



Institute
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MCR and SCR for Pension Funds

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MCR and SCR for Pension Funds

Not only the Assets are Risky!

ertise
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Thought leadership
Progress
Community
Sessional Meetings
Education
Working parties
Volunteering
Research
Shaping the future
Networking
Professional support
Enterprise and risk
Learned society
Opportunity
International profile
Journals
Support

Content workshop

- The Netherlands: some facts
- Solvency II: a very short overview
- Solvency for Dutch Pension Funds
- Minimum Capital Requirement
- Solvency Capital Requirement
- Conclusions

The Netherlands



1,200 windmills

16.9M people

41,500 km² (18% water)

20,000 km dykes



Ranking Dutch Pensions

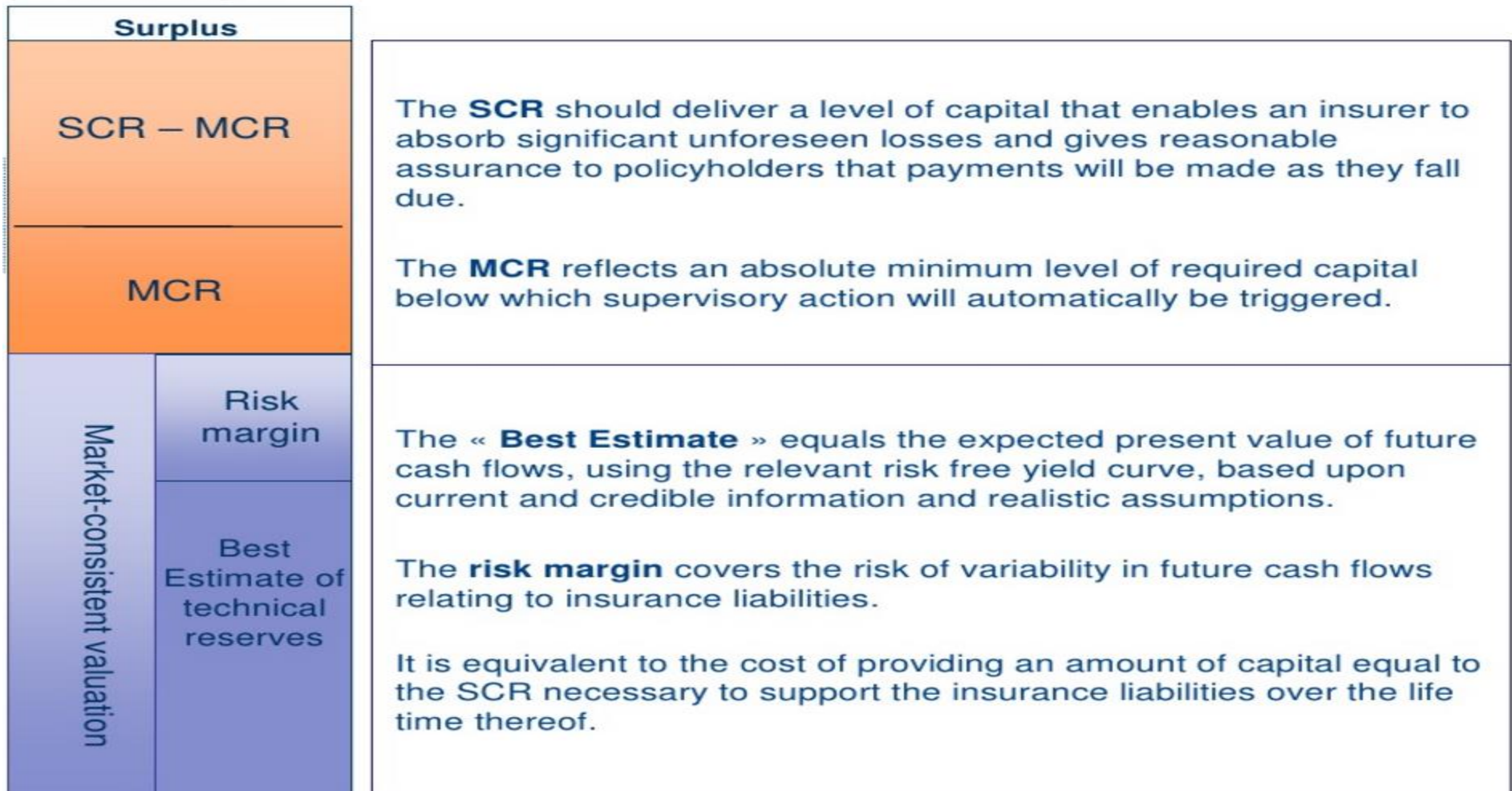
- MGPI 2015 (overall pension system): 2nd (out of 25)
- APSI 2014 (sustainability): 5th (out of 60)
- Total Assets PFs (2015Q3): € 1.25 trillion
 - € 74,000 per capita
- Total Pension reserves (2015Q3): € 1.14 trillion
 - € 67,000 per capita

Solvency II for EU insurance companies

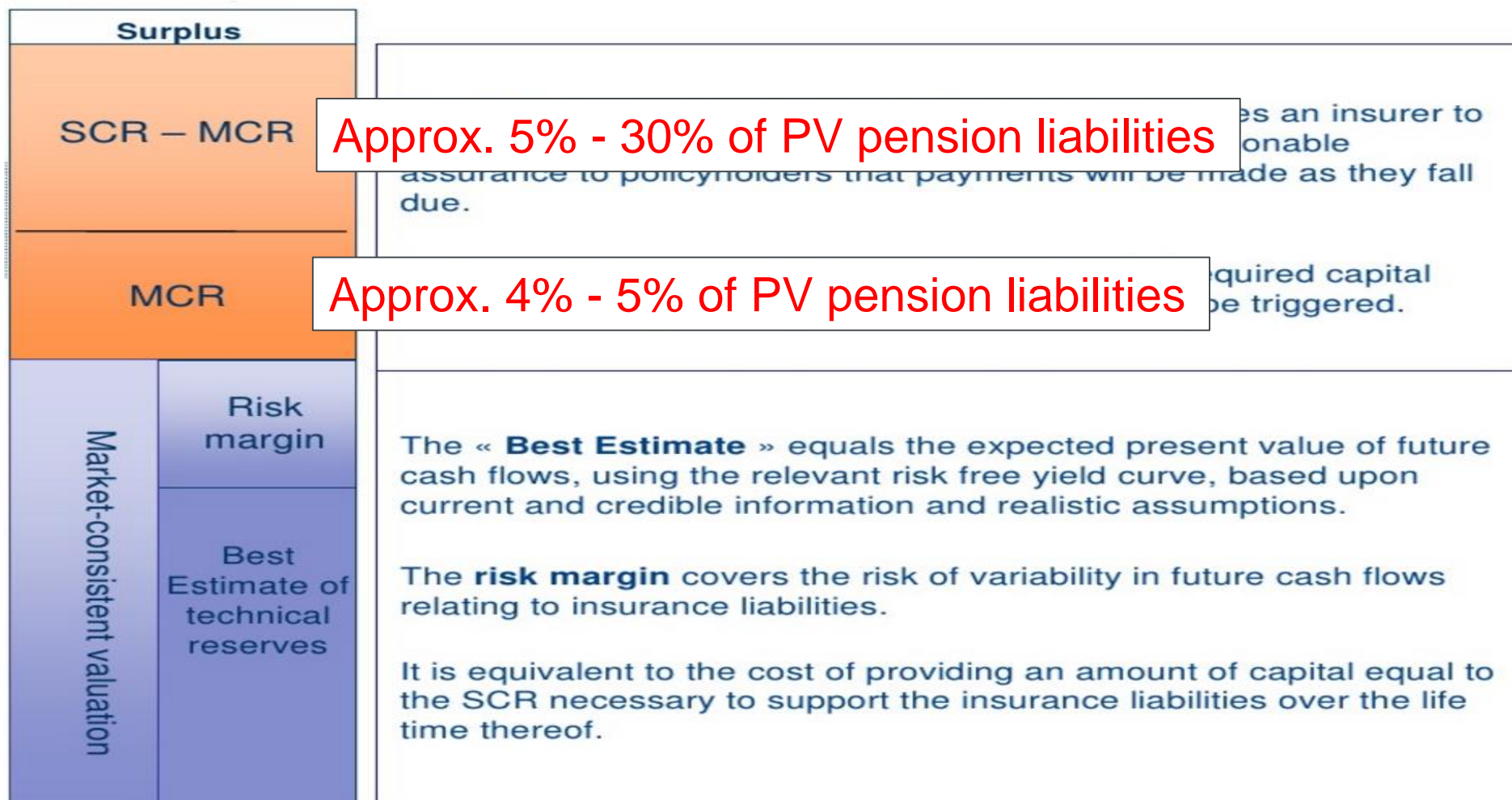
- Effective 1 January 2016 (finally)
- MCR = absolute minimum capital required
- SCR = the capital required to ensure that the (re)insurance company will be able to meet its obligations over the next 12 months with a probability of **at least 99.5%**.
- IORP ¹⁾ Directive (2004) = for EU pension funds
 - All EU PFs must have sufficient assets to cover pension liabilities
 - Each EU country should make its own regulation
 - Design a modern, comprehensive prudential framework to secure the retirement promises to employees.

1) IORP = Institutions for Occupational Retirement Provisions

Solvency II for insurers (Liabilities); 2016



Solvency II for Dutch PFs (Liabilities); 2007+



Solvency Capital Requirements for Dutch PFs

- IORP interpretation by the Dutch regulator
- **Financial Testing Framework** defining 10 (!) risk categories, each with its own risk buffer
- Risks related to:
 - all sorts of investments
 - the PF population
 - the discount rate.
- All 10 different risks must be valued exactly by the actuary for each individual PF. In general this means that the SCR (incl. MCR) will be some 10 – 35% of the net reserves!

Pension Fund Balance Sheet (simplified)

Assets:	1,100M	
- Bonds		500M
- Shares		400M
- Real estate		100M
- Commodities		75M
- Cash		25M
Liabilities:	1,000M	
- Pension reserves		1,000M
Equity:	100M	
- Own capital		100M

Solvency Required Capital for Dutch PFs

- Pension Act Art. 131: **MCR-PF**
 - Copied from 3rd directive Solveny II
 - Every PF must have a MCR
 - If 'own capital' < MCS-PF: instructions to recover.
- Level MCR-PF ('conclusion 11') = sum of
 - α of actual net pension reserve
 - β of risk capital (death)
 - γ of premium/claims for additional insurance (disability).

MCR for Dutch PFs

- $\alpha = 4\%$ * actual pension reserve * ratio-1:
 - ratio-1 = $\frac{\text{actual pension reserve} - \text{re-insured pens. reserve}}{\text{actual pension reserve}}$
 - ratio-1 at least 85% (\rightarrow min $\alpha = 3.4\%$)
 - Fully re-insured PF:
 - No investment risks and fixed investment costs for at least 5 years: $\alpha = 1\%$ * pension reserve
 - No investment risks and fixed investment costs less than 5 years: $\alpha = 25\%$ * net investment costs

MCR for Dutch PFs

- $\beta = 0.3\% * \text{risk capital (death)} * \text{ratio-2}$:
 - ratio-2 = $\frac{\text{actual risk capital} - \text{re-insured risk capital}}{\text{actual risk capital}}$
 - ratio-2 at least 50% (\rightarrow min $\beta = 0.15\%$)

MCR for Dutch PFs

- γ = highest of:
 - 18% * disability insurance premium (max. € 50M) + 16% * (disability premium -/- € 50M) * ratio-3
 - 26% * average claims past 3 years (max. € 35M) + 23% * (average claims past 3 years -/- € 35M) * ratio-3
 - ratio-3 = $\frac{\text{past year claims own account}}{\text{total claims past 3 years capital}}$; at least 50%

Only a few PFs have their own disability risk fund → mostly $\gamma = 0$

MCR for Dutch PFs

Total level of MCR-PF based on:

- Pension reserve: 1,000M (25% re-insurance)
- Risk capital (death): 5,000M (33% re-insurance)
- Disability pensions fully re-insured.

$$\begin{aligned} \text{MCR-PF} &= 4\% * 1,000\text{M} * 85\% (= \text{min}) + \\ & 0.3\% * 5,000\text{M} * 67\% = \\ & 44\text{M} = 4.4\% \text{ pension reserve} \end{aligned}$$

MCR for Dutch PFs

In case $MCR-PF < Own\ Capital$, take action:

- Inform Supervisory Body instantly
- Recovery plan:
 - Immediate recovery with extra premium, or
 - Pension cuts spread over max next 10 years
 - Only 1st pension cut is unconditional.
- Every PF must already have a crisis plan

SCR for Dutch PFs

- Pension Act Art. 132: “every pension fund must have a **SCR-PF** so the pension fund has enough capital to cover all **unconditional** liabilities for a **97.5%** guarantee next year”
 - Indexation is conditional → no SCR required
 - Compare insurers: 99.5%.
- Level of SCR-PF based on a solvency test using
 - Standard model (>99% of all PFs)
 - Own internal model (<1%).
- Detailed description in Conclusion 12: How to calculate the SCR-PF.

Risk categories (S_i) to determine SCR-PF

No.	Risk category
1	Yield risk
2	Shares and Real Estate risk
3	Currency risk
4	Commodities risk
5	Credit risk
6	Insurance Technical risk
7	Cash Flow risk
8	Concentration risk
9	Operational risk
10	Active Asset Management risk

S_1 : Yield risk

Taken into account:

- To compensate a 25% (approx.) shock in the yield curve (increase or decrease)
- 0.40 Correlation downward yield shock with shares and real estate risk (S_2)
- 0.40 Correlation downward yield shock with credit risk (S_5)

S₁: Yield risk



S_1 : Yield risk

Quantity of S_1

- Actual Pension reserve YE2014 = 1,000M
- Recalculated Pension reserve YE2014 = 1,073M
- Actual Pension reserve YE2015 (approx.) = 1,015M

$$S_1 = 73M$$

S_2 : Shares and Real Estate risk

Taken into account:

- Fall in shares of:
 - S_{2A} Mature markets shares + Real Estate Funds: 30%
 - S_{2B} Emerging markets shares: 40%
 - S_{2C} Non listed shares: 40%
 - S_{2D} Real Estate: 15%
- 0.75 Correlation between S_{2A} , S_{2B} , S_{2C} , S_{2D}
- Correlation with S_1 (yield risk): 0.40

S₂: Shares and Real Estate risk

Risk	Sub category	Amount	Buffer %	Buffer amount
S _{2A}	Mature Market Shares	300M	30%	90M
S _{2B}	Emerging Markets Shares	75M	40%	30M
S _{2C}	Non listed Shares	25M	40%	10M
S _{2D}	Real Estate	100M	15%	15M

S_2 : Shares and Real Estate risk

Quantity of S_2 using:

- $\sqrt{[S_{2A}^2 + S_{2B}^2 + S_{2C}^2 + S_{2D}^2 + (2 \times 0.40 \times S_{2A} \times S_{2B}) + (2 \times 0.40 \times S_{2A} \times S_{2C}) + (2 \times 0.40 \times S_{2A} \times S_{2D}) + (2 \times 0.40 \times S_{2B} \times S_{2C}) + (2 \times 0.40 \times S_{2B} \times S_{2D}) + (2 \times 0.40 \times S_{2C} \times S_{2D})]}$

$$S_2 = 118M$$

S_3 : Currency risk

Taken into account:

- Fall in currencies relative to Euro:
 - S_{3A} Mature markets: 20%
 - S_{3B} Emerging markets: 35%
- Correlation between S_{3A} currencies: 0,50
- Correlation between S_{3B} currencies: 0,75
- Correlation between S_{3A} and S_{3B} : 0,25

S₃: Currency risk

Risk	Sub category	Amount	Buffer %	Buffer amount
S _{3A1}	Mature Market USD	150M	20%	30M
S _{3A2}	Mature Markets JPY	50M	20%	10M
S _{3B1}	Emerging Markets CNY	40M	35%	14M
S _{3B2}	Emerging Markets ARS	35M	35%	12.25M

S_3 : Currency risk

Quantity of S_3 using:

- $S_{3A} = \sqrt{[S_{3A1}^2 + S_{3A2}^2 + (2 \times 0.50 \times S_{3A1} \times S_{3A2})]} = 36.06M$
- $S_{3B} = \sqrt{[S_{3B1}^2 + S_{3B2}^2 + (2 \times 0.75 \times S_{3B1} \times S_{3B2})]} = 24.56M$
- $\sqrt{[S_{3A}^2 + S_{3B}^2 + (2 \times 0.25 \times S_{3A} \times S_{3B})]}$

$$S_3 = 48.4M$$

S₄: Commodity risk

Taking into account:

- Covering a fall of 35%
- Mostly index futures and index options

Risk	Sub category	Amount	Buffer %	Buffer amount
S ₄	MSCI World Energy	30M	35%	10.5M
S ₄	DB Agriculture Fund	25M	35%	8.75M
S ₄	Gold	20M	35%	7M

$$S_4 = 26.25M$$

S_5 : Credit risk

Taking into account:

- increase of the credit spread of credit sensitive investments (in case of worse vision on economic growth)
- different rating classes (external qualification)
- 0.40 Correlation downward yield shock with yield risk (S_1)
- 0.50 Correlation downward yield shock with shares and real estate risk (S_2)

S₅: Credit risk

Rating class	Increase of credit spread	Market value bonds	Standard shock	Weighted shock
European Gov bonds AAA	nil	0%	0%	0%
AAA or equiv. rating	+ 60 bp	20%	40%	8%
AA or equiv.	+ 80 bp	15%	40%	6%
A or equiv.	+ 130 bp	25%	74%	18.5%
BBB or equiv.	+ 180 bp	30%	100%	30%
Till BB or equiv.	+ 530 bp	10%	300%	30%
Total		100%		92.5%

S_5 : Credit risk

Taking into account:

- Credit spread 1.3%
- All cash custodians AAA-rating, default risk nil

$$S_5 = 18.75M$$

S₆: Technical risk

3 sub risks:

1. Process Risk
2. TMD (trend in mortality development):
3. NSD (negative stochastic deviation):

S₆: Technical risk – Process Risk

- Value of negative effect on net reserve in case of decease or leaving service next year, with 97.5% certainty:
 - Number of participants in PF
 - Insurance of death risk

S₆: Technical risk – Process Risk

$$\sqrt{\sum_{i=1}^5 \left(\sum_{c=30}^{c=90} \left(\left(\frac{c_{1i,c}}{\sqrt{n_{i,c}}} + \frac{c_{2i,c}}{n_{i,c}} \right) * VPV_{i,c} \right)^2 \right)}$$

- i = pension type
- c = age of participants
- $c_{1i,c}$ = parameter 'table 1'
- $c_{2i,c}$ = parameter 'table 2'
- $n_{i,c}$ = number of participants
- $VPV_{i,c}$ = pension reserve

S₆: Technical risk - TMD

- TMD (trend in mortality development):
 - Uncertainty related to future longevity trend
 - For each pension type and based on (average) age

Note: pension reserves are calculated on a forecasted mortality table 2014 - 2184 (!)

S₆: Technical risk – TMD

Trend in mortality development

$$\sum_{i=1}^5 \left(\sum_{c=30}^{c=90} (c_{3i,c} * VPV_{i,c}) \right)$$

- i = pension type
- c = age of participants
- $c_{3i,c}$ = parameter 'table 3'
- $VPV_{i,c}$ = pension reserve

S_6 : Technical risk - NSD

- NSD (negative stochastic deviation):
 - Difference between actual average age at death and expected age at death

S₆: Technical risk – NSD

Negative stochastic deviation

$$\sqrt{\sum_{i=1}^5 \left(\sum_{c=30}^{c=90} \left(\frac{c_{4i,c}}{\sqrt{n_{i,c}}} * VPV_{i,c} \right)^2 \right)}$$

- i = pension type
- c = age of participants
- $c_{4i,c}$ = parameter 'table 4'
- $n_{i,c}$ = number of participants
- $VPV_{i,c}$ = pension reserve

S_6 : Technical risk

Taking into account:

$$S_6 = \text{Process Risk} + \sqrt{[\text{TMD}^2 + \text{NSD}^2]}$$

Quantity of S_6 :

- Process Risk = 6.6M
- TMD = 27.7M
- NSD = 11.8M

$$S_6 = 6.6 + \sqrt{[27.7^2 + 11.8^2]} = 36.7M$$

S_7 : Liquidity risk

Taken into account:

- Cash flow risk for pension payments
- For now 0% is allowed
- Pension payments exceeds premiums with 10M and 50% chance of a deficit

$$S_7 = 5M$$

S_8 : Concentration risk

Taken into account:

- Insufficient investment spread
- Max 15% of all assets in own company
- No specific rules how to calculate!
- 0% is still allowed

$$S_8 = 0$$

S₉: Operational risk

Human or technical failure in internal processes, or uncertain external events (power outages or flooding)

Taken into account:

- Mandatory SLA's with all service providers
- No specified rules how to calculate
- 0% still allowed

$$S_9 = 0$$

S_{10} : Active Asset Management risk

Related to freedom of asset manager to differ from the strategic asset mix incl. band width.

Taken into account:

- Z-score at 97.5% certainty = 2 (A)
- Tracking error i.c.o. active AM = 1.8% (B)
- Only for listed shares (375M) (C)

$$S_{10} = A \times B \times C = 13.5M$$

Risk categories to determine SCR-PF

No.	Risk category	Quantity
1	Yield risk	73M
2	Shares and Real Estate risk	118M
3	Currency risk	48.4M
4	Commodities risk	26.25M
5	Credit risk	18.75M
6	Insurance Technical risk	36.7M
7	Cash Flow risk	5M
8	Concentration risk	0
9	Operational risk	0
10	Active Asset Management risk	13.5M
		340M

Final calculation of SCR-PF

Using:

$$\sqrt{[S_1^2 + S_2^2 + (2 \times 0.40 \times S_1 \times S_2) + S_3^2 + S_4^2 + S_5^2 + (2 \times 0.40 \times S_1 \times S_5) + (2 \times 0.50 \times S_2 \times S_5) + S_6^2 + S_7^2 + S_8^2 + S_9^2 + S_{10}^2]}$$

SCR-PF = 186M = 18.6% of Pension Reserve

Conclusion 1

- Equity (own capital) = 100M
- Minimum capital Required MCR = 44M
- Solvency Capital Required SCR = 186M

Practical consequences:

- Additional premiums (employer + participants) ??
- No indexation

Conclusion 2

- The Dutch modern, comprehensive prudential framework is considered as the most strict in the EU.
→ some Dutch PFs move to Belgium! ☹️
- Required capital SCR = 186M
- Change in assets and liabilities 2015 = 195M (approx.)
- The strict rules were close to prudent in 2015!!



Questions



Comments

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