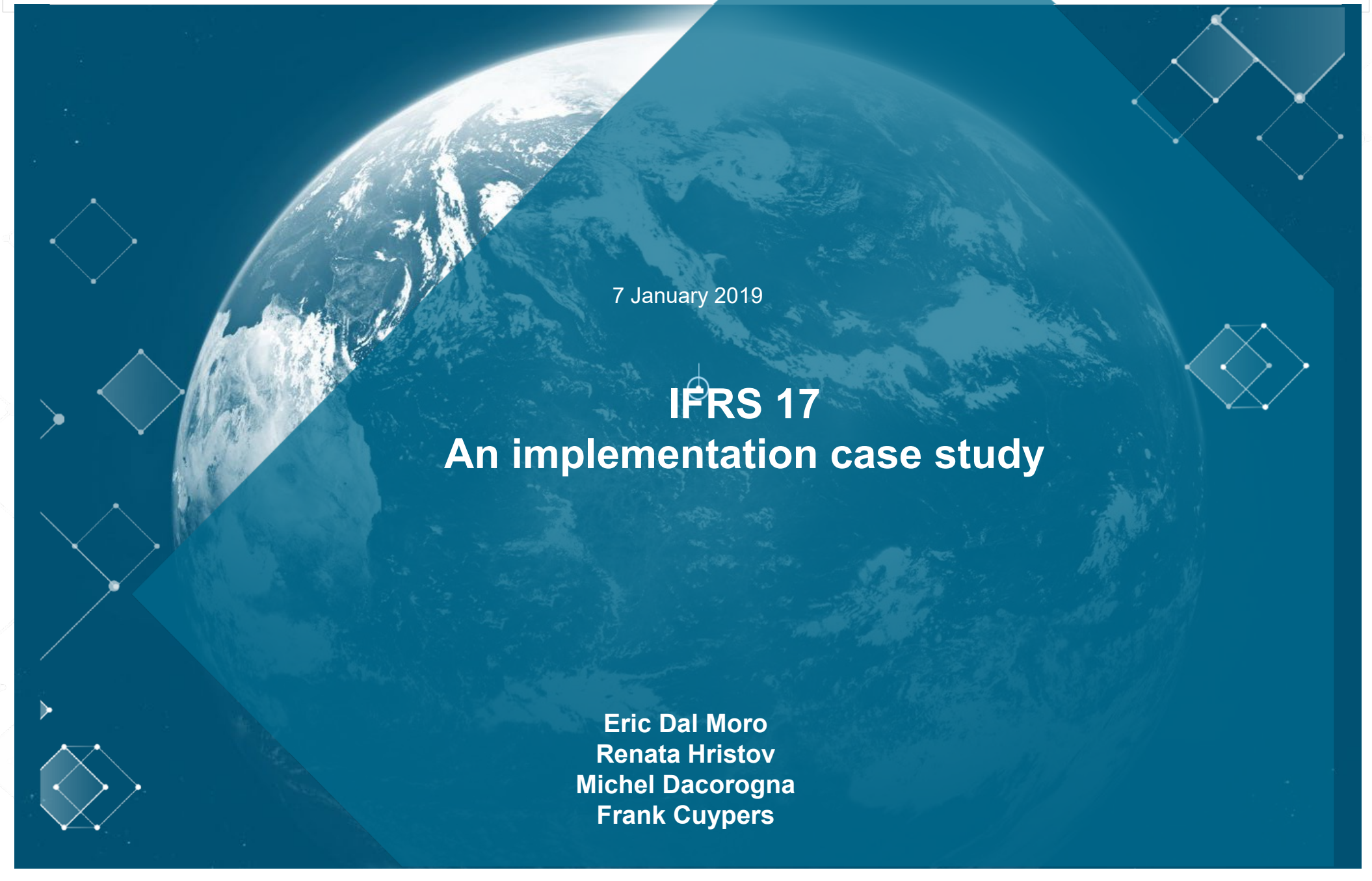

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IFRS 17
An implementation case study

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SCOR The Art & Science of Risk | P&C

General Approach

- This approach is relevant for insurance contracts with a coverage period of more than one year
- Entities required to measure their insurance contracts using the current measurement model, where current estimates are re-estimated every reporting period

Best estimate

Expected future cash flows	• An **explicit** and **unbiased** estimate of the current value of expected future cashflows • From premiums, claims and benefits
Discounted at risk free rate	• Future cashflows adjusted to take into account the **time value of money**

Margins

Risk Adjustment Margin	• Explicit adjustment to reflect **uncertainty** in the amount and timing of the future cashflows
Contractual Service Margin	• The expected contract profit which eliminates any gain at inception of the contract

Agenda

- **Portfolio presentation**
- **Management presentation – Choice of the risk adjustment**
- **Financial analysts discussion**
- **Conclusion**

Portfolio presentation

LoB	Nb contracts	Premium	LR	Commission	Internal expense
Agriculture	167	5'060	70.6%	19.9%	5%
Aviation	167	6'708	63.8%	20.7%	5%
Property	167	16'716	60.0%	19.7%	5%
Liability	167	16'856	71.5%	19.9%	5%
Motor	166	24'708	55.5%	19.6%	5%
Credit	166	5'070	50.9%	20.2%	5%
Total	1000	75'118	61.5%	19.8%	5%

	Average Premium	Average CoV
Agriculture	30	15%
Aviation	40	10%
Property	100	12%
Liability	101	20%
Motor	149	10%
Credit	31	10%

Correlation between contracts is 50% as a standard

Mean time to payment of the portfolio = 5 years

Discount rate = 2% flat

Portfolio presentation – Different Risk Adjustment calculation

Cost of capital (Normal distribution) – Example on one contract

LoB	Agriculture
Premium	36.2
UW LR	85.5%
Commission	10.9%
Internal expenses	5.0%
Combined ratio	101.3%
CoV UW LR	20.1%
Capital 99.5% VaR	16.0
CoC	0.9
CoC diversified	0.6

Loss Ratio Pricing/ Underwriting

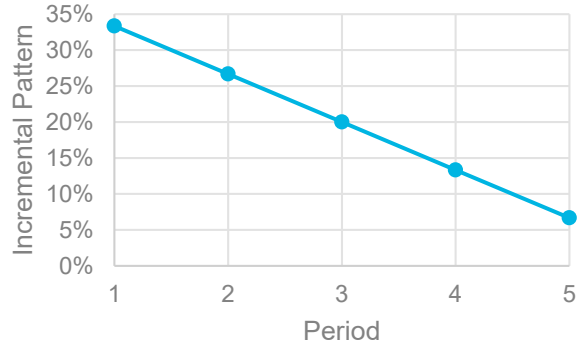
UW LR + Com. + Internal expenses

Coefficient of Variation UW LR

VaR 99.5% of a normal distribution with CoV 20.1%*85.5%*36.2 and Mean 85.5%*36.2 (use of Norm.Inv function in Excel)

$$\text{CoC} = 16 * 6\% \left(\frac{33\% \ (pattern\ 1)}{(1+2\%)^1} + \frac{27\%}{(1+2\%)^2} + \frac{20\%}{(1+2\%)^3} + \frac{13\%}{(1+2\%)^4} + \frac{7\%}{(1+2\%)^5} \right)$$

$$CoC_{diversified} = \sqrt{{}^{t}\begin{pmatrix} CoC_1 \\ \dots \\ CoC_n \end{pmatrix} \begin{pmatrix} 1 & 50\% & 50\% \\ 50\% & \dots & 50\% \\ 50\% & 50\% & 1 \end{pmatrix} \begin{pmatrix} CoC_1 \\ \dots \\ CoC_n \end{pmatrix}}$$



Portfolio presentation – Different Risk Adjustment calculation

VaR 75% (Normal)– Example on one contract

LoB	Agriculture
Premium	16.6
UW LR	76.1%
Commission	13.7%
Internal expenses	5.0%
Combined ratio	94.8%
CoV UW LR	14.4%
Risk Adjustment (VaR 75%)	1.2
Risk Adjustment diversified	0.9

Loss Ratio Pricing/ Underwriting

UW LR + Com. + Internal expenses

Coefficient of Variation UW LR

VaR 75% of a normal distribution with CoV 14.4%*76.1%*16.6 and Mean 76.1%*16.6 (use of Norm.Inv function in Excel)

$$VaR_{diversified} = \sqrt{{}^{t}\begin{pmatrix} VaR_1 \\ \dots \\ VaR_n \end{pmatrix}\begin{pmatrix} 1 & 50\% & 50\% \\ 50\% & \dots & 50\% \\ 50\% & 50\% & 1 \end{pmatrix}\begin{pmatrix} VaR_1 \\ \dots \\ VaR_n \end{pmatrix}}$$

Portfolio presentation – Different Risk Adjustment calculation

TVaR 65% (LogNormal) – Example on one contract

LoB	Liability
Premium	140.4
UW LR	42.0%
Commission	21.4%
Internal expenses	5.0%
Combined ratio	68.4%
CoV UW LR	23.5%
Sigma2	0.099
Mu	-0.872
Risk Adjustment (TVaR)	6.27
Risk Adjustment diversified	4.44

Loss Ratio Pricing/ Underwriting

UW LR + Com. + Internal expenses

Coefficient of Variation UW LR

$$\sigma = \sqrt{ln(1 + [UW\ LR \times CoV]^2)}$$

$$\mu = ln(UW\ LR) - \frac{\sigma^2}{2}$$

$$TVaR_{diversified} = \sqrt{{}^{t}\begin{pmatrix} TVaR_1 \\ \dots \\ TVaR_n \end{pmatrix} \begin{pmatrix} 1 & 50\% & 50\% \\ 50\% & \dots & 50\% \\ 50\% & 50\% & 1 \end{pmatrix} \begin{pmatrix} TVaR_1 \\ \dots \\ TVaR_n \end{pmatrix}}$$

$$TVaR = 140.4 \times 42\% \times \left(\frac{1 - \Phi\left[\frac{ln(VaR_\alpha) - \mu - \sigma^2}{\sigma}\right]}{1 - \alpha} - 1 \right)$$

where Φ is the normal distribution

VaR_α is the VaR of the lognormal distribution for the α quantile estimated using the Lognorm.inv excel function

Portfolio presentation – Different Risk Adjustment calculation - Summary

								Diversified		
Contract	LoB	Premium	UW LR	Commission	Internal expenses	Combined ratio	CoV UW LR	CoC 6%	VaR 75%	TVaR65%
1	Agriculture	36.2	85%	11%	5%	101%	20%	0.65	2.96	4.05
2	Agriculture	16.6	76%	14%	5%	95%	14%	0.19	0.87	1.06
3	Liability	140.4	42%	21%	5%	68%	24%	1.45	6.63	4.44

Cost of Capital 6% seems to be below the 2 other risk measures in this case.

VaR and TVaR do show a consistent behaviour for these 3 cases.

Portfolio presentation – Onerous contract testing

Simple test:

A contract is onerous if $Combined\ ratio + \frac{Risk\ Adjustment}{Premium} > 1$

LoB	Agriculture
Premium	36.2
UW LR	85.5%
Commission	10.9%
Internal expenses	5.0%
Combined ratio	101.3%
CoV UW LR	20.1%
Capital 99.5% VaR	16.0
CoC	0.9
CoC diversified	0.6

Onerous:
101.3% + 0.6/36.2

LoB	Agriculture
Premium	16.6
UW LR	76.1%
Commission	13.7%
Internal expenses	5.0%
Combined ratio	94.8%
CoV UW LR	14.4%
Risk Adjustment (VaR 75%)	1.2
Risk Adjustment diversified	0.9

Profitable:
94.8%+0.9/16.6

LoB	Liability
Premium	140.4
UW LR	42.0%
Commission	21.4%
Internal expenses	5.0%
Combined ratio	68.4%
CoV UW LR	23.5%
Sigma2	0.099
Mu	-0.872
Risk Adjustment (TVaR)	6.27
Risk Adjustment diversified	4.44

Profitable:
68.4%+4.44/140.4

Disclosure:

A disclosure related to onerous contract (Explanation of recognized amounts) has to be published in the IFRS 17 accounts

Agenda

- Portfolio presentation
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Management decision

LoB	Nb contracts	Premium	LR	Commission	Internal expense	Combined Ratio	CoC 6% (Normal)			VaR 75% (Normal)			TVaR 65% (LogN)			No risk margin
							Risk Margin	%onerous	Quantile	Risk Margin	%onerous	Quantile	Risk Margin	%onerous	Quantile	%onerous
Agriculture	167	5'060	70.6%	19.9%	5%	96%	58	44%		266	48%		327	49%		41%
Aviation	167	6'708	63.8%	20.7%	5%	89%	45	35%		204	41%		226	43%		35%
Property	167	16'716	60.0%	19.7%	5%	85%	123	26%		560	30%		580	32%		25%
Liability	167	16'856	71.5%	19.9%	5%	96%	257	47%		1'175	54%		1459	55%		45%
Motor	166	24'708	55.5%	19.6%	5%	80%	147	17%		670	24%		648	25%		16%
Credit	166	5'070	50.9%	20.2%	5%	76%	27	4%		124	10%		109	11%		4%
Total	1000	75'118	61.5%	19.8%	5%	86%	656	**28%**	**56%**	3'000	**34%**	**75%**	3348	**35%**	**77%**	**27%**

Which risk margin to choose ?

Basics

- CoC method: What does the 56% quantile mean ?
- VaR method: Are you telling the analysts that there will be losses reported one quarter out of 4 (75% Quantile)? Should we be worried? 34% of your products are losing money, why are you selling those?

Criteria for choice

- Popularity of each method – Align with the way in which the entity looks at risk
- What does the risk adjustment (for non-financial risk) include?
- How do we allow for diversification of risk in the adjustment?
- How do we represent the company's risk appetite and general approach to risk management in the risk adjustment?

Communication strategy

- Communicate the risk coverage provided by the CSM in addition to the risk adjustment ?
- What disclosure requirements do we have, and how should we present the information?

How important is the quantile for investors ? Do investors favour high quantiles ?

- High quantiles may increase the P/E ratios as the entity will be viewed as more conservative/less risky

Pricing strategy

- More refined pricing to create more uniform profitability to improve the picture of the entity

Should we change the reinsurance strategy ?

- Consider Stop Loss covers instead of proportional – Check the costs of these covers
- How is the adjustment affected by our reinsurance position?

Management decision

Competitor 1 – Specialized in core P&C - TVaR

LoB	Nb contracts	Premium	LR	Commission	Internal expense	TVaR 65% (LogN)		
						Risk Margin	%onerous	Quantile
Property	167	25'271	49.6%	19.5%	5%	520	10%	
Liability	167	8'305	82.6%	19.7%	5%	1223	71%	
Motor	166	24'836	49.5%	19.5%	5%	416	7%	
Total	500	58'412	54.2%	19.5%	5%	2159	**17%**	**77%**

Competitor 2 – Specialized in specialty P&C - VaR

LoB	Nb contracts	Premium	LR	Commission	Internal expense	VaR 75% (Normal)		
						Risk Margin	%onerous	Quantile
Agriculture	167	5'199	73.6%	19.6%	5%	271	56%	
Aviation	167	6'517	65.4%	19.5%	5%	198	41%	
Credit	166	4'935	48.8%	20.2%	5%	116	7%	
Total	500	16'651	63.0%	19.7%	5%	584	**35%**	**75%**

Competitor 3 – Monoliner Credit

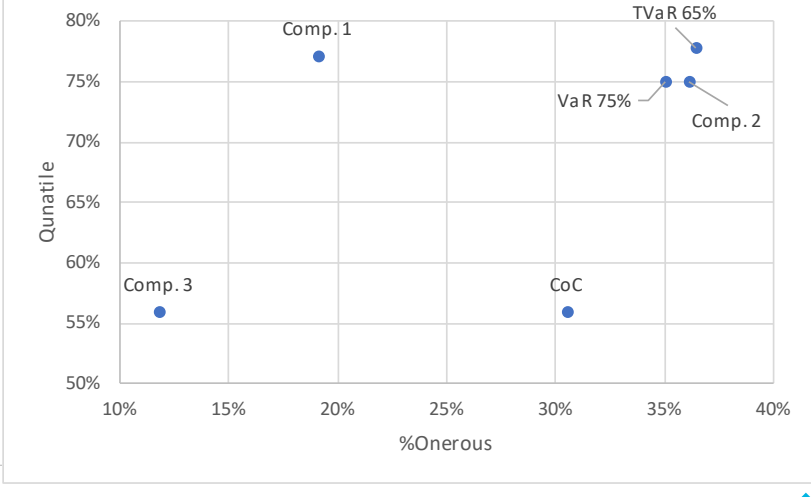
LoB	Nb contracts	Premium	LR	Commission	Internal expense	CoC 6% (Normal)		
						Risk Margin	%onerous	Quantile
Credit	166	4'812	49.3%	19.8%	5%	49	8%	
Total	166	4'812	49.3%	19.8%	5%	49	**8%**	**56%**

Reminder: Our company

%Onerous	Quantile
28%	56%
34%	75%
35%	77%

Which risk margin to choose ?

- Criteria for choice ?
- Communication strategy ?
- Position of the competitors ?
- How important is the quantile for investors ?
- Should we change the reinsurance strategy ?



Agenda

- Portfolio presentation
- Management presentation – Choice of the risk adjustment
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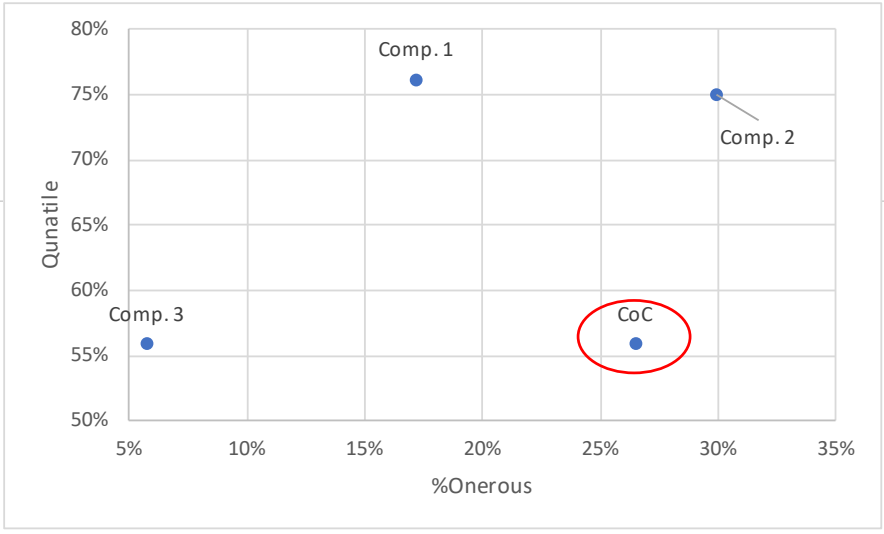
Financial analysts review



Competitor 1 – Specialized in core P&C - TVaR

Competitor 2 – Specialized in specialty P&C - VaR

Competitor 3 – Monoliner Credit

Questions from financial analysts

Can you explain the TVaR method in simple words for our investors?

Why do you compare unfavourably with Company 1 ?

Your risk adjustment seems to be small in comparisons to your competitors. Why ?

Do you intend to change your strategy to be more in line with your competitors ?

How was the confidence level determined?

How are exceptionally large events allowed for?

How comparable are risk adjustments across the market, both nationally and internationally?

Is it reasonable to think of the risk adjustment as “policyholders’ capital” ?

How accurate is the risk adjustment given the varying amounts and accuracy of data by class of business and by company?

Why is your diversification not effective in particular when compared to Company 3

How was the level of aggregation chosen for calculating the risk adjustment?

Agenda

- Portfolio presentation
- Management presentation – Choice of the risk adjustment
- Financial analysts discussion
- Conclusion

Conclusion and some good news

- Many new questions ahead
- Profitability figures (through Onerous Contract Testing) more visible
- Crucial choice for the Risk Adjustments
- Need to rethink strategy / underwriting / product offering ?

GOOD NEWS

- The “ChainLadder” package in R includes now a function called “QuantileIFRS17” which provides an automatic estimation of the quantile estimation based on input triangles.
- The “MackChainLadder” function in the same package offers also different quantile estimations of the Chain-Ladder method.

Thank you

All models available on google drive on:

https://drive.google.com/drive/folders/1vl8iiaxbz_mzi3bp5cLoMkaJSUA_6HZi