

Reinsurance of Insurance Risk

Aktuárský Seminář
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VIG **Re**

— Reinsurance of Insurance Risk

Vienna Insurance Group



Vienna Insurance Group

The Leading Insurance Group in Austria & CEE

Close to

200

years of experience

Around

50

Group companies

Represented in

25

markets

More than

50%

of premiums coming from CEE

More than

25,000

employees

About

55%

of profits coming from CEE

Since

1994

continuous payout of dividends

Current market capitalization

~ € 3.0

billion

S&P Rating

A+

with stable outlook

VIG **Re**

— Reinsurance of Insurance Risk

VIG Re

VIG **Re**

VIG Re

VIG Re at a Glance



VIG Re was **founded in 2008**, responsible for all assumed reinsurance business of Vienna Insurance Group, both from VIG companies and external parties



The Company provides made-to-measure reinsurance to **more than 350 insurance companies** in **35 countries**

**STANDARD
& POOR'S**

S & P FSR Rating A+
stable outlook confirmed
on September 3, 2018

VIG 
VIENNA INSURANCE GROUP

Part of **Vienna Insurance Group**

VIG **Re**

Underwriting Territories

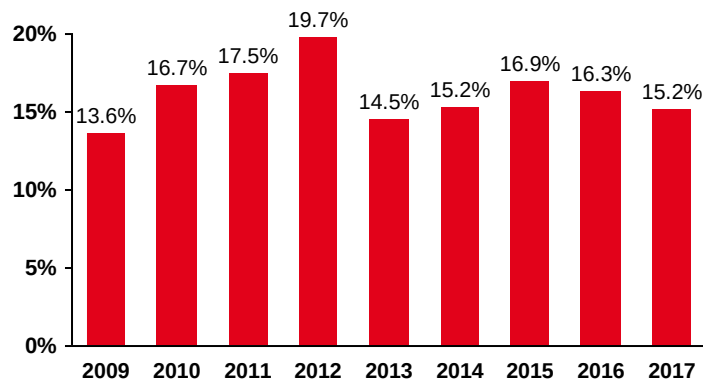


Key Figures (Consolidated Financial Statements)

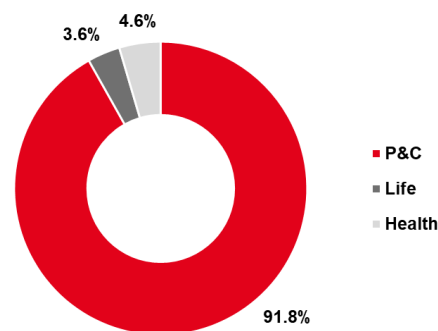
EUR '000	2009	2010	2011	2012	2013	2014	2015	2016	2017
Gross written premium	257,241	280,612	292,287	470,914	411,900	431,211	390,300	417,432	459,938
Net earned premium	163,758	178,197	172,779	327,538	250,994	237,043	209,636	226,296	260,574
Combined ratio*	95.7%	96.1%	95.8%	94.8%	97.4%	97.6%	95.5%	93.2%	94.9%
Profit before tax	14,426	18,556	20,618	24,297	18,367	19,860	22,682	22,404	23,435

*for Non-Life

ROE (before tax)



Portfolio Split 2017



— Reinsurance of Insurance Risk

Role of Reinsurance

Sources

Swiss Re: <http://www.swissre.com/publications/>

Casualty Actuarial Society: <http://casact.org/>

Definition of Reinsurance

Reinsurance is insurance that is purchased by an insurance company

Reinsurance is the transfer of part of the hazards or risks that a direct insurer assumes by way of insurance contract or legal provision on behalf of an insured, to a second insurance carrier, the reinsurer, who has no direct contractual relationship with the insured

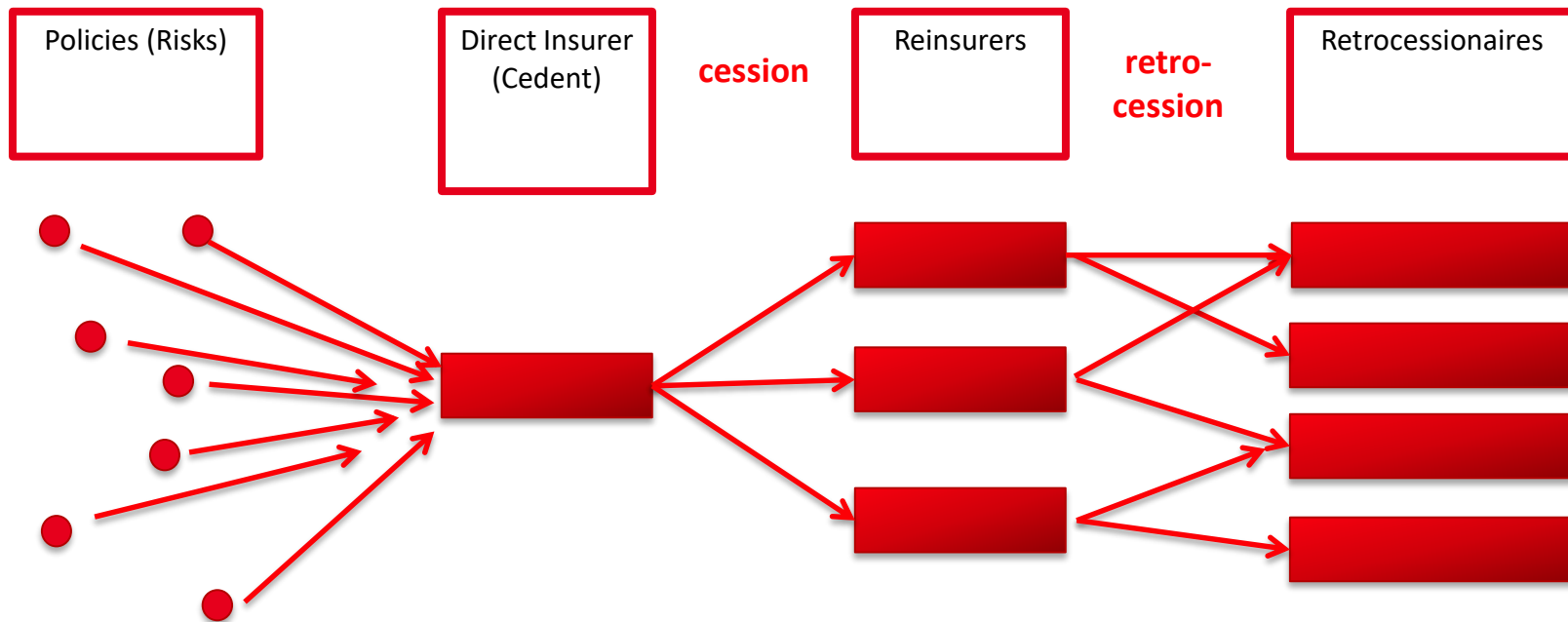
Origins

First professional company Cologne Re (founded in 1846) as consequence of the catastrophic fire in Hamburg in 1842

- 1846: Cologne Re
- 1853: Aachen Re
- 1857: Frankfurt Re
- **1863: Swiss Re**
- **1880: Munich Re**
- 1886: Frankona Re

Today about 200 professional reinsurers worldwide and large number of direct insurers writing also reinsurance

Risk Sharing



Purpose

- Protection against large single losses and catastrophes
- Reduces volatility of the financial results
- Reduction of solvency capital requirement
- More underwriting capacity for smaller players
- Know-how transfer
- Etc.

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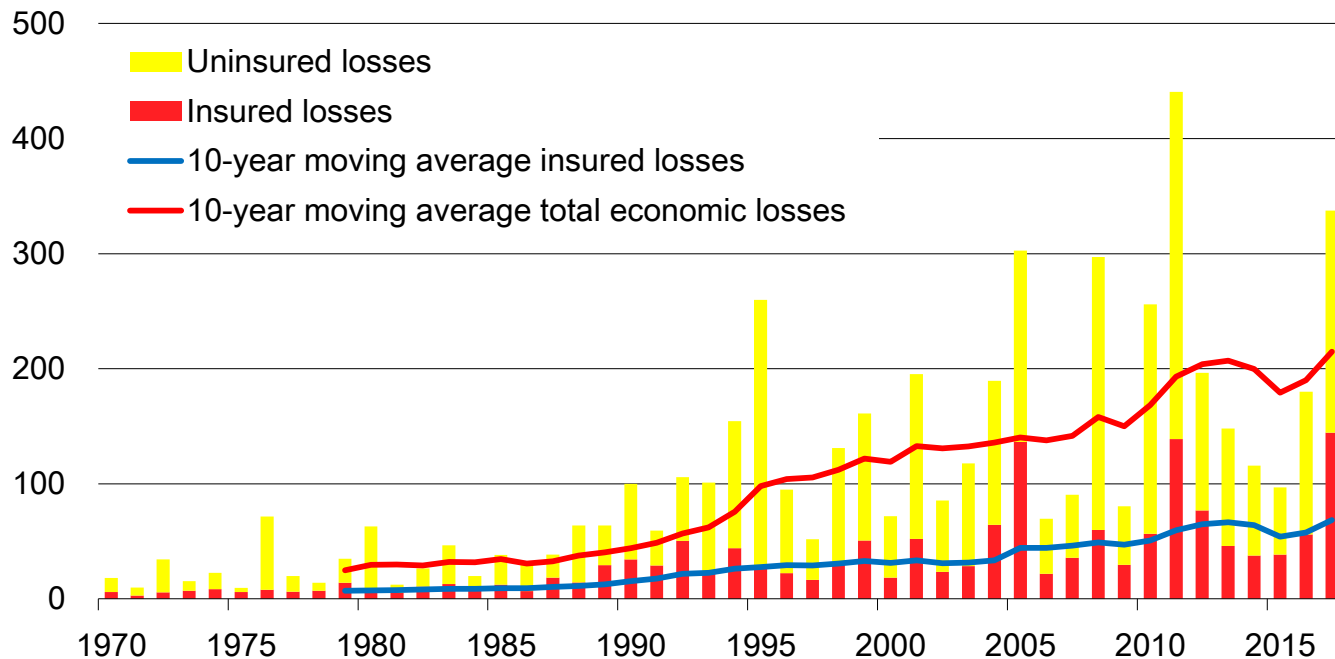
Market Catastrophe Losses

Swiss Re Catastrophe Criteria

Insured losses (claims):	
Maritime disasters	USD 20.3 million
Aviation	USD 40.7 million
Other losses	USD 50.5 million
<i>or</i> Total economic losses:	USD 101 million
<i>or</i> Casualties	
Dead or missing	20
Injured	50
Homeless	2000
Source: Swiss Re Institute	

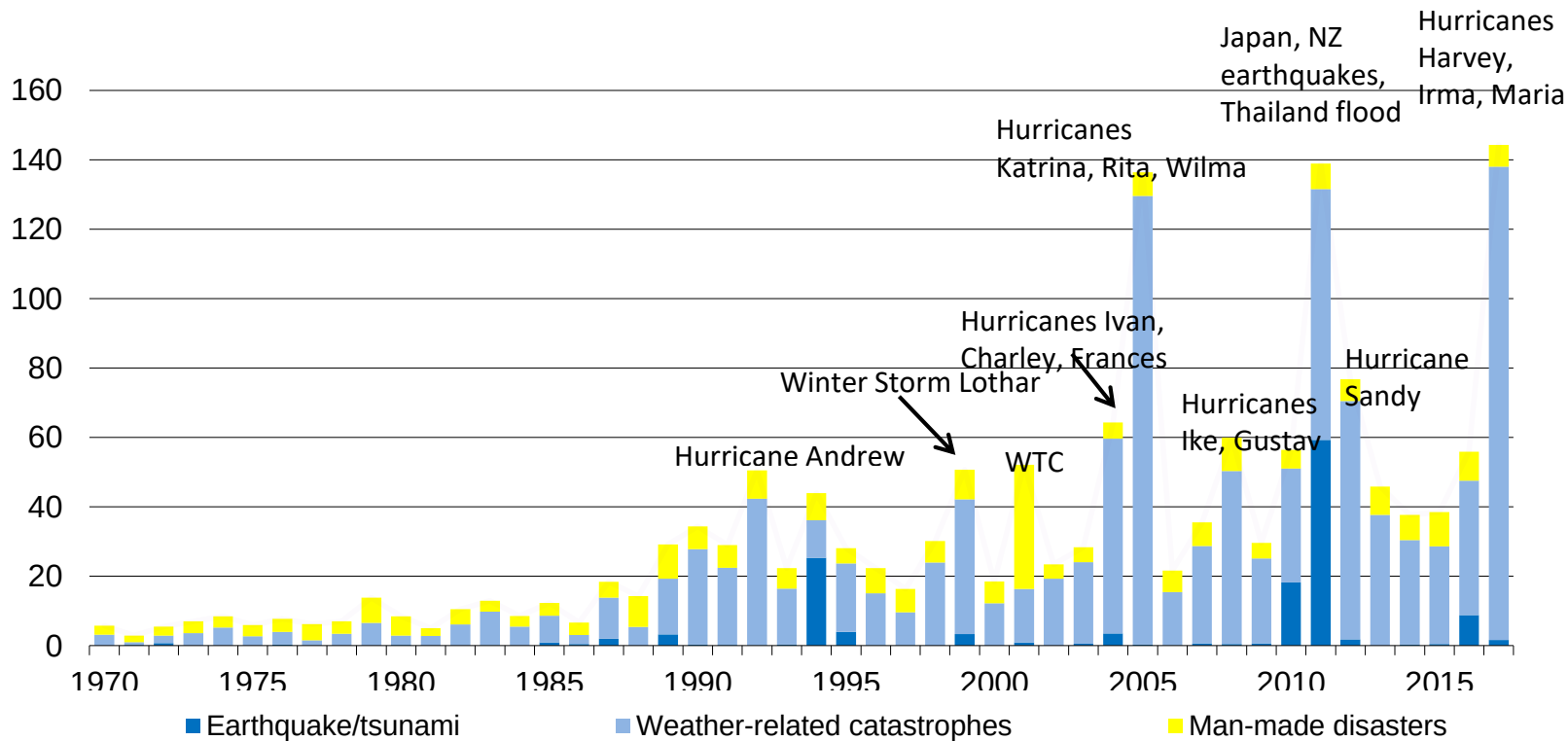
Market Losses

Insured vs uninsured catastrophe losses, 1970 – 2017, in USD billion at 2017 prices



Market Losses

Insured catastrophe losses 1970 - 2017 in USD billion, at 2017 prices

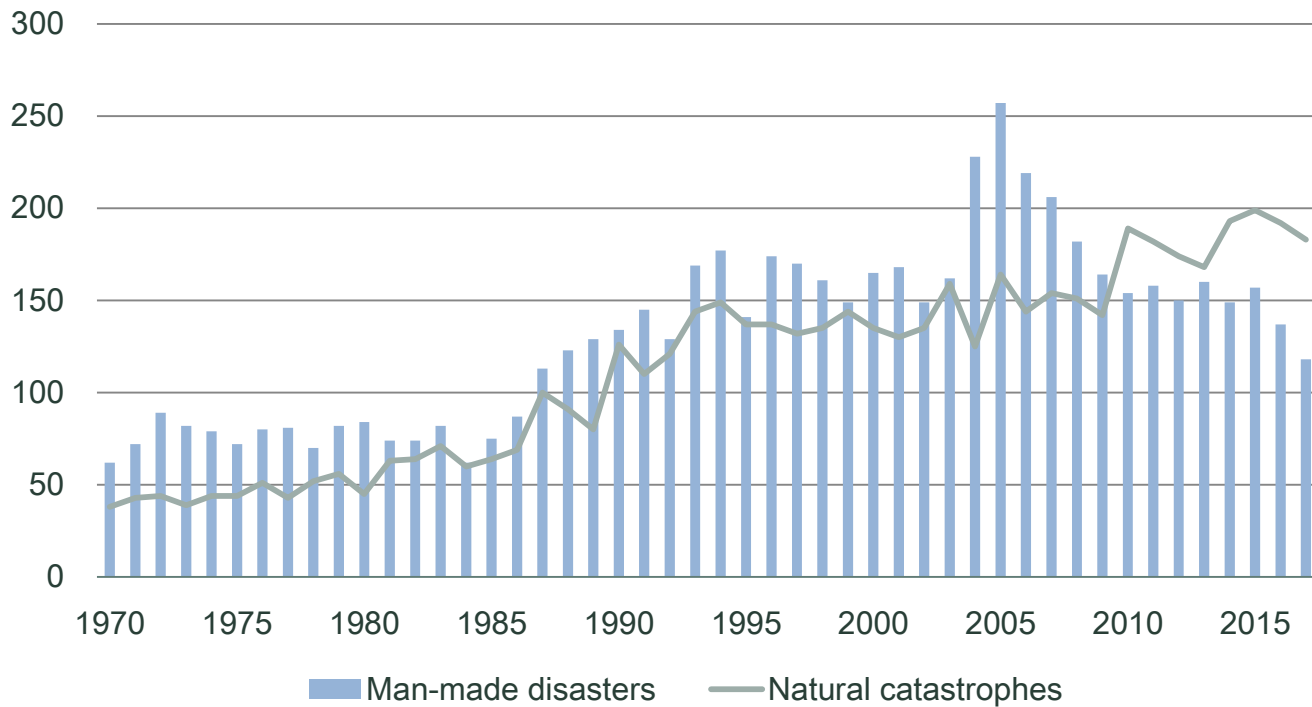


Source: Swiss Re



Market Losses

Number of catastrophic events, 1970-2017



Source: Swiss Re

— Reinsurance of Insurance Risk

Types of Reinsurance

Types of Reinsurance I

Facultative:

each risk considered individually, obligation to neither cede nor to accept

Obligatory:

group of homogenous risks automatically ceded to the reinsurance treaty

Types of Reinsurance II

Proportional

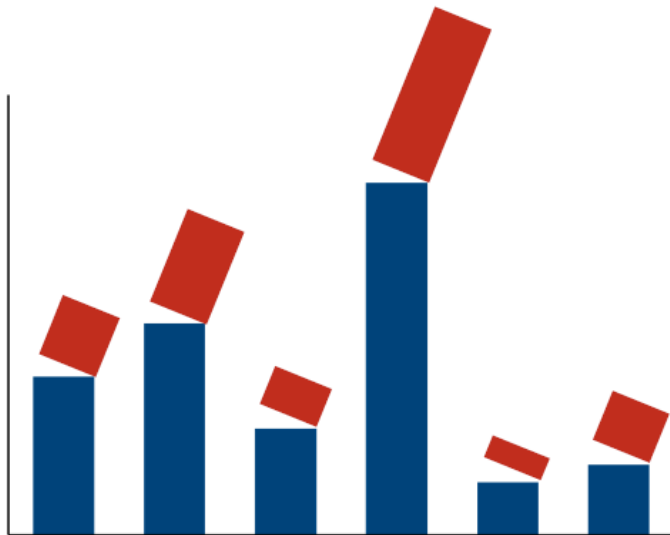
- Quota Share
- Surplus

Non-Proportional

- Risk XL
- Cat XL
- Stop Loss
- Aggregate XL

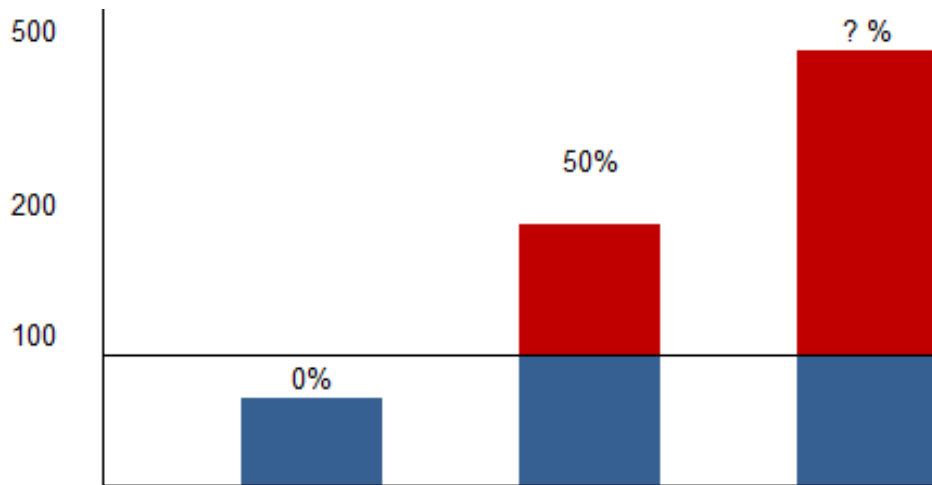
Proportional: Quota Share

- ceded loss calculated as: $X_z = q \cdot X$
- ratio q used also for premium
- commission fixed / sliding scale / profit commission



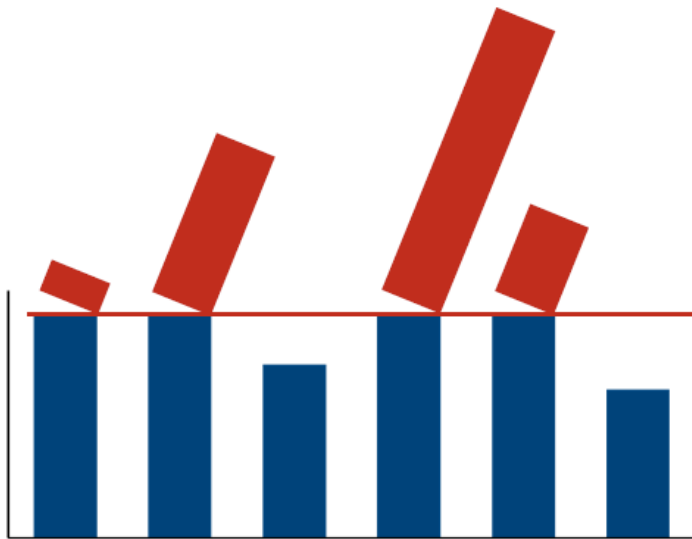
Proportional: Surplus

- ceded loss calculated as: $X_Z = \left(1 - \frac{a}{S}\right) \cdot X$ for $S > a$
- ratio $(1-a/S)$ used also for premium
- commission mainly fixed



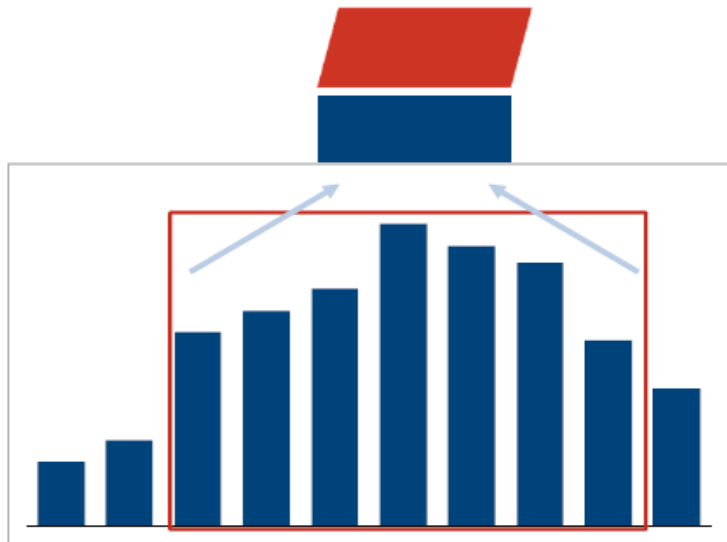
Non-Proportional: Risk XL

- ceded loss calculated as: $X_Z = X - a$ for $X > a$
- premium as % of GNPI
- reinstatements free / paid / combination



Non-Proportional: Cat XL

- ceded loss calculated as: $X_z = \sum_{i=1}^n X_i - a$
- premium as % of GNPI
- reinstatements free / paid / combination

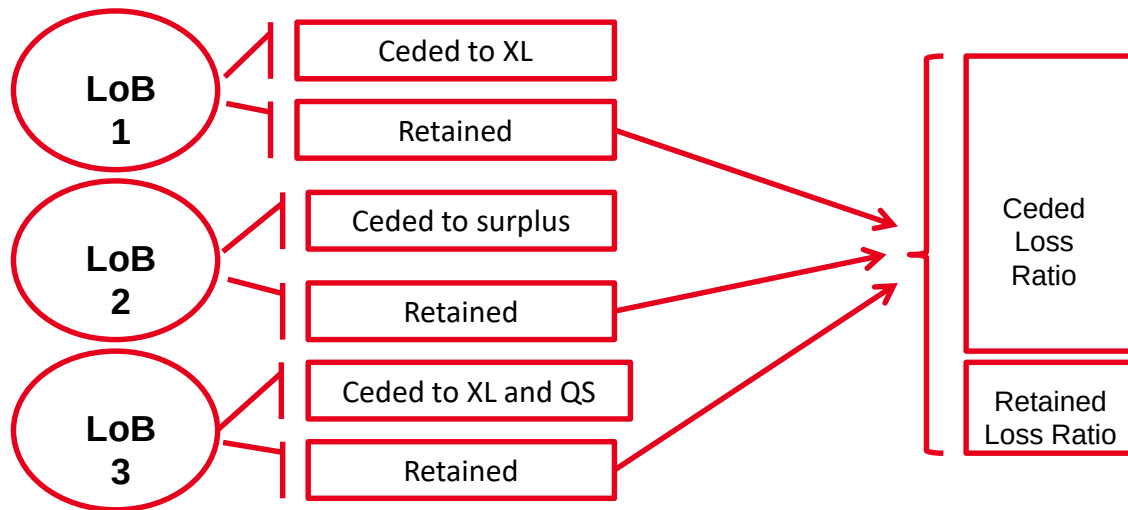


Types of Reinsurance

Non-Proportional: Cat XL



Non-Proportional: Stop Loss



Types of Reinsurance

Reinsurance Program: Example (in CZK)

Line of Business	Type of reinsurance	Layer	Retention	Limit	Rate	Reinstatements
Personal Accident	XL	1	2 000 000	18 000 000	0,65%	1-3@100%
Personal Accident	XL	2	20 000 000	30 000 000	0,16%	1@100%
Motor Liability	XL	1	30 780 000	23 220 000	2,10%	1-15@free
Motor Liability	XL	2	54 000 000	81 000 000	0,80%	1-15@free
Motor Liability	XL	3	135 000 000	Unlimited	0,21%	unlimited@free
Marine Hull	QS	-	100 000 000	100 000 000	-	-
General Liability	XL	1	10 000 000	10 000 000	6,50%	1-30@free
General Liability	XL	2	20 000 000	30 000 000	3,60%	1-20@free
General Liability	XL	3	50 000 000	50 000 000	1,50%	1-10@free
General Liability	XL	4	100 000 000	200 000 000	0,80%	1-5@free
Fire	Surplus	-	100 000 000	1 500 000 000	-	-
Fire	QS	-	50 000 000	50 000 000	-	-
Fire	XL	-	30 000 000	70 000 000	0,39%	1@free; 2-3@50%
Nat Cat	XL	1	270 000 000	630 000 000	1,20%	2@100%
Nat Cat	XL	2	900 000 000	1 100 000 000	0,90%	1@100%
Nat Cat	XL	3	900 000 000	1 500 000 000	0,30%	1@100%
Nat Cat	RPP	- fixed price, covering reinstatement premium L1-L2				

Types of Reinsurance

How much Capacity? (Nat Cat)

Cumulative Probability
Gross Loss OEP for Variation using 'Variation'

	Flood		Wind	
Probability	VaR	TVaR	VaR	TVaR
10,00%	0 Kč	92 100 453 Kč	0 Kč	62 888 459 Kč
20,00%	0 Kč	103 613 009 Kč	0 Kč	70 749 516 Kč
25,00%	0 Kč	110 520 543 Kč	0 Kč	75 466 151 Kč
40,00%	0 Kč	138 150 679 Kč	0 Kč	94 332 688 Kč
50,00%	0 Kč	165 780 815 Kč	0 Kč	113 199 226 Kč
60,00%	0 Kč	207 226 019 Kč	0 Kč	141 499 032 Kč
75,00%	0 Kč	331 561 630 Kč	0 Kč	226 398 452 Kč
80,00%	0 Kč	414 452 037 Kč	0 Kč	282 998 064 Kč
90,00%	0 Kč	828 904 075 Kč	0 Kč	565 996 129 Kč
95,00%	326 151 471 Kč	1 450 309 357 Kč	305 676 614 Kč	935 734 592 Kč
98,00%	679 248 645 Kč	2 944 806 306 Kč	581 149 035 Kč	1 725 909 583 Kč
99,00%	1 177 991 695 Kč	5 011 675 072 Kč	937 160 108 Kč	2 727 620 145 Kč
99,50%	2 025 841 749 Kč	8 504 672 338 Kč	1 505 511 096 Kč	4 293 387 584 Kč
99,60%	2 399 453 285 Kč	10 082 181 293 Kč	1 757 598 808 Kč	4 959 981 064 Kč
99,80%	4 098 337 755 Kč	17 097 671 428 Kč	2 727 738 596 Kč	7 767 233 906 Kč
99,90%	6 772 456 926 Kč	28 997 655 663 Kč	4 307 762 232 Kč	12 168 681 280 Kč
99,99%	39 362 649 701 Kč	170 044 702 742 Kč	19 710 762 320 Kč	49 888 271 767 Kč

SII Internal
Model?

X

SII Standard
Formula?

VIG Re

Types of Reinsurance

How much Capacity? (other)

- Maximise capacity to gain competitive advantage
- Price for „empty capacity“
- Unlimited cover for MTPL

Line of Business	Type of reinsurance	Layer	Retention	Limit	Rate	Reinstatements
Fire	Surplus	-	100 000 000	1 500 000 000	-	-
Fire	QS	-	50 000 000	50 000 000	-	-
Fire	XL	-	30 000 000	70 000 000	0,39%	1@free; 2-3@50%

How to Structure Reinsurance Program?

- Define capacity
- What is maximum retention (e.g. group rules)
- Targets of the company might be:
 - Minimise price
 - Maximise mean net underwriting result
 - Minimise volatility of net underwriting result
 - Maximise return on capital
 - Other (financial, cash-flow, etc.)

— Reinsurance of Insurance Risk

Reinsurance Market

Reinsurance Market Subjects

Insurance Companies (reinsurance buyers)

Brokers (modelling, structuring, negotiating, administration of treaties)

Reinsurers (providing capacity)

Supervisory Authorities

Top 5 Global Reinsurers

in millions USD

	2017 turnover	2016 turnover	2016/2017 evolution
Munich Re	37 821	33 154	14%
Swiss Re	34775	35 622	-2.37%
Berkshire Hathaway ⁽¹⁾	24 212 ⁽²⁾	13 917	73.97%
Hannover Re	21 313	17 232	23.68%
Scor group	17 718	14 569	21.6%
Total	135 839	114 494	18.64%

(1) Figures from the 2017 annual report

(2) The 2017 revenue includes 10.2-billion aggregate excess-of-loss retroactive reinsurance agreement with all AIG's subsidiaries

Source: <https://www.atlas-mag.net>

Top 5 Global Reinsurers

	2017 combined ratio	2016 combined ratio	2016/2017 evolution
Hannover Re	99.8%	93.7%	+6.1 points
Scor	103.7%	93.1%	+10.6 points
Swiss Re	111.5%	93.5%	+18 points
Munich Re	114.1%	95.8%	+18.3 points
Berkshire Hathaway	-	89.4%	-

— Reinsurance of Insurance Risk

Renewal Process

Timeline of Renewal 1.1. xxxx

- **May – September:** data preparation by insurance companies and submissions to brokers, suitability assessed by brokers / internally
- **September – December:** data sent to reinsurers who provide their quotes > decision about final terms and wordings > placement
- **December 31st** – all treaties need to be placed (rare exceptions possible)

— Reinsurance of Insurance Risk

Actuaries in VIG Re



Actuaries in VIG Re

Life



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Non-Life Reserving

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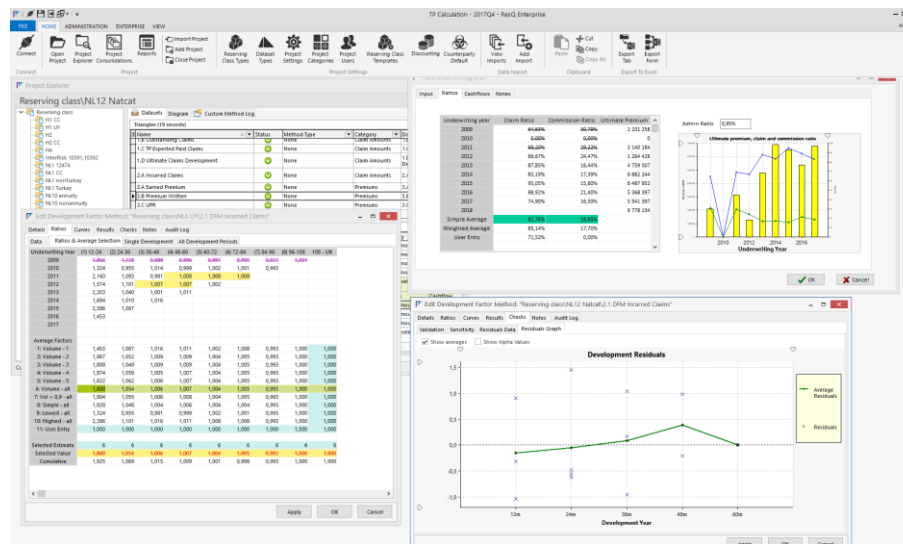
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Non-Life Reserving

- Methodological development and calculation of technical provisions under IFRS and Solvency II
- Works with ResQ, VBA, SQL, MS Access, MS Excel



Daniel Marcinek
Reserving Actuary
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Life

- Assessment of life reinsurance contracts, calculation of technical provisions under IFRS and Solvency II
- Works with Prophet, VBA, MS Excel



Jaroslav Vichr
Life Actuary

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The screenshot shows the VIG Re software interface. At the top, there's a menu bar with 'File', 'Home', 'Object', 'Utilities', 'Analyse', and 'Format'. Below the menu, there's a toolbar with buttons for 'Back', 'Forward', 'Circular Dependencies', 'Properties', 'Close Diagram', 'Refresh', and 'View'. The main workspace is divided into several panes. On the left, there's a 'Model Components' pane showing a tree structure of products and variables. The central pane shows a 'Diagram' view with a flowchart of variables and their dependencies. The right pane shows a 'Formula' editor for the variable 'RPR_ADD_TECH_INTEREST'. The formula is written in a structured format with line numbers and conditional logic. The bottom pane shows the 'Indicator Expression' and 'Run Settings'.

NL Pricing and Capital Modeling Team



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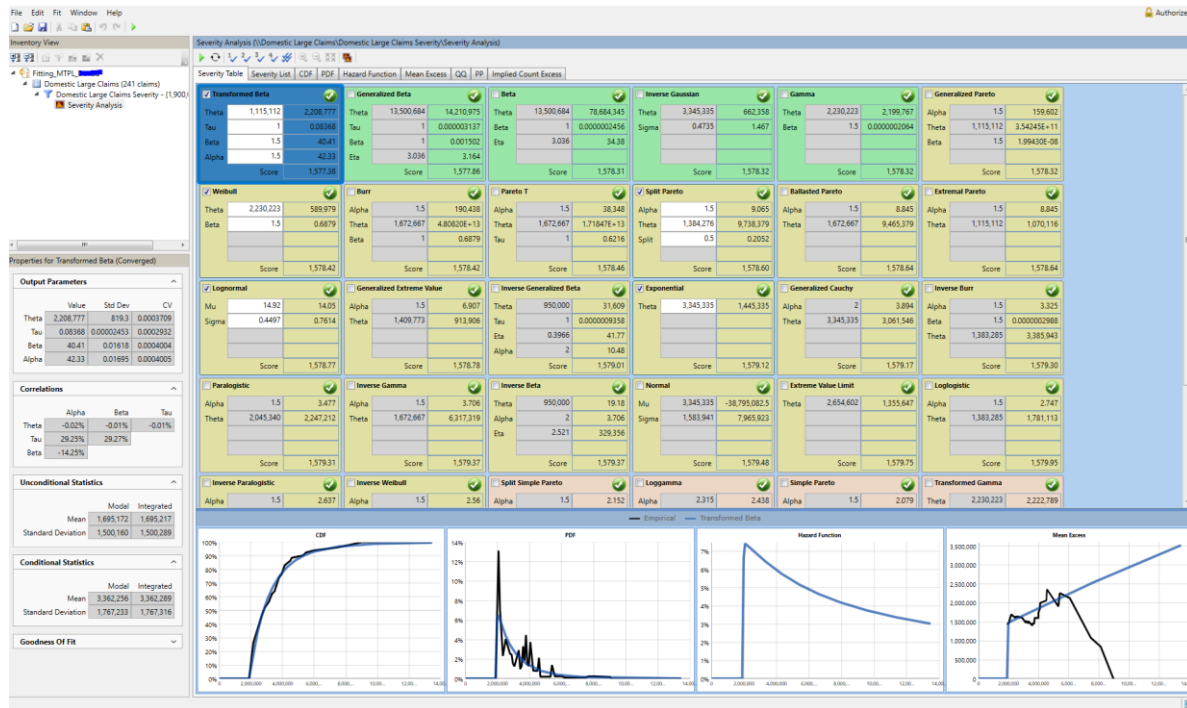
Jan Doležal
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- Pricing tools & methodological development
- Pricing complex reinsurance treaties
- Modelling of Natural Catastrophes
- Development and operation of partial internal model under Solvency II
- Work with MetaRisk, VBA, MS Excel, SQL, Python, PACE

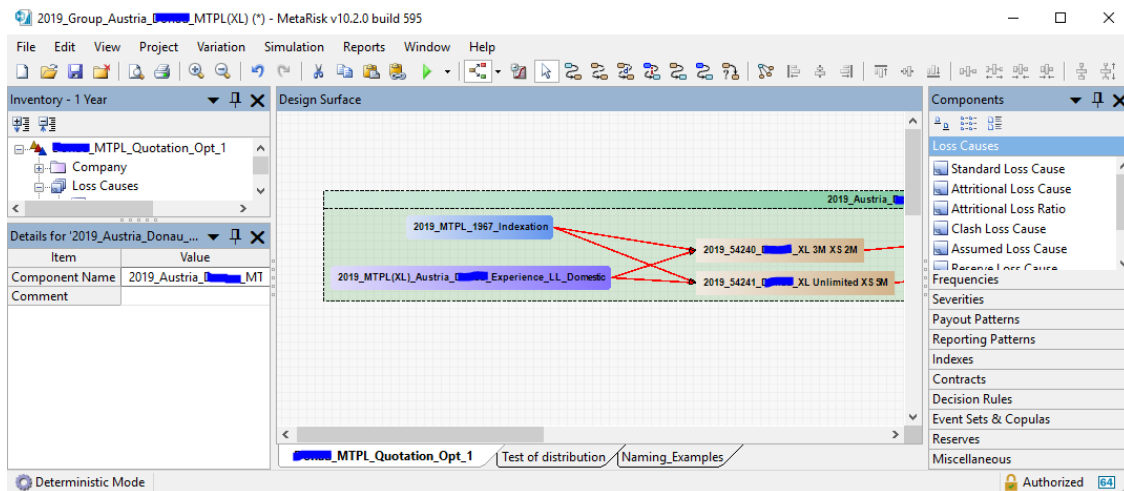
Pricing of NL Reinsurance: Simple Example



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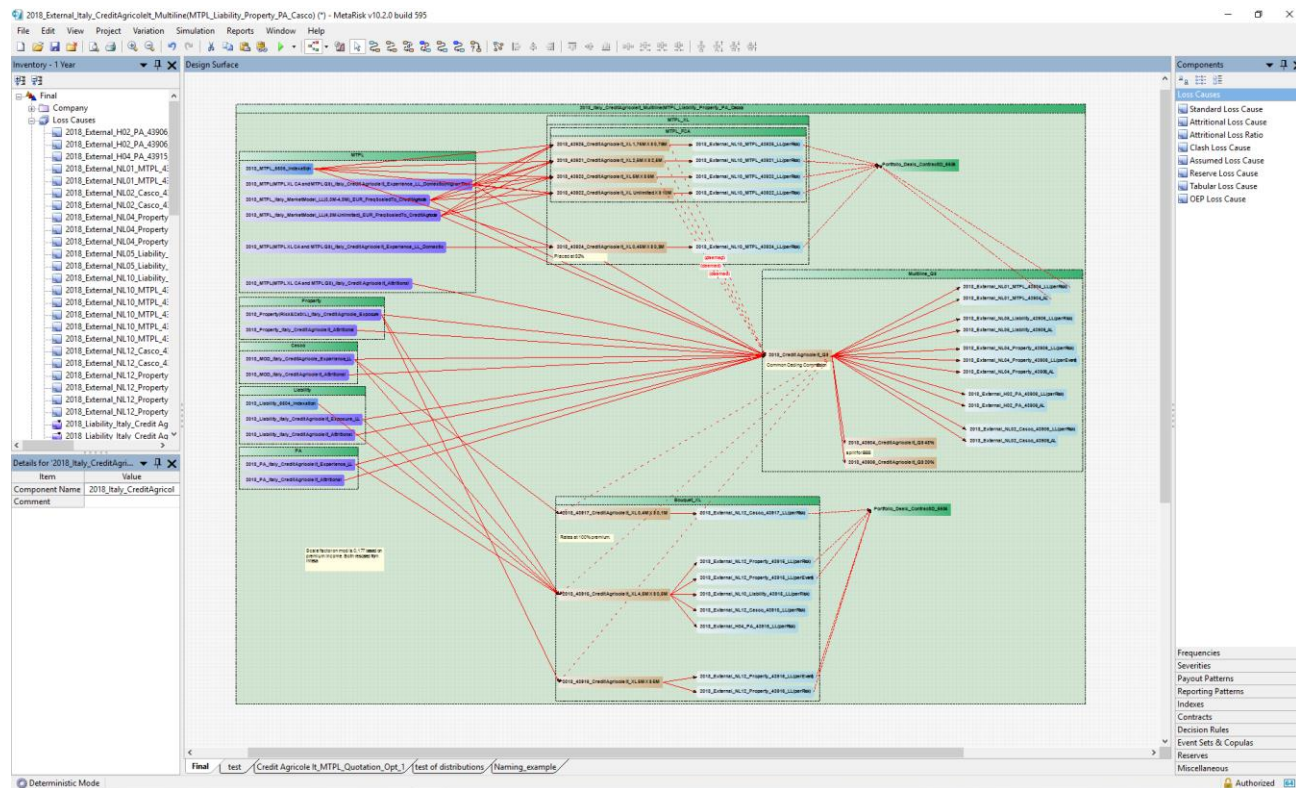
Pricing of NL Reinsurance: Simple Example



Probability	Loss and ALAE	
	VaR	TVaR
10,00 %	0 €	953 649 €
20,00 %	0 €	1 072 855 €
25,00 %	0 €	1 144 379 €
40,00 %	230 189 €	1 409 396 €
50,00 %	476 009 €	1 621 487 €
60,00 %	782 156 €	1 870 816 €
75,00 %	1 430 711 €	2 344 505 €
80,00 %	1 740 337 €	2 535 415 €
90,00 %	2 235 847 €	3 106 413 €
95,00 %	2 872 929 €	3 694 899 €
98,00 %	3 703 071 €	4 389 926 €
99,00 %	4 157 610 €	4 879 846 €
99,50 %	4 659 103 €	5 375 929 €
99,60 %	4 817 585 €	5 534 715 €
99,80 %	5 342 138 €	6 024 373 €
99,90 %	5 801 069 €	6 496 162 €
99,99 %	7 724 618 €	8 109 179 €

Probability	Loss from Reinsurer Perspective	
	VaR	TVaR
10,00 %	-605 448 €	348 201 €
20,00 %	-605 448 €	467 407 €
25,00 %	-605 448 €	538 930 €
40,00 %	-375 259 €	803 948 €
50,00 %	-129 440 €	1 016 039 €
60,00 %	176 708 €	1 265 368 €
75,00 %	825 263 €	1 739 057 €
80,00 %	1 134 888 €	1 929 966 €
90,00 %	1 630 399 €	2 500 965 €
95,00 %	2 267 481 €	3 089 451 €
98,00 %	3 097 623 €	3 784 478 €
99,00 %	3 552 162 €	4 274 398 €
99,50 %	4 053 655 €	4 770 481 €
99,60 %	4 212 137 €	4 929 267 €
99,80 %	4 736 689 €	5 418 925 €
99,90 %	5 195 621 €	5 890 714 €
99,99 %	7 119 170 €	7 503 731 €

Pricing of NL Reinsurance: Complex Example



Partial Internal Model under Solvency II

- After the renewal we merge all models and create one huge stochastic model (incl. natural catastrophes on cross-country level)
- This will serve for calculation of SCR (expected from 2020)
- Retrocession optimization
- Assessment of business profitability
- Etc.



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Questions?

Contacts



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