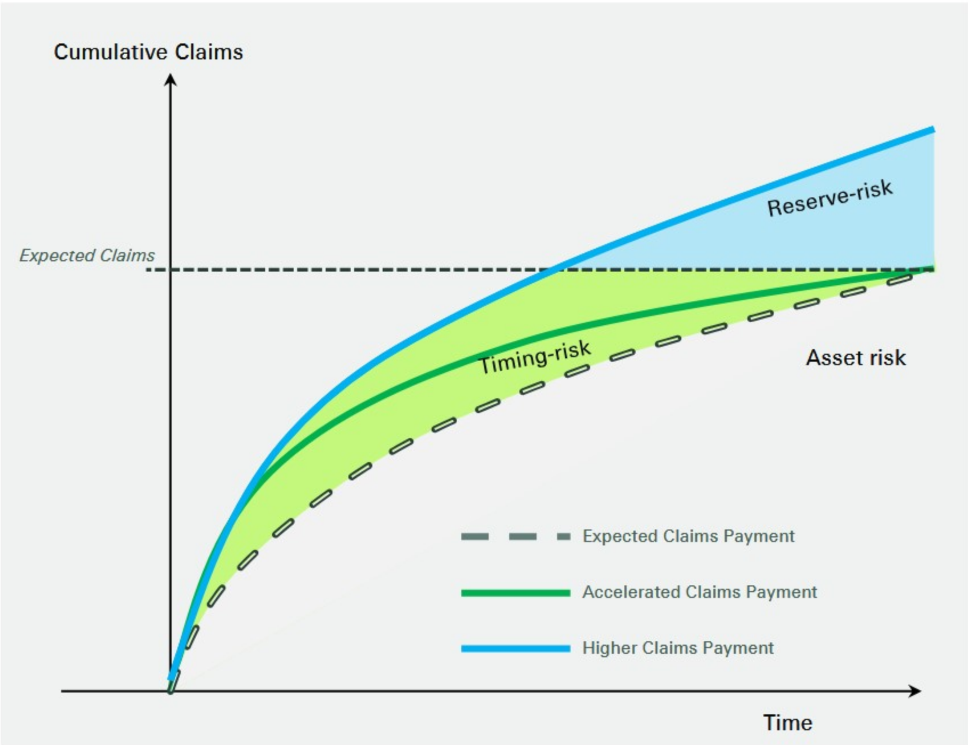
- When stopping writing insurance in a certain LoB;
- if they want to reduce capital requirements from a LoB.

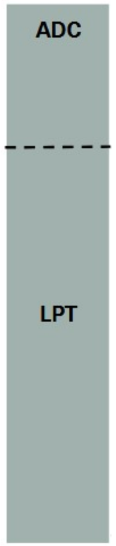
Retrospective cover can take several forms:

- LPT - Loss Portfolio Transfer
- ADC - Adverse Development Cover
- Novation
- Sale / merger / others

Retrospective Reinsurance

Two components are often combined in order to transfer the economic and regulatory cost of loss reserves via `restrospective reinsurance` (source: SwissRe).





LPT and ADC

- `Loss Portfolio Transfer` - the reinsurer pays off the claims in exchange for the assets covering the loss reserves.

Result: ~~timing risk~~, ~~investment risk~~ (for the cedent).

- `Adverse Development Cover` - the reinsurer pays claims in excess of an agreed reserves level in exchange for a risk premium (`Loss Additional Premium`).

Result: ~~risk of insufficient reserves~~ (for the cedent).

Effect on solvency capital requirements

- `Insurance risk` - a pure LPT that *covers only the value of loss reserves* reduces net provisions but not insurance risk.
- In order to have real insurance risk transfer, on must `combine` LPT with ADC.
- `Market risk` - reduced by LPT (taken by reinsurer), not significantly reduced by ADC.
- `Counterparty risk` is naturally increased for the cedent. Depends on the rating of the chosen reinsurer.
- `Operational risk` - generally neutral.

Example of a Loss Portfolio Transfer...

- `PERIOD` - "This Contract is in respect of all Loss Settlements paid by the Reassured after 31 December, 2021 but only with respect to policies incepting during the period 1st January, 2016 to 31 December, 2021, both dates *inclusive*."
- `LIMITS` - €18,000,000 in the aggregate of net Loss Settlements applicable hereunder, excess of €35,000,000 in the aggregate of net Loss Settlements applicable hereunder.
- `PREMIUM` - "Premium in full of: EUR 6,000,000 payable at 31 December 2021."

...combined with Adverse Development Cover...

- `LOSS ADDITIONAL PREMIUM` - “In the event that the total paid aggregate of Loss Settlements applicable hereunder is €38,000,000 or greater, the Reassured shall pay to the Reinsurer an Additional Premium of

a. €2,400,000 which will be due and payable immediately;
b. 80% of all further paid losses hereon, subject to a maximum Loss Additional Premium of €5,000,000 in total.”

…and a Profit Commission (LPT).

- `PROFIT COMMISSION` - “At Commutation the Reassured shall be entitled to a Profit Commission of 25% of the result of the following:

a. Income: The paid Premium of €6,000,000

b. Outgo: Reinsurer’s cost of €2,000,000 (margin)

c. Outgo: reinsurance incurred claims.”

We will assume that the actuarially calculated Gross Claims Estimate is 46M, and run some scenarios (from 30M to 60M).

Example of an Adverse Development Cover - III