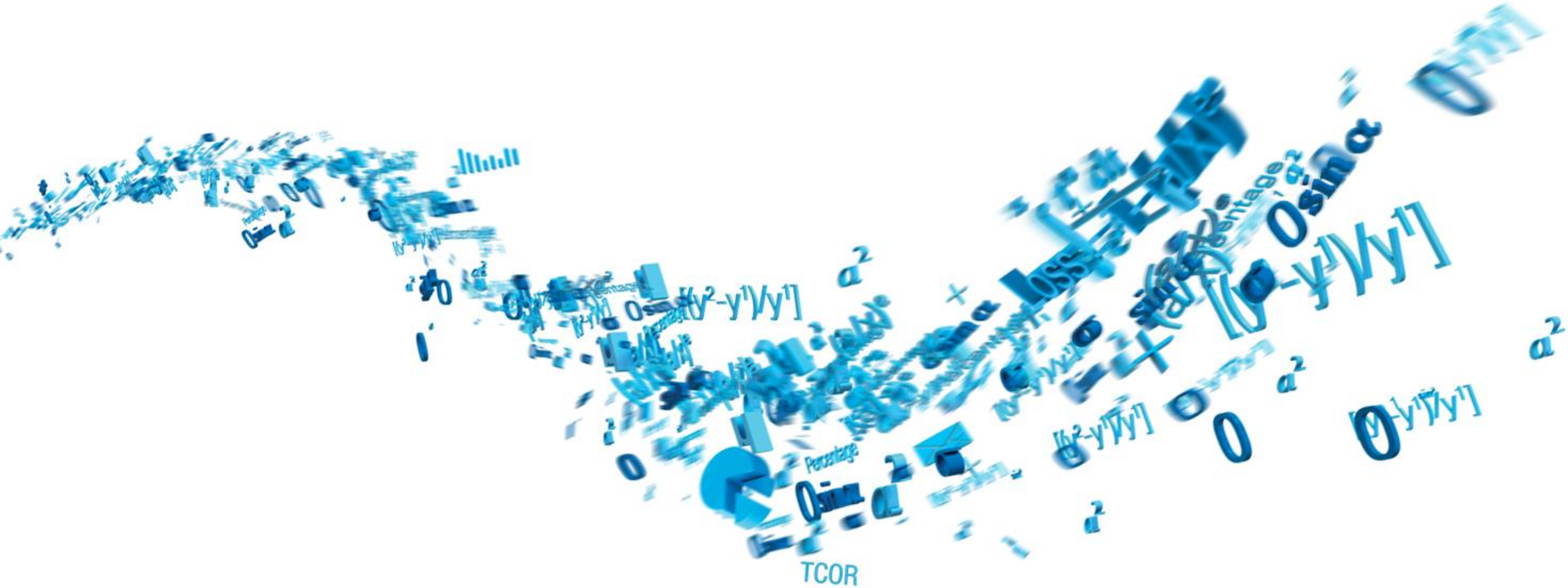

Non-Traditional forms of Reinsurance

Retroactive Reinsurance

Peter Mlej
November 2015

Prepared by Aon Benfield

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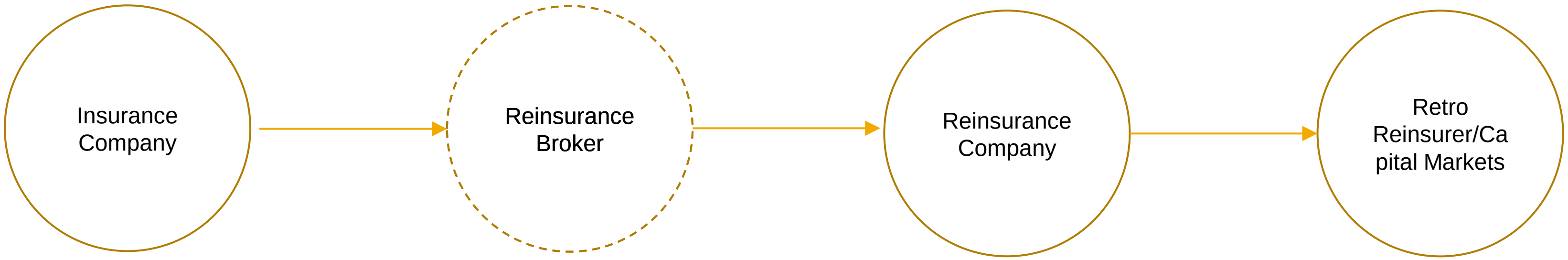
Reinsurance Market Participants



Main function is assessment of cedent risk, structuring, placement and administration of reinsurance treaty

1. **Brokers** negotiate/discuss with client (insurer) and reinsurers, the structure, conditions and the price of the reinsurance treaty- **stand as an opposition to reinsurers during the price negotiation**
2. **Actuaries** analyse, price and optimize reinsurance treaty, work on stochastic models for reinsurance program optimizations, spot market trends etc.
3. **Cat management** run catastrophic models (in-house models or third vendor models) on clients' portfolios, test new models and their versions, made first estimate of cat losses on client portfolio just after the cat event
4. **Model development team (for Aon Benfield it is Impact Forecasting Team)**, works on development of catastrophic models
5. **Client technical management team**, administration of treaties (premium allocation, collection of recoveries etc.)

Topics

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Introduction – Traditional Reinsurance vs. Non-Traditional Reinsurance Solutions

Standard Products: Wrap-up

Quota Share – insurance company cedes the same percentage of losses and premium to reinsurer and receives commission, fixed cession/percentage

Surplus – insurance company cedes the same percentage of premium and losses, based on the sum insured in excess of deductible and receives commission, ratio differs for each risk

Excess of Loss (per risk or per event)**-** losses excess of deductible are recovered from reinsurer, fixed premium paid plus reinstatement premium, works on per loss basis

Stop Loss - losses excess of deductible (defined via loss ratio) recovered from reinsurer, fixed premium paid, works for accumulated losses per period

Aggregate Excess of Loss- the same as Stop Loss, deductible and limit are defined on monetary basis

*all the products are covered in detail e.g. in the presentation from 4th of December 2014 for CSaP

Reinsurance Products

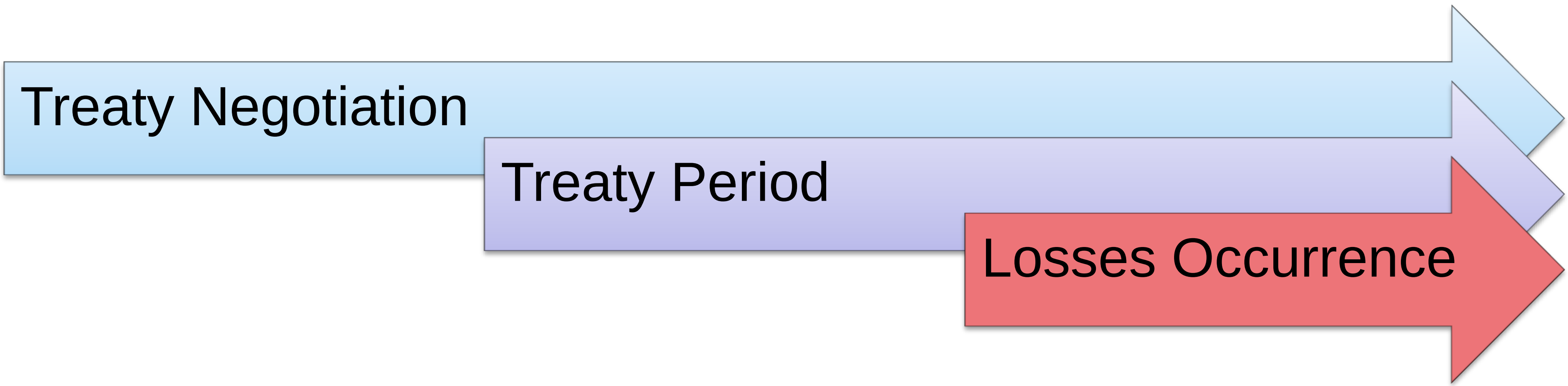
Quota Share

Surplus

Aggregate covers

Stop Loss

Excess of Loss



Contract Functionality

Reinsurance contract covers future losses!

Reinsurance Products

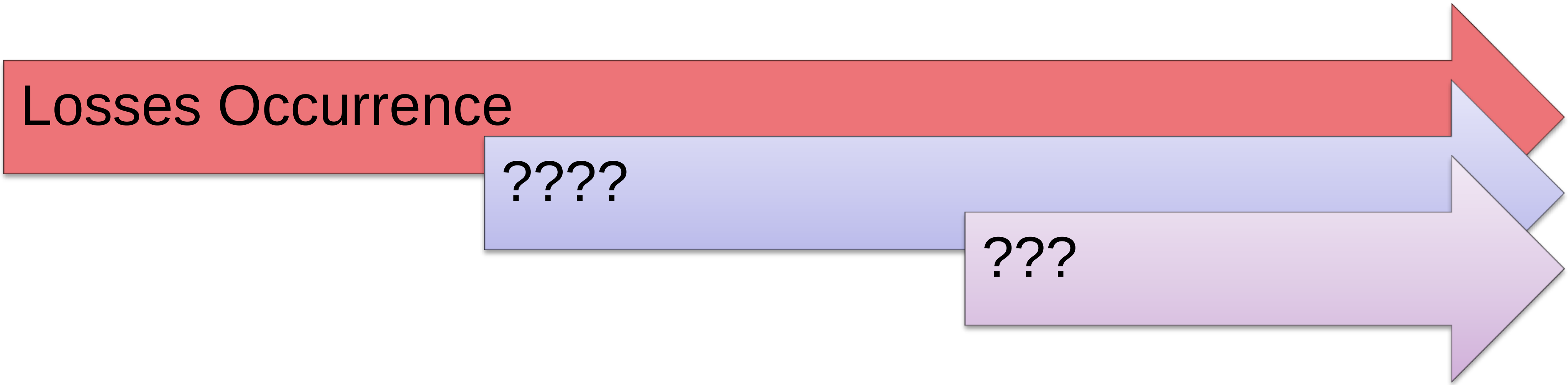
Quota Share

Surplus

Aggregate covers

Stop Loss

Excess of Loss



Retroactive Reinsurance

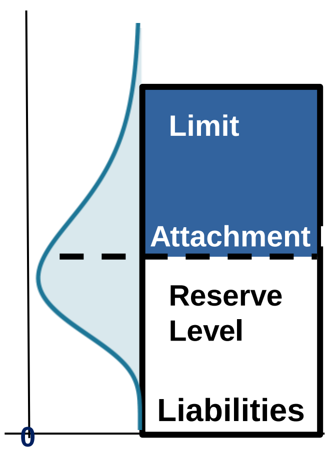
Does reinsurance market provide solution for already incurred losses?

Section 1: Retroactive Reinsurance Solutions

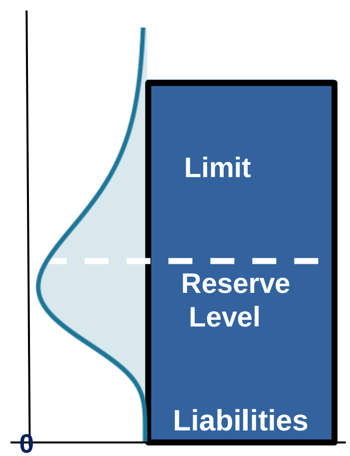
Retroactive Reinsurance

Solutions for the risks associated with unresolved non-life liabilities of the insurance company. Solutions mainly used as a capital relief and/or BS & P&L stabilization.

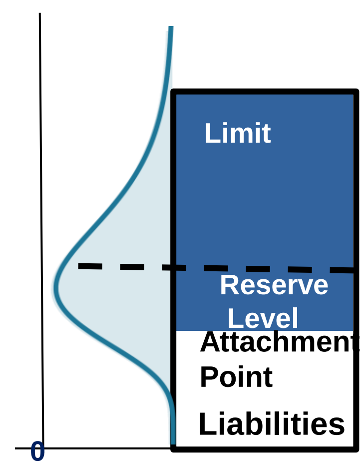
Adverse **D**evelopment **C**over "Out of the Money"
ADC



Loss **P**ortfolio **T**ransfer
LPT



Adverse **D**evelopment **C**over "In the Money"
ADC



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Section 2: Motivation for Retroactive Solutions

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Business Strategy

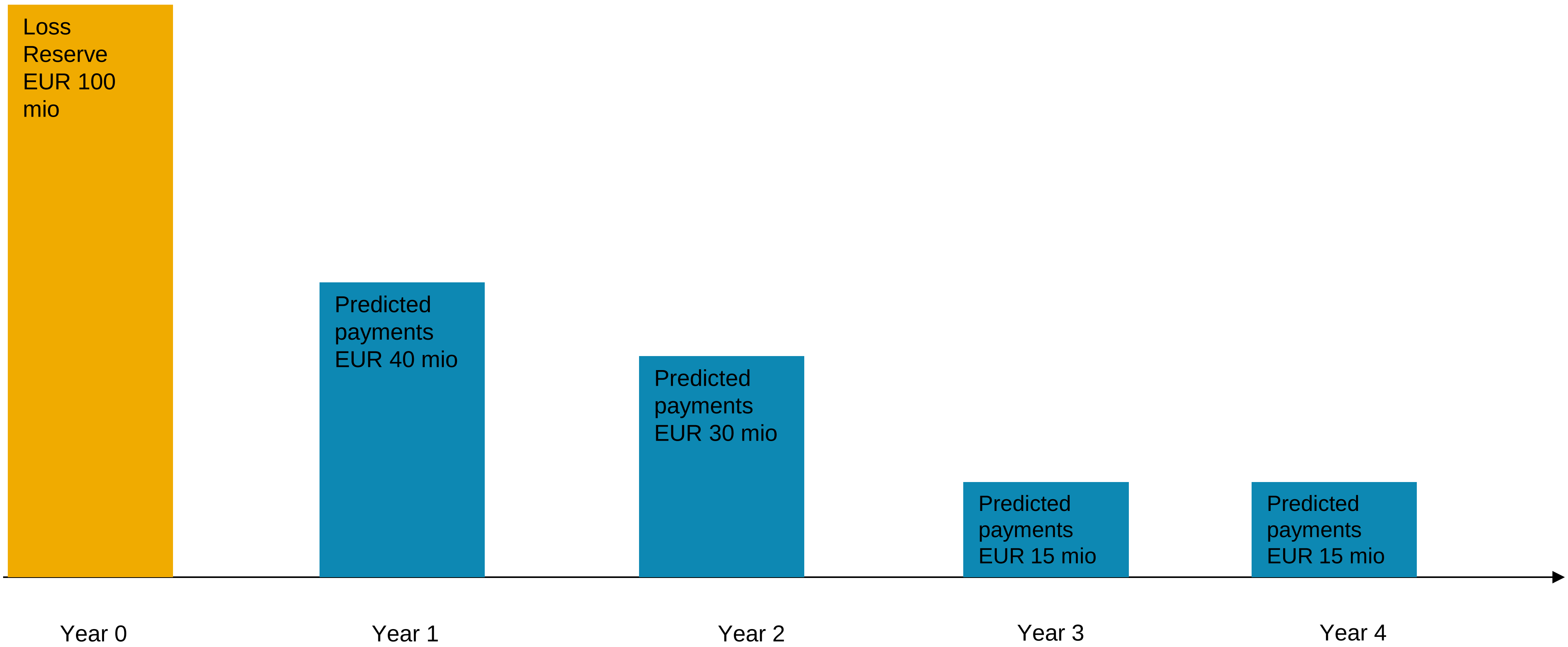
- Exit business line or market
- Hibernation of alternative risk retaining entity such as captive
- Finality in case of M&A process

Capital Management

- Regulator or rating agency requirements for strengthening capital positon
- Stabilisation of profit and loss statement, protection against adverse development in reserves

Key two drivers for ADC/LPT are reserve risk and timing risk (payment acceleration)

Reserve Risk Management



Claims expected pay-out pattern of total reserves EUR 100 mio

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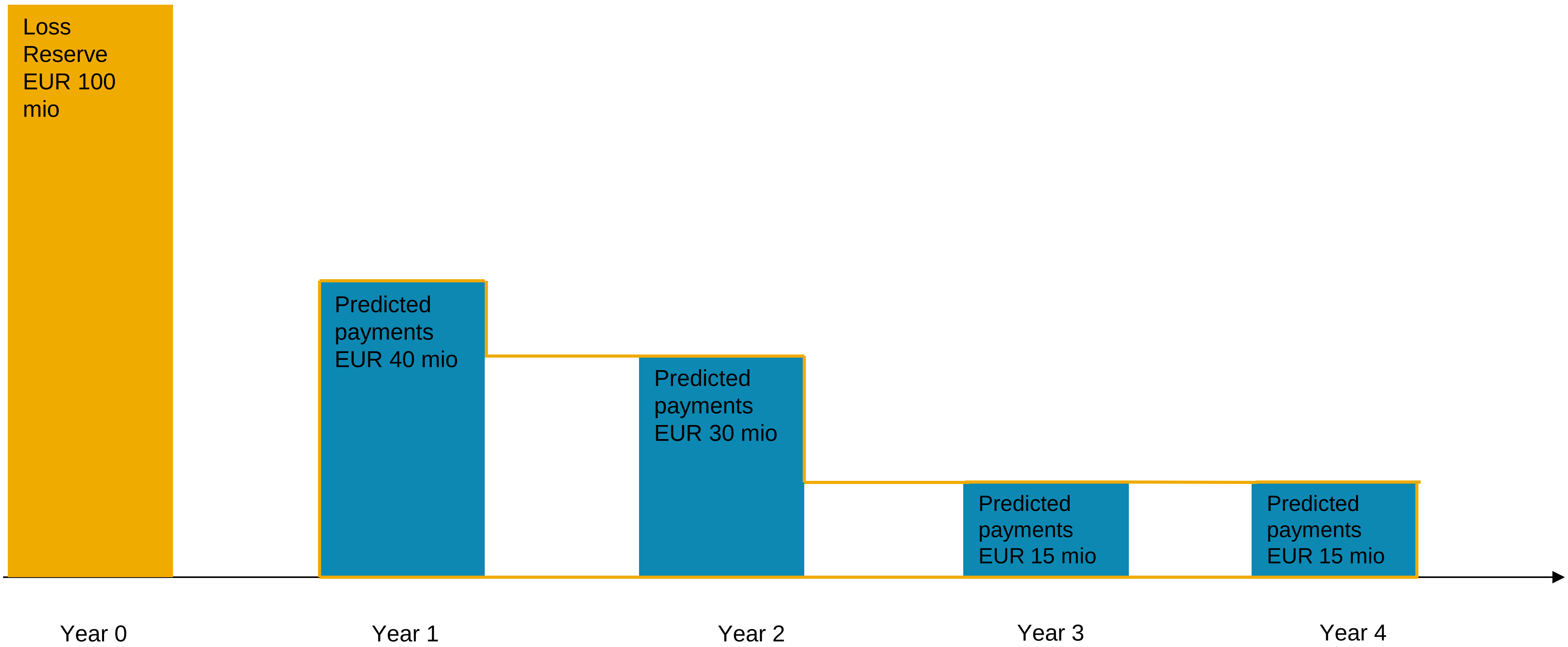
Reserve Risk Management



“Ring-fence” of liabilities in the troublesome portfolio

Section 3: Adverse Development Cover

Adverse Development Cover (ADC)

General principles

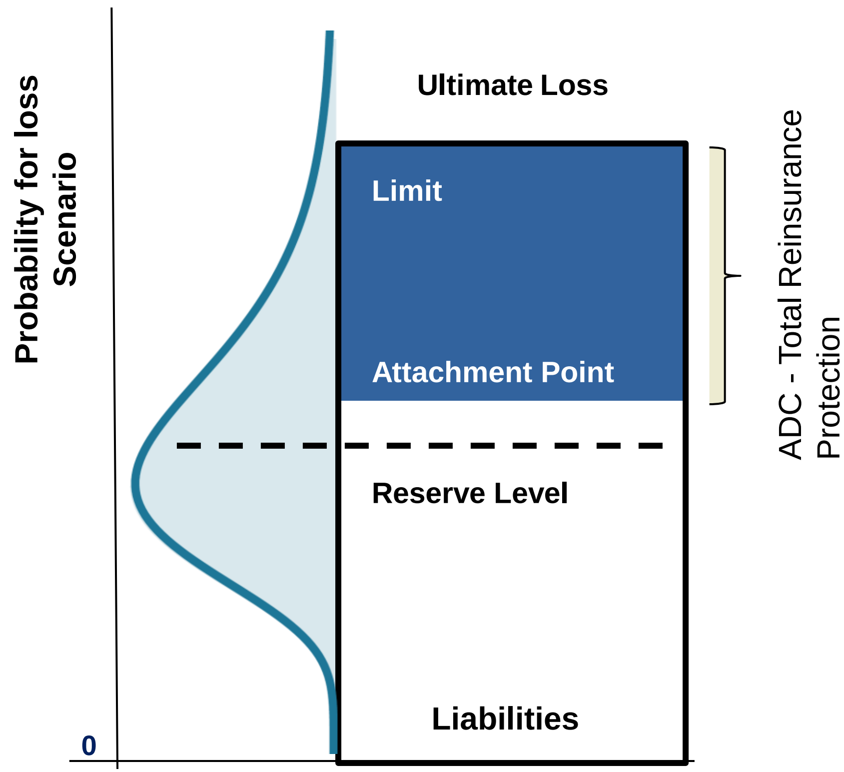
- This ADC is “out of the money” i.e. It attaches above the current claims reserves
- Paid claims in excess of a defined retention (Attachment Point) are ceded to the reinsurer, thus provides stop loss type protection
- The reinsurer receives a premium payment
  - Expected ceded technical provisions
  - Plus volatility charge
  - Plus expenses/profit

Implications

- On day one, the technical provisions can be reduced to the retention of the ADC, less a safety margin for the reinsurance default risk

Conclusion

- Using an ADC creates an upper threshold for cumulative claims payments and therefore, under IFRS, the technical provisions above the retention can be released immediately (less safety margin)
- The probability of exceeding the cover should be lower than the required percentile (VaR, S&P or Solvency II)



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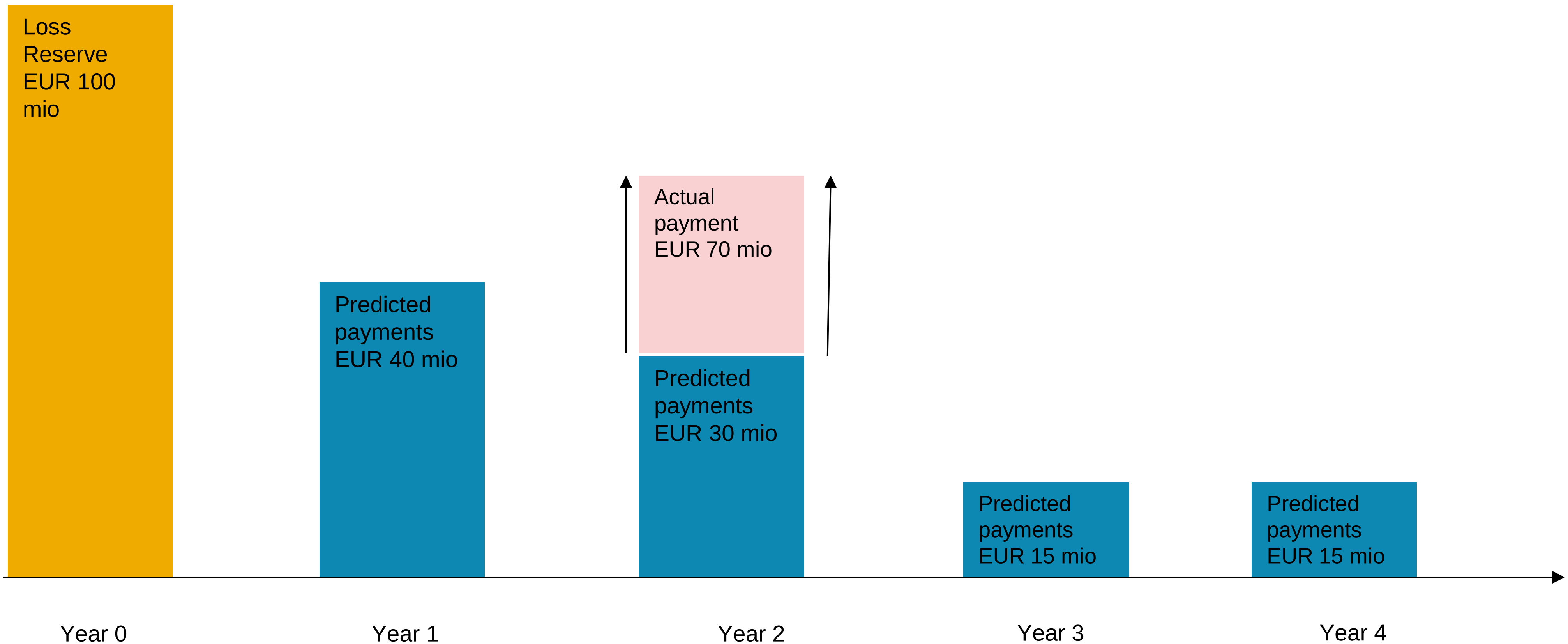
Reserve Risk Management: Reserve Risk



- Cumulatively paid EUR 140 mio instead of EUR 100 mio
- ADC “out of the money”, deductible 110 mio

ADC attaching “out of the money” reduced reserve volatility and so claims settlement, additional amount paid is covered by reinsurer

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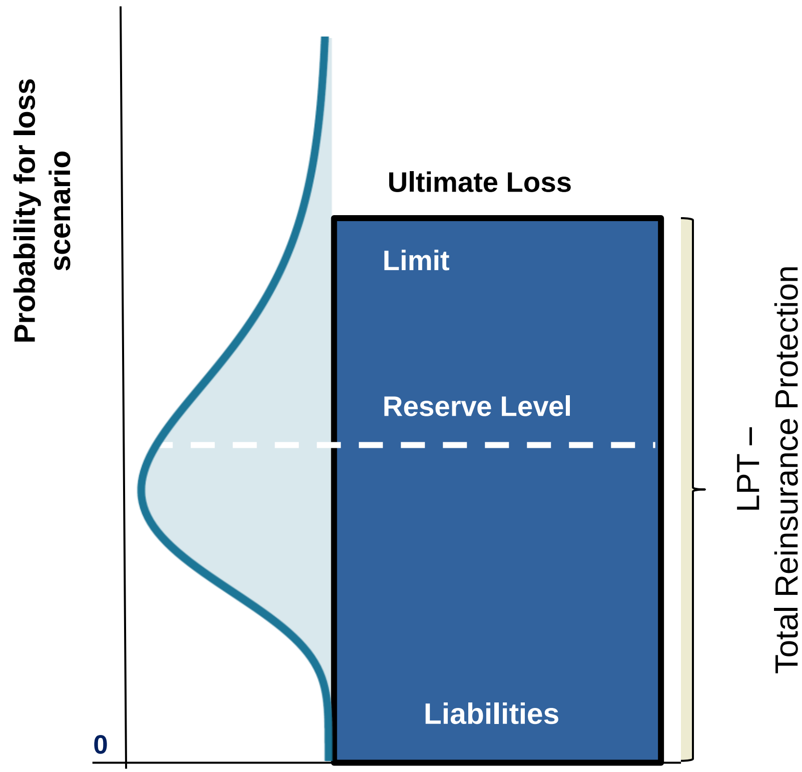
Section 4: Loss Portfolio Transfer

Loss Portfolio Transfer (LPT)

General principles

- Protection is provided by a reinsurer for all claims from the ground up, subject to a limit which is set above the current reserve level
- 100%(or less) reinsurance of the expected liabilities
- The reinsurer receives a premium payment
  - Expected technical provisions
  - Plus volatility charge
  - Plus expenses/profit
- Very often contract is not for 100% (keep insurer involved in proper claim mng.)
- Usually commutation clause after couple of years
- Profit commission can be used (tailored made for a contract)



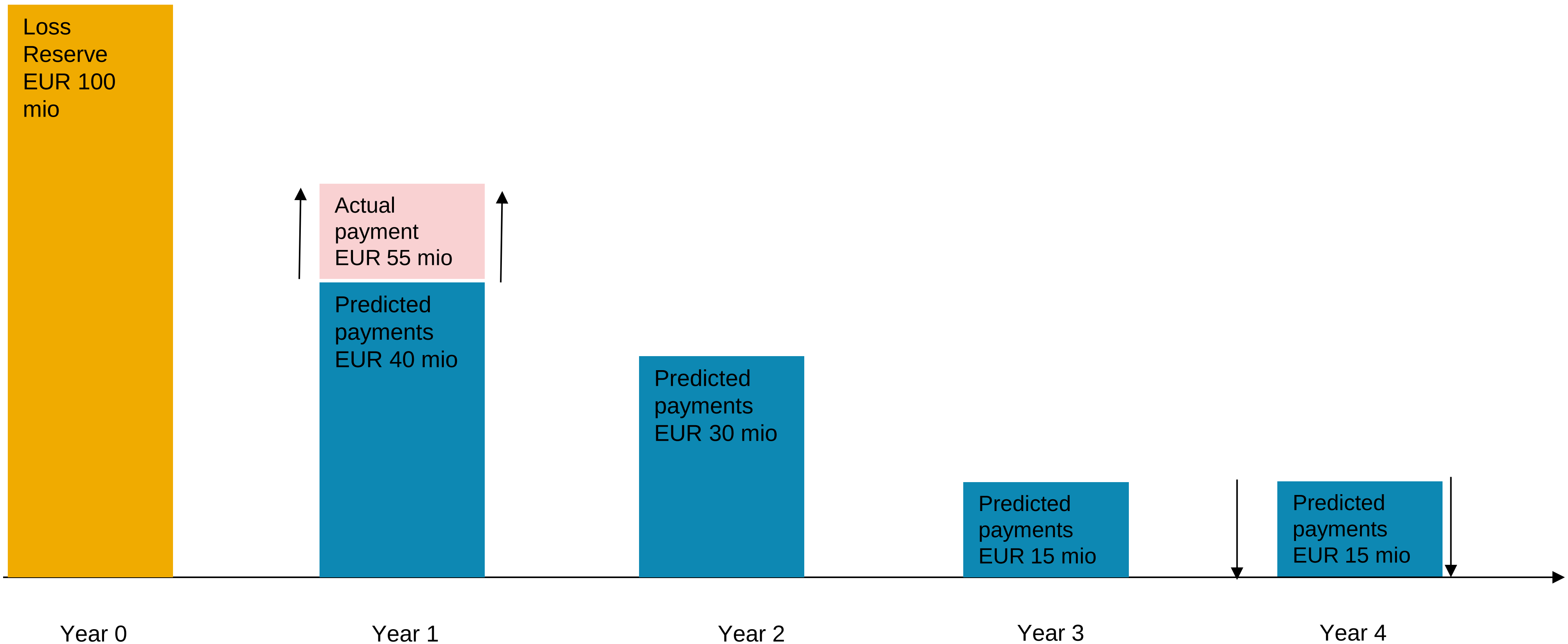
Implications

- On day one, technical provisions can be reduced to the retention of the LPT (100%-x%) less a safety margin for reinsurance default risk
- Credit risk associated with the reinsurer
- Some residual risk associated with burning through the whole programme – some capital reserve will have to be retained

Conclusion

- Using an LPT transfers x% of the liability to a reinsurer and thereby reduces the exposure by the same percentage
- It is unlikely that the reinsurer would introduce a limit for traditional personal lines exposure
- **Surplus in the technical provisions can be released immediately**

Reserve Risk Management: Timing Risk



- Cumulatively still insurer pays EUR 100 mio
- Acceleration in payment-pattern, in year 1 insurer should pay EUR 55 mio instead of EUR 40 mio expected

- LPT provides protection in case of ALM mismatch and timing risk
- ALM and timing mismatch risk is ceded to reinsurer*

*only cash operations

Section 5: Adverse Development Cover “in-the-money”

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Blended LPT / ADC Solution

General principles

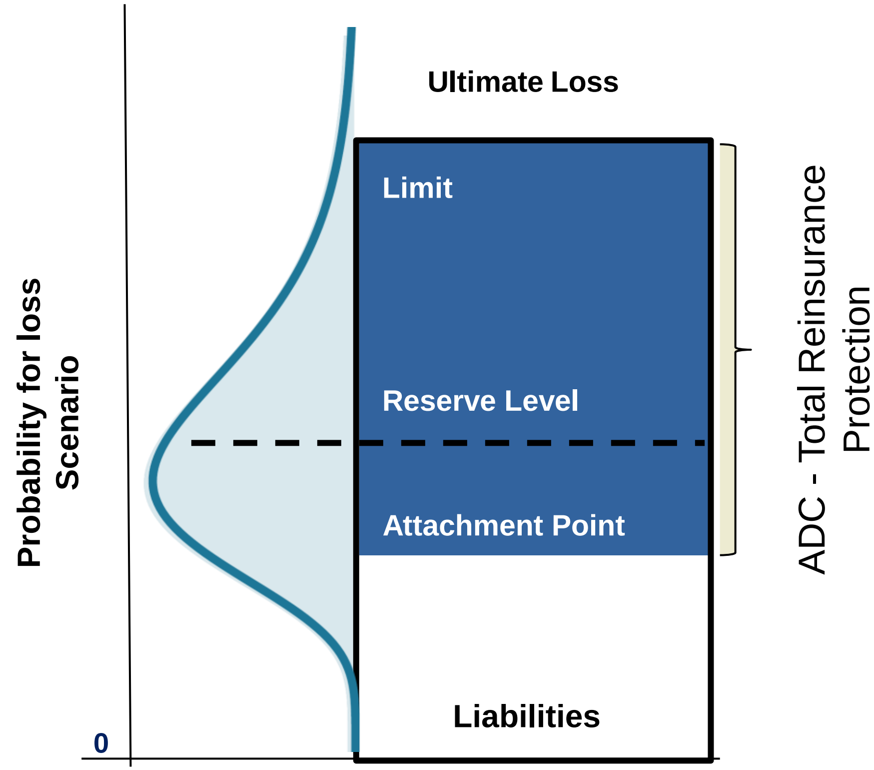
- This ADC is “in the money” i.e. It attaches below the current claims reserves and is in effect a blend of the traditional “out of the money” ADC and LPT models.
- Unlike the LPT, the reinsurance protection (the blue area) does not attach at 0 with this form of reinsurance.
- Premium will reflect the likelihood and magnitude of any likely deterioration of reserves.

Implications

- Premium will be higher than the “out of the money” ADC, given the higher volatility and greater likelihood of loss
- On day one, the technical provisions can be reduced to the retention of the ADC, less a safety margin for the reinsurance default risk

Conclusion

- Using an ADC creates an upper threshold for cumulative claims payments and therefore, under IFRS, the technical provisions above the retention can be released immediately (less safety margin)
- The probability of exceeding the cover should be lower than the required percentile (VaR, S&P or Solvency II)



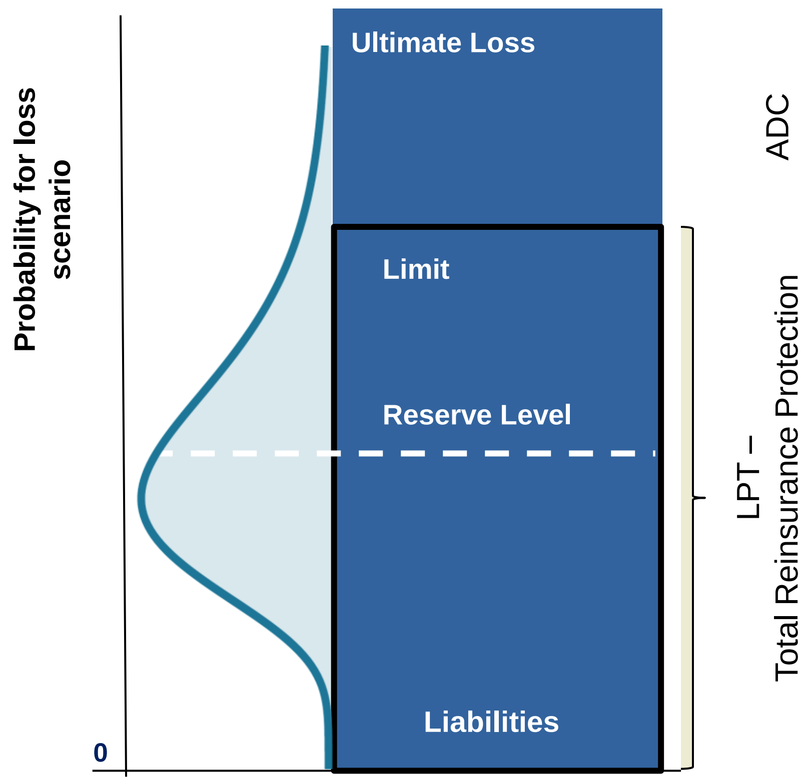
Creativity without Borders (real example): ADC above LPT

General principles

- Protection is provided by a reinsurer, participating on LPT, for all claims from the ground up, subject to a limit which is set above/or at the current reserve level
- 100% reinsurance of the expected liabilities
- In case limit of LPT does not cover all liabilities ADC is in place
- It is custom made solution so there is a potential to play around with cost and limits and by this way possibility to save money

Motivation

- Client wants to split it, in that way (save money, diversified reinsurers on the panel, use different broker, first put in place LTP and then decided to cover more.., etc.)



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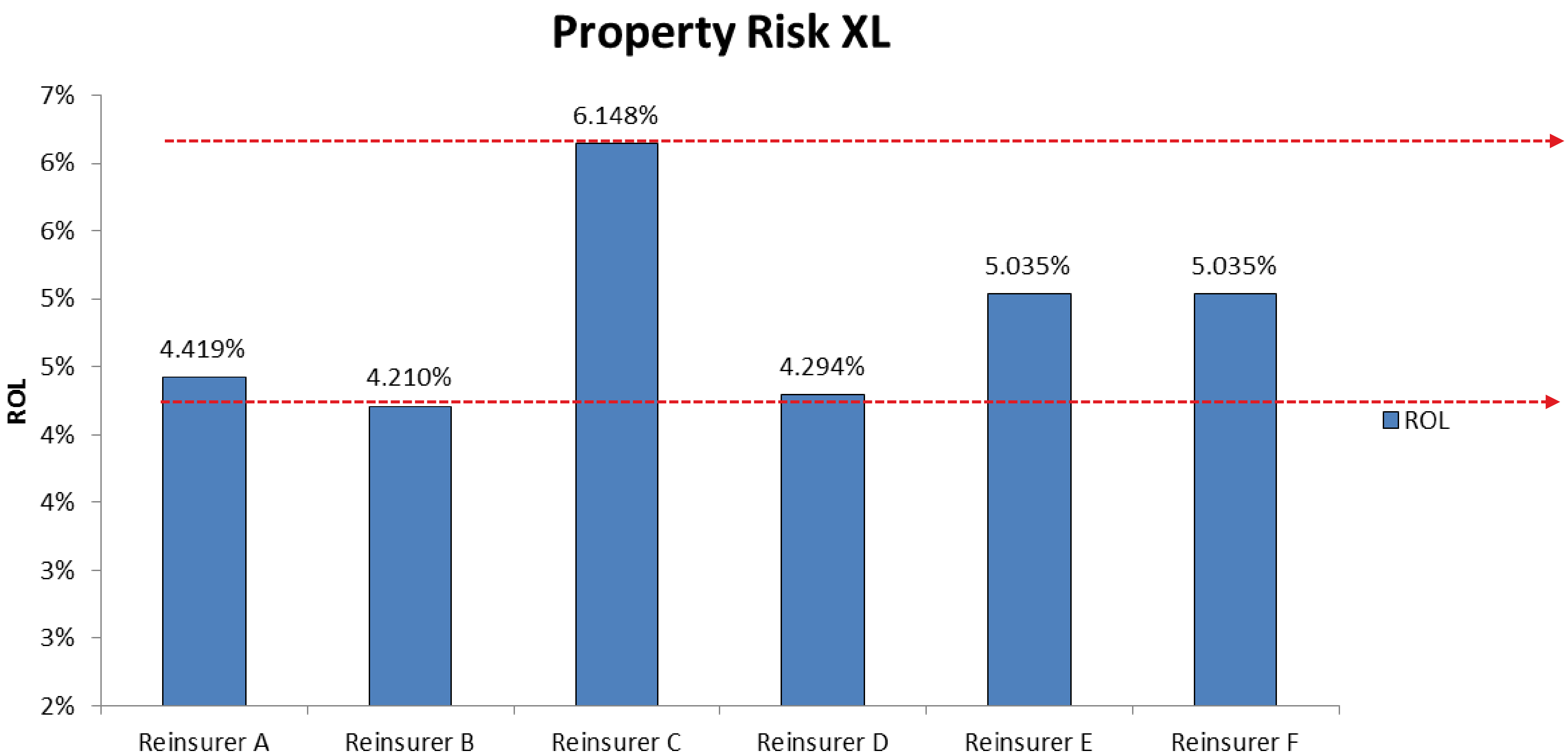
Section 6: Pricing of ADC/LPT treaty

Key Pricing Steps for LTP/ADC

- ✓ **Derivation of "best estimates" liabilities (chain ladder, Borhnuetter Ferguson etc.)**
- ✓ **Variability of reserves estimations (bootstrapping of triangles), important mainly for products with deductibles well above the "best estimates"**
- ✓ Dependencies between classes, in case of more classes are transferred
- ✓ **Discount factors (present value of the contract)**
- ✓ Consideration of tax implication, cost of allocated capital, quality of data etc.

"Best estimates", variability in reserves and **discount factors** are the main drivers of the price

Example of Reinsurers' Quotes: standard property excess of loss (new program for insurer)



Huge variability in provided quotes

- ✓ **Real example of property risk XL quotes from different reinsurers**
- ✓ **ROL is monetary price divided by limit of the cover (here ROL for all layers)**
- ✓ **Stretch almost 2% in ROL, means difference in price approximately EUR 1.5 mio**

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Case Study

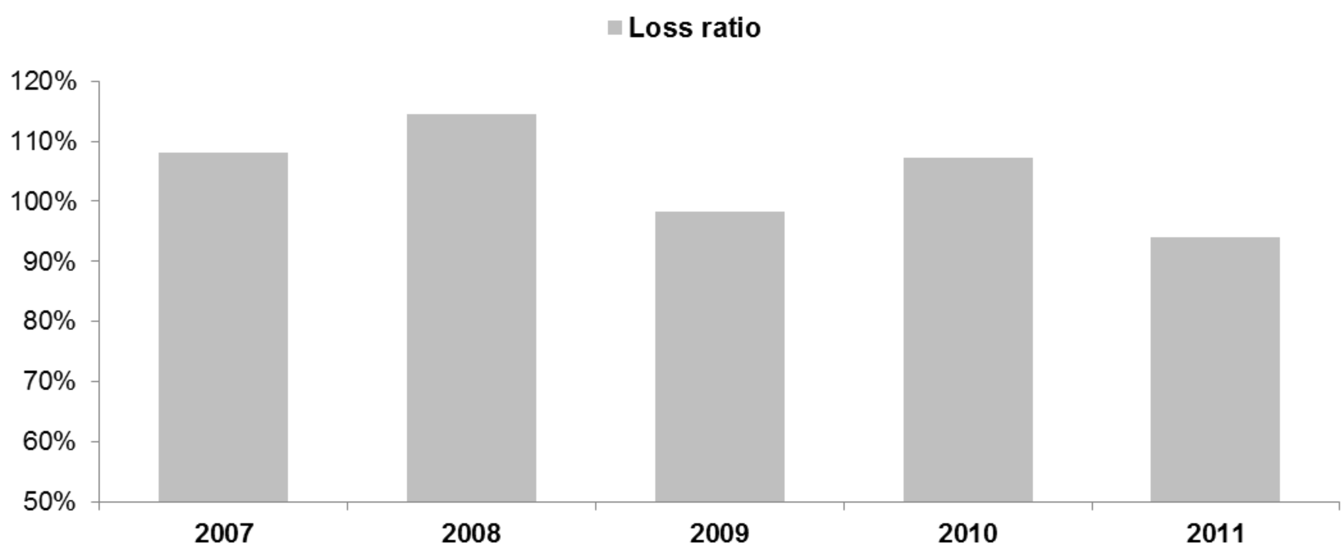
Insurance Company: ABC

Line of Business: Motor Third Party Liability

Underwriting Results: for years 2007 to 2011 loss ratio already above 100%

Objective: reinsurance cover to protect future results' volatility from legacy business and strengthen its capital position

Size of technical provisions: EUR 50 mio



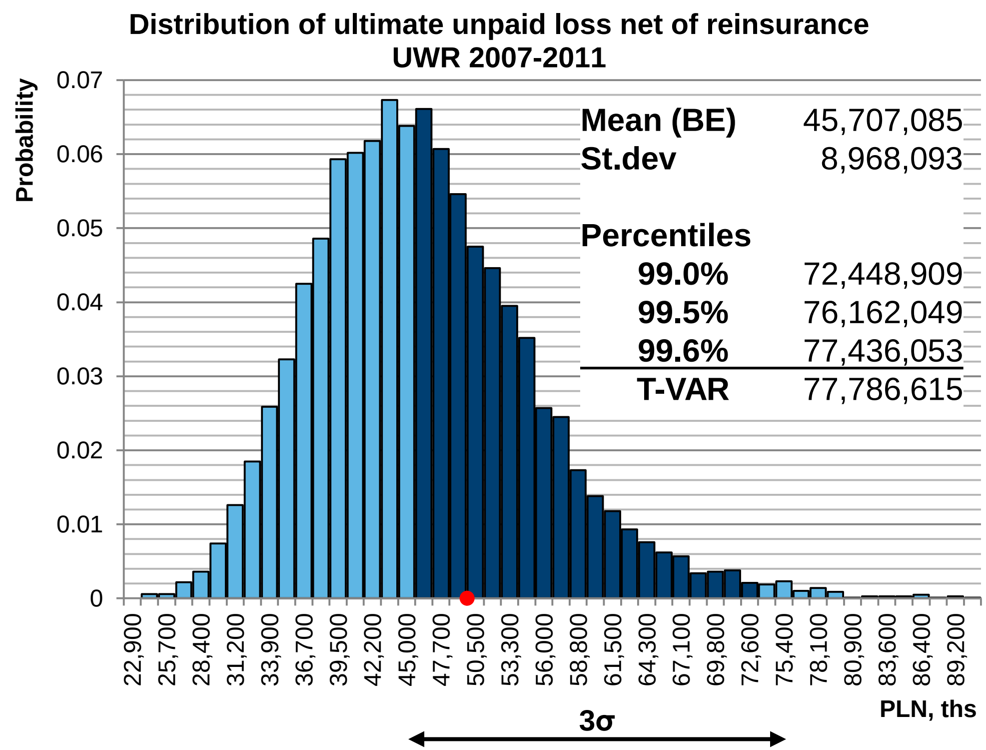
Retroactive reinsurance cover is suitable solution to protect future earnings against **further reserve deterioration** or **rapid settlements**

Key Structuring Steps

1. ABC approached their broker with the aim of reserve risk reduction, mainly due the insufficient Solvency 2 ratio
2. After the discussion, broker identified 3 main possibilities and formulate data requirements
3. Data gathering and validation with the insurance company
4. Broker's actuaries are analyzing data and structuring possible solutions
   - ❑ Proposal for structures and its features
   - ❑ Estimation of the price on reinsurance market
   - ❑ Identifying reinsurance market
   - ❑ Impact on solvency position
5. Solution proposed to the ABC
6. ABC decision about the desired solution and costs for such a solution
7. Broking company is negotiating the price with reinsurers
8. Final placement of the contract

Bootstrapping the triangles

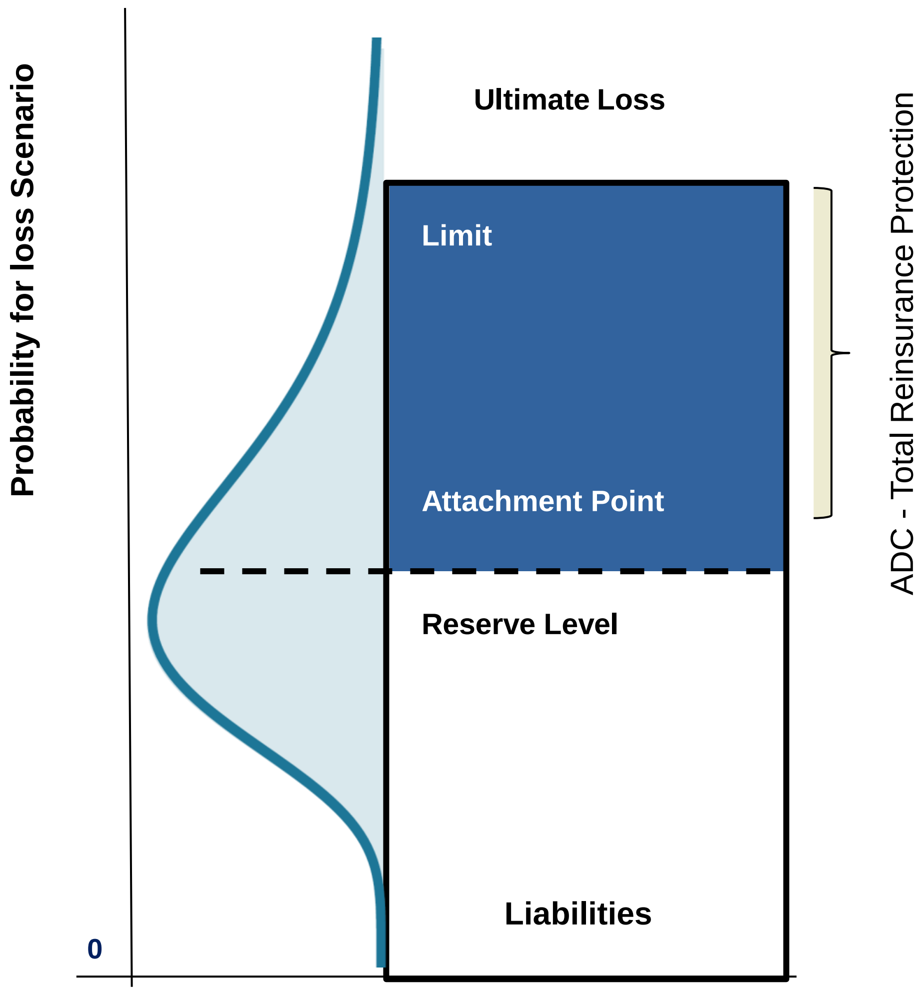
- In order to structure reinsurance solutions we performed stochastic analysis of ultimate loss
- With the help of bootstrapping technique we have obtained the distribution of ultimate net loss for underwriting years 2007-2011 net of specific reinsurance in given underwriting year



Probabilistic distribution of reserves is essential for reinsurance price estimation

Peter England and Richard Verrall's, Analytic and bootstrap estimates of prediction errors in claims reserving

ADC "Out of the Money"



Details of cover

- **URW: 2007-2011**
- **Limit: EUR 25 m**
  - Limit corresponds to 3σ
- **Attachment Point: EUR 50 m**
  - Attachment point at current claims reserves vs BE EUR 45 mio
- **Expected reins. premium: EUR 4 m (16% ROL)**
- **Premium paid in cash**

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Pricing of the Proposed Reinsurance

- Pricing of the reinsurance highly depends on the individual reinsurers participating on the treaty
- Broker determines best estimate of the price for two main reasons
  - To perform impact/profitability analysis of retroactive treaty
  - To have better position during negotiation with reinsurers

Price = (Risk Premium + Risk Margin + Cost of the Capital)

Cost of the Capital:
- Reinsurer needs to consider cost of the capital associated with such a deal
- TVaR method to allocate capital

Risk Margin:
- Individual for each reinsurer
- Depends on soft factors as reinsurance market conditions (soft etc,), quality of data, portfolio

Risk Premium:
- Average loss cost to the reinsurance program
- Best estimates of reserves and its variability
- Discounted according to the payment pattern

ADC "Out of the Money" :PRICE

- Pricing of the reinsurance highly depends on the individual reinsurers participating on the treaty
- Broker determines best estimate of the price for two main reasons
    - To perform impact/profitability analysis of retroactive treaty
    - To have better position during negotiation with reinsurers

Price = (1,807,858+ 422,255+1,758,952) (= 3,989,064)

- ➢ 2.5% interest rate
- ➢ 8% cost of capital applied on TVaR (1 in100)
- ➢ 10% volatility charge (10% times standard deviation)
- ➢ Average losses to the layer

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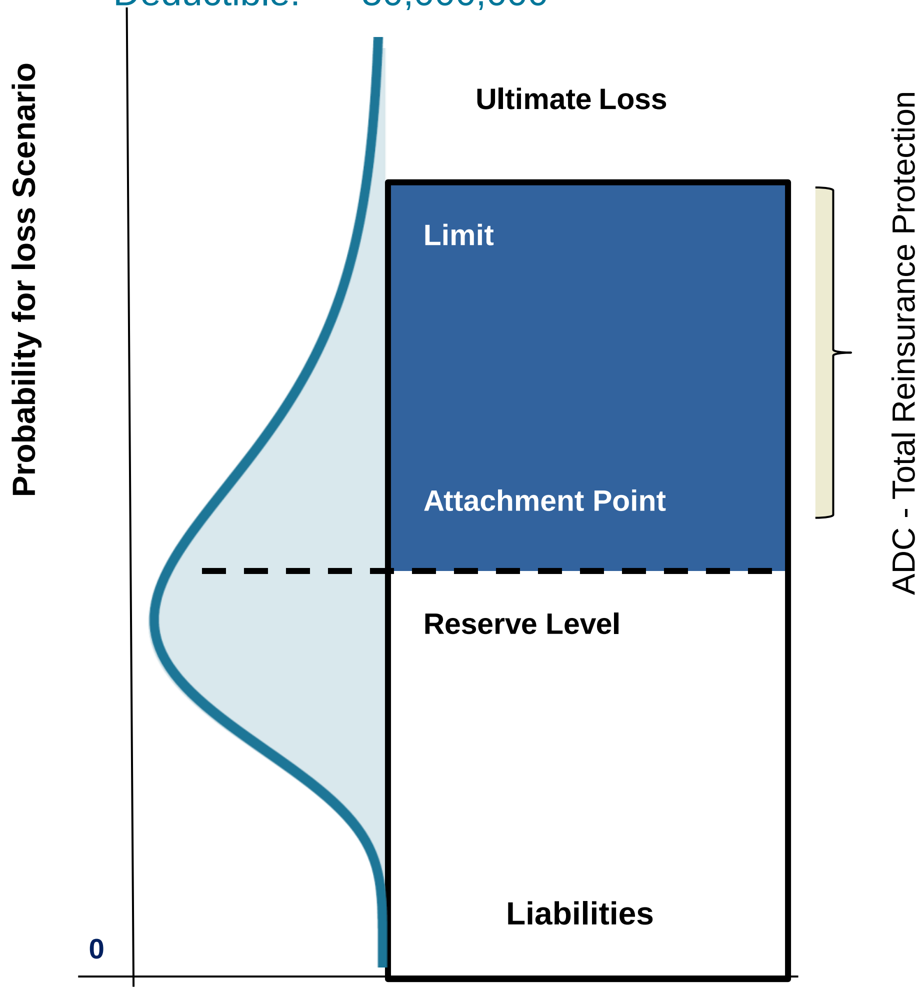
ADC “Out of the Money”

Reserves: 50,531,325
Best estimate: 45,707,085
Deductible: 50,000,000



Scenarios Example

Scenarios	Actual Value of Payments	Result before ADC	Recoveries from ADC	Result after ADC
1	**50,531,325**	**0**	531,325	- 3,468,675
2	**45,707,085**	**4,824,240**	-	824,240
3	**60,000,000**	**- 9,468,675**	10,000,000	- 3,468,675
4	**30,000,000**	**20,531,325**	-	16,531,325
5	**...**	**...**	...	

- Result before ADC= Reserves-Actual Payments

1st Scenario:50,531,325-50,531,325=0

- Recoveries from ADC= Payments above deductible

1st Scenario: max(50,531,325-50,000,000,0)=531,325

- Result after ADC=Reserves-Actual Payments + Recoveries from ADC-Premium for ADC

1st Scenario: 50,531,325-50,531,325+531,325,-4,000,000=-3,468,675

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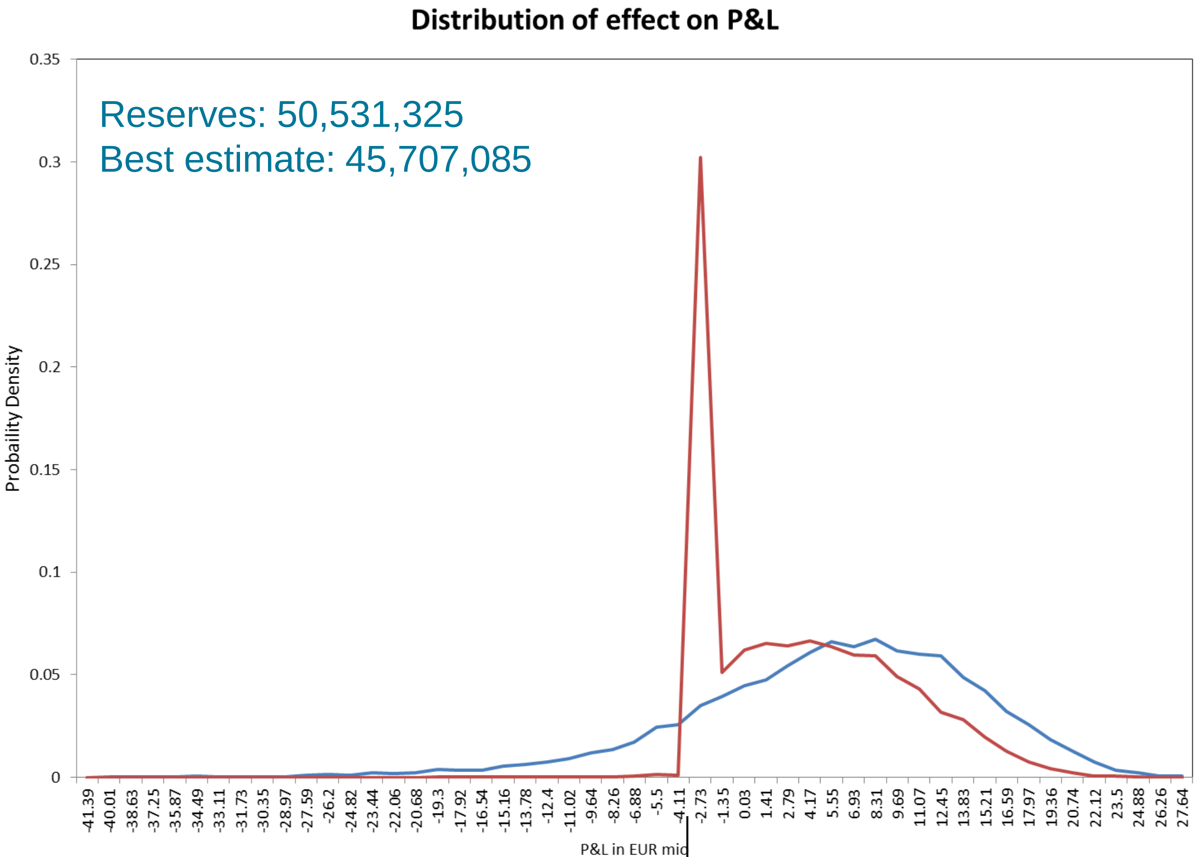
ADC “Out of the Money”



	Before ADC	After ADC OTM
mean	4,824,240	2,714,678
stdev	8,968,093	5,993,190
10.0%	-6,460,539	-3,468,675
1.0%	-21,917,584	-3,468,675
0.5%	-25,630,724	-4,630,724
0.4%	-26,904,728	-5,904,728
T-VAR 1 in 100	-27,255,290	-3,584,249

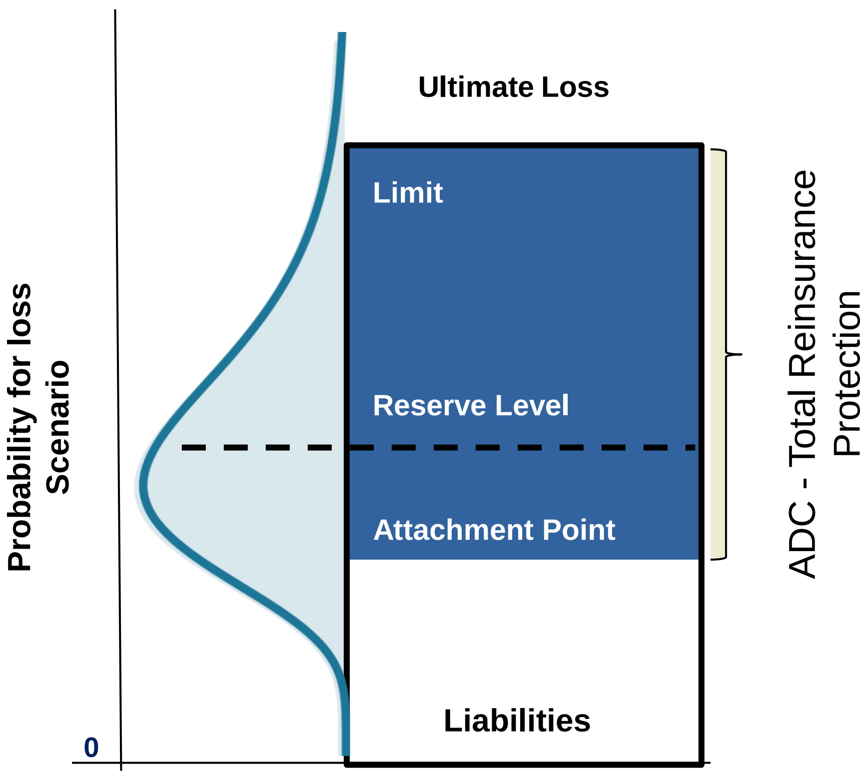
- Cover starts working from payments above EUR 50 mio

EUR 50,531,325- EUR 50 ,000,000-4,000,000=-3,468,675

ADC provides stop loss type protection: losses from ceded portfolio **will not cost more than reinsurance premium** paid for the cover

Hence this cover also **decreases volatility of future profits**

ADC “In the Money”

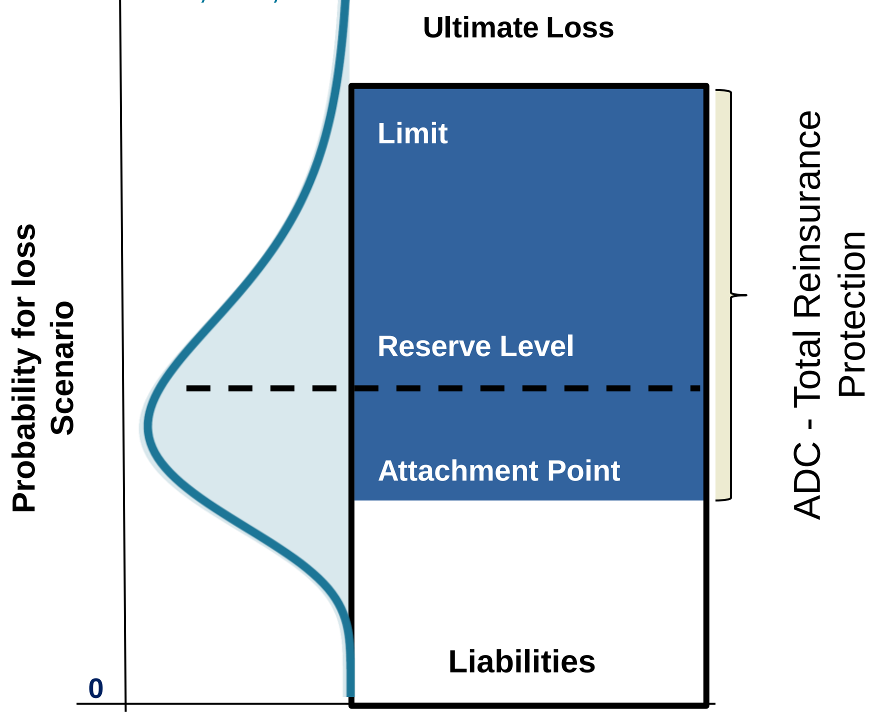


Details of cover

- **URW: 2007-2011**
- **Limit: EUR 30 m**
    - corresponds to 3σ
- **Attachment Point: EUR 45 m**
    - Attachment point at current BE EUR 45 mio
- **Expected reins. premium: EUR 8 m (26% ROL)**
- **Partially funds withheld, partially cash payment**

ADC "In the Money"

Reserves: 50,531,325
Best estimate: 45,707,085
Deductible: 45,000,000



Scenarios	Actual Value of Payments	Result before ADC	Recoveries from ADC	Result after ADC
1.0	50,531,325	0	5,531,325	-2,468,675
2.0	45,707,085	4,824,240	707,085	-2,468,675
3.0	60,000,000	- 9,468,675	15,000,000	- 2,468,675
4.0	30,000,000	20,531,325	-	12,531,325
5.0	...	...		

- ❑ Result before ADC= Reserves-Actual Payments

1st Scenario:50,531,325-50,531,325=0

- ❑ Recoveries from ADC= Payments above deductible

1st Scenario: max(50,531,325-45,000,000,0)=5,531,325

- ❑ Result after ADC=Reserves-Actual Payments + Recoveries from ADC-Premium for ADC

1st Scenario: 50,531,325-50,531,325+5,531,325,-8,000,000=-2,468,675

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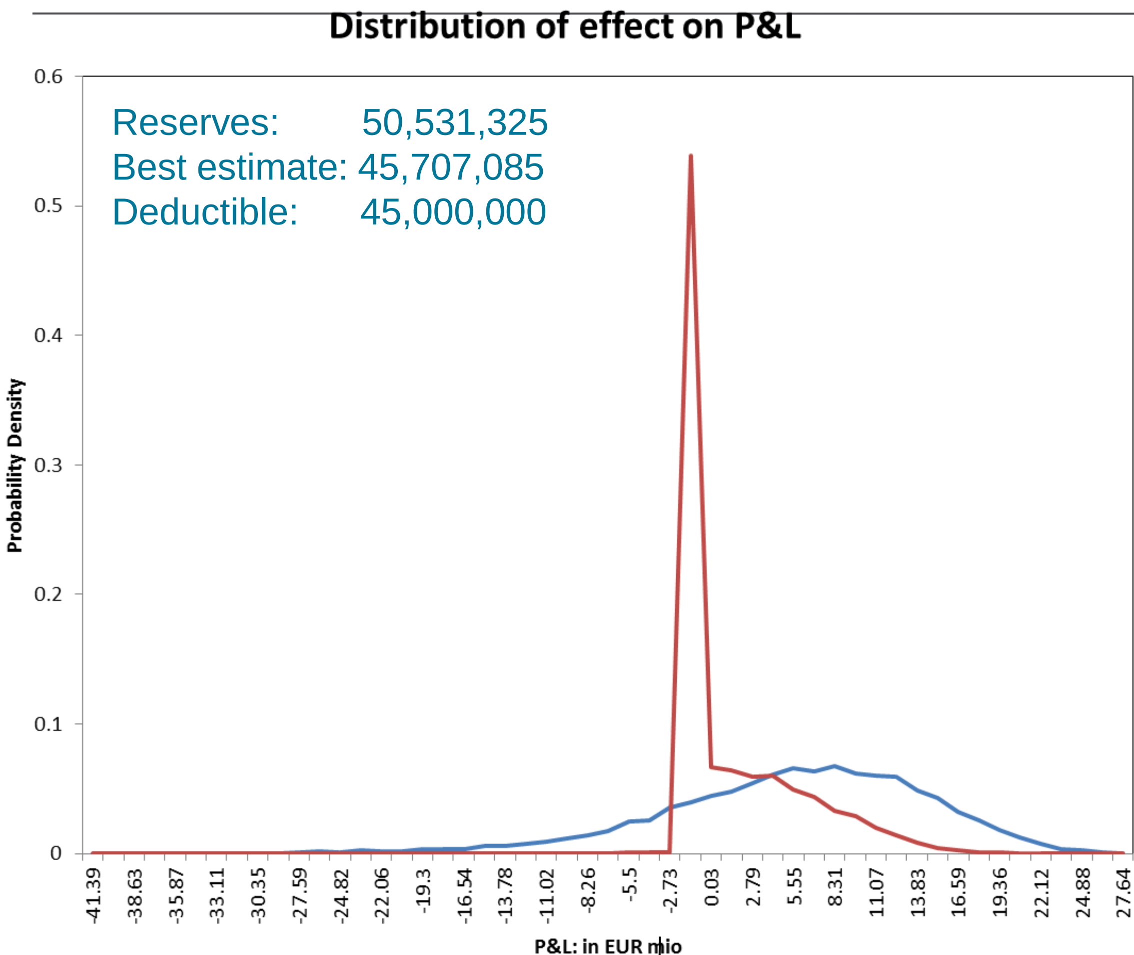
ADC "In the Money"



	Before ADC	After ADC ITM
mean	4,824,240	612,772
stdev	8,968,093	4,345,640
10.0%	-6,460,539	-2,468,675
1.0%	-21,917,584	-2,468,675
0.5%	-25,630,724	-3,630,724
0.4%	-26,904,728	-4,904,728
T-VAR 1 in 100	-27,255,290	-2,534,962

- Cover starts working from payments above EUR 45 mio

EUR 50,531,32-EUR 45,000,000-8,000,000=-2,468,675

ADC "In the money" provide the same stop loss solution as ADC "out of the money" and better reduction in volatility but for higher price

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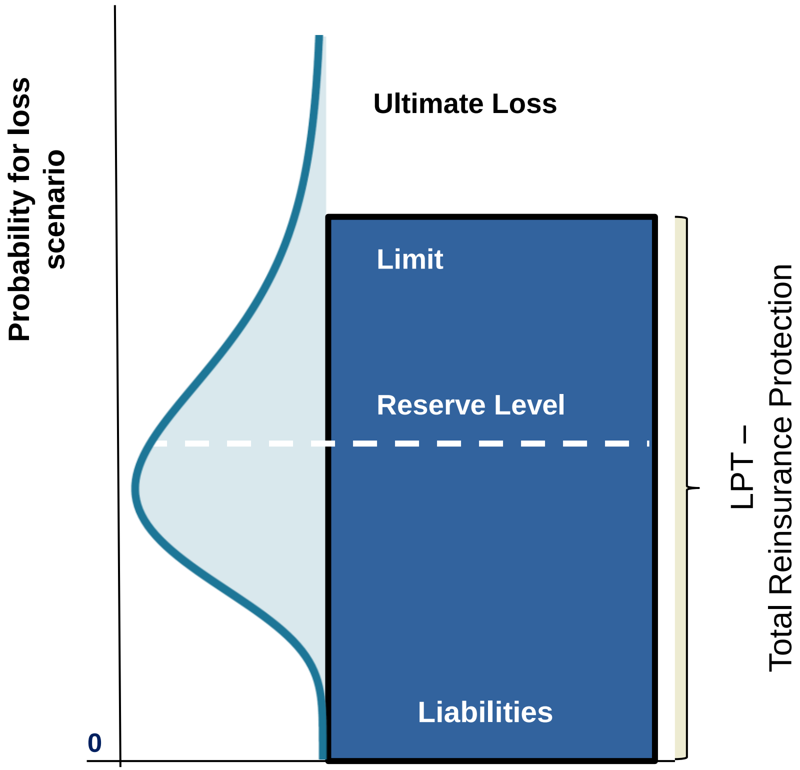
Loss Portfolio Transfer



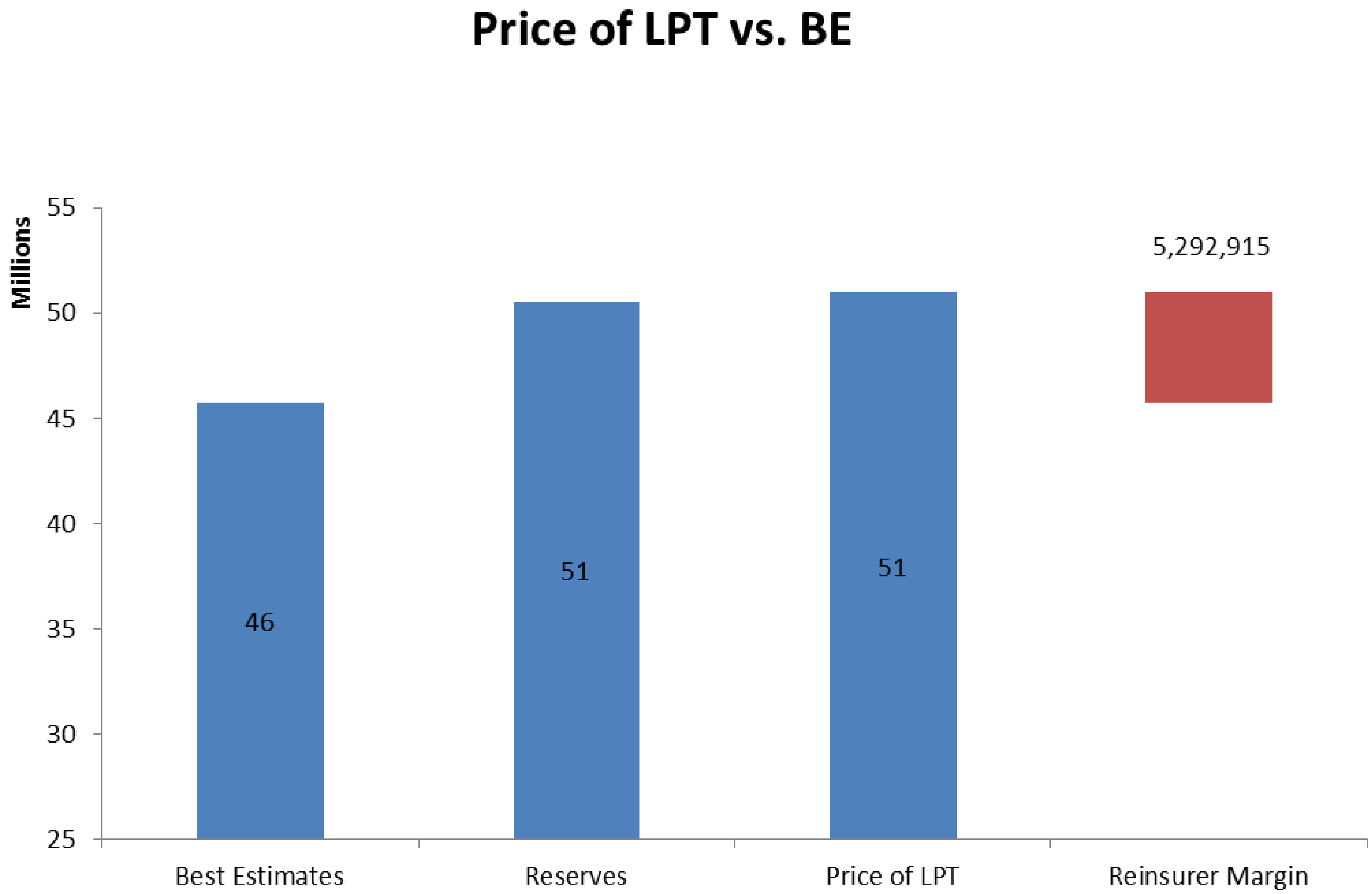
Details of cover

- **URW: 2007-2011**
- **Limit: EUR 75 m**
  - Limit responds to BE + 3σ
- **Attachment Point: EUR 0 m**
- **Expected reins. premium: EUR 51 m (26% ROL)**

•Funds withheld with partially cash payment

The direct impact of LPT is transfer of the whole reserve risk to reinsurer

Loss Portfolio Transfer



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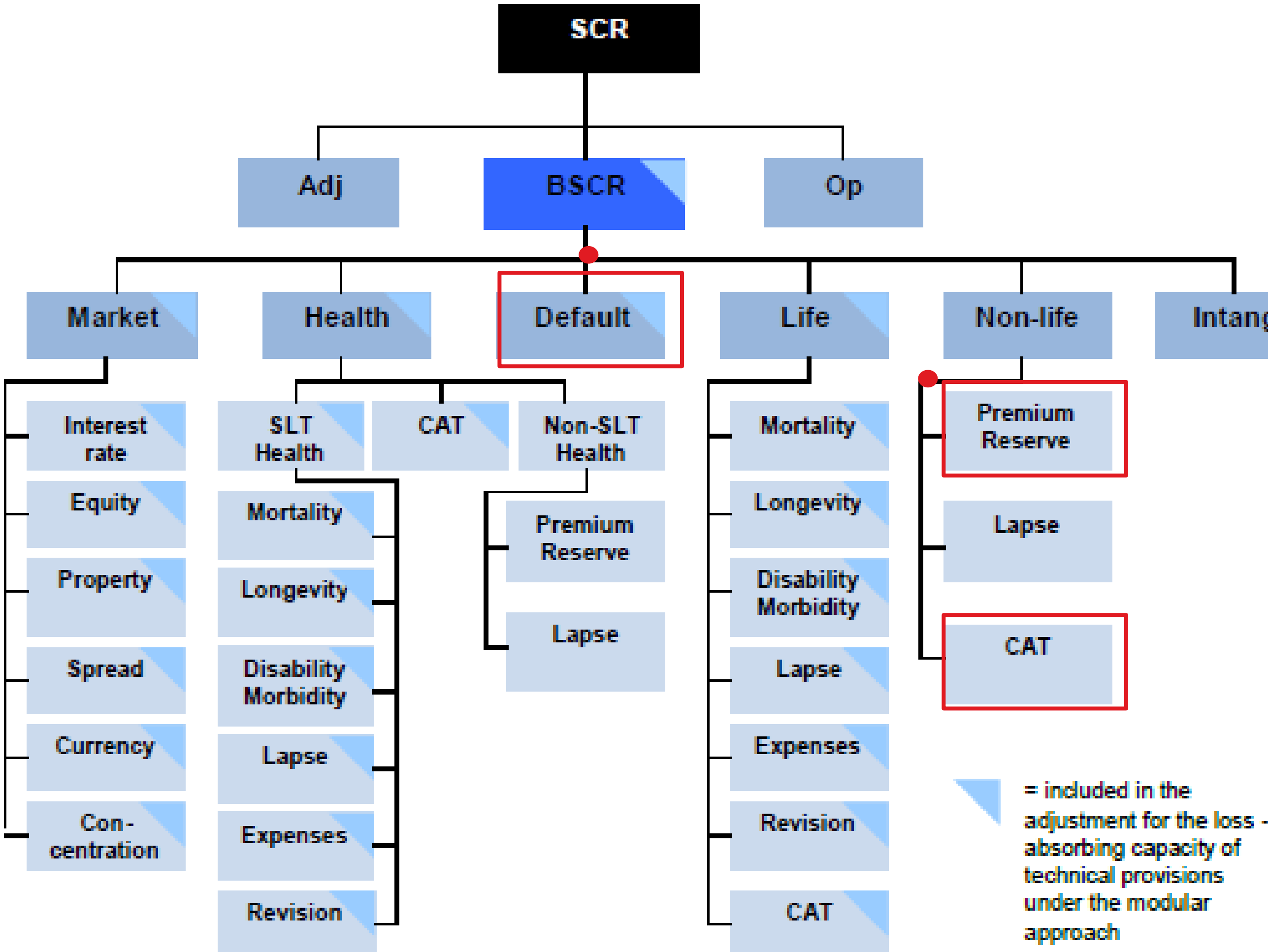
Case Study: SII

Solvency II and Reinsurance: Where does reinsurance play a role for non-life



Default risk of reinsurer

Non-Life premium risk

Non-Life reserve risk

Cat exposure risk

Diversification effects

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Solvency II and Reinsurance: Wrap-up

Proportional Reinsurance-Standard Formula

- ✓ Reduction of SCR proportional to cession amount e.g. Quota Share 50% cession, reduces SCR_{prem} by 50% before diversification
- ✓ longer term impact on future reserve risk

Non-Proportional reinsurance-Standard Formula

- ✓ Capital requirement reduction by 20% for MTPL, Fire & Property and GTPL
- ✓ 0% for all other lines of business
- ✓ Small risk mitigation via premium reduction

Risk adequate provision of non-proportional reinsurance possible only via Undertaking Specific Parameters or by Internal Model

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Solvency II and Reinsurance: Retroactive Reinsurance

Loss Portfolio Transfer

✓ Similar to Quota Share on prior year's reserve risk, loss reserves ceded to reinsurance company
✓ Reduction of SCR proportional to ceded reserves (100% LTP equivalent to 100% quota share)

Adverse Development Covers

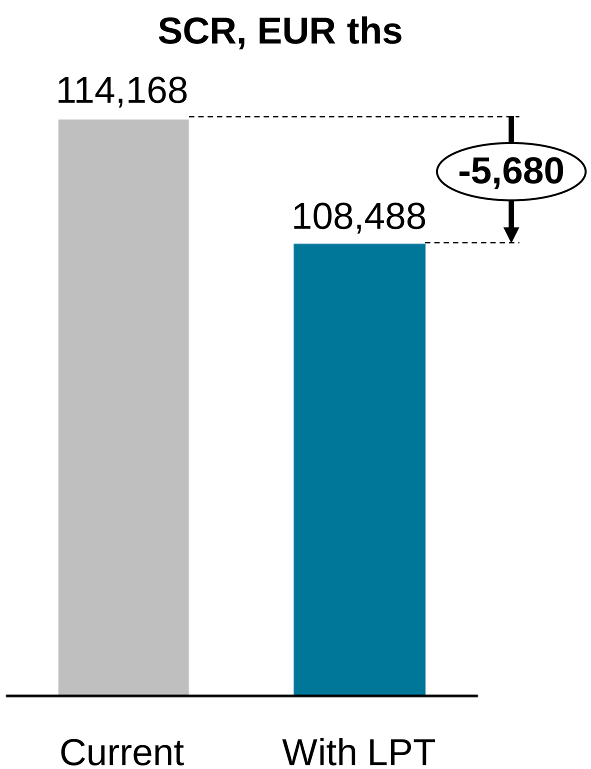
✓ Similar treatment as Excess of Loss covers
✓ Standard formula does not recognize ADC
✓ No reduction of reserves volume
✓ No adjustment of reserve risk's standard deviation

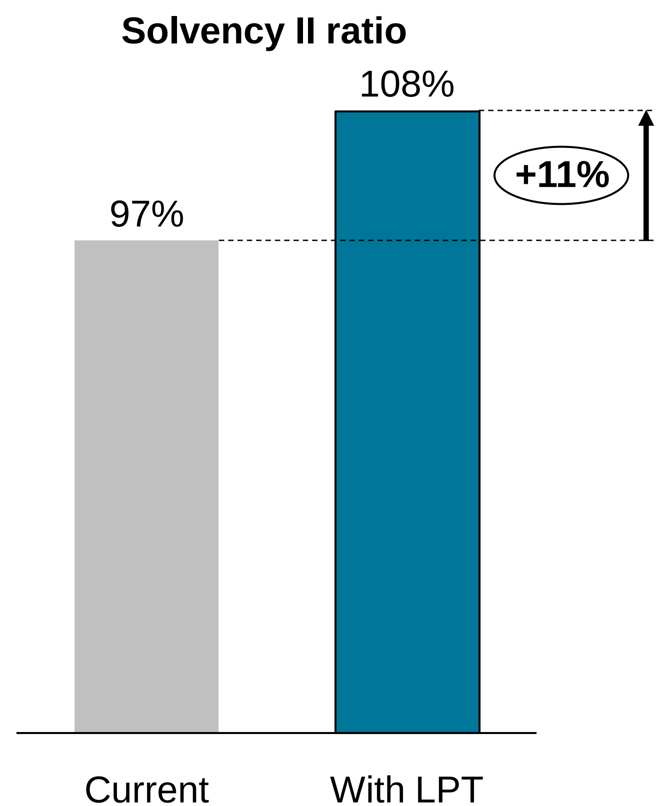
Risk adequate provision ADC possible only via Undertaking Specific Parameters or by Internal Model

Prospective and Retroactive Solutions

Reinsurance Type	Standard Formula	Internal Model
Quota Share	👍	👍
Surplus	👍	👍
Excess of Loss	👍	👍
Excess of Loss CAT	👍	👍
Stop Loss/Aggregate	👎	👍
LPT	👍	👍
ADC	👎	👍

LPT: Solvency II Benefit





✓ *LPT cedes 100% of reserves to reinsurer, reduction of reserve risk before diversification*

LPT solution also brings capital benefit in form of reduced SII capital requirement

Solvency Ratio=Available Capital/ Required Capital (SCR,required solvency margin)

Motivation of Accepting Reinsurance Company

Motivation of ceding company is straight forward and directly observable from our case study

Motivators of Accepting re/insurer

- Eventual profit
- Specialisations
- Liquidity

Example of big player on retroactive market

Berkshire Hathaway

- Number 5 in reinsurance market
- NICO, is the entity that Berkshire primarily uses as the counterparty to its retroactive reinsurance transactions
- Original amount reserved for the liabilities reinsured under its retroactive deals is USD 29.1 bil
- Premium received USD 22.1 bil
- NICO ‘s investments (total assets USD 127 bil) consist, 3.6% in bonds,53.3% in common stock, 34.8% in “other investments“, primary common stock equivalents

Berkshire Hathaway makes significant investment income on timing mismatch of upfront premium and losses paid later on.

**information published on Insurance Coverage Litigation Committee CLE Seminar March 2014, Tuscon USA, Berkshire Hathaway and Loss Portfolio Transfers: Do They Make Sense?

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Thank you!

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