ISFA –Specifics features

Indra Loljeeh- Anne Pellerin

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Why buying reinsurance ?

Summary:

- Financial protection against exceptional losses
- **Reducing the volatility of the result**
- **Reducing the minimum solvency margin**
- Spreading of risks
- Technical support
- Financing new business
- Tax effectiveness

Capital Allocation

- Solvency II requires capital allocation (SCR).
- Capital is allocated depending on:
  - The premium income
  - The risk underwritten (treaty, clauses…)
  - The line of business
- Capital allocation factors are determined by Risk management team.
- Allocated capital has to be remunerated.

Capital Allocation

- Illustration: Allocation factor = 85% (SCR= 1,85 x Premium)

Allocation based on expected loss					
Line of Business	BP	LR	Expected Loss	Capital	Allocation factor
Property	50.000.000	65%	32.500.000	42.941.708	86%
Property CAT	5.000.000	43%	2.166.667	2.862.781	57%
MTPL	80.000.000	70%	56.333.333	74.432.294	93%
GTPL	15.000.000	92%	13.812.500	18.250.226	122%
Credit and Bonds	10.000.000	43%	4.333.333	5.725.561	57%
Marine	40.000.000	54%	21.666.667	28.627.805	72%
Aviation	15.000.000	50%	7.500.000	9.909.625	66%
Total	215.000.000	64%	138.312.500	182.750.000	**85%**

Allocation based on Volatility								
Line of Business	BP	LR	Expected Loss	CV	Variance (B€)	Share on Variance	Capital	Allocation factor
Property	50.000.000	65%	32.500.000	15%	23.766	36,3%	66.379.819	133%
Property CAT	5.000.000	43%	2.166.667	50%	1.174	1,8%	3.278.016	66%
MTPL	80.000.000	70%	56.333.333	10%	31.734	48,5%	88.637.546	111%
GTPL	15.000.000	92%	13.812.500	12%	2.747	4,2%	7.673.507	51%
Credit	10.000.000	43%	4.333.333	20%	751	1,1%	2.097.930	21%
Marine	40.000.000	54%	21.666.667	10%	4.694	7,2%	13.112.063	33%
Aviation	15.000.000	50%	7.500.000	10%	563	0,9%	1.571.120	10%
Total	215.000.000	64%	138.312.500	6%	65.429	100,0%	182.750.000	**85%**

Optimal reinsurance

- Aim of reinsurance : reducing the risk retained by the cedant
- Unfortunately, ceding risk also implies ceding premium and profit
- The decision-maker is faced with a difficult choice :
  - Ceding huge amounts of premium, reducing both risk and profit consequently
  - Ceding small amounts of premium, keeping huge profits and risk in retention

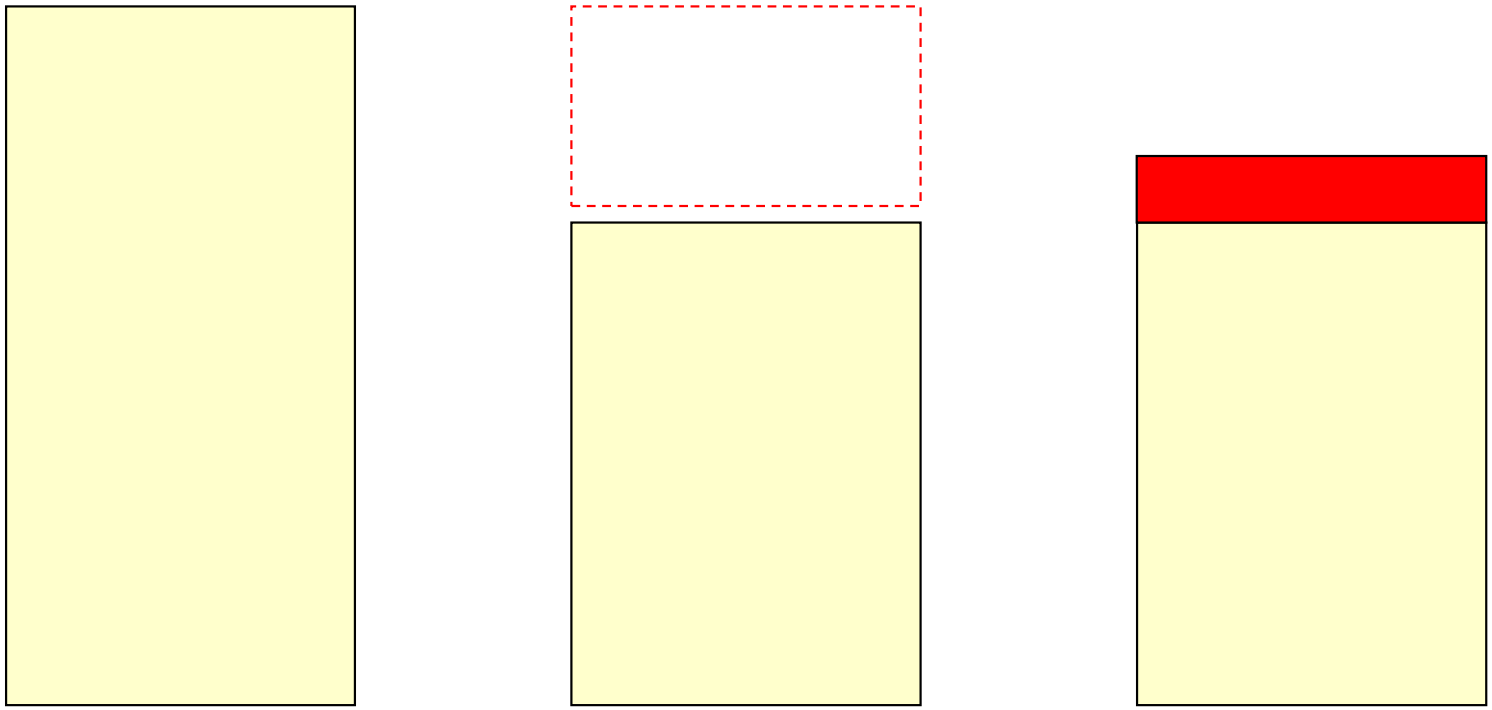
Modern optimal reinsurance

- When writing insurance contracts, capital must be allocated
- At least for solvency reasons (control authorities)
- Capital has a cost
- Buying reinsurance may reduce the capital needs
- Buying reinsurance also has a cost
- The cost of reinsurance may be lower than the cost of holding capital

Impact of reinsurance on SCR

Risk mitigation effect of reinsurance

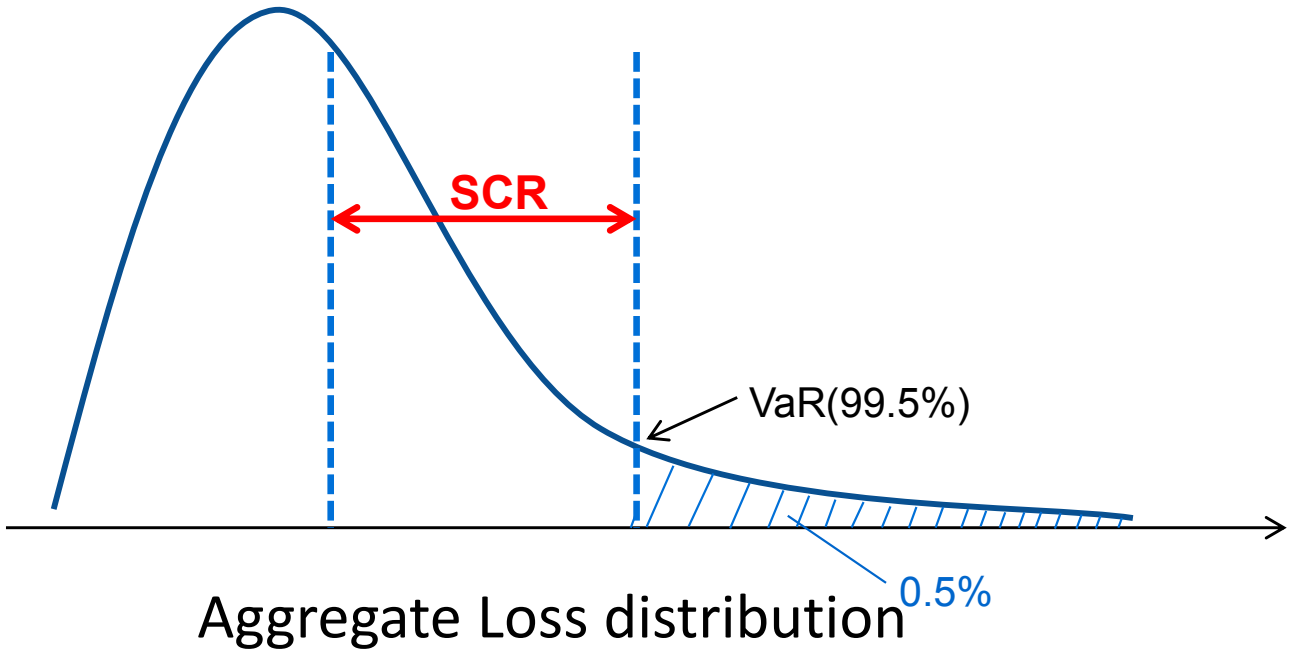
Additional capital to cover reinsurer's default risk



SCR gross of reinsurance

SCR net of reinsurance

Reminder



Modern optimal reinsurance

- We need to measure :
  - The capital (economic capital or risk adjusted capital RAC)
  - The expected profit
- Profit :

$$\text{Profit} = P - S - (P^{\text{Re}} - S^{\text{Re}})$$

- Expected profit :

$$\text{E(Profit)} = P - ES - (P^{\text{Re}} - ES^{\text{Re}})$$

Modern optimal reinsurance

- A portion of the required solvency level (RSL) is provided by the policyholders : this is the technical premium P

- The remaining part is provided by the shareholders: this is the economic capital (or risk adjusted capital RAC)

$$RSL = P + RAC$$

Modern optimal reinsurance

- Compute the expected return on risk adjusted capital, also called RORAC :

$$RORAC = \frac{E(\text{Profit})}{\text{RAC}}$$

- **In your project, you can suppose RAC = SCR or RAC = VaR(UW(net of reinsurance)+Credit)**

- Between two situations X1 and X2, choose the one maximizing the RORAC :

$$RORAC(X_1) > RORAC(X_2)$$

On your project - Insurers

- Model for claims S
  - Attritional
  - Large
  - CAT
- EPI deterministic
- Several reinsurance structures with their corresponding prices

➔ Calculated by yourselves.

➢ You have everything in hand to calculate the impact of a reinsurance program on your balance sheet

Profitability Model for Insurers

Written Premium	Gross Written premium (GWP)	10.000.000	WP
	Brokerage (BK)	2.500.000	WP*Bk_Rate
	Fees (E)	1.250.000	WP*Exp_Rate
	Gross Ultimate loss (UL)	5.750.000	GUL
Reinsurance	Premium Ceded	500.000	CP
	Expected Ultimate Recoveries	400.000	UR
Expected Profit (EP)		400.000	(WP-CP) - (UL-UR) - E- BK

- RoRAC = EP/ Allocated Capital

  ➔ This is to be optimized then …

Profit calculations - Reinsurers

- The capital allocated comes from the shareholder
  - The shareholder requires a return on investment
  - The allocated capital can be invested
- The premium paid by clients is also a source of income
  - The premium received can be invested
  - Expenses have to be deduced
  - Taxes have to be paid
  - Losses have to be paid
- Return on Equity computation can get complicated ….

Presentation of the EPA Model

- Insurance profit:
  - Written Premium (+)
  - Investment on premium (+)
  - Loss (-)
  - Expenses (-)

- Return on Equity
  - Insurance profit/Allocated capital (+)
  - Return on Capital (+)
  - Taxes (-)

EPA Model - for Reinsurers

	Premium Breakdown		Notation	Calculation
Written Premium	Gross Written Premium	500.000	GWP	GWP
	Brokerage	50.000	BK	Bk_Rate*GWP
	Net Written Premium	450.000	NWP	GWP - BK (- other fees like Retro ?!)
	Ultimate Loss	375.000	UL	LR * GWP (- Recuperations by Retro !?)
Expenses	Expenses	62.500	E	Exp_Rate*GWP
Combined Operating Result		12.500	COR	GWP - UL - E - BK
Investments	Period Funds Held	50,00%	P	P
	Investment Yield	1,00%	I_Rate	I_Rate
	Investment Return	2.250	IR	NWP*P*I_Rate
Insurance Profit (IP_Rate)		2,95%	IP_Rate	(IR+COR)/GWP
Others	Return on Capital	1,00%	ROC_Rate	ROC_Rate
	Tax	20,00%	Tax_Rate	Tax_Rate
	Allocated Capital	60,00%	AC_Rate	AC_Rate
RoE		4,73%	RoE	(IP_Rate/AC_Rate + ROC_Rate) * (1 - Tax_Rate)

Parameters (illustration)	
Bk_Rate	10,0%
LR	75%
Exp_Rate	12,50%
P	0,50
I_Rate	1%
ROC_Rate	1%
Tax_Rate	20%
AC_Rate	60%

Parameters to be used

Allocation factor			
Rating || Treaty	QS	SL	XL
A++	80,0%	175,0%	100,0%
A	60,0%	150,0%	80,0%
B--	45,0%	125,0%	70,0%

Target RoE			
Rating || Treaty	QS	SL	XL
A++	8,00%	8,00%	8,00%
A	7,00%	7,00%	7,00%
B--	6,00%	6,00%	6,00%

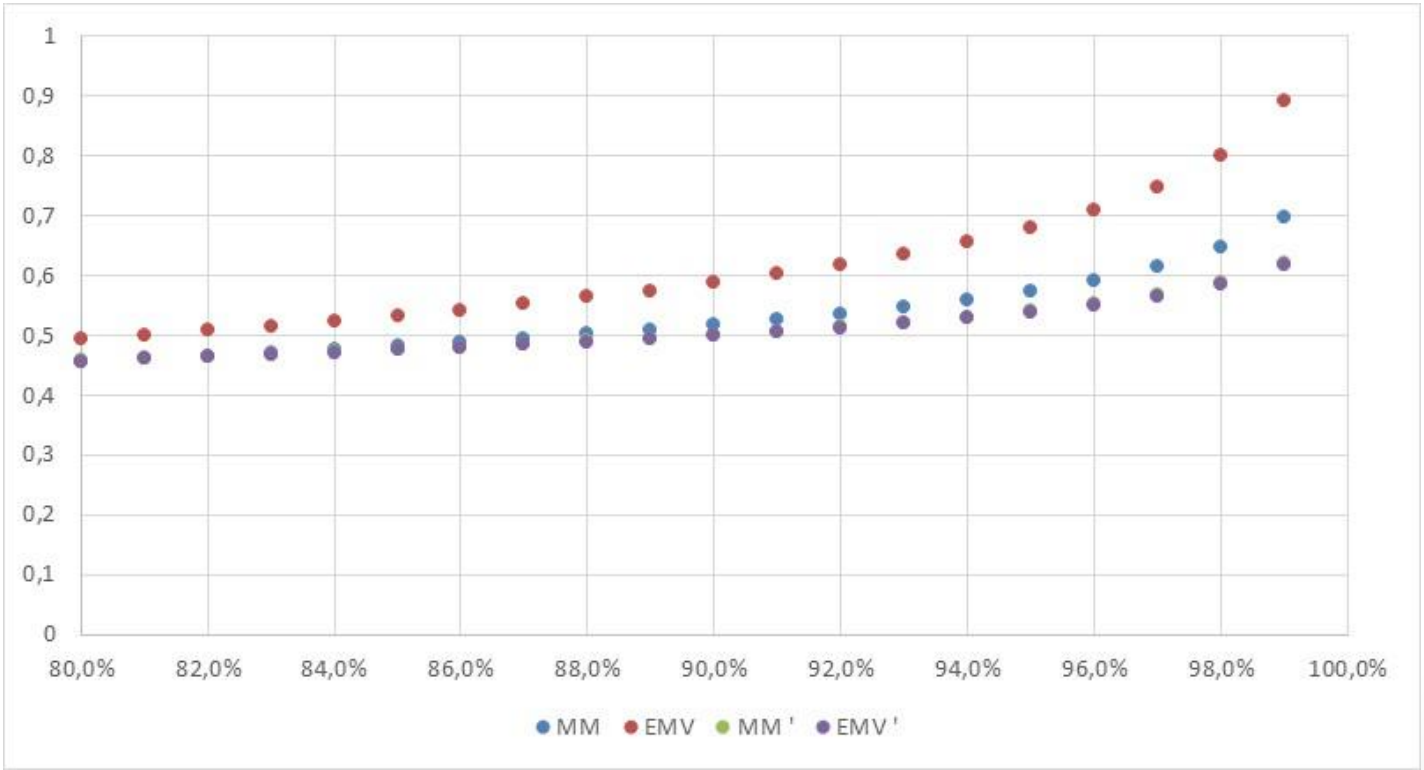
	Value
Exp_Rate	12,5%
P	50,0%
I_Rate	2,0%
ROC_Rate	2,0%
Tax_Rate	20,0%
Bk_Rate P	2,5%
Bk_Rate NP	10,0%

Fitting of LN distribution

	Mu	-1,00
	Sigma	20,00%

Rand()	LR	
0,985342	56,88%	-0,56416
0,359711	34,24%	-1,07185
0,155485	30,04%	-1,20264
0,266642	32,48%	-1,1246
0,502066	36,83%	-0,99896
0,927631	49,25%	-0,70833
0,152083	29,95%	-1,20551
0,738202	41,79%	-0,87244
0,578057	38,27%	-0,96062
0,392789	34,84%	-1,05441
0,825683	44,37%	-0,81255
0,838439	44,83%	-0,80239
0,170629	30,41%	-1,19034
0,877051	46,40%	-0,76793
0,006889	10,00%	-2,30259

		MM	EMV
All data	Mean	37,37%	38,18%
	Stdev	10,94%	15,88%
	Mu	-1,02536	-1,04262
	Sigma	28,67%	39,94%
All wo smallest	Mean	39,33%	39,37%
	Stdev	8,19%	8,05%
	Mu	-0,9545	-0,95262
	Sigma	20,61%	20,24%



Other points of attention

- Choices of index
- Superinflation/Hyperinflation impact ?!

Questions ?