Risk margin – developing a rounded proposal

I. Background

EIOPA have proposed the following variation of the CROF proposal above in the March 2020 holistic impact assessment:

$$RM = CoC \cdot \sum_{t\geq 0} \frac{SCR(t)\cdot max\left(\lambda^t, 0.5\right)}{\left(1+r(t+1)\right)^{t+1}}, \text{ where } \lambda = 0.975.$$

While this is a positive development, EIOPA have not proposed any changes to the 6% CoC rate or to allow for group diversification. In addition, the value of 0.975 for lambda is too high, and no justification for the imposition of an arbitrary floor of 0.5 has been provided.

The purpose of this note is to set out different combinations of existing CRO forum proposals on the risk margin, based on plausible ranges of cost-of-capital rates, EIOPA's lambda parameter, and EIOPA's floor parameter, and to propose a single unified approach. This includes an analysis of cost of capital rates and lambda values (with no arbitrary floor) and the corresponding: (i) the overall level of the risk margin across industry; (ii) the maximum possible value of the risk margin as a percentage of SCR; and (ii) the volatility of the risk margin with respect to interest rates as a percentage of SCR.

Our paper continues as follows. In Section II, we discuss implications of different cost-of-capital rates and lambda values for the maximum possible value and maximum possible volatility of the risk margin with respect to different product lines. In Section III, we present analysis supporting a lower calibration for the cost-of-capital rate. In Section IV, we present arguments for allowing diversification at group level and between product lines. In Section V, we consider the calibration of the lambda parameter and discuss the floor.

Finally, we conclude in Section VI with an amalgamated proposal for discussion. Taken together with allowance for diversification at group level and across business lines, assuming EIOPA would want to set a prudent floor for the forward cost-of-capital rate of 1%, this combination would result in a reduction in the risk margin level of 58%-78% depending on product duration, with a corresponding reduction in volatility, and remains consistent with previous CROF feedback to EIOPA.

Impact of amalgamated proposal – CoC rate 3%, lambda 0.85 and 1% floor with diversification (15% estimate)

	One-year product	Medium-term product	Long-term product
Impact on level	-58%	-72%	-78%
Impact on interest rate sensitivity	-58%	-80%	-84%

II. Implications of different cost-of-capital rates and lambda values

The excessive size and volatility of the risk margin represents a pan-European issue, of importance to (re)insurance undertakings across EEA jurisdictions. For the entire industry, according to EIOPA figures, the total risk margin was €179bn in Q1 2019. Given this, the key aim of this workstream is to develop, as input into the Solvency II 2020 review consultation process, an all-round technically robust solution which addresses both the excessive level and the excessive volatility of the risk margin – and, by extension, the high degree of procyclicality inherent in the current design, the wrong management incentives that can stem from this, and the resulting macroprudential negative impacts for financial stability.

Under this context, tables 1, 2 and 3 below provide, for different levels of the cost-of-capital rate and different calibrations of EIOPA's lambda parameter (assuming no arbitrary floor): (i) reductions in the level of the risk margin held across industry; (ii) the maximum possible value of the risk margin (as a percentage of SCR); and (iii) the maximum sensitivity of the risk margin to a 1% fall in interest rates (as a percentage of SCR). Under table 1 we also provide an indication of the impact of allowing for group diversification.

We can see from the tables below that, while reductions in the cost of capital and the lambda parameter are both effective in reducing the level of the risk margin, the lambda parameter is more effective at reducing volatility of the risk margin with respect to interest rates. Corresponding tables for 10-year, 20-year and 30-year products with a constant SCR are also provided in Appendix 2.

Level of the risk margin held across industry

The table below provides an estimate of the resulting level of the risk margin held across industry at Q1 2019 – with the figures in brackets representing the change in percentage terms in the level of the risk margin under each combination. The calculations are high-level estimates and assume an average product (and risk margin) duration of 7 years. In practice, the impacts will depend on the characteristics of the liabilities, and in particular the duration of these. We therefore provide similar tables for shorter and longer products in Appendix 3.

Table 1. Total risk margin held across industry (€bn estimated, Q1 2019)

CoC / lambda	0.975	0.95	0.9	0.85	0.8
6%	152 (-15%)	132 (-26%)	104 (-42%)	85 (-52%)	72 (-60%)
5%	127 (-29%)	110 (-39%)	86 (-52%)	71 (-60%)	60 (-66%)
4%	102 (-43%)	88 (-51%)	69 (-61%)	57 (-68%)	48 (-73%)
3%	76 (-57%)	66 (-63%)	52 (-71%)	43 (-76%)	36 (-80%)
2%	51 (-72%)	44 (-75%)	35 (-81%)	28 (-84%)	24 (-87%)

In addition to the above, a recent data collection exercise by the CROF found that allowing for diversification at group level and between business lines led to an average reduction of 16% (in relative terms i.e. not additive) in the risk margin, although the total across industry might be expected to be lower given that the CROF tends to consist of larger insurance groups where diversification would be more material.

Maximum possible value for the risk margin

With the introduction of the lambda parameter, assuming no arbitrary floor to this, the maximum possible value of the risk margin relative to SCR is given as (see Appendix 1 for derivation of this):

$$\frac{CoC}{1-\lambda}$$

Under the current approach (i.e. with lambda effectively equal to one), there is no theoretical maximum, so the risk margin can, in theory, become infinite. The table below provides the theoretical maximum risk margin as a percentage of SCR for different combinations of lambda and the cost of capital rate.

Table 2. Maximum possible value of the risk margin (as a percentage of SCR)

CoC / lambda	0.975	0.95	0.9	0.85	0.8
6%	240%	120%	60%	40%	30%
5%	200%	100%	50%	33%	25%
4%	160%	80%	40%	27%	20%
3%	120%	60%	30%	20%	15%
2%	80%	40%	20%	13%	10%

Maximum possible sensitivity of the risk margin to 1% fall in interest rates

We can also evaluate the sensitivity of the risk margin with respect to interest rates by considering the maximum change in the value of the risk margin, as a percentage of SCR, given a fall in interest rates from 1% to 0% (assuming that SCR does not change with interest rates).

Table 3. Maximum sensitivity of risk margin to 1% fall in interest rates (as a percentage of SCR)

CoC / lambda	0.975	0.95	0.9	0.85	0.8
6%	69%	20%	5%	3%	1%
5%	57%	17%	5%	2%	1%
4%	46%	13%	4%	2%	1%
3%	34%	10%	3%	1%	1%
2%	23%	7%	2%	1%	0%

In addition to the above table, the tables below provide estimates for the change in the total risk margin held at YE17, YE18, and YE19, using the yield curves at each point in time and assuming all else equal. We can see that a lower CoC rate and a lower lambda parameter are both effective in reducing volatility, although the lambda parameter is more effective.

Table 4. Change in total industry risk margin, YE17 to YE18 (€bn estimated)

CoC / lambda	1.0	0.975	0.95	0.9	0.85	0.8
6%	**+1.2**	+0.9	+0.7	+0.4	+0.3	+0.2
5%	+1.0	+0.7	+0.6	+0.4	+0.2	+0.2
4%	+0.8	+0.6	+0.4	+0.3	+0.2	+0.1
3%	+0.6	+0.4	+0.3	+0.2	+0.1	+0.1
2%	+0.4	+0.3	+0.2	+0.1	+0.1	+0.1

Table 5. Change in total industry risk margin, YE18 to YE19 (€bn estimated)

CoC / lambda	1.0	0.975	0.95	0.9	0.85	0.8
6%	**+8.4**	+6.0	+4.4	+2.5	+1.5	+1.0
5%	+7.0	+5.0	+3.7	+2.1	+1.3	+0.8
4%	+5.6	+4.0	+2.9	+1.7	+1.0	+0.7
3%	+4.2	+3.0	+2.2	+1.3	+0.8	+0.5
2%	+2.8	+2.0	+1.5	+0.8	+0.5	+0.3

Proposed way forward

We would propose that we continue to put forward arguments for a more appropriate calibration of EIOPA's cost of capital rate (see Appendix 4), recognition of diversification at group level (Appendix 5), and a more appropriate lambda parameter and the removal of the arbitrary floor (Appendix 6) as part of a single combined proposal. In the section below, we propose plausible ranges for each of these parameters, based predominantly on previous work by the CROF, which we then amalgamate into a single proposal.

III. Proposal for an updated cost-of-capital-rate

The CRO Forum acknowledges the efforts of EIOPA in reviewing the calibration of the CoC rate during the 2018 Solvency II Standard Formula Review. However, the CRO Forum considers that the information and sources used to derive the CoC of 6% which are presented in the report tend to include an upward bias. Furthermore, EIOPA have made very conservative choices for parameters and estimates to derive the CoC rate from these sources.

The general approach adopted by EIOPA corresponds to estimating the cost of capital under a CAPM approach, which estimates the cost of capital as a function of the expected return on the market portfolio and 'beta' value:

CoC rate = β.[Equity risk premium]

EIOPA have followed this approach and, having derived an estimate of a beta value of 1 and an equity risk premium of 6%, they have arrived at the Solvency II cost-of-capital rate of 6%.

While EIOPA have made some necessary adjustments to estimate the beta value, not all necessary adjustments have been made while those that have been made have been excessively prudent. In fact, we believe that several further adjustments are necessary to ensure that the Solvency II cost-of-capital rate is appropriately justified. Analysis from the CRO-CFO Forum clearly illustrates that a value of 3% for the Solvency II CoC rate is appropriate, yet remains significantly prudent. Based on this, the CROF considers an appropriate range for the starting CoC parameter to be 2% - 3%. In addition, as we discuss below there are a number of areas where EIOPA's derivation of the cost-of-capital rate is flawed, not least the inconsistency of applying a levered beta to a reference undertaking with no debt. Correcting for this on its own would reduce the cost-of-capital rate to 4%, and therefore, in conjunction with an appropriate value of EIOPA's lambda parameter, we consider implications of a cost-of-capital range of **2%-4%** in this paper.

We outline below areas that correspond to important flaws or omissions in EIOPA's approach to derive the Solvency II cost-of-capital rate.

Consideration of debt / use of unlevered beta

The cost-of-capital should take into account the share of debt held by insurers. The current derivation is flawed as it does not do this, and so derives an upwardly-biased cost of *equity* rather than a cost of capital (i.e. weighted average cost of capital, or "WACC").

Given this, the cost of capital calculation should therefore take into account the financing structure of insurance capital. The WACC can either be calculated explicitly, or through the use of an unlevered beta, which corresponds to the estimated beta of companies if they were to hold no debt, and therefore corresponds to an estimate of the WACC.

Estimating the WACC directly could potentially be onerous. Instead, the use of an unlevered beta would be a more practical way to estimate the WACC as estimates of this are already available from external sources. For example, a comprehensive NYU Stern study finds an unlevered beta for insurance companies of 0.65. This would reduce the cost-of-capital rate to c. **4%** on its own.

Use of a forward-looking premium

EIOPA in their second set of advice to the European Commission on specific items in the Solvency II Delegated Regulation (EIOPA-BoS-18/075) proposes to use only historic return models to ensure methodological consistency, stronger stability and lower dependence on assumptions.

However, there is considerable scientific evidence that the backward-looking equity risk premium ("ERP") is an upward biased estimate of the true theoretical ERP, which is forward-looking by virtue of the CAPM definition. For example, Ibbotson and Chen (2003) show that after accounting for unexpected capital gains, the ERP for the USA is reduced significantly, by 2% (i.e. 200bps). In a similar vein Fama and French (2002) show that the backward-looking ERP over 1951 and 2002 was also 2% higher than the forward-looking one. The ERP based on historical return models requires certainly fewer assumptions to be calculated. However, if using an historical return ERP, it is essential to address its upward bias, by making a -2 % correction.

Adjustment for pure insurance risks

A key source of return for going concern undertakings relates to expected profit from new business. However, the reference undertaking is closed to new business and therefore any estimate of the cost-of-capital rate should be adjusted downwards in order to remove the impact on this of the compensation for franchise risk that investors require to invest in ongoing insurance entities and will not require this compensation for the transferred run-off portfolio.

Furthermore, the reference undertaking is assumed to hold no risky assets whereas ongoing insurance entities, on which the cost of capital is based, do hold a significant amount of market-risky assets (e.g. equities, bonds). Therefore, the cost-of-capital rate should be adjusted downwards to account for this because by its definition, the "total return" CAPM cost of capital reflects already all the risks and costs assumed by investors.

The general CAPM framework is not designed to reflect only the cost of running off pure insurance risks as is the case with the risk margin. Our analysis indicates a downward adjustment of 30% is necessary to account for these two effects. The 30% adjustment is likely to be conservative when considered in the context of the risk profiles of life insurers in particular who carry large amounts of asset risk. This level of adjustment is consistent with the downward adjustment assumed by CEIOPS in its 2009 final advice on the risk margin.

Other considerations

Use of arithmetic vs geometric mean

The ERP results presented in the scientific articles and analytical reports use an arithmetic and a geometric mean. The use of an arithmetic or a geometric mean can produce materially different results. Therefore the use of a geometric mean in deriving the cost-of-capital rate should also be considered.

Use of a market risk premium

The CAPM approach used to estimate the cost of capital should take into account a diversified market portfolio i.e. a globally diversified portfolio including asset classes other than equites – which would lower the market risk premium. The impact of this on the beta values should also be considered.

Summary

The current 6% level of the Solvency II cost of capital rate is excessive because:

- It was calibrated based on backward-looking equity risk premiums, rather than forward looking market risk premium, which introduces a strong upward bias;
- It was calibrated based on a 100% equity funding assumption but with the use of a levered beta (which is completely inconsistent)

- It was calibrated without fully adjusting the beta for the run-off of pure insurance and asset risk.

This leads to a level of the Risk Margin which is too high and volatile and does not seem reasonable within the Solvency II framework.

If EIOPA persist with an assumption of pure equity funding then the Solvency II CoC rate from the standard CAPM methodology should be derived in the following way:

CoC rate = (1-x)β.[Market risk premium]

Where:

- **Market risk premium** represents the expected return above the risk-free rate that investors would require in order to hold a global diversified portfolio containing all market assets, including equities and bonds, on a forward looking basis.
- **β** is the unlevered beta of the insurance sector. Using an unlevered beta is consistent with CEIOPS' assumption that firms are 100% funded by equity, which will tend to add a layer of prudence in the calibration of the CoC rate. Not using an unlevered beta in this context would result in an inappropriately high cost-of-capital.
- **x** is the adjustment required to derive a beta for pure insurance risks – i.e. excluding the impact of franchise risk and assets held by insurers (which are more correlated to the rest of the market).

Our analysis supports the following ranges of values for the parameters outlined above:

x = 30%: this is derived from conservative estimates of the impact of franchise risk, and the impact due to assets held by insurers. This level of adjustment is consistent with the downward adjustment assumed by CEIOPS in its 2009 final advice on the risk margin.

β = 0.65 - 0.8: This represents a prudent range for the unlevered beta for insurers based on a realistic estimate of 0.65 from a comprehensive NYU Stern study. (Alternatively, if not considering the unlevered beta, the Weighted Average Cost of Capital approach would also lead to lower the Cost of capital derived from the CAPM).

Market risk premium = 4-5%: A backward-looking assessment of the risk premium for a diversified world equity portfolio would support a value of around 5%-7%. However, this does not take into account that a global diversified portfolio contains assets other than equities, in particular bonds which have lower risk premiums and does not account for the fact that backward-looking risk premiums contain a strong survivorship bias. Studies support at least a 2% downward adjustment to take account of these effects. This is consistent with average estimates of forward-looking Equity Risk premiums by Thomson Reuters (4.5% worldwide).

Taken together, these assumptions produce a Solvency II CoC rate of around 2%-3%. Used in conjunction with an appropriate lambda parameter, we believe an appropriate range would be **2%-4%**.

IV. Allowance for diversification

According to recital 55 of the Solvency II Directive, the value of technical provisions should correspond to the amount an (re)insurer would have to pay if it transferred its contractual rights and obligations immediately to another (re)insurer.

The Level I text Article 77 in its current form, states in paragraph 5 that: "[…] the risk margin shall be calculated by determining the cost of providing an amount of eligible own funds equal to the Solvency Capital Requirement (SCR) necessary to support the insurance and reinsurance obligations over the lifetime thereof." This paragraph is geared towards the risk margin of an insurance undertaking, and so it appears counterintuitive that Solvency II regulation via the Delegated Acts does not apply this Directive principle consistently with respect to:

- legal entities pursuing both life and non-life insurance activities – when calculating the risk margin by composite firms, an assumption is made that the life and non-life (re)insurance obligations are taken over by two separate reference undertakings (art. 38.1(b) of Level II act). This implies that no diversification benefit can be assumed between life and non-life insurance portfolios.
- group diversification – the risk margin at group level is calculated as the sum of the risk margins of the undertakings of the group. This implies that no diversification benefit can be assumed between different entities of a group, which penalises large insurance and reinsurance groups in particular.

In both cases regulation in a straightforward way allows for diversification between lines of business and, in the case of groups, group-wide diversification when calculating the SCR, but then artificially restricts its allowance for the determination of the risk margin (in Level II Articles 38.1(b) and 340).

The main purpose of the risk margin is to ensure that the value of the technical provisions is equivalent to the amount that (re)insurers would be expected to require in order to take over and meet the (re)insurance obligations. Consistent with previous CRO Forum work in 2008 on properly taking into account diversification effects[1], such a restriction is not borne out by actual experience, leading to an unnecessarily conservative assumption in the risk margin calculation for groups.

For example, as part of general market practice we commonly see there are instances groups, including all subsidiaries, to have been subject to a takeover: Resolution (purchased by Pearl Group), Friends Life Group (purchased by Aviva), Delta Lloyd (merged with NN) and AIA (aborted purchase by Prudential plc). Therefore, an assumption that the portfolio of each entity in the group is transferred to different (re)insurer is not borne out by actual experience and leads to an unnecessarily conservative assumption in the risk margin calculation for groups.

With diversification being the fundamental principle of insurance itself, its adequate allowance in the Solvency II balance sheets appears to be a key issue, hence the CRO Forum regards appropriate adjustments necessary in the Level II Articles 38.1(b) and 340 to achieve necessary consistency between the SCR and the risk margin calculations and to align the level II with the level I Directive. Specifically, this arbitrary separation of obligations should therefore be removed, and the risk margin methodology should be amended to allow for diversification between lines of business within a composite firm and legal entities within a group by, for example, deleting Art. 38.1(b) of the Level II act and by replacing Art. 336 of the Level II act with: Method 1: Risk Margin

Commented [Ecofin1]: To be further discussed. This would lobby for a changed definition of the "reference undertaking" and hence possibly create complications in calculation.

[1] https://www.thecroforum.org/wp-content/uploads/2012/10/croforummvlpaperjuly2008-2.pdf

The consolidated risk margin of technical provisions on the basis of the consolidated data shall be calculated as the sum of the following:

(a) a risk margin calculated on the basis of consolidated data referred to in Article 335(1)(a), (b) and (c) of this Regulation following the rules laid down in Title I, Chapter VI, Section 4 of Directive 2009/138/EC;

(b) the proportional share of the risk margin of each undertaking referred to in Article 335(1)(d) of this Regulation; for a related third-country insurance or reinsurance undertaking which is not a subsidiary the risk margin shall be calculated as if that undertaking had its head office in the Union.

V. Calibration of EIOPA's lambda parameter

It is important to consider all angles when calibrating the lambda parameter, including procyclicality given that it effectively reduces the sensitivity of the risk margin to interest rates as well as reducing the overall level of the risk margin.

We have argued in previous papers and consultation responses for the introduction of the lambda parameter on the basis that the risk margin should be lower for risks with dependence over time in order to be representative of a transfer price and in line with the Level 1 text – as they are less risky than independent risks. This is because investors would require a higher premium to commit to funding a riskier liability.

Risk dependence can occur because some risks are non-repeatable, or due to reductions in exposure in stress. For example, a cure for cancer can increase life expectancy of annuity policyholders, but this is a non-repeatable event. Conversely, lapses reduce exposure e.g. if 40% of policyholders lapse then the next lapse stress applies only to 60% of policyholders at outset.

Another way to consider the lambda parameter is that it introduces a time-dependent cost-of-capital rate. The current risk margin calculation may be written as:

$$RM = CoC \cdot \sum_{t \geq 0} \frac{SCR(t)}{\left(1 + r(t+1)\right)^{t+1}} = \sum_{t \geq 0} \frac{CoC(t) \cdot SCR(t)}{\left(1 + r(t+1)\right)^{t+1}}$$

where CoC(t) is a generic forward cost-of-capital rate at time t. In this context, the lambda parameter can be viewed as introducing a time-dependent forward cost-of-capital rate, equal to $CoC(t) = \lambda^t \cdot CoC(0)$.

As explained above, leaving aside considerations on dependence of risk over time, the CRO Forum considers that an appropriate effective average cost of capital should range between 2 to 3%. The lambda parameter allows to reduce the effective average CoC while providing more benefit to longer business in comparison to shorter business – an objective explicitly assigned by EIOPA to the revision of the risk margin. Sensitivity analysis shows that if the CoC were to stay at its current 6% level, the lambda parameter should be at least 0.85 to ensure that the risk margin is decreased by an amount equivalent to a reduction of the CoC to 3% for an insurer with a portfolio duration of 8 years. On the other hand, EIOPA proposed calibration of the lambda to 0.975 would require a reduction of the CoC below 4% to ensure that the risk margin is decreased by an amount equivalent to a reduction of the CoC to 3% for an insurer with a portfolio duration of 8 years.

Another way to consider EIOPA's lambda parameter through the use of expert judgement, is to consider a bottom up "frictional cost" approach to viewing the market value adjustment underlying the risk margin calculation and the amount of time that we would expect for most of the asymmetric information and potentially other frictional costs between investors and insurance companies about the risk being transferred to dissipate. For example, by way of illustration, assuming that less than 5% of the information asymmetry would remain at around 15 years would imply a starting lambda parameter of 0.8. On the other hand, a lambda of 0.85 implies a time frame of 20 years, while a lambda of 0.9 implies a time frame of 30 years[2]. Intuitively, these appear to be reasonable time frames and could suggest a plausible range for lambda of **0.8 – 0.9**.

[2] In contrast, under a lambda of 0.975 as proposed by EIOPA, the 5% threshold would only be met after 118 years, which is very difficult to justify.

Arguments around asymmetric information apply to all risks equally, but arguments around risk dependence over time apply to some risks more than others. For example, with lapse risks, the impact of successive 1-in-200 mass lapse shocks of 40% is significantly smaller than the sum of 40% mass lapse shocks on independent policy books. Further consideration of risk dependence over time could therefore be used to introduce lower values of lambda for risks with risk dependence over time e.g. for lapse risk a lambda of 0.6 could apply. That said, we are conscious of EIOPA's concerns around complexity of potential solutions and have therefore stopped short of proposing different parameters for lambda (e.g. by product type or a broad life/GI split) – but this could be considered further.

Finally, the imposition of an arbitrary floor in EIOPA's proposal means that the forward cost of capital rate would remain positive, which is not aligned with the notion of diversifiable risks in an efficient market – and hence a strong argument can be made that it should be removed. However, should EIOPA wish to pursue a prudent approach in this area, the floor can also be viewed as imposing a floor on the forward cost-of-capital rate of between 0% and 1%. This could be achieved by setting the floor to a value which implies a given forward cost-of-capital rate (e.g. with a starting CoC of 3%, a floor of 0.33 corresponds to a floor for the forward cost-of-capital rate of 1%.

VI. Proposal

Analysis presented above suggests that, in addition to allowing for diversification at group level and across lines of business, the following values would represent reasonable ranges for the parameters in EIOPA'S updated calculation for the risk margin, as presented in the holistic impact assessment:

	Minimum	Maximum
Cost-of-capital rate	2%	4%
Lambda	0.8	0.9
Floor parameter	0%	1%[3]

Each of these parameters will have differing impact across lines of business. For example, changes to the cost-of-capital rate will have the same proportional impact for both short-term and long-term products, while changes to the lambda parameter and the corresponding floor will have a greater proportional impact on the size of the risk margin for longer-term products than for shorter-term products. In addition, the impact of any changes to the floor will depend on the lambda parameter – the lower the lambda parameter, the more material the floor will become as this starts to bite at earlier years. Given this, our analysis below presents impacts on the size and volatility of the risk margin for stylised short-term (one-year products), medium-term (duration five years) and long-term products (duration 10 years). We consider the impacts of each proposal on: (i) the level of the risk margin; and (ii) the sensitivity to a 25bp reduction in risk-free rates.

Estimated impacts: current EIOPA proposals (holistic impact assessment)

First, we consider the impacts of the current EIOPA proposals. We can see that these achieve only a minimal reduction in the risk margin level and volatility:

Impact of EIOPA proposals

	One-year product	Medium-term product	Long-term product

[3] For a starting CoC of 4%, a floor of 0.25 would be required to achieve a floor for the forward cost-of-capital rate of 1%.

Impact on level	0	-9%	-18%
Impact on interest rate sensitivity	0	-17%	-31%

Estimated impacts: cost-of-capital ranges

Impact of 2%/3%/4% cost-of-capital rate

	One-year product	Medium-term product	Long-term product
Impact on level	-66%/-50%/-33%	-66%/-50%/-33%	-66%/-50%/-33%
Impact on interest rate sensitivity	-66%/-50%/-33%	-66%/-50%/-33%	-66%/-50%/-33%

Estimated impacts: lambda and corresponding floor

Impact of 0.8/0.85/0.9 lambda – with no floor

	One-year product	Medium-term product	Long-term product
Impact on level	0%/0%/0%	-45%/-38%/-29%	-66%/-59%/-49%
Impact on interest rate sensitivity	0%/0%/0%	-69%/-61%/-49%	-87%/-82%/-72%

The table below provides corresponding impacts with a floor of 1%

Impact of 0.8/0.85/0.9 lambda – with floor

	One-year product	Medium-term product	Long-term product
Impact on level	0%/0%/0%	-44%/-37%/-29%	-61%/-56%/-47%
Impact on interest rate sensitivity	0%/0%/0%	-65%/-59%/-48%	-87%/-82%/-72%

In the 2018 Solvency II review consultation the CROF argued for a CoC rate of 2%-3%, which would achieve a reduction in the risk margin of 50%-67% across the board. In addition, industry has consistently highlighted the need to allow for diversification at group level and across business lines. Assuming an average diversification of 15%, this implies an overall reduction of 58% - 72%, as well as a need for a tapering approach to address the issues impacting long-term business in particular.

Given this, we propose to remain consistent with that approach and would therefore propose the combinations for the cost-of-capital rate and the lambda parameter which would reduce the risk margin by a similar amount overall. For example, a CoC rate of 3% with a tapering parameter of 0.85 and including diversification. In addition, we believe a strong case could be made for the floor to be removed, given that insurance risk is largely diversifiable against the market as a whole. However, should EIOPA wish to pursue a prudent approach in this area, the floor corresponding to a floor on the forward cost-of-capital rate of between 0% and 1% could be applied.

Taken together with allowance for diversification at group level and across business lines, assuming EIOPA would want to set a prudent forward cost-of-capital rate of 1%, this combination would result

in a reduction in the risk margin level of 58%-78% depending on product duration, with a corresponding reduction in volatility, and remains consistent with previous CROF feedback to EIOPA.

Impact of joint proposal – CoC rate 3%, lambda 0.85 and 1% floor with diversification (15% estimate)

	One-year product	Medium-term product	Long-term product
Impact on level	-58%	-72%	-78%
Impact on interest rate sensitivity	-58%	-80%	-84%

For clarity, and transparency, we also provide the impacts of the proposal on the risk margin level with one element dropped and compare these to the EIOPA proposal from the holistic impact assessment.

Impact of joint proposal on risk margin level with one element dropped

	One-year product	Medium-term product	Long-term product
Proposal	-58%	-72%	-78%
No diversification	-50%	-67%	-74%
No changes to CoC rate (CoC 6%)	-15%	-45%	-56%
No changes to lambda (lambda 0.975)	-58%	-61%	-65%
No changes to floor (floor 0.5)	-58%	-70%	-74%
EIOPA approach	0%	-9%	-18%

The table below provides a full summary of potential combinations (for one-year/medium/long-term products), with colour coding denoting achievability (in terms of likelihood of achieving this outcome or better: green, yellow, orange, red).

	Lambda =>	0.975	0.95	0.9	0.85	0.8
No changes to EIOPA floor						
6%	Without diversification	0%/-9%/-18%	0%/-16% /-28%	0%/-25%/-36%	0%/-30%/-39%	0%/-33%/-41%
	With diversification	-15%/-23%/-30%	-15%/-29%/-38%	-15%/-37%/-45%	-15%/-41%/-49%	-15%/-43%/-50%
5%	Without diversification	-17%/-24%/-32%	-17%/-30%/-40%	-17%/-38%/-47%	-17%/-42%/-50%	-17%/-45%/-51%
	With diversification	-29%/-36%/-42%	-29%/-41%/-49%	-29%/-47%/-55%	-29%/-51%/-57%	-29%/-53%/-58%
4%	Without diversification	-33%/-39%/-45%	-33%/-44%/-52%	-33%/-50%/-57%	-33%/-54%/-60%	-33%/-56%/-61%
	With diversification	-43%/-49%/-54%	-43%/-53%/-59%	-43%/-58%/-64%	-43%/-61%/-66%	-43%/-62%/-67%
3%	Without diversification	-50%/-55%/-59%	-50%/-58%/-64%	-50%/-63%/-68%	-50%/-65%/-70%	-50%/-67%/-71%
	With diversification	-58%/-61%/-65%	-58%/-64%/-69%	-58%/-68%/-73%	-58%/-70%/-74%	-58%/-72%/-75%
2%	Without diversification	-67%/-70%/-73%	-67%/-72%/-76%	-67%/-75%/-79%	-67%/-77%/-80%	-67%/-78%/-80%
	With diversification	-72%/-74%/-77%	-72%/-76%/-79%	-72%/-79%/-82%	-72%/-80%/-83%	-72%/-81%/-83%
Floor of 1%						
6%	Without diversification	0%/-9%/-18%	0%/-17%/-31%	0%/-29%/-47%	0%/-37%/-55%	0%/-43%/-60%
	With diversification	-15%/-23%/-31%	-15%/-29%/-42%	-15%/-39%/-55%	-15%/-47%/-62%	-15%/-52%/-66%
5%	Without diversification	-17%/-24%/-32%	-17%/-31%/-43%	-17%/-40%/-55%	-17%/-47%/-62%	-17%/-52%/-66%
	With diversification	-29%/-36%/-42%	-29%/-41%/-51%	-29%/-49%/-62%	-29%/-55%/-67%	-29%/-60%/-71%
4%	Without diversification	-33%/-39%/-46%	-33%/-44%/-54%	-33%/-52%/-63%	-33%/-58%/-68%	-33%/-61%/-71%
	With diversification	-43%/-49%/-54%	-43%/-53%/-61%	-43%/-59%/-69%	-43%/-64%/-73%	-43%/-67%/-75%
3%	Without diversification	-50%/-55%/-59%	-50%/-58%/-65%	-50%/-64%/-71%	-50%/-67%/-74%	-50%/-70%/-76%
	With diversification	-58%/-61%/-65%	-58%/-65%/-70%	-58%/-69%/-76%	-58%/-72%/-78%	-58%/-74%/-80%
2%	Without diversification	-67%/-70%/-73%	-67%/-72%/-76%	-67%/-75%/-79%	-67%/-77%/-80%	-67%/-78%/-80%
	With diversification	-72%/-74%/-77%	-72%/-76%/-79%	-72%/-79%/-82%	-72%/-80%/-83%	-72%/-81%/-83%
No floor						
6%	Without diversification	0%/-9%/-18%	0%/-17%/-31%	0%/-29%/-48%	0%/-37%/-55%	0%/-43%/-60%
	With diversification	-15%/-23%/-31%	-15%/-29%/-42%	-15%/-39%/-56%	-15%/-47%/-62%	-15%/-52%/-66%
5%	Without diversification	-17%/-24%/-32%	-17%/-31%/-43%	-17%/-40%/-57%	-17%/-47%/-62%	-17%/-52%/-66%
	With diversification	-29%/-36%/-42%	-29%/-41%/-51%	-29%/-50%/-63%	-29%/-55%/-67%	-29%/-60%/-71%
4%	Without diversification	-33%/-39%/-46%	-33%/-44%/-54%	-33%/-52%/-65%	-33%/-58%/-68%	-33%/-61%/-71%
	With diversification	-43%/-49%/-54%	-43%/-53%/-61%	-43%/-60%/-70%	-43%/-64%/-73%	-43%/-67%/-75%
3%	Without diversification	-50%/-55%/-59%	-50%/-58%/-66%	-50%/-64%/-74%	-50%/-67%/-74%	-50%/-70%/-76%
	With diversification	-58%/-61%/-65%	-58%/-65%/-71%	-58%/-70%/-78%	-58%/-72%/-78%	-58%/-74%/-80%
2%	Without diversification	-67%/-70%/-73%	-67%/-72%/-77%	-67%/-76%/-83%	-67%/-77%/-80%	-67%/-78%/-80%
	With diversification	-72%/-74%/-77%	-72%/-76%/-81%	-72%/-80%/-85%	-72%/-80%/-83%	-72%/-81%/-83%

	Very Likely
	Likely
	Possible
	Unlikely

Appendix 1: Derivation of maximum possible risk margin

With no floor, the use of a tapering parameter results in the following formula for the risk margin:

$$RM = CoC \cdot \sum_{t \geq 0} \frac{SCR(t) \cdot \lambda^t}{\left(1 + r(t+1)\right)^{t+1}}$$

If we assume a non-increasing SCR over time, the maximum possible value of the risk margin for a product with term to maturity of T occurs when the SCR remains constant in each time period. If we then assume a constant interest rate r, this means that the risk margin can be seen as a geometric series:

$$RM = CoC \cdot \sum_{t \geq 0} \frac{SCR \cdot \lambda^t}{(1+r)^{t+1}}$$

$$= CoC \cdot SCR \cdot (1+r)^{-1} \cdot \sum_{t \geq 0} \frac{\lambda^t}{(1+r)^t}$$

$$= a + ap + ap^2 + ap^3 + \cdots$$

where:

$$a = CoC \cdot SCR \cdot (1+r)^{-1}$$

$$p = \frac{\lambda}{(1+r)}$$

The solution for any geometric series $S_T(a,p)$ i.e. with such parameters a and p and finite time T, is given as:

$$S_T(a,p) = a\frac{1-p^T}{1-p}$$

In the limit, as T tends to infinity, for $|p| < 1$, the solution becomes:

$$S_\infty(a,p) = \frac{a}{1-p}$$

In the risk margin calculation, the value of the risk margin for an infinite product becomes:

$$\frac{CoC \cdot SCR \cdot (1+r)^{-1}}{1 - \frac{\lambda}{(1+r)}} = \frac{CoC \cdot SCR}{1 + r - \lambda}$$

Assuming non-negative interest rates, and expressing this as a proportion of SCR, the maximum possible value for the risk margin for a certain cost of capital rate and lambda parameter is then:

$$\frac{CoC}{1-\lambda}$$

A similar logic can also be applied for finite products.

Appendix 2: Maximum possible risk margin and maximum possible change for finite products

Following on from the main text, the tables below provide maximum possible values for the risk margin as a percentage of SCR, and maximum sensitivities of this with respect to a 1% change in interest rates for different combinations of the CoC rate and EIOPA's lambda parameter. We can see that reductions in both measures are able to reduce these maximum values, and hence reduce risks from pro-cyclicality, while the lambda parameter is more effective in achieving this for longer-term products where excessive levels and volatilities are most prevalent.

A. One-year product

Maximum possible value of the risk margin (as a percentage of SCR)

CoC / lambda	0.975	0.95	0.9	0.85	0.8
6%	6%	6%	6%	6%	6%
5%	5%	5%	5%	5%	5%
4%	4%	4%	4%	4%	4%
3%	3%	3%	3%	3%	3%
2%	2%	2%	2%	2%	2%

Maximum sensitivity of risk margin to 1% fall in interest rates (as a percentage of SCR)

CoC / lambda	0.975	0.95	0.9	0.85	0.8
6%	0.06%	0.06%	0.06%	0.06%	0.06%
5%	0.05%	0.05%	0.05%	0.05%	0.05%
4%	0.04%	0.04%	0.04%	0.04%	0.04%
3%	0.03%	0.03%	0.03%	0.03%	0.03%
2%	0.02%	0.02%	0.02%	0.02%	0.02%

B. Five-year product

Maximum possible value of the risk margin (as a percentage of SCR)

CoC / lambda	0.975	0.95	0.9	0.85	0.8
6%	29%	27%	25%	22%	20%
5%	24%	23%	20%	19%	17%
4%	19%	18%	16%	15%	13%
3%	14%	14%	12%	11%	10%
2%	10%	9%	8%	7%	7%

Maximum sensitivity of risk margin to 1% fall in interest rates (as a percentage of SCR)

CoC / lambda	0.975	0.95	0.9	0.85	0.8
6%	0.8%	0.8%	0.7%	0.6%	0.5%
5%	0.7%	0.6%	0.6%	0.5%	0.4%
4%	0.5%	0.5%	0.4%	0.4%	0.3%
3%	0.4%	0.4%	0.3%	0.3%	0.3%
2%	0.3%	0.3%	0.2%	0.2%	0.2%

C. Ten-year product

Maximum possible value of the risk margin (as a percentage of SCR)

CoC / lambda	0.975	0.95	0.9	0.85	0.8
6%	54%	48%	39%	32%	27%
5%	45%	40%	33%	27%	22%
4%	36%	32%	26%	21%	18%
3%	27%	24%	20%	16%	13%
2%	18%	16%	13%	11%	9%

Maximum sensitivity of risk margin to 1% fall in interest rates (as a percentage of SCR)

CoC / lambda	0.975	0.95	0.9	0.85	0.8
6%	2.7%	2.4%	1.8%	1.3%	1.0%
5%	2.3%	2.0%	1.5%	1.1%	0.8%
4%	1.8%	1.6%	1.2%	0.9%	0.7%
3%	1.4%	1.2%	0.9%	0.7%	0.5%
2%	0.9%	0.8%	0.6%	0.4%	0.3%

D. Twenty-year product

Maximum possible value of the risk margin (as a percentage of SCR)

CoC / lambda	0.975	0.95	0.9	0.85	0.8
6%	95%	77%	53%	38%	30%
5%	79%	64%	44%	32%	25%
4%	64%	51%	35%	26%	20%
3%	48%	38%	26%	19%	15%
2%	32%	26%	18%	13%	10%

Maximum sensitivity of risk margin to 1% fall in interest rates (as a percentage of SCR)

CoC / lambda	0.975	0.95	0.9	0.85	0.8
6%	8.6%	6.4%	3.6%	2.1%	1.4%
5%	7.2%	5.3%	3.0%	1.8%	1.1%
4%	5.7%	4.2%	2.4%	1.4%	0.9%
3%	4.3%	3.2%	1.8%	1.1%	0.7%
2%	2.9%	2.1%	1.2%	0.7%	0.5%

E. Thirty-year product

Maximum possible value of the risk margin (as a percentage of SCR)

CoC / lambda	0.975	0.95	0.9	0.85	0.8
6%	128%	94%	57%	40%	30%
5%	106%	79%	48%	33%	25%
4%	85%	63%	38%	26%	20%
3%	64%	47%	29%	20%	15%
2%	43%	31%	19%	13%	10%

Maximum sensitivity of risk margin to 1% fall in interest rates (as a percentage of SCR)

CoC / lambda	0.975	0.95	0.9	0.85	0.8
6%	15.8%	10.2%	4.6%	2.4%	1.4%
5%	13.2%	8.5%	3.9%	2.0%	1.2%
4%	10.5%	6.8%	3.1%	1.6%	0.9%
3%	7.9%	5.1%	2.3%	1.2%	0.7%
2%	5.3%	3.4%	1.5%	0.8%	0.5%

Appendix 3: Estimated impact of different lambda and CoC rate combinations for long- and short-term products

Table 1 in the main text provided estimated impacts of different combinations of the CoC rate and EIOPA's lambda parameter (assuming no floor) on the level of the risk margin held across the industry, assuming an average product duration of seven years. However, as highlighted, the impacts will differ by the nature of liabilities and in particular the duration of these. This appendix therefore provides similar tables for longer-term (duration 11 years) and shorter-term products (duration four years).

Estimated impact of different calibrations on risk margin for longer-term products

CoC / lambda	0.975	0.95	0.9	0.85	0.8
6%	-24%	-40%	-59%	-69%	-76%
5%	-36%	-50%	-66%	-74%	-80%
4%	-49%	-60%	-73%	-80%	-84%
3%	-62%	-70%	-79%	-85%	-88%
2%	-75%	-80%	-86%	-90%	-92%

Estimated impact of different calibrations on risk margin for shorter-term products

CoC / lambda	0.975	0.95	0.9	0.85	0.8
6%	-5%	-10%	-18%	-25%	-30%
5%	-21%	-25%	-32%	-37%	-42%
4%	-37%	-40%	-45%	-50%	-54%
3%	-53%	-55%	-59%	-62%	-65%
2%	-68%	-70%	-73%	-75%	-77%

Appendix 4 – Additional considerations on the cost of capital rate

Consideration of debt / use of unlevered beta

As the WACC derivation of the CoC rate refers to the Cost of equity derived from the CAPM and an average beta of listed insurance companies, the share of debt should be assessed on a sample of listed companies. Otherwise, not to do so leads to an overestimate of the Cost of capital rate.

The share of eligible debt instruments in the EOFs of significant listed European insurance groups is clearly significant and cannot be considered at all to be nil. The following table indicates the share of debt instruments in EOFs (excluding others sectors and D&A) for 18 significant EEA insurance groups, which concentrates a material amount of the total EEA RM. Their average share of debt financing is c. 25%[4].

Share of debt instruments in eligible own funds (excluding others sectors and D&A) for some significant EEA (re)insurance groups			
AEGON N.V.	28%	Mapfre, S.A.	13%
Ageas SA/NV	29%	NN Group N.V.	26%
Allianz SE	18%		
Assicurazioni Generali S.p.A.	20%	Phoenix Group Holdings	24%
Aviva plc	31%	Prudential plc	20%
AXA SA	32%	RSA Insurance Group plc	19%
CNP Assurances SA	27%	Talanx AG	11%
		Unipol Gruppo Finanziario S.p.A.	31%
Legal & General Group Plc	21%	Vienna Insurance Group AG	13%
Total of debt instruments in EOF / total EOF for these 18 groups			*23%*

Source : SFCR reports YE 2018

The impact of the use of debt financing on reducing the CoC rate depends on the relative cost of debt to the cost of equity and on the benefit of the tax deductibility of interest payments which depends on the tax rate.

Significant cost differences exist between equity and debt funding and tax relief on debt payments contributes to reducing further the effective cost of debt financing compared to equity financing. The average corporate tax rate has tended to decrease in the European Union between 2010 and

[4] The estimate is not expected to be materially different for the 66 listed European companies considered by EIOPA. Currently, this situation reflects the effect of transitory measures but there is no reason to assume that the share of debt financing will not be replaced in the future by Solvency II compliant instruments.

2017 but continues to be relatively high (around 22%). The cost of debt financing is currently very low (estimated at c. 200 bps over the risk free rate) and it is usually materially lower than the cost of equity (for instance, around 200 bps lower or more since 2012). Therefore, if we were to assume a 25% weight of debt and an average corporate tax rate of 22%, the WACC cost of capital would instantly be materially lower.

Use of a forward-looking premium

The paper "The Cost of Capital: the Swiss Army Knife of Finance" by Damodaran which EIOPA references in paragraph 1422 of the consultation paper articulates the limitations of the historical return approach. This paper states regarding backward looking equity risk premiums ("ERPs"): "Not only are they backward looking, by construct, and subject to manipulation, with very different values for the premium based upon what period of history you look at, whether you use T.Bills or T.Bonds as your risk free rate and how you compute averages. Not surprisingly, analysts use this to advantage and pick equity risk premiums that reflect their valuation biases, pushing towards the higher numbers [...], if their bias is towards lower values, and the lower numbers to justify higher values". So historical return models can introduce a strong survivorship bias as they are backward-looking and depend strongly on the time period chosen.

Going too far back to calibrate the market risk premium (as when EIOPA uses data starting in 1926 for the US case) tends to increase it artificially. EIOPA reasonably underlines in the consultation paper that "the inclusion of the World War II period and the following economic recovery in the US time series may be considered questionable, because that economic situation is not comparable with today". Similarly, a data set starting more than 40 years ago in 1975 for the European case when the economic environment and growth perspective was different from today might also lead to an upward bias (and the backward looking approach introduces anyway an upward bias).

Additionally EIOPA considers that the backward-looking ERP is less volatile than the forward-looking one. However, the backward-looking ERP is extremely volatile and backward-looking ERP estimates have a very wide confidence margin. For example: the Shiller dataset covering 1871-2012 produces a 17.7% standard deviation, Damodoran's one covering 1928-2015 yields a 20.1% standard deviation and Norges Bank (2016) « The Equity Risk Premium ») with ERP calculated over very long time horizons, it displays a standard deviation of approximately 20%. As a consequence, researchers using the same data but calculating equity returns over different periods, will obtain widely differing estimates of the ERP.

The ERP for a given year should be based on a specific estimate of the dividend growth potential, based on analyst estimates of earnings growth, rather than historic figures. In its report (pages 83 onwards), Damodaran derives the forward looking equity risk premia based on the S&P 500 from 2008 to 2017, including the contribution of share buy-backs (S&P figures are used by EIOPA for deriving the historical return ERP so that it is consistent to use it also to derive the forward looking ERP). The average of the ERPs calculated for this 10 year period is c. 5%.

ERPs calculated by Damodaran based on S&P 500 figures[5]

2008	4.46%	2013	5.78%

[5] It can be noted that the 2016 FL ERP calculated by Damodaran in its 2017 report (5.16%, pages 91-92) revises the figure presented in its 2016 report (6.12%) which appears in the consultation paper on page 282 in the extract from the Damodaran paper.

2009	6.43%	2014	4.96%
2010	4.36%	2015	5.78%
2011	5.20%	2016	5.16%
2012	6.01%	2017	4.50%

The Norges bank note "The equity risk premium" (2016) indicates that "The expected World ERP from the discount models may be closer to 4 percent if expectations of interest rate normalisation are taken into account. Estimates from cross-sectional and time-series models also suggest an expected World ERP of 3 to 4 percent."

Use of arithmetic vs geometric mean

Several studies have shown that the choice of an arithmetic or geometric premium can have material impact on results. For example:

- Dimson, Marsh and Staunton conducted a benchmark study of ERPs in their 2003 paper which analyses historical equity risk premia and concluded that "when developing forecasts for the future, investors and managers should adjust historical risk premiums downward for the impact of these factors. This suggests that a plausible, forward-looking risk premium for the world's major markets would be in the order of 3% on a geometric mean basis, while the corresponding arithmetic mean risk premium would be around 5%." In a 2011 update they concluded that they "infer that investors expect a long-run equity premium (relative to bills) of around 3%–3½% on a geometric mean basis and, by implication, an arithmetic mean premium for the world index of approximately 4½%–5%".
- Damodaran shows a range of historic ERPs from 2.3% to 7.96% depending on the choices made (arithmetic vs geometric, T.Bills vs T.Bonds, averaging period) and a range for Europe of 3.1% to 5.1% and 3.2% to 5.6% for the world.
- The Norges bank note "The equity risk premium" (2016) states that the geometric average returns provide a better indication of investment returns over multiple periods while the arithmetic averages have more desirable statistical properties. Results presented in this note are both for the geometric and arithmetic means.