Revisiting Risk Margin Simplifications under Solvency II (2027)

A modified duration approach incorporating the lambda decay factor

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1. Context and summary

Under the Solvency II Delegated Regulation (EU) 2026/269 (hereafter "DR 2026/269"), the formula for calculating the risk margin has been revised in order to introduce an additional annual decrease of 4% (Article 34a DR 2026/269). In the remainder of this document, this decrease will be referred to as the "lambda method", in reference to the "λ" factor associated with this annual rate.

A consultation paper entitled "Revised Guidelines on Valuation of Technical Provisions" (EIOPA-BoS-25/382, hereafter "CP 25/382") was published on 09 October 2025. This document proposes adaptations to the simplified formulas for calculating the risk margin. Among these, method 3, which is based on a simplified calculation of the duration of the Best Estimate of technical provisions, has not been modified to reflect this new 4% decrease.

This position is explicitly confirmed by EIOPA, which indicates that no simple duration-based formula exists that can reproduce this exponential "lambda" decrease.

However, the present document shows that an alternative simplified formula, based on a modified duration, can in fact capture this effect while remaining equivalent to method 2 proposed by EIOPA. This approach allows entities currently using method 3 for the calculation of the risk margin to limit the operational impacts resulting from the introduction of the new regulatory framework.

In practice, the simplified SCR projection method based on duration is particularly used for Life and Health SLT portfolios, for which the explicit projection of SCR modules is less frequent than in some large Non-Life groups. The results presented in this document are therefore likely to be of particular interest to such undertakings, while remaining applicable in other contexts where the simplified method is used.

2. Developments under Delegated Regulation 2015/35

Before addressing the changes introduced by DR 2026/269, it is useful to revisit methods 2 and 3 proposed in the Guidelines on Valuation of Technical Provisions (EIOPA-BoS-14/166 and EIOPA-BoS-22/217, hereafter "CP 14/166").

According to Article 37 of Delegated Regulation (EU) 2015/35 (updated in August 2022 and hereafter "DR 2015/35"), the risk margin is defined as:

$$RM_0 = 6\% \times \sum_{t=0}^{\infty} \frac{SCR_t}{(1+r_{t+1})^{t+1}}$$

where SCR_t denotes the projected SCR at time t, as defined in Article 38(2) of DR 2015/35.

Method 2, defined in CP 14/166, proposes the following approximation:

$$SCR_t = SCR_0 \times {}^{BE_t}/_{BE_0}$$

where BE_t denotes the Best Estimate of technical provisions projected at time t, obtained from the initial Best Estimate BE_0 through the run-off of the liability cash flows.

Assuming that projected cash flows occur at year-end and are discounted accordingly, one obtains:

$$\sum_{t=0}^{\infty} \frac{BE_t}{BE_0} \times \frac{1}{(1+r_{t+1})^{t+1}} = \frac{\sum_{t=0}^{\infty} \sum_{i=t+1}^{\infty} CF_i \times \frac{1}{(1+r(t,i))^{i-t}} \times \frac{1}{(1+r_{t+1})^{t+1}}}{BE_0}$$

where $r(t,i)$ denotes the forward rate between t and i. Using the relation:

$$\frac{1}{(1+r(t,i))^{i-t}} \times \frac{1}{(1+r_{t+1})^{t+1}} = \frac{1}{(1+r_i)^i} \times \frac{1}{(1+r(t,t+1))^1},$$

we obtain:

$$\sum_{t=0}^{\infty} \frac{BE_t}{BE_0} \times \frac{1}{(1+r_{t+1})^{t+1}} = \frac{\sum_{t=0}^{\infty} \sum_{i=t+1}^{\infty} \frac{CF_i}{(1+r_i)^i} \times \frac{1}{(1+r(t,t+1))^1}}{BE_0}$$

which leads to:

$$\sum_{t=0}^{\infty} \frac{BE_t}{BE_0} \times \frac{1}{(1+r_{t+1})^{t+1}} = \frac{\sum_{i=1}^{\infty} \sum_{t=0}^{i-1} \frac{CF_i}{(1+r_i)^i} \times \frac{1}{(1+r(t,t+1))^1}}{BE_0}.$$

In practice, this expression can be approximated by:

$$\sum_{t=0}^{\infty} \frac{BE_t}{BE_0} \times \frac{1}{(1+r_{t+1})^{t+1}} = \frac{\sum_{i=1}^{\infty} \frac{CF_i}{(1+r_i)^i} \sum_{t=0}^{i-1} \frac{1}{(1+r(t,t+1))^1}}{BE_0} \cong \frac{\sum_{i=1}^{\infty} \frac{CF_i}{(1+r_i)^i} \times i}{\sum_{t=1}^{\infty} CF_t \times \frac{1}{(1+r_t)^t}} \times \frac{1}{1+r_{Du\ BE}}$$
$$= \frac{Dur_{BE}}{1+r_{Du\ BE}} = Dur_{BE}^M.$$

where Dur_{BE} denotes the (unmodified) duration of the Best Estimate of technical provisions, and Dur_{BE}^M denotes the corresponding modified duration.

Thus, method 2 of CP 14/166 implicitly leads to:

$$RM_0 = 6\% \times SCR_0 \times \sum_{t=0}^{\infty} \frac{BE_t/BE_0}{(1+r_{t+1})^{t+1}} \cong 6\% \times SCR_0 \times Dur_{BE}^M,$$

which corresponds exactly to the formula used in method 3 proposed by EIOPA. The two methods therefore appear indirectly equivalent.

Note 1. The formula of method 3 in CP 14/166 also includes an additional division by $1 + r_1$. This adjustment appears to result from an unintended bias, which was corrected by EIOPA in CP 25/382.

Note 2. The table below presents the error associated with the above approximation, calculated using the EUR yield curve as at 31-12-2025 and a set of uniform cash flows for different durations. The resulting error is negligible.

Duration	RD 2015/35
1	0,000%
5	0,084%
10	0,116%
20	-0,013%

3. Developments under Delegated Regulation 2026/269

We now generalise the previous results under the new framework introduced by DR 2026/269.

Under this framework, the risk margin formula becomes (article 37 DR 2026/269):

$$RM_0 = 4{,}75\% \times \sum_{t=0}^{\infty} \frac{SCR_t \times \lambda_t^t}{(1+r_{t+1})^{t+1}}.$$

where:

$$\lambda_t = \mathrm{MAX}\left[50\%^{1/t}; 0{,}96\right].$$

Method 2 of CP 25/382 is maintained in the form:

$$SCR_t = SCR_0 \times {}^{BE_t}/_{BE_0}.$$

However, method 3 remains unchanged compared with CP 14/166 and therefore does not explicitly reflect the exponential decrease introduced by the λ factor.

By proceeding in a similar way as in the previous section, one obtains:

$$\sum_{t=0}^{\infty} \frac{BE_t}{BE_0} \times \frac{\lambda_t^t}{(1+r_{t+1})^{t+1}} = \frac{\sum_{t=0}^{\infty} \sum_{i=t+1}^{\infty} \frac{CF_i}{(1+r_i)^i} \times \frac{\lambda_t^t}{(1+r(t,t+1))^1}}{BE_0}.$$

or equivalently:

$$\sum_{t=0}^{\infty} \frac{BE_t}{BE_0} \times \frac{\lambda_t^t}{(1+r_{t+1})^{t+1}} = \frac{\sum_{i=1}^{\infty} \sum_{t=0}^{i-1} \frac{CF_i}{(1+r_i)^i} \times \frac{\lambda_t^t}{(1+r(t,t+1))^1}}{BE_0}.$$

This term can be approximated by:

$$\sum_{t=0}^{\infty}\frac{BE_t}{BE_0}\times\frac{\lambda_t^t}{(1+r_{t+1})^{t+1}}=\frac{\sum_{i=1}^{\infty}\frac{CF_i}{(1+r_i)^i}\sum_{t=0}^{i-1}\frac{\lambda_t^t}{(1+r(t,t+1))^1}}{BE_0}$$

$$\cong\frac{\sum_{i=1}^{\infty}\frac{CF_i}{(1+r_i)^i}\times\sum_{t=0}^{i-1}\lambda_t^t}{\sum_{t=1}^{\infty}CF_t\times\frac{1}{(1+r_t)^t}}\times\frac{1}{1+r_{Du\ _{BE}^{f}}}=\frac{Dur_{BE}^{f}}{1+r_{Dur_{BE}^{f}}}=Dur_{BE}^{f;M}$$

where

$$Dur_{BE}^{f}=\frac{\sum_{t=1}^{\infty}\frac{CF_t}{(1+r_t)^t}\times f(t)}{\sum_{t=1}^{\infty}CF_t\times\frac{1}{(1+r_t)^t}}$$

denotes the duration modified by a function f, defined for $t\geq 1$ by :

$$f(t)=\begin{cases}0 \text{ si } t=0\,;\\ \frac{1-0{,}96^t}{1-0{,}96} \text{ si } 0< t<18\,;\\ \frac{1-0{,}96^{17}}{1-0{,}96}+(t-17)\times 50\% \text{ otherwise.}\end{cases}$$

The function $f(t)$ represents a non-linear deformation of time, reflecting the impact of the lambda decrease on future SCR projections.

Thus, method 2 of CP 25/382 implies:

$$RM_0=4{,}75\%\times\sum_{t=0}^{\infty}\frac{SCR_t\times\lambda_t^t}{(1+r_{t+1})^{t+1}}\cong 4{,}75\%\times SCR_0\times Dur_{BE}^{f;M}.$$

Note. The table below presents the error associated with the above approximation, calculated using the EUR yield curve as at 31-12-2025 and a set of uniform cash flows for different durations. The resulting error is negligible.

	Relative error (Method 3 vs Method 2)	
Duration	RD 2015/35	RD 2026/269
1	0,000%	0,000%
5	0,084%	0,143%
10	0,116%	0,159%
20	-0,013%	0,059%

4. Example

Consider the following uniform cash flow pattern and $SCR_0 = 2.000.000$ EUR.

Années	Cash flows	Risk-Free Rate	Discount factors
0	-	2,076%	100,000%
1	1.000.000	2,076%	97,966%
2	1.000.000	2,163%	95,810%
3	1.000.000	2,283%	93,452%
4	1.000.000	2,386%	90,999%
5	1.000.000	2,479%	88,476%
6	1.000.000	2,565%	85,902%
7	1.000.000	2,651%	83,264%
8	1.000.000	2,724%	80,654%
9	1.000.000	2,793%	78,042%
10	-	2,863%	75,406%

The duration of these cash flows, calculated as the product of the three columns of the previous table, is 5,26. Using the following values[1] of $f(t)$:

Years (t)	Values of f(t)
0	0,000
1	1,000
2	1,960
3	2,882
4	3,766
5	4,616
6	5,431
7	6,214
8	6,965
9	7,687
10	8,379

the modified duration becomes 4.69 (obtained as the product of the columns of cash flows, discount factors and $f(t)$).

Applying the formula:

$$RM_0 \cong 4{,}75\% \times SCR_0 \times \frac{Dur_{BE}^{f}}{1 + r_{Du\,{}_{BE}^{f}}} = 4{,}75\% \times 2.000.000 \times \frac{4{,}69}{1 + 2{,}479\%}$$

[1] For completeness, the full set of values of $f(t)$ is provided in the appendix.

we obtain 435.136 EUR. The result obtained using method 2 is 434.728 EUR, corresponding to a difference of 0,09%.

5. Conclusions

Method 3 of CP 14/166 can therefore be generalised in order to incorporate the decrease introduced by the λ factor through an approximation of the form:

$$RM_0 \cong 4{,}75\% \times SCR_0 \times Dur_{BE}^{f;M}.$$

This formulation is equivalent to method 2 proposed in CP 25/382 and allows the lambda decrease to be captured, unlike the version of method 3 proposed in that consultation paper.

This approach allows entities currently using method 3 of CP 14/166 to limit the adaptations required to their calculation tools and processes, while remaining consistent with the new regulatory framework introduced by DR 2026/269, applicable from January 2027.

This reformulation therefore preserves an intuitive interpretation of the risk margin of the form “SCR × duration”, while incorporating the new dynamics introduced by the lambda factor.

6. Appendix

The following table provides the complete set of values for $f(t)$.

Years (t)	Values of f(t)	Years (t)	Values of f(t)	Years (t)	Values of f(t)
0	0,000	30	19,010	60	34,010
1	1,000	31	19,510	61	34,510
2	1,960	32	20,010	62	35,010
3	2,882	33	20,510	63	35,510
4	3,766	34	21,010	64	36,010
5	4,616	35	21,510	65	36,510
6	5,431	36	22,010	66	37,010
7	6,214	37	22,510	67	37,510
8	6,965	38	23,010	68	38,010
9	7,687	39	23,510	69	38,510
10	8,379	40	24,010	70	39,010
11	9,044	41	24,510	71	39,510
12	9,682	42	25,010	72	40,010
13	10,295	43	25,510	73	40,510
14	10,883	44	26,010	74	41,010
15	11,448	45	26,510	75	41,510
16	11,990	46	27,010	76	42,010
17	12,510	47	27,510	77	42,510
18	13,010	48	28,010	78	43,010
19	13,510	49	28,510	79	43,510
20	14,010	50	29,010	80	44,010
21	14,510	51	29,510	81	44,510
22	15,010	52	30,010	82	45,010
23	15,510	53	30,510	83	45,510
24	16,010	54	31,010	84	46,010
25	16,510	55	31,510	85	46,510
26	17,010	56	32,010	86	47,010
27	17,510	57	32,510	87	47,510
28	18,010	58	33,010	88	48,010
29	18,510	59	33,510	89	48,510