The World of Structured Reinsurance

Case Study – Spread Loss

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Rio de Janeiro, 15th April 2015

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General Overview

Structured Reinsurance

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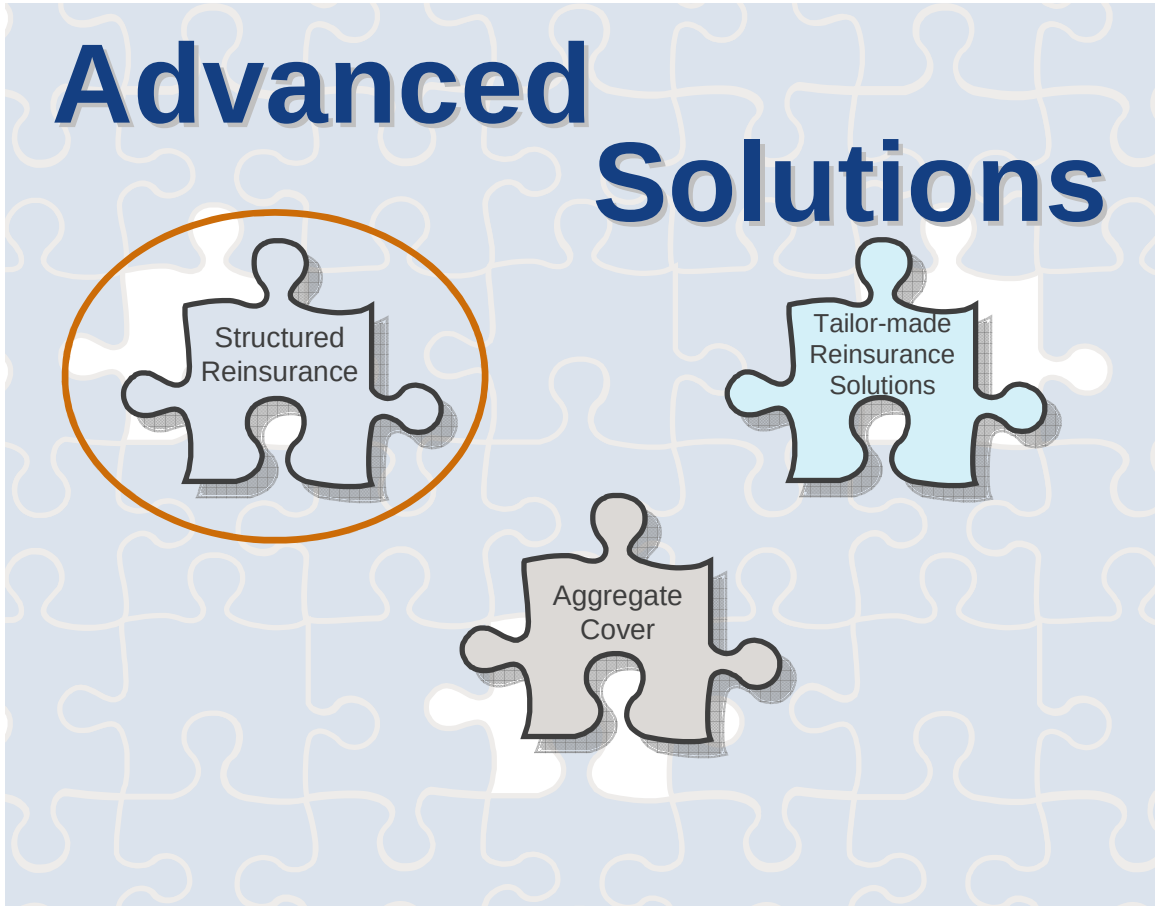
General Overview
Advanced Solutions



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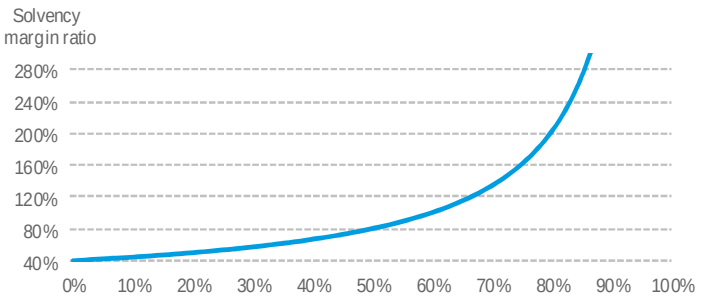
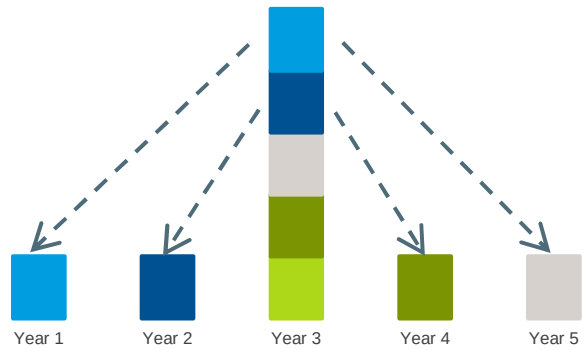
General Overview
Structured Reinsurance

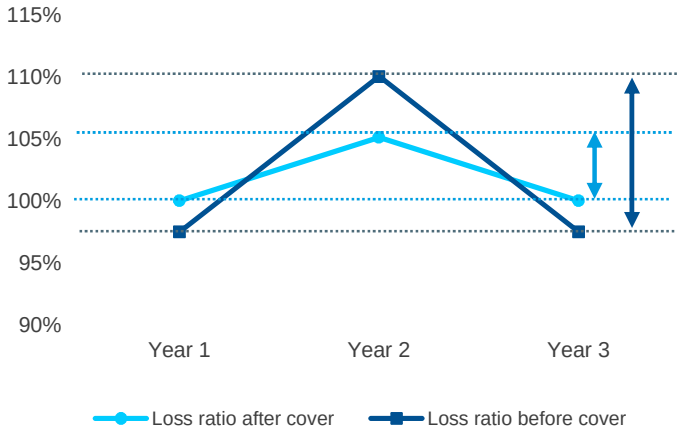
Surplus Relief Quota Share



Spread Loss



Aggregate XL



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Case Study

Spread Loss

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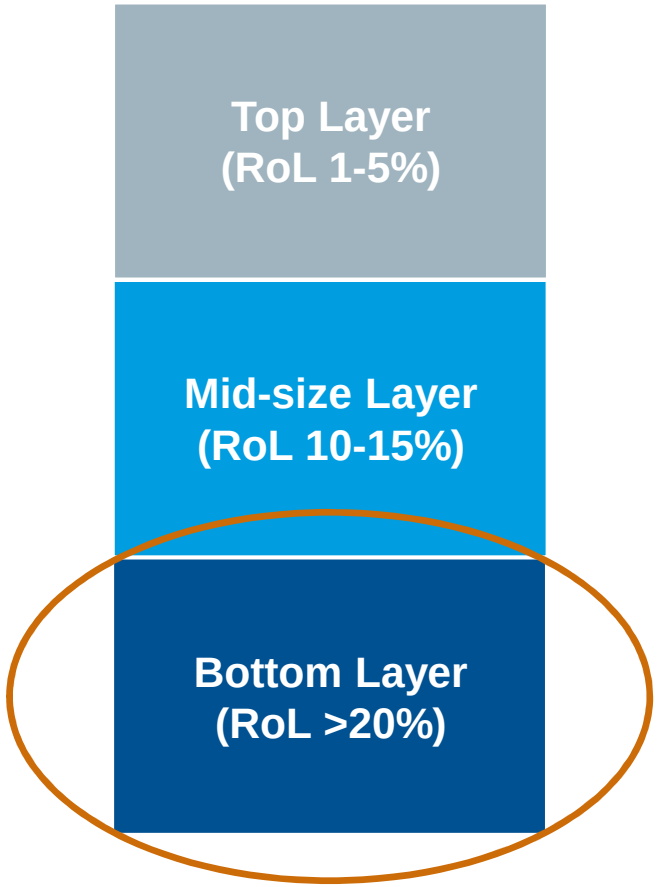
Case Study – Spread Loss
Motivation

Excess of Loss Program



1st Layer:

- Period: 1-year contract
- Coverage: BRL 10m xs BRL 5m
- Reinstatements: 2 @ 100%
- Aggregate Limit: BRL 30m p.a.
- Premium: BRL 3m p.a. (RoL of 30%)

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Case Study – Spread Loss (10m xs 5m)

Motivation

Point of View – Chief Actuary

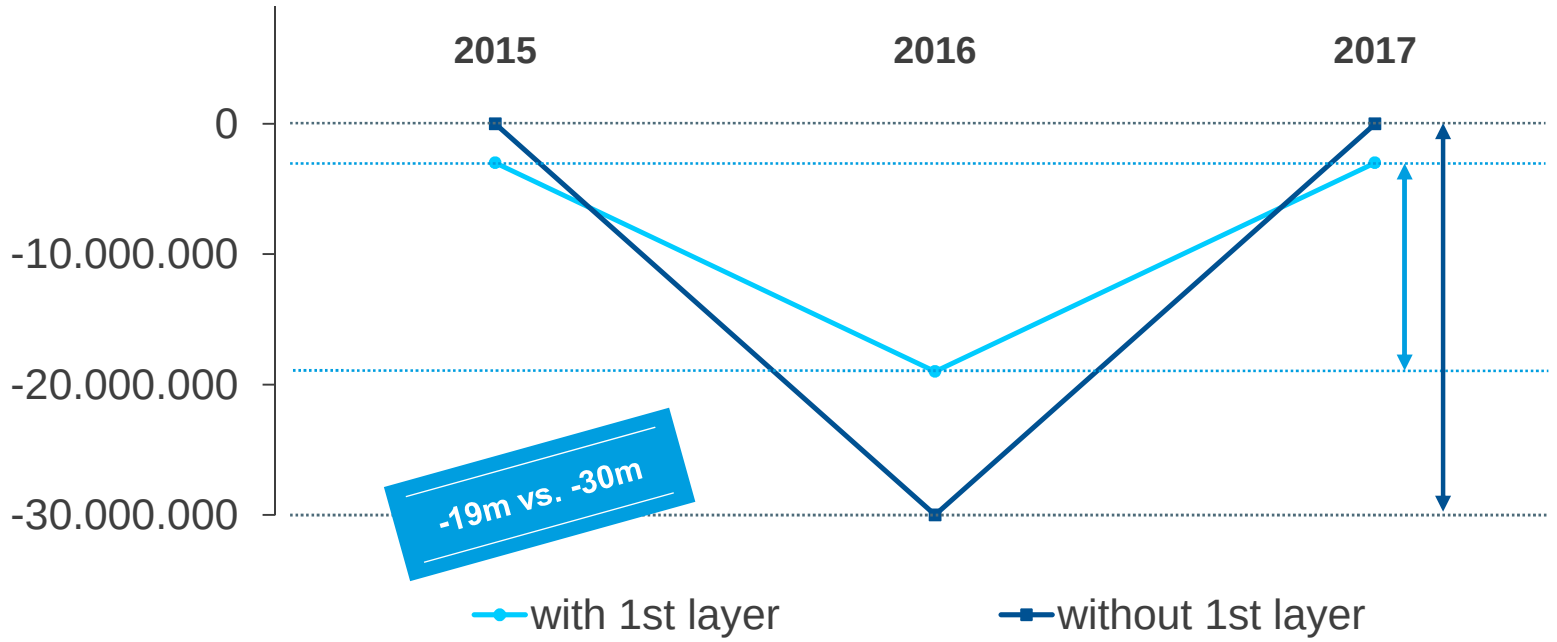
figures in BRL	2015	2016	2017	2015 - 2017
Premium	-3m	-3m	-3m	-9m
Reinstatement Premium	-	-3m	-	-3m
Losses (f.g.u.)	-	-15m	-	-15m
Ceded Losses	-	10m	-	10m
Total	**-3m**	**-11m**	**-3m**	**-17m**

Point of View – CFO

figures in BRL	2015	2016	2017	2015 - 2017
Losses (f.g.u.)	0	-15m	0	0
Total	**0**	**-15m**	**0**	**0**

Case Study – Spread Loss (10m xs 5m)

Motivation



Purchasing the 1st layer reduces the volatility of annual results

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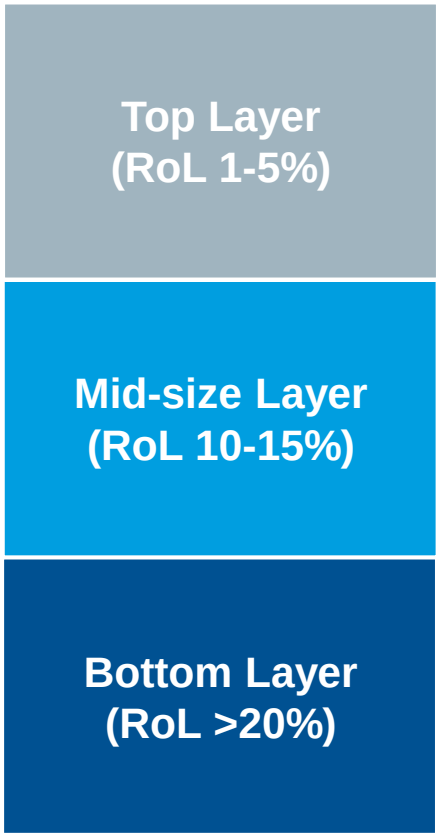
Case Study – Spread Loss (10m xs 5m)

Motivation

Excess of Loss Program



High retention – 1st Layer not needed

- lower layers do not provide a relief in medium to long term
- cost-efficient

Solution
Spread Loss

Small retention – 1st Layer is important

- lower layers protect annual results
- reduced volatility

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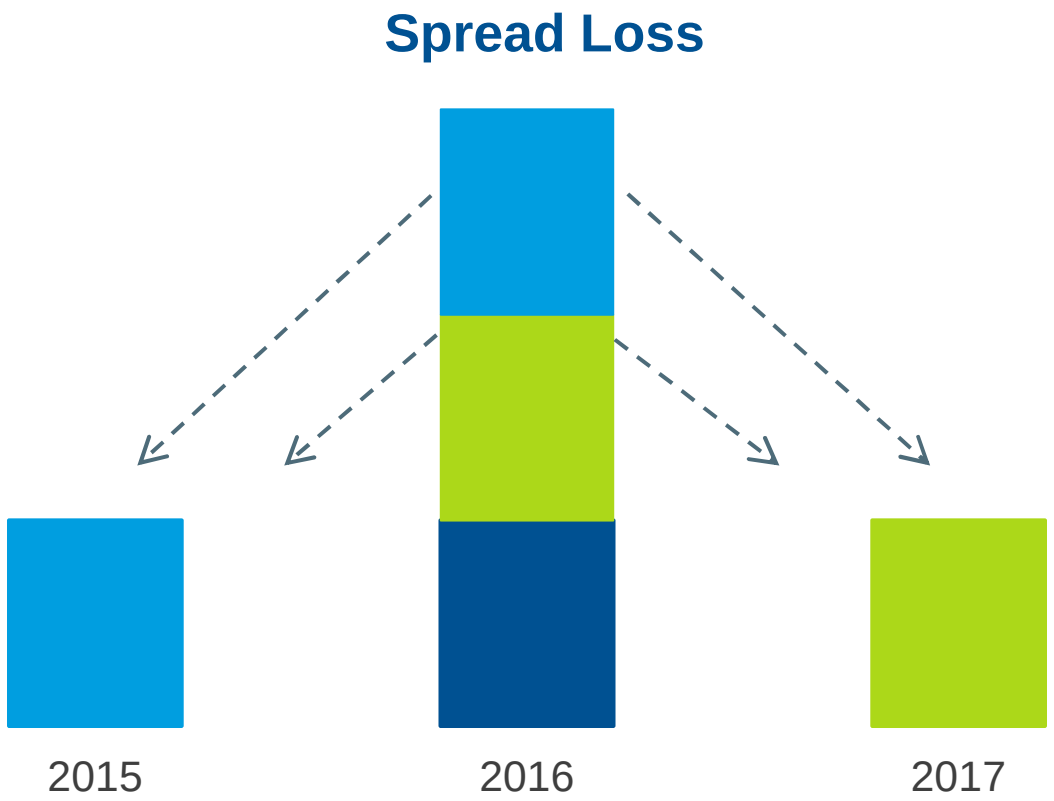
Case Study – Spread Loss (10m xs 5m)

Motivation



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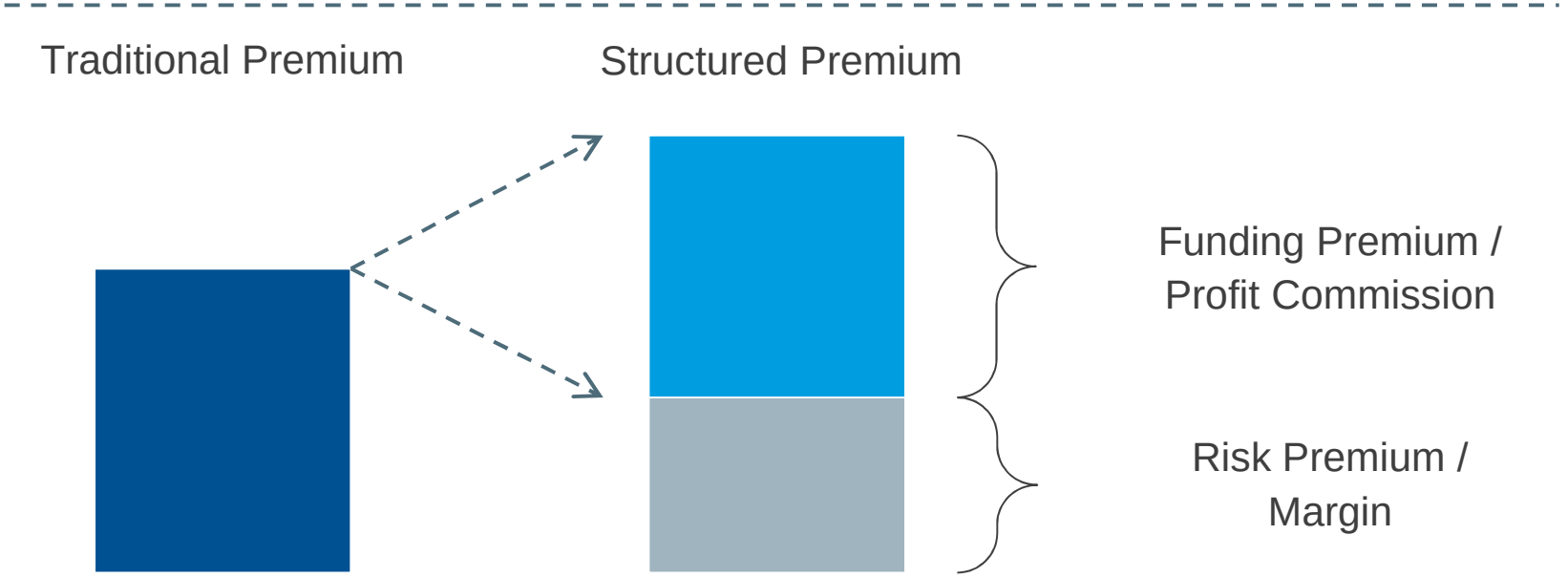
Case Study – Spread Loss (10m xs 5m)

Structured Elements

- Multi-year Term
  - distribution of a substantial loss over 3 to 5 years
- Structured Premium
  - higher participation in own results



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Case Study – Spread Loss (10m xs 5m)

Conditions

- Period: 3-year contract
- Coverage: BRL 10m xs BRL 5m
- Reinstatements: 2 @ 100%
- Anual Limit: BRL 30m p.a.
- Aggregate Limit: BRL 60m over the Period
- Premium: BRL 4m p.a.
  (RoL of 40%)
- Risk Margin: 25% of Premium; Nil on Reinstatement Premium, if any
- Profit Commission: 100% upon Commutation on 

Case Study – Spread Loss (10m xs 5m)

Conditions

- Experience Account: (accumulated)

  Premium
  \+ Reinstatement Premium, if any
  – Risk Margin
  – Ceded Losses
  = Balance

100% Reinsurer

100% Profit Commission

- Premium Payment (Funds Withheld)

  - Only Risk Margin is transferred to the Reinsurer
  - Positive Experience Account is retained by the Reinsured on behalf of the Reinsurer (Premium Reserve Deposit)

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Case Study – Spread Loss (10m xs 5m)

Scenario: No Loss

figures in BRL	2015	2016	2017	2015 - 2017
Premium	-4m	-4m	-4m	-12m
Reinstatement Premium	-	-	-	-
Losses (f.g.u.)	-	-	-	-
Ceded Losses	-	-	-	-
Profit Commission	-	-	9m	9m
Total	**-4m**	**-4m**	**5m**	**-3m**

figures in BRL	2015	2016	2017	2015 - 2017
with 1st Layer	-3m	-3m	-3m	-9m
without 1st Layer	0	0	0	0

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Case Study – Spread Loss (10m xs 5m)

Scenario: One Loss

figures in BRL	2015	2016	2017	2015 - 2017
Premium	-4m	-4m	-4m	-12m
Reinstatement Premium	-	-4m	-	-4m
Losses (f.g.u.)	-	-15m	-	-15m
Ceded Losses	-	10m	-	10m
Profit Commission	-	-	3m	3m
Total	**-4m**	**-13m**	**-1m**	**-18m**

figures in BRL	2015	2016	2017	2015 - 2017
with 1st Layer	-3m	-11m	-3m	-17m
without 1st Layer	0	-15m	0	-15m

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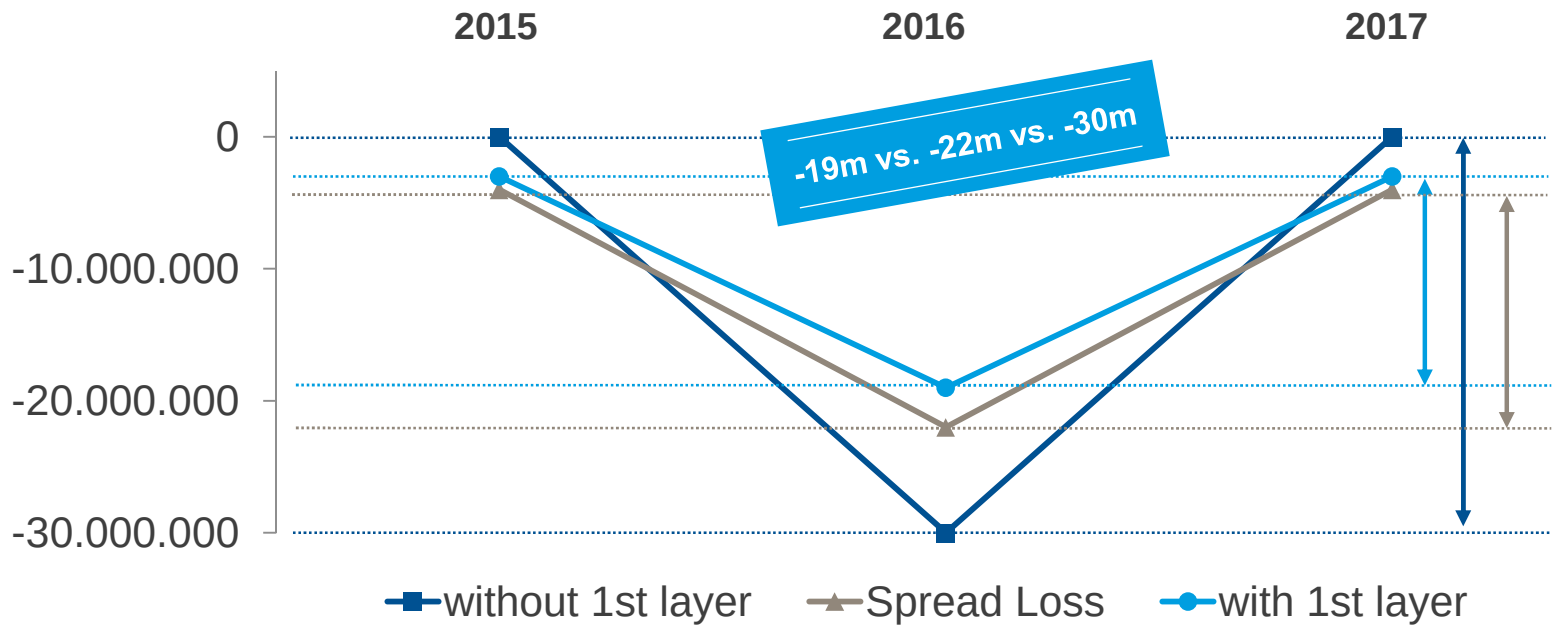
Case Study – Spread Loss (10m xs 5m)

Scenario: Two Losses



Spread Loss also reduces the volatility with a substantial saving component

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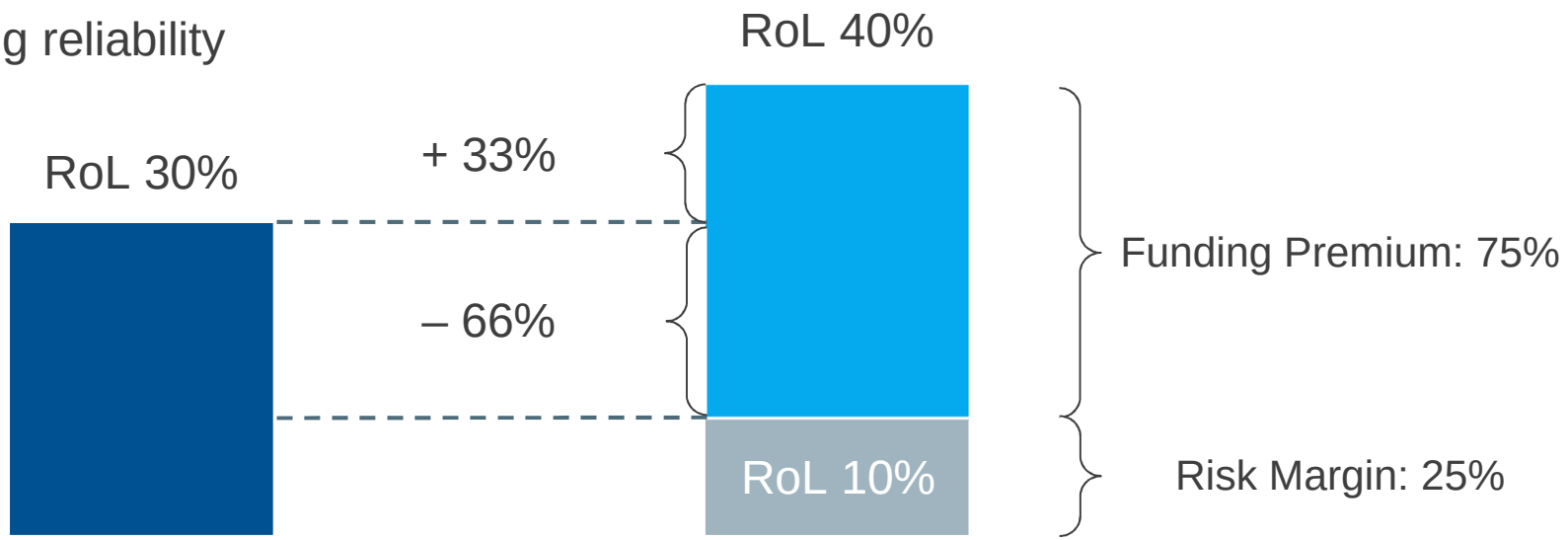
Case Study – Spread Loss (10m xs 5m)
Summary

- Protection of net retention and annual results
- Reduced volatility
- Cost-efficient
- Planning reliability



Strong alternative to self-retention

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Compliance

Risk Transfer and more

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Compliance

Experience for more than 30 years

- Strong guiding principles
- Risk transfer analysis
- No endorsements with the intent to alter the economics of the transaction, unless during the normal course of business
- No backdating
- No explicit financing for known loss events
- No difference in substance and form ("substance over form")
- Treaty review by Compliance Committee
  - Legal
  - Group Accounting (US GAAP/IFRS Competence Team)
  - Technical Accounting
  - Underwriting

Protect reputation of our Clients and Hannover Re

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Appendix

Risk Transfer Measurements – Expected Reinsurer's Deficit (ERD)

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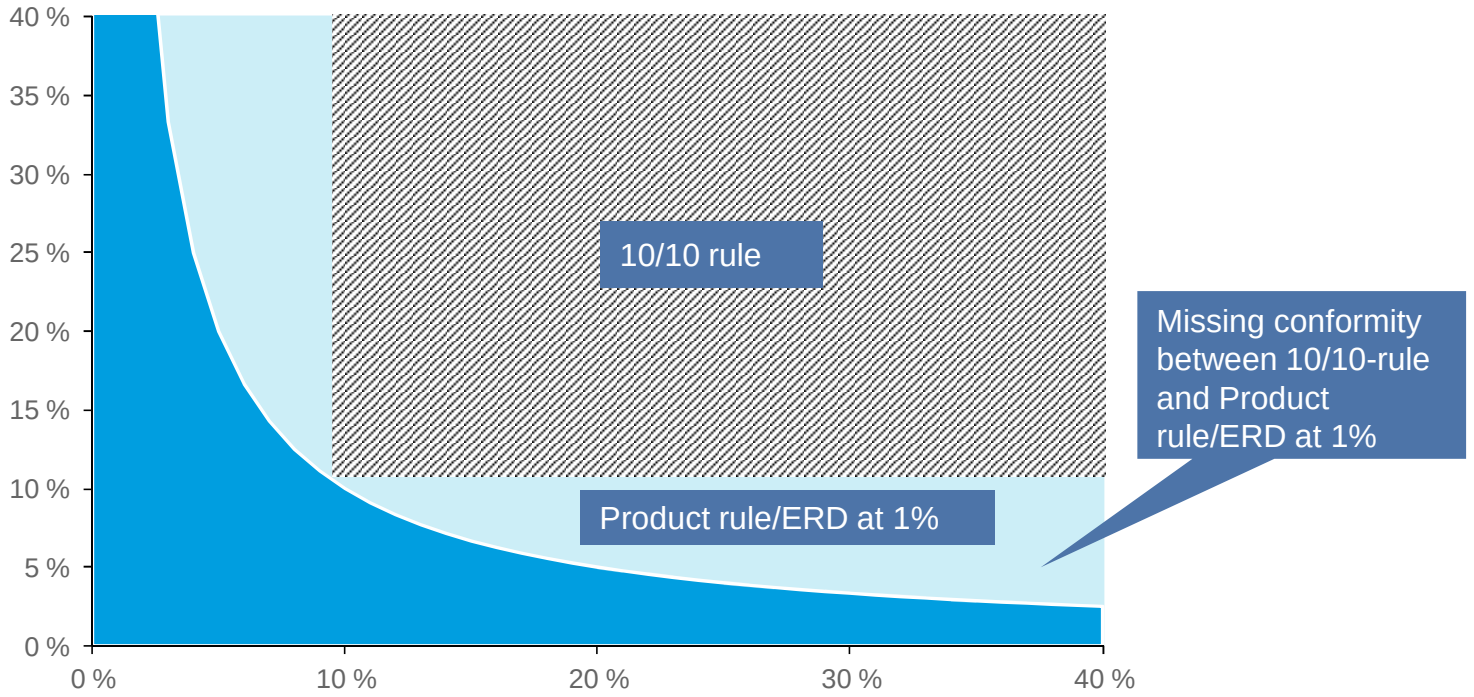
Risk transfer - comparison

10/10 Rule, Product Rule and ERD



Significant risk transfer following 10/10 rule and Product rule/ERD at 1%

Significant risk transfer following Product rule/ERD at 1%, but not following 10/10 rule

No significant risk transfer following 10/10 rule and Product rule/ERD at 1%

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Internationally accepted risk measurement
The ERD rule

- An international accepted risk measurement is the Expected Reinsurer Deficit (ERD)[1)]
- ERD[2)] = **probability of loss** x **average loss level** ≥ 1 % (of premiums)
  - The ERD is the result of the product of two components:
  - **Probability of a loss** ("frequency") and **average loss level** ("severity") of the reinsurer under a treaty. The average loss level is calculated as the expected value over all loss scenarios of the reinsurer and is expressed as a positive percentage of the premium.

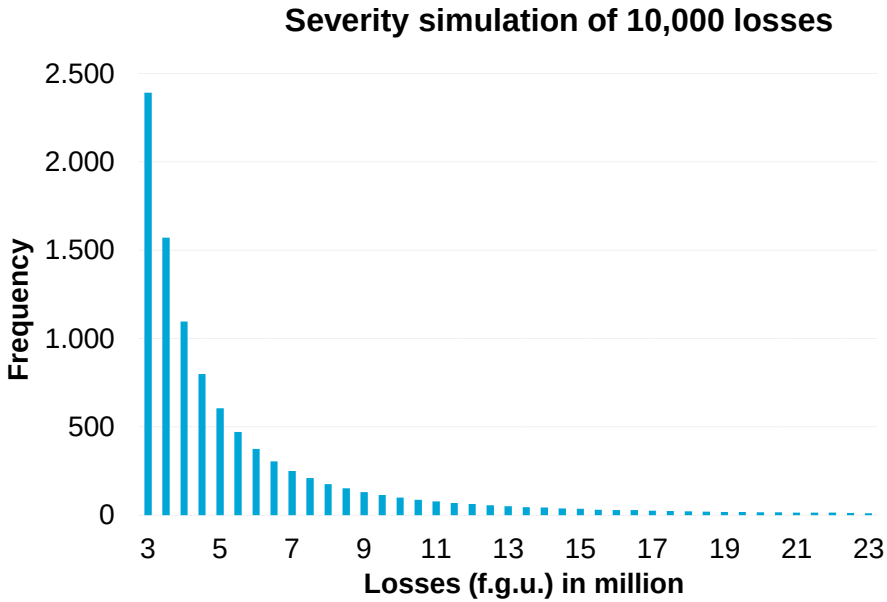
$$ERD = -\frac{Average\ Loss\ Level \times Break\ Even\ Probability}{Expected\ Premium} \geq 1\,\%$$

1) ERD originally suggested by CAS (Casualty Actuarial Society)
2) Simplified version

ERD Calculation

Spread Loss (10m xs 5m)

Monte Carlo Simulation: 10,000	
Frequency	Poisson-distribution
Mean	2.3
Severity	Pareto-distribution
Scale parameter	2,500,000
Shape parameter	1.5



$$ERD = -\frac{E(\min(R;0))}{E(P)}$$

E(min(R;0)) is the average loss level, i.e. the expected value over all loss scenarios (present value basis) of the reinsurer weighted by the "break-even probability", i.e. the probability that the reinsurer's result is below or equal zero

E(P) is the expected average amount of ceded premiums (present value basis)

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ERD Calculation

Spread Loss (10m xs 5m)

10,000 runs	Nominal	in % of PV Premium
Expected Premium	16,526,881	
Average Result	1,539,624	9.3%
Std. dev.	3,258,871	
Maximum Result	3,000,000	18.2%
Minimum Result	-26,294,018	-159.1%
ERD		**4.6%**

PV Result	Distribution
-12,240,948	1%
-5,861,683	5%
-2,392,697	10%
-516,566	15%
601,893	20%
3,000,000	50%
3,000,000	80%
3,000,000	95%
3,000,000	100%
Break Even Probability: result ≤ 0	**17.86%**

10,000 runs	Result
1	-1,456,783
2	3,000,000
3	1,909,203
…	…
725	-14,604,424
726	3,000,000
727	-12,689,933
…	…
9,999	-3,533,408
10,000	3,000,000

$$\textit{Average Loss Level} = \frac{-1{,}456{,}783 + \ldots + (-3{,}533{,}408)}{\text{number of losses}} = -4{,}218{,}677$$

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ERD Calculation

Spread Loss (10m xs 5m)

$$\text{ERD} = -\frac{\text{Average Loss Level} \times \text{Break Even Probability}}{\text{Expected Premium}}$$

$$= -\frac{-4{,}218{,}677 \times 17.86\%}{16{,}526{,}881} \approx 4.56\% > 1\%$$

- Therefore, the example treaty has in our opinion sufficient risk transfer in order to be accounted for as reinsurance under US GAAP and consequently under IFRS.
- Please note that the risk transfer analysis is based on the **entire premium** and not only on the margin part.

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