



Solvency II

Some L&H Issues

P&C Non-Proportional Recognition - Problems

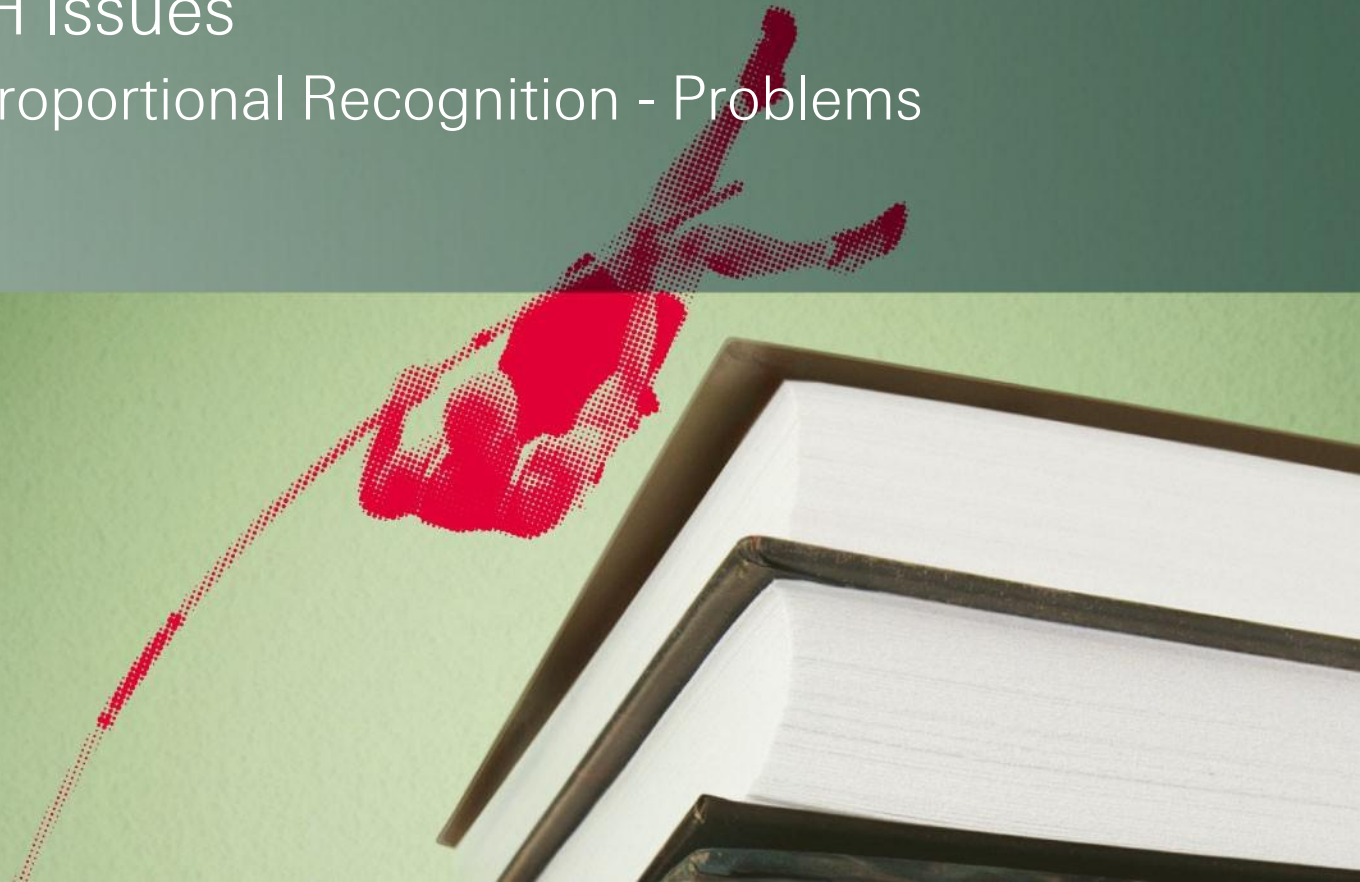




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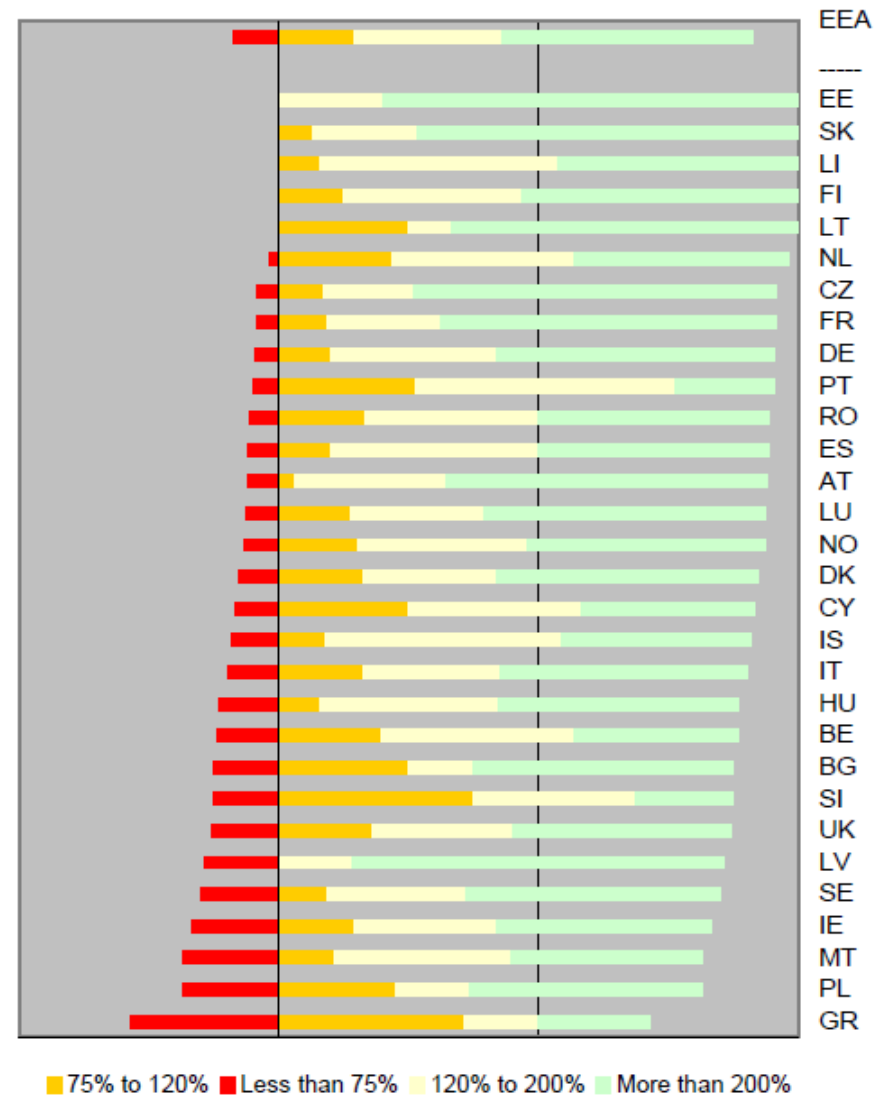
- Standard Model (QIS5) Life & Health Issues
 - Reinsurance

- Quirk in Recognition of Non-Proportional Reins in P&C Premium and Reserve Risk

EIOPA QIS 5 Report

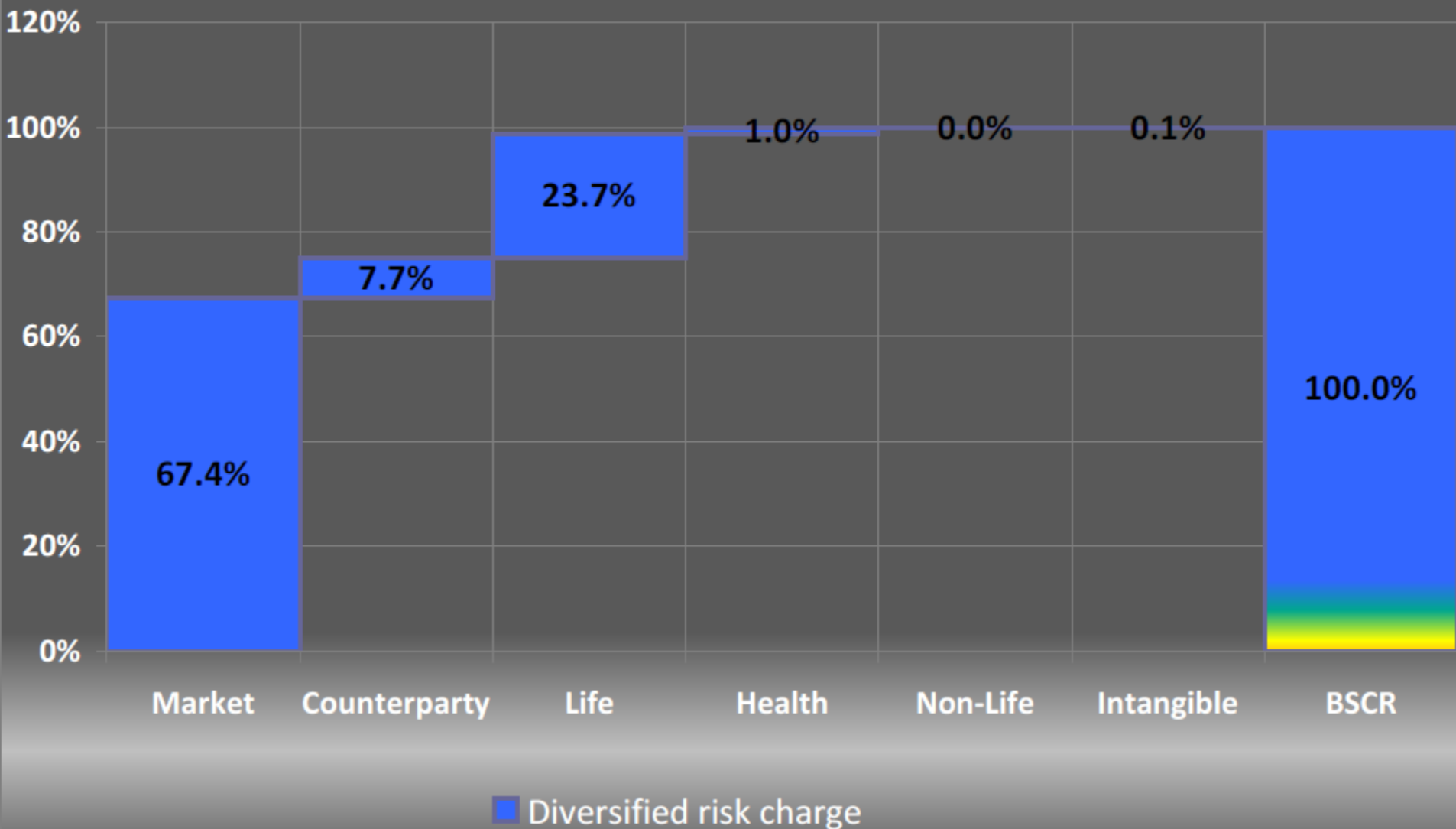
- Greece was last in Solvency Ratios
- 30% Solvency Ratios < 75%
- 65% Solvency Ratios < 120%
- 80% Solvency Ratio < 200%

Graph 5: Distribution of SCR coverage by country



Graph 35: Diversified BSCR - Life undertakings (solo)

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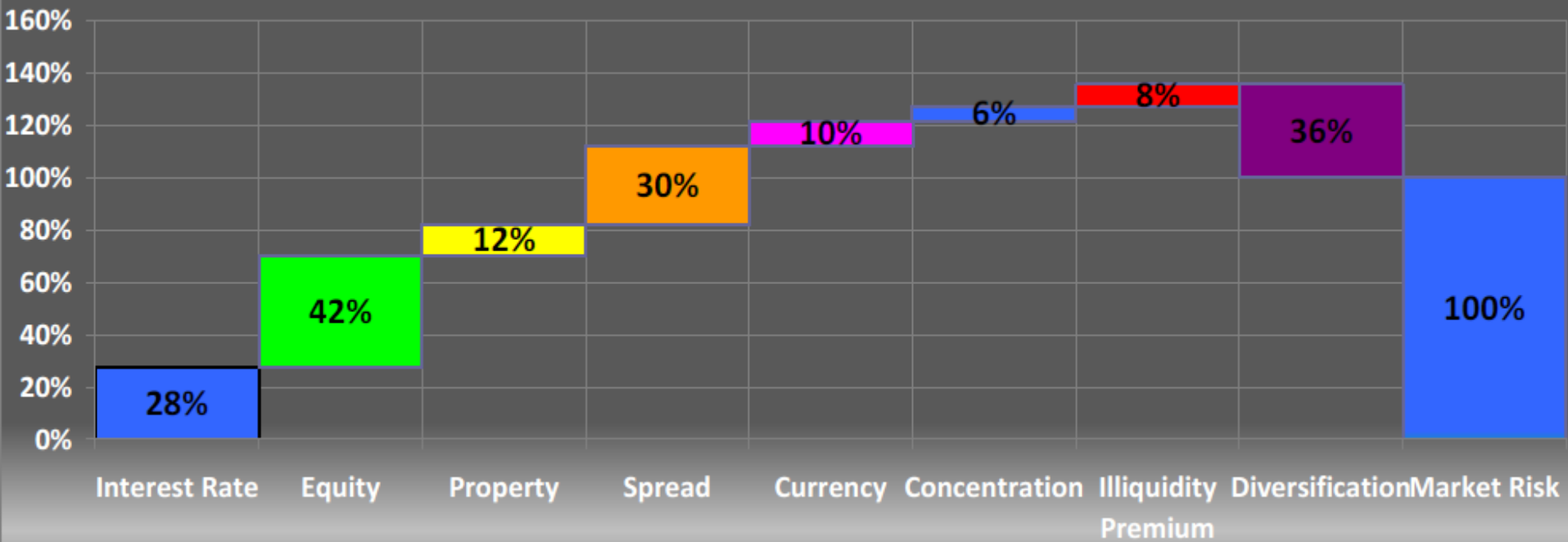
Market Risk

- "Market" Risk is misnomer:
 - Should be "Asset Liability Mismatch" Risk
- $SRC = \Delta NAV \mid \text{Shock}$
- $NAV = \text{Net Asset Value} = PV \text{ Assets} - PV \text{ Liabilities}$
- If Assets & Liabilities move in same direction

 $\Delta NAV = 0$

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Graph 37: Market Risk Composition (solo)



Asset Risk "Solutions"

■ Asset Liability Matching

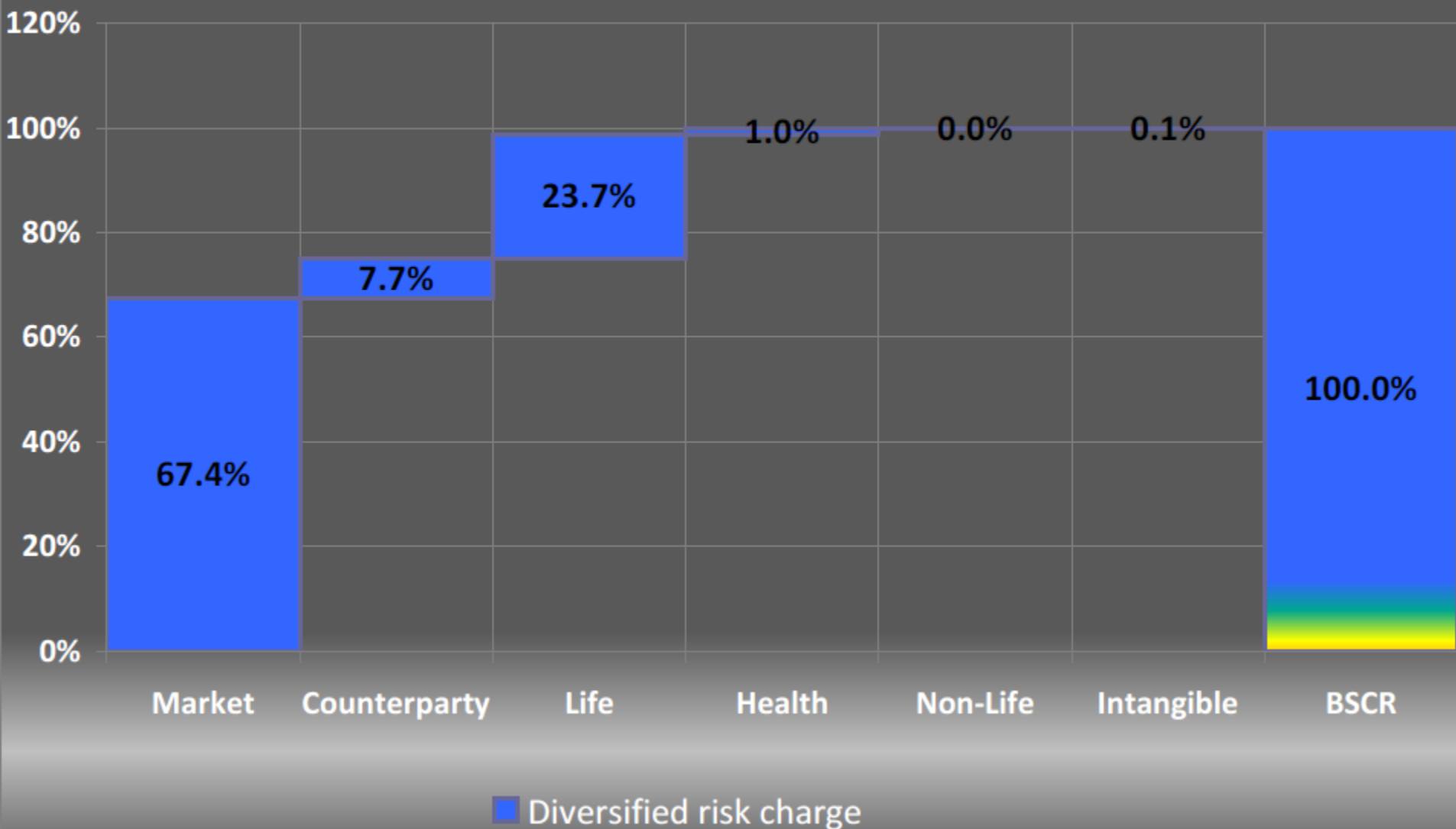
- USA Experience
- No longer gain on spread between guarantees and investments
- Full immunization is impossible → Dynamic Hedging
 - However, standard model does not allow for credit for Dynamic Hedging

■ Unit Linked Products

- Policyholder to bear burden of Asset Risk
- No embedded options

Graph 35: Diversified BSCR - Life undertakings (solo)

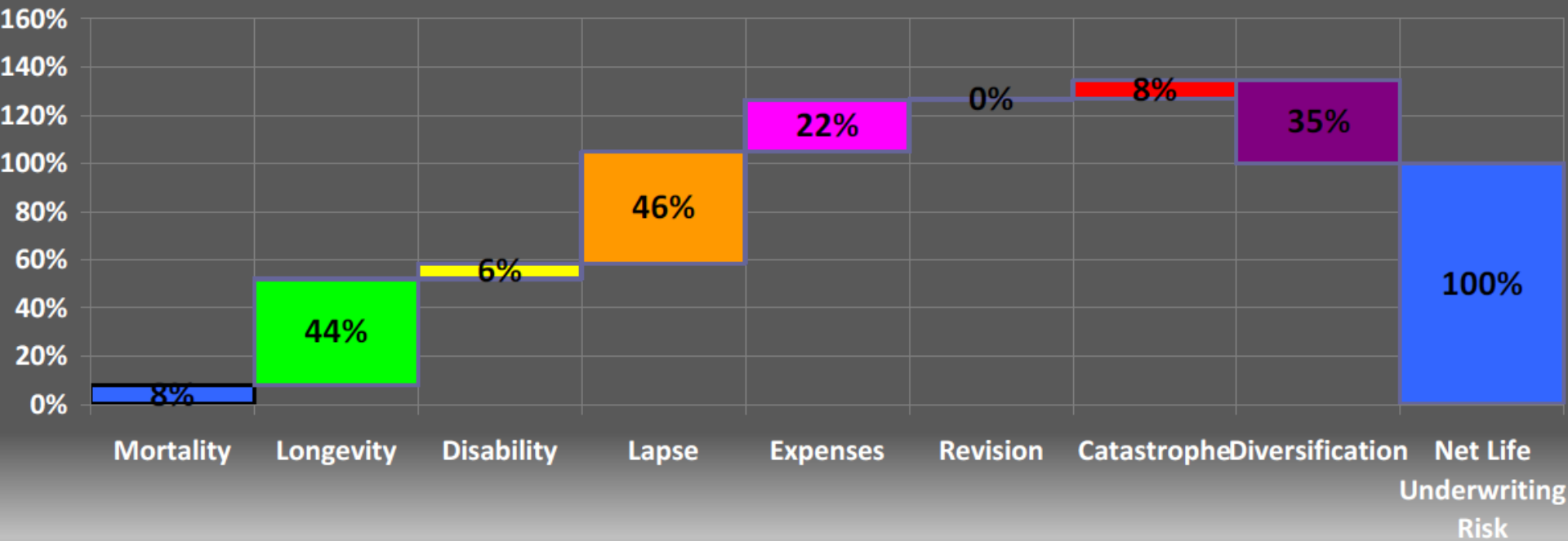
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Life Risk

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Graph 41: Life Underwriting Risk Composition - Life undertakings (solo)





Lapse Risk

- Lapse Risk = Δ NAV | Shock
 - Loss of Embedded Value
- Max of 3 Shock Scenarios
 1. Mass Lapse: Onetime additional +30% lapses
 - eg if lapses normally 10% pa,
 - Shock = 40% next yr, 10% thereafter
 2. Lapse Up: permanent increase of 50%
 - eg Shock = 15% all years
 3. Lapse Down: permanent decrease of 50%
 - eg Shock = 5% all years
- Solution ?



Longevity

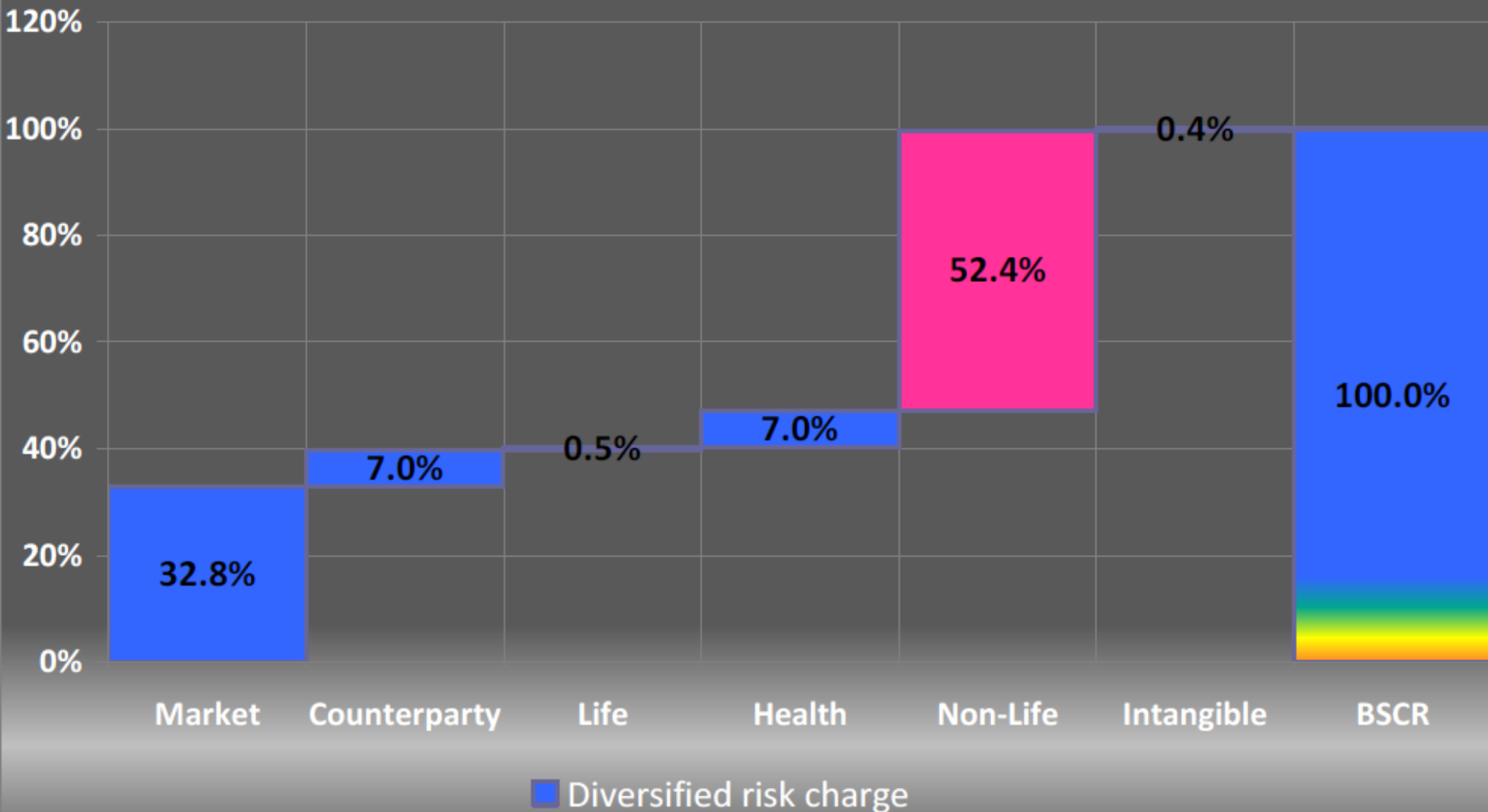
- Shock = permanent 25% decrease in mortality
- Solutions:
 - Longevity Swaps
 - New products do not offer guaranteed annuity



Reinsurance Recognition in Non-Life Risk Standard Formula (QIS5)

Graph 36: Diversified BSCR - Non-life undertakings (solo)

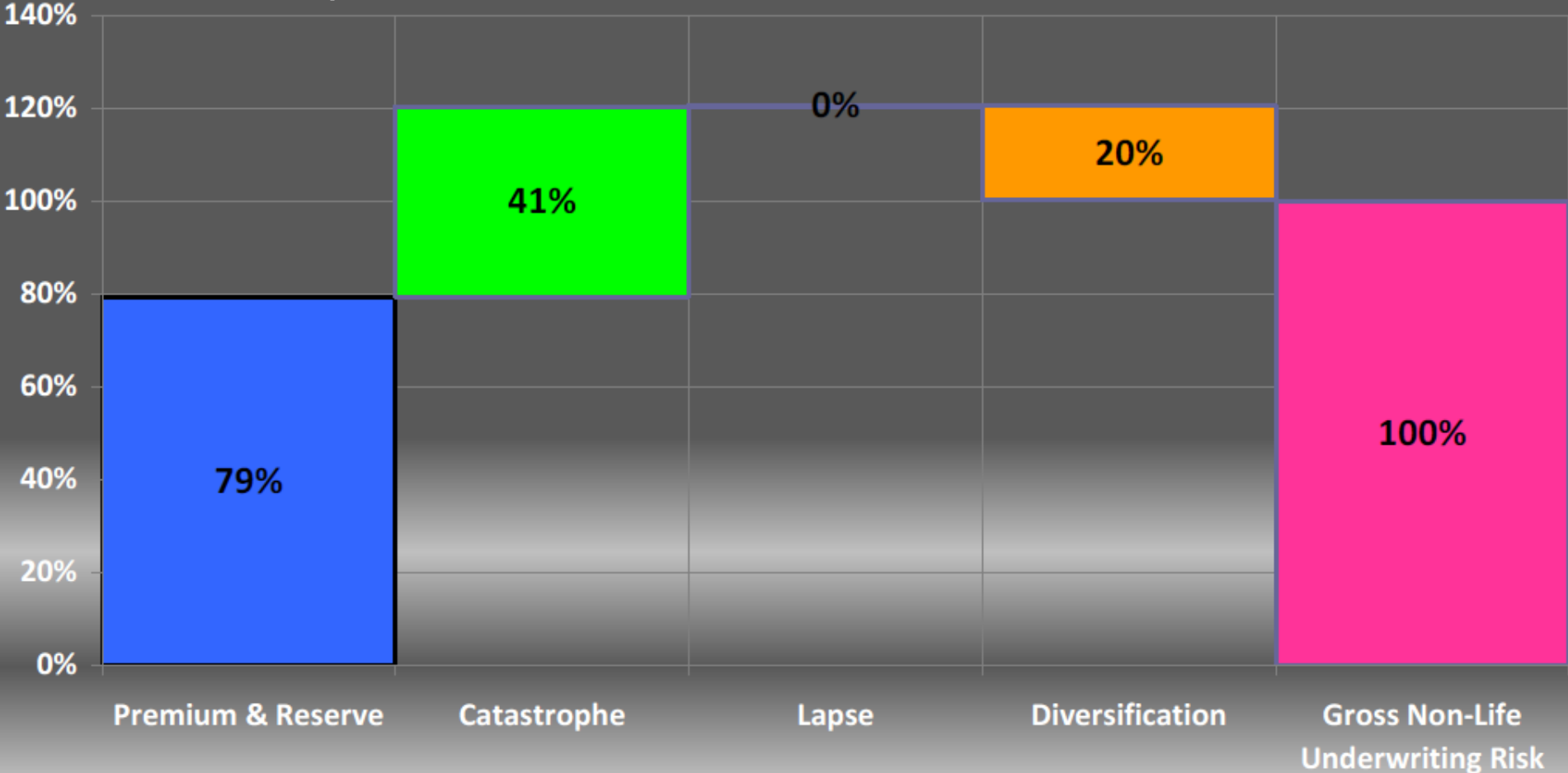
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Graph 46: Non-Life Underwriting Risk Composition (groups)

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Non-Life Premium and Reserve SCR

$$NL_{pr} = \rho \left(\frac{1}{1 + \rho} \right) V$$



Premium and reserve risk

Function of volume and volatility

- Capital charge for the combined premium and reserve risk

$$\begin{aligned}
 NL_{pr} &= \rho(\sigma) \cdot V \\
 &= RiskFactor \cdot Volume
 \end{aligned}$$

- $V = \text{Volume} = \text{Premium or Reserves}$

- $\rho(\sigma)$ - Capital charge assumes:
 - log-normal distribution
 - once in two hundred year event

- Specifically:

$$\rho(\sigma) = \frac{\exp\left(N_{0.995} \cdot \sqrt{\log(\sigma^2 + 1)}\right) - 1}{\sqrt{\sigma^2 + 1}}$$

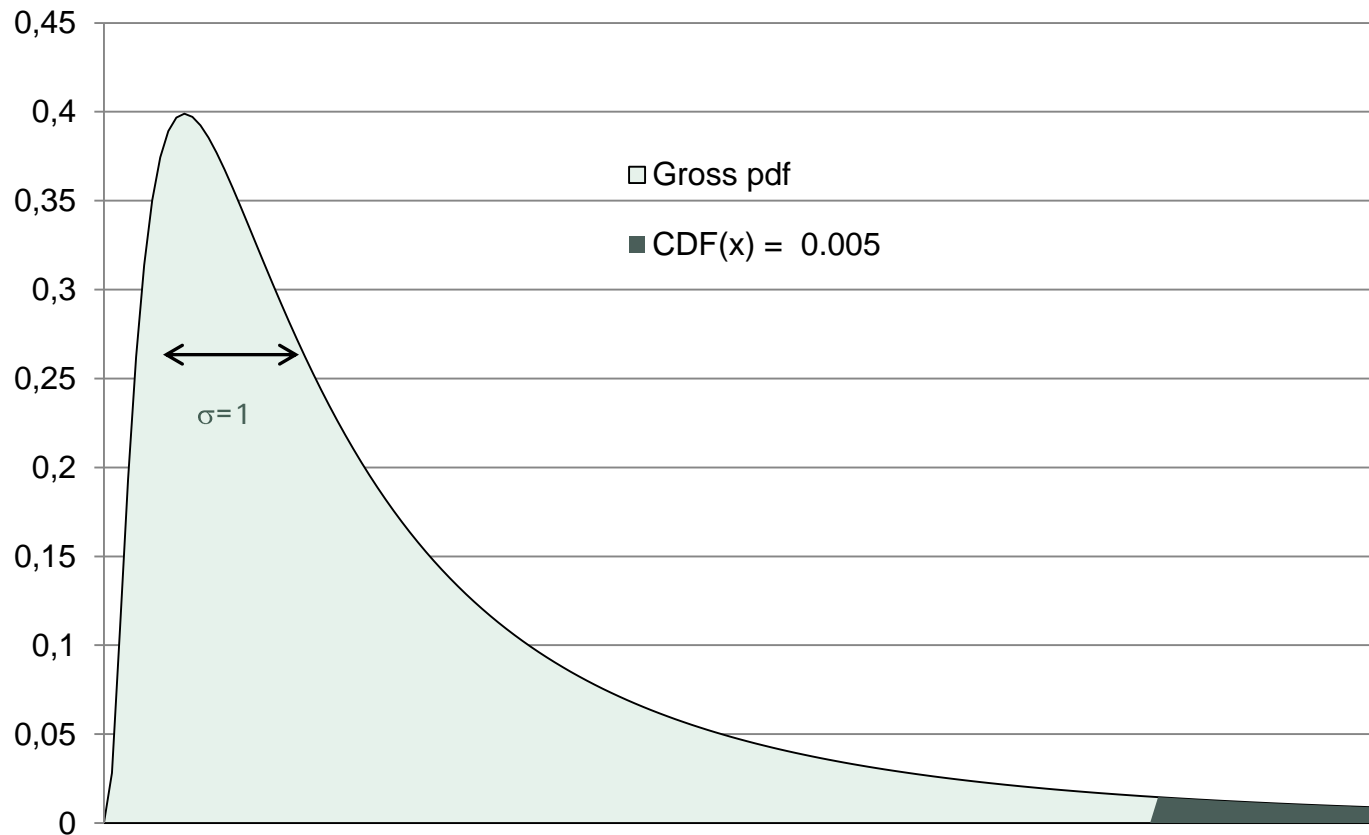
- where: $\sigma = \text{combined standard deviation of risk and volume}$



Volatility parameters

Line of business	Premium risk		Reserve risk	
	OIS 5: σ	$\rho(\sigma)$	OIS 5: σ	$\rho(\sigma)$
Motor TPL	10.0%	29%	9.5%	27%
Motor other	8.5%	24%	10.0%	29%
Marine, Aviation, Transport	18.0%	56%	14.0%	42%
Fire and other property damage	12.5%	37%	11.0%	32%
Third-party liability	15.0%	45%	15.5%	47%
Credit & suretyship	21.5%	69%	20.0%	63%
Legal assistance	6.5%	18%	9.0%	26%
Assistance	5.0%	14%	11.0%	32%
Miscellaneous	13.0%	38%	15.0%	45%
NP reinsurance – property	17.5%	54%	20.0%	63%
NP reinsurance – casualty	17.0%	52%	20.0%	63%
NP reinsurance – MAT	16.0%	49%	20.0%	63%

Log-Normal Distribution: $\sigma = 1$



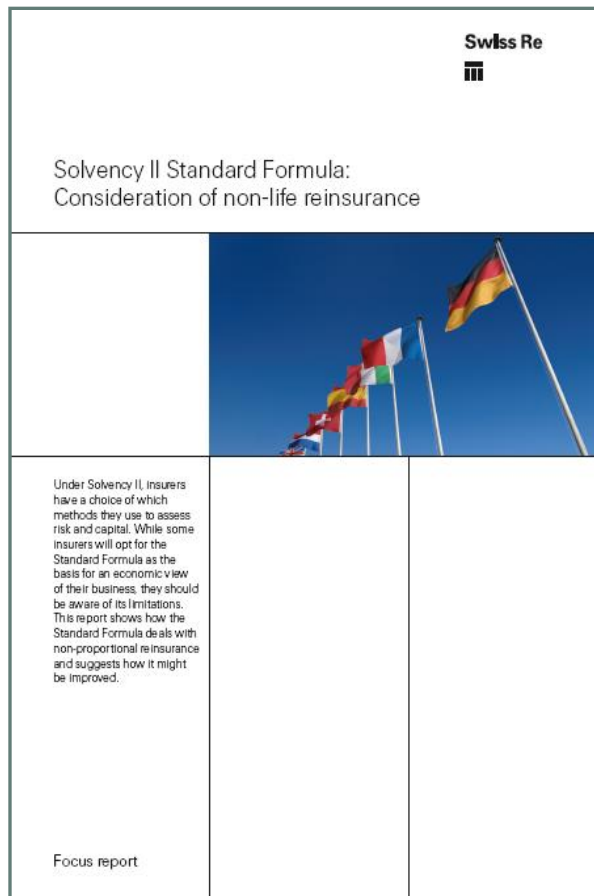


Non-Proportional Reinsurance

Evolution in NLT



Non-proportional reinsurance under the Standard Formula QIS 4



- Inappropriate consideration of non-proportional reinsurance
- It was clear that:
 - Standard Formula to be improved
 - OR ELSE: increasing effort to implement an internal or partial internal model (costs!)

Swiss Re published a Focus Report on 19 May 2009:
“Solvency II Standard Formula: Consideration of non-life reinsurance”



Non-proportional reinsurance in the Standard Formula QIS 5

The AMICE proposal

(developed in cooperation with Swiss Re, Munich Re and Hannover Re and endorsed by CRO Forum, CFO Forum and CEA)

Assumptions:

- The reinsurance instrument meets the five principles for recognition as a risk mitigation technique
- A per risk excess of loss reinsurance covers all insurance claims incurring during the following year
- Allowance for sufficient reinstatements to cover all losses occurring throughout the year

Inputs:

- Retention (a) and limit (b) of the non-proportional reinsurance contract: $b \times a$
- Average cost per claim and its standard deviation (both gross of non-proportional reinsurance per Line of Business (LoB))
- Standard deviation for the premium risk gross of reinsurance and the respective volume measure of the premium risk
- Assumption of a lognormal distribution for underlying losses



Requirements for effective risk mitigation under the Solvency II Standard Formula

5 Principles for recognising reinsurance:

Principle 1
Economic effect over legal form

Principle 3
Liquidity and certainty of value

Principle 2
Legal certainty, effectiveness and enforceability

Principle 4
Credit quality of the provider of the reinsurance

Principle 5
Direct, explicit, irrevocable and unconditional features



Treatment of non proportional cessions in the Standard Formula (QIS 5)

- Standard deviations per Line of Business are defined separately for premium risk and reserve risk
- Alteration of the standard deviation for premium risk $\sigma_{(prem,lob,unadjusted)}$ to arrive at the standard deviation for premium risk net of reinsurance

$$\sigma_{(prem,lob)} = \sigma_{(prem,lob,unadjusted)} * \frac{NetRatio_i}{GrossRatio_i}$$

- The net-gross ratio is defined in the following way

$$\frac{NetRatio_i}{GrossRatio_i} = \sqrt{\frac{1 + \Omega_{lob}^{net} / M_{lob}^{net}}{1 + \Omega_{lob}^{gross} / M_{lob}^{gross}}}$$



Treatment of non proportional cessions in the Standard Formula (QIS 5)

Adjustment factor = risk-mitigating effect of non-prop reinsurance
= $\sigma_{(prem,lob)}$

- M_{lob}^{gross} = Average cost per claim gross of reinsurance per LOB, estimated from the claims of the last year
- Ω_{lob}^{gross} = Standard deviation of the cost per claim gross of reinsurance per LOB, estimated with the standard estimator from the claims of the last year
- Recent 3 financial years
- Exclude Cat claims (both gross and net claims),
 - *no deduction of cat reinsurance premium for calculation of net premium figure*



Example: Non-proportional reinsurance in the Standard Formula QIS 5

Commercial and Industrial Fire Portfolio suffering from high severity and low frequency risk:

Gross premium income:	100 mio EUR
Net premium income:	96.1 mio EUR
Average cost per claim gross:	2.700 EUR
Standard deviation of the average cost per claim gross:	23.400 EUR
Average cost per claim net ¹ :	2.695 EUR
Standard deviation of the average cost per claim net ¹ :	18.947 EUR

¹ Calculated with the log-normal distribution

Reinsurance:

Layer structure:	15 mio xs 5 mio EUR
Reinsurance premium:	3.9 mio EUR

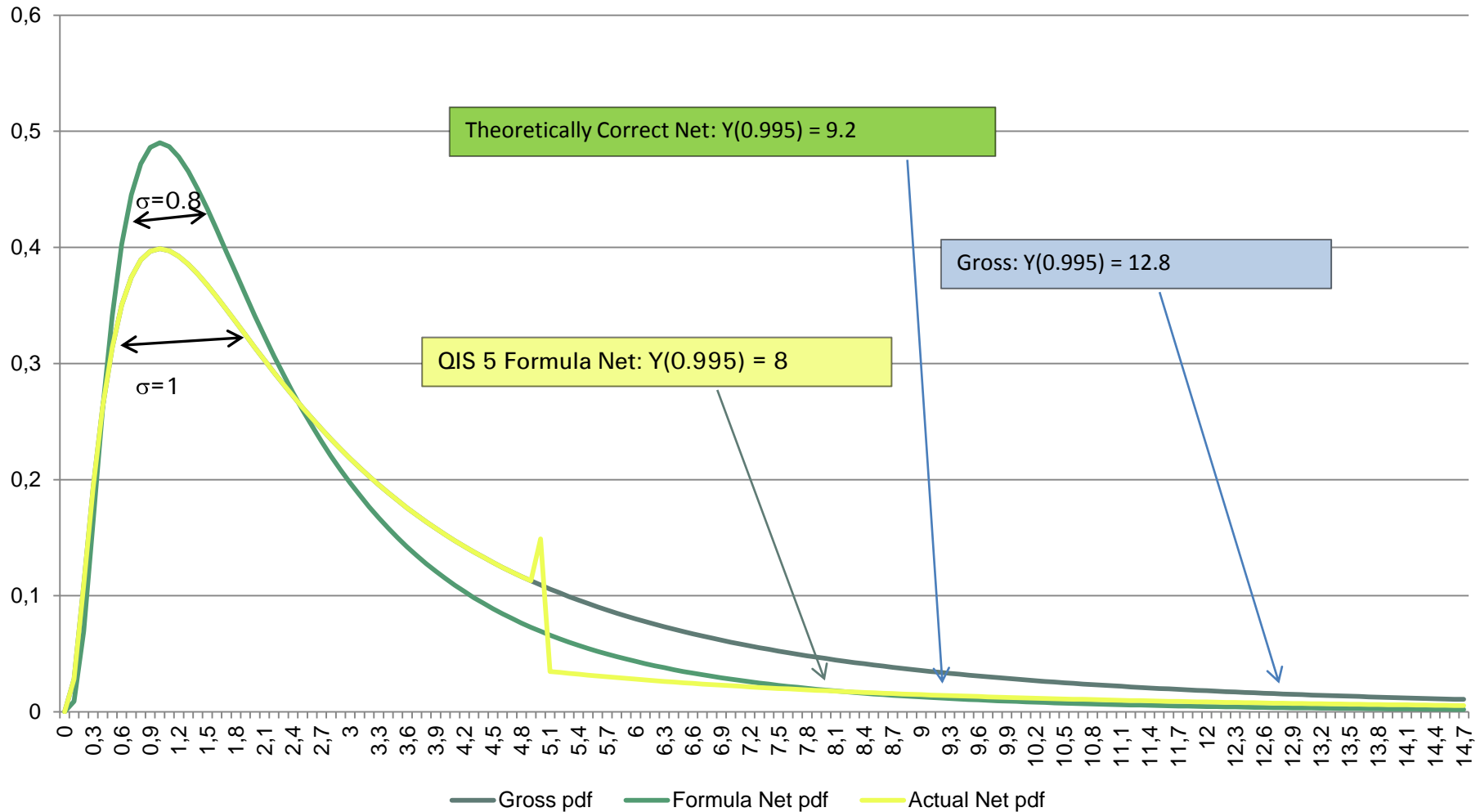
Adjustment factor for non- proportional reinsurance:

$$= \sqrt{\frac{1 + \left(\frac{\text{Claims standard deviation net}}{\text{Average costs per claim net}}\right)^2}{1 + \left(\frac{\text{Claims standard deviation gross}}{\text{Average costs per claim gross}}\right)^2}} = \sqrt{\frac{1 + \left(\frac{18.947}{2.695}\right)^2}{1 + \left(\frac{23.400}{2.700}\right)^2}} = 81.4\%$$

(Adjusted) Standard Deviation for the premium risk:

Unadjusted standard deviation:	12.5 %
Adjusted standard deviation:	11.3 %

Non-proportional reinsurance in the Standard Formula QIS 5





Practical Problems

- EIOPA Report on the fifth Quantitative Impact Study (QIS5) for Solvency II
- Premium Risk
 - Company specific adjustment factors
 - Few insurers (3%) made use of those factors in QIS 5
 - "Most undertakings failed to determine the adjustment for non-proportional reinsurance in the premium risk factors because of problems with data availability. The calculations were also seen as too complex."

Table 16: Non-proportional reinsurance adjustment in non-life

Line of business*	Median of non-proportional reinsurance adjustment	Sample size (EEA)
Non life – Motor vehicle liability	81.2%	87
Non life – Motor other classes	99.4%	39
Non life – MAT	77.9%	27
Non life – Fire	81.4%	81
Non life – Third party liability	81.7%	87

* Sample size for credit, legal expenses, assistance and miscellaneous too small to be included

Source: EIOPA report on QIS 5 results, 14 March 2011



Thank you



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