



EIOPA-CP-17-006
6 November 2017

Consultation Paper

on

**EIOPA's second set of advice to the
European Commission on specific
items in the Solvency II Delegated
Regulation**

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Responding to this paper

EIOPA welcomes comments on the second set of advice to the European Commission on specific items in the Solvency II Delegated Regulation.

Comments are most helpful if they:

- respond to the question stated, where applicable;
- contain a clear rationale; and
- describe any alternatives EIOPA should consider.

Please send your comments to EIOPA in the provided Template for Comments, by email to CP-17-006@eiopa.europa.eu by 5th January 2018.

Contributions not provided in the template for comments, or sent to a different email address, or after the deadline will not be processed.

Rationale for the deadline

The deadline of 5 January 2018 is less than the three month public consultation period which is EIOPA's aim as set out in its Public Statement of Consultation Practices¹. On this occasion, the imposition of an external deadline for receipt of the final advice of 28 February 2018 prevents a three month period. The extent EIOPA has already engaged with stakeholders on the SCR review is set out later in the introduction.

Publication of responses

Contributions received will be published on EIOPA's public website unless you request otherwise in the respective field in the template for comments. A standard confidentiality statement in an email message will not be treated as a request for non-disclosure.

Please note that EIOPA is subject to Regulation (EC) No 1049/2001 regarding public access to documents and EIOPA's rules on public access to documents².

Contributions will be made available at the end of the public consultation period.

¹ See paragraph 3.3 of https://eiopa.europa.eu/Publications/Statements/Public_Statement_Consultations_Practices.pdf

² [Public Access to Documents](#)

Data protection

Please note that personal contact details (such as name of individuals, email addresses and phone numbers) will not be published. They will only be used to request clarifications if necessary on the information supplied.

EIOPA, as a European Authority, will process any personal data in line with Regulation (EC) No 45/2001 on the protection of the individuals with regards to the processing of personal data by the Community institutions and bodies and on the free movement of such data. More information on data protection can be found at <https://eiopa.europa.eu/> under the heading 'Legal notice'.

Introduction

Review of the Commission Delegated Regulation (EU) 2015/35³ (Solvency II Delegated Regulation)

1. The European Commission expressed its intention to review methods, assumptions and standard parameters used when calculating the Solvency Capital Requirement with the standard formula. This review is to be performed before December 2018⁴.
2. The European Commission has asked EIOPA to provide technical advice as part of its review of the Solvency Capital Requirement⁵.

What is the scope of this consultation paper?

3. This consultation paper covers the following areas:
 - I. Recalibration of standard parameters of premium and reserve risks
 - II. Volume measure for premium risk
 - III. Recalibration of mortality and longevity risks
 - IV. Health catastrophe risk
 - V. Man-made catastrophe risk
 - VI. Natural catastrophe risk
 - VII. Interest rate risk
 - VIII. Market risk concentration
 - IX. Currency risk at group level
 - X. Unrated debt
 - XI. Unlisted equity
 - XII. Strategic equity investments
 - XIII. Simplification of the counterparty default risk

³ Commission Delegated Regulation (EU) 2015/35 of 10 October 2014 supplementing Directive 2009/138/EC of the European Parliament and of the Council on the taking-up and pursuit of the business of Insurance and Reinsurance (Solvency II), OJ L 12, 17.1.2015

⁴ Recital 150 of Commission Delegated Regulation (EU) 2015/35

⁵ See:

https://eiopa.europa.eu/Publications/Requests%20for%20advice/CfA_annex.pdf
and

<https://eiopa.europa.eu/Publications/Requests%20for%20advice/2017.02.21%20-%20Annex%20CfA%20II.pdf>

- XIV. Treatment of exposures to CCPs and changes resulting from EMIR
- XV. Simplification of the look-through approach
- XVI. Look-through approach at group level
- XVII. Loss-absorbing capacity of deferred taxes
- XVIII. Risk margin
- XIX. Comparison of own funds in insurance and banking sectors
- XX. Capital instruments only eligible as tier 1 up to 20% of total tier 1
- XXI. Impact assessment

Structure of this consultation paper

4. The consultation paper is divided into 21 chapters, each covering the areas described in the paragraph above on scope of the consultation paper. Each chapter follows the same structure:

- Extract from the call for advice
- Legal basis
- Feedback statement on main comments received on the discussion paper
- EIOPA's advice
 - Analysis
 - Advice (and if relevant proposals for legal articles)

5. The exceptions are:

- Chapter 12 on strategic equity investments which provides information only, as requested by the Commission.
- Chapter 21 on impact assessment.

Length of the consultation paper

6. The consultation paper is a long document. This reflects the large number of topics being consulted on and EIOPA's desire to be fully transparent on the basis for its proposed advice.

7. Where appropriate, material is placed in annexes to the chapters.

8. As well as the common structure set out above, EIOPA's proposed advice is highlighted in a blue box towards the end of each chapter, and these blue boxes are a good place to start for those readers who do not need to consider some or all of the issues in detail.

Engagement with stakeholders

9. In addition to the consultation paper EIOPA has engaged with stakeholders throughout the development of its advice.
10. EIOPA issued a first discussion paper in December 2016. It has held meetings with stakeholders during 2017 on 23 May, 8 June and 27 September. In addition EIOPA has been in dialogue with its Insurance and Reinsurance Stakeholder Group.
11. EIOPA has also sought information on specific topics from insurance undertakings and from national supervisory Authorities (“NSAs”).

Next steps

12. EIOPA will send its final advice on the areas covered by this consultation paper to the European Commission by the end of February 2018.

1. Recalibration of standard parameters of premium and reserve risks

1.1. Call for advice

14. According to Article 115 of the Solvency II Delegated regulation, the capital requirement for non-life premium and reserve risk shall be equal to the following for a given Line of business l :

$$SCR_l = 3. \sigma_l. V_l, \text{ where:}$$

(a) σ_l denotes the standard deviation for non-life premium and reserve risk determined in accordance with Article 117 for a given Line of business l ;

(b) V_l denotes the volume measure for non-life premium and reserve risk determined in accordance with Article 116 for a given Line of business l .

15. As part of the SCR review EIOPA is asked to assess which of standard parameters for non-life premium and reserve risk, and the standard parameters for medical expense risk need to be changed and to suggest possible new calibrations where appropriate, making use of the experience gained.

16. The initial calibration of the non-life premium and reserve risk standard deviation was carried out by a Joint Working Group⁶ (JWG) in 2011.

1.1.1. Selection of line of business

17. EIOPA has identified that for the following Line of business a recalibration exercise could be needed for the non-life premium and reserve risk standard deviation:

- medical expense (Line of business n°1 of Annex I of the Delegated Regulation)
- credit and suretyship (Line of business n°9)
- assistance (Line of business n°11)
- legal expenses (Line of business n°10)
- worker compensation (Line of business n°3).

18. EIOPA has selected these Lines of business to be recalibrated by analyzing the calibration done in 2010-2011. In the report of the Joint Working Group, data availability⁷ and data limitations are discussed and for every single Line of business the number of undertakings that provided data is reported.

⁶ Calibration of the Premium and Reserve Risk Factors in the Standard Formula of Solvency II, Report of the Joint Working Group on Non-Life and Health NSLT Calibration, EIOPA, 12 December 2011: https://eiopa.europa.eu/Publications/Reports/EIOPA-11-163-A-Report_JWG_on_NL_and_Health_non-SLT_Calibration.pdf

⁷ *ibid* pp 9-11.

19. EIOPA has selected for the purpose of this exercise the Lines of business where data has been assessed as not representative enough for both premium and reserve risks, in view of the number of undertakings that currently are doing business in the same Lines of business.
20. In particular, where the number of undertakings that submitted valid data is less than one hundred before adjustments due to the exclusion of catastrophe losses and where the data provided came from less than 20 different European countries, EIOPA has considered that a recalibration would be necessary. It should be noted that these criteria do not apply to non-proportionate reinsurance Lines of business, due to the specific nature of the business and due to the limited number of undertakings that carry out this business.
21. It is worth to notice that the Joint Working Group explicitly excluded credit and suretyship and assistance reserve risks from the recommendations because of the lack of observations⁸.
22. Below is disclosed the amount of submission received by the Joint Working Group in 2011:

⁸ *ibid* p.4

	JWG				
	AS	CS	HME	HWC	LE
Undertakings	86	97	269	51	149
Countries	21	21	25	16	19
AT	2		1		8
BE	1	1	6	5	12
BU	1	1			
CY					
CZ		2	1		
DE			56		31
DK	3	2	7	7	2
EE					
EL					
ES	6	5	14		3
FI		3	2	4	10
FR	5	3	51	2	8
HU	2	3	3		2
IE	5	8	11		4
IT	20	26	34	1	32
LI					
LT	4	6	6	1	
LU	1	3	1	1	4
LV	3	4	8		1
MT	4	2	8	4	3
NL	4	4	21	1	8
NO	1		1	7	
PL		2	2	1	
PT	2	2	5	6	3
RO	7	9	8	2	2
SE	3		5	1	
SI	4	5	5		5
SK	2	1	1		1
UK	6	5	11	5	10
IS			1	3	

1.2. Data

1.2.1. Data collection exercise

23. For the purpose of this recalibration, EIOPA requested data at EU level covering as wide a range of undertakings (of all types and sizes) and Member States as possible. The data had to be provided by undertakings that do direct business in one of the five lines of business aforementioned. The data was collected by EIOPA from December 2016 to March 2017.

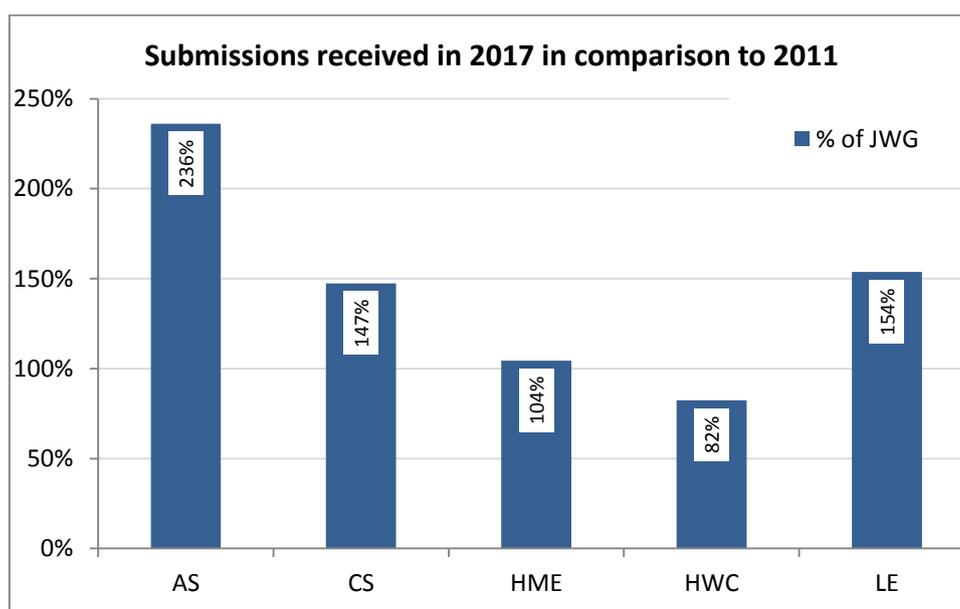
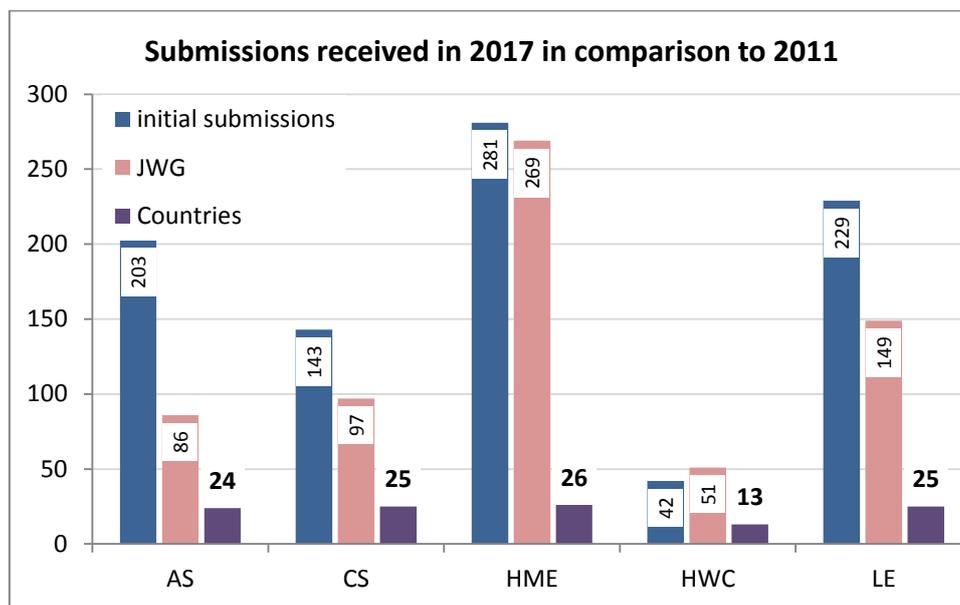
24. For more details on the data collection exercise, please refer to the *Discussion Paper on the review of specific items in the Solvency II Delegated Regulation* published by EIOPA in December 2016⁹.

25. As a result of this exercise, EIOPA received data from 483 undertakings from 27 countries. The distribution among Line of business is shown in the table below.

	2017 submissions				
	AS	CS	HME	HWC	LE
Undertakings	203	143	281	42	229
Countries	24	25	26	13	25
AT	3	3			16
BE	2	1	2	4	3
BU					
CY					
CZ	8	5	10		3
DE	12	2	10		18
DK			1	1	
EE	1	2	6		1
EL	14	7	18	1	20
ES	19	7	17	1	12
FI		4	26	8	26
FR	9	6	37		24
HR	12	8	8	1	6
HU	7	6	7	2	5
IE	5	6	2		1
IT	50	31	52		51
LI	1	3	4		
LT			1		1
LU	2	1	4		4
LV	5	4	4		1
MT	4	3	3	1	1
NL	4	5	20		13
NO					
PL	6	3	3	1	2
PT	13	9	18	16	11
RO	10	9	11	3	2
SE	2	2	4	1	1
SI	5	4	6		3
SK	6	4	2		1
UK	3	8	5	2	3

⁹ EIOPA-CP-16/008 of 5th December 2016 : https://eiopa.europa.eu/Publications/Consultations/EIOPA-CP-16-008_Discussion_Paper_on_SII_DR_SCR_Review.pdf

26. The charts below disclose the comparison per Line of business between the submissions received in 2017 and the 2011 JWG data collection.



1.2.2. Data cleaning

27. In order to get exploitable data, the first step was a dialogue between undertakings and NSAs to clarify some areas of uncertainty.

28. The second step consisted in cleaning data where possible. The most common inconsistencies with data were the following:

- unit of values, where the unit described by the undertaking does not correspond to the underlying unit in the submitted values,
- negative values, e.g. in earned premiums,
- zeros e.g. in earned premiums,

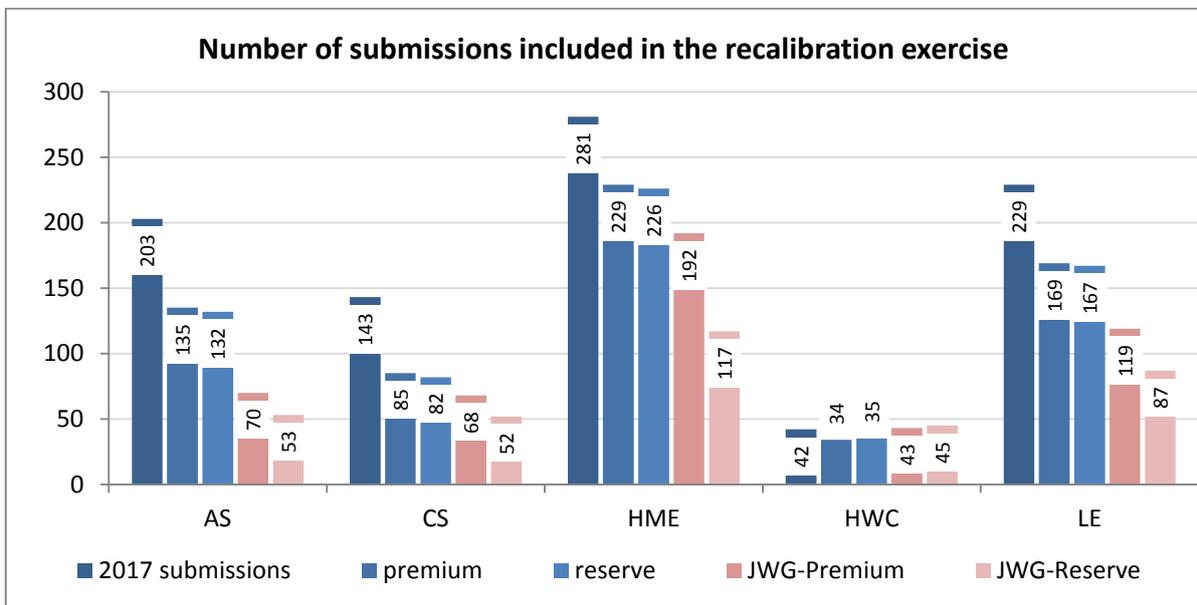
- inconsistency between earned premium and loss estimates which leads to not entirely natural loss ratios,
- inconsistency between loss estimates and triangle data,
- inclusion of catastrophe events and other outliers in premium risk data.

29. Finally, where data could not be considered sufficiently reliable, submissions were not taken into account.

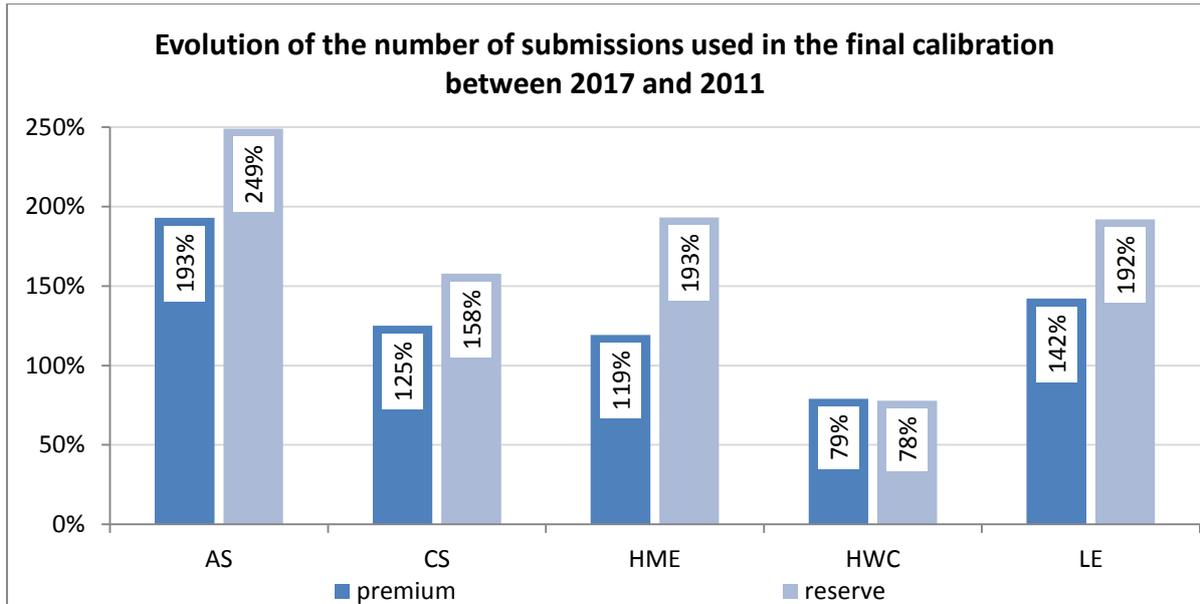
1.2.3. Representativeness of data

30. Representativeness of data collected in 2017 can be drawn both by comparing to the total number of submissions finally used in 2011 and, to the total volumes of premium and reserve of 2011.

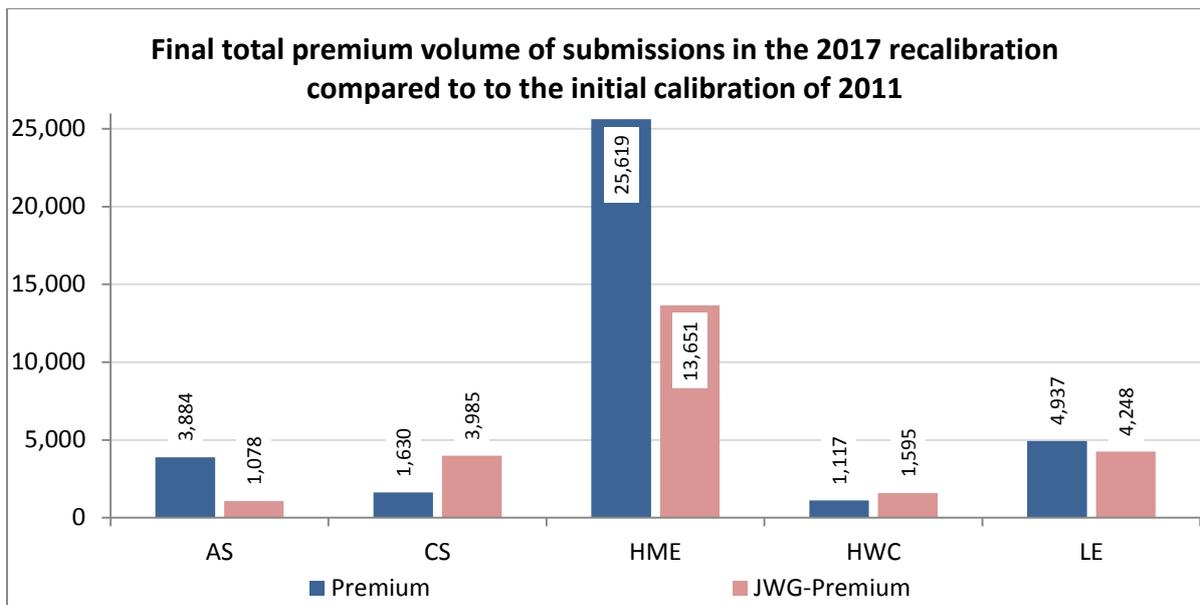
31. The chart below sums up distribution of submission after the cleaning process and compares with the outcome of the same process performed by the JWG.

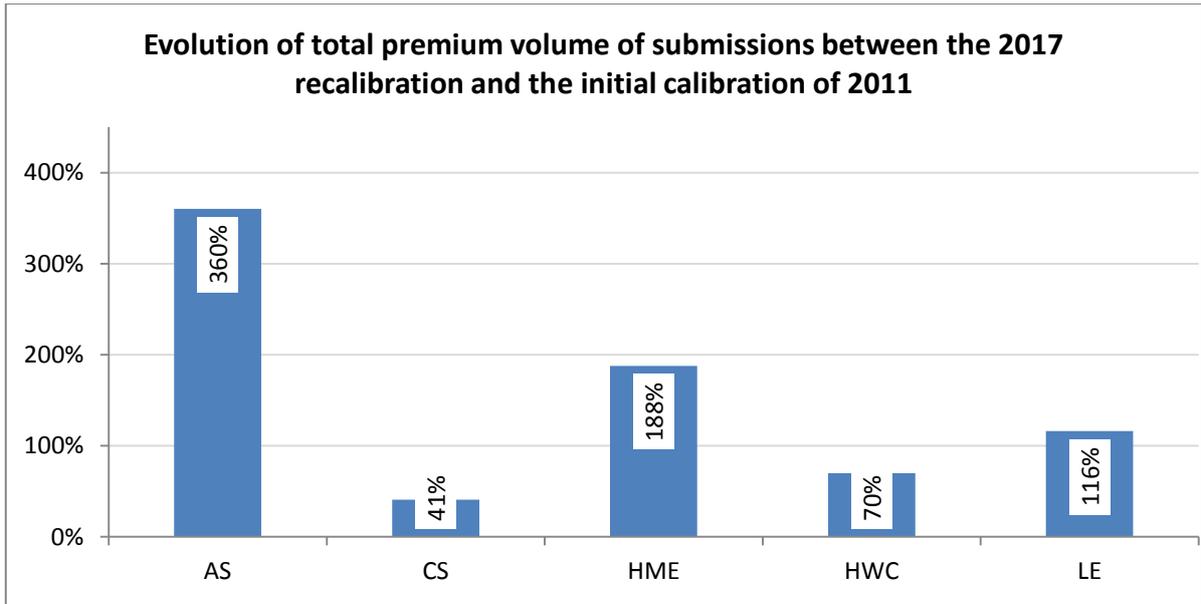


32. In proportion of respective initial submission set, the 2017's cleaning process resulted in the inclusion of a higher amount of data than the 2011's one. Therefore, for all line of business except worker's compensation line of business the 2017 recalibration relied on a higher number of submissions than the initial calibration of 2011.

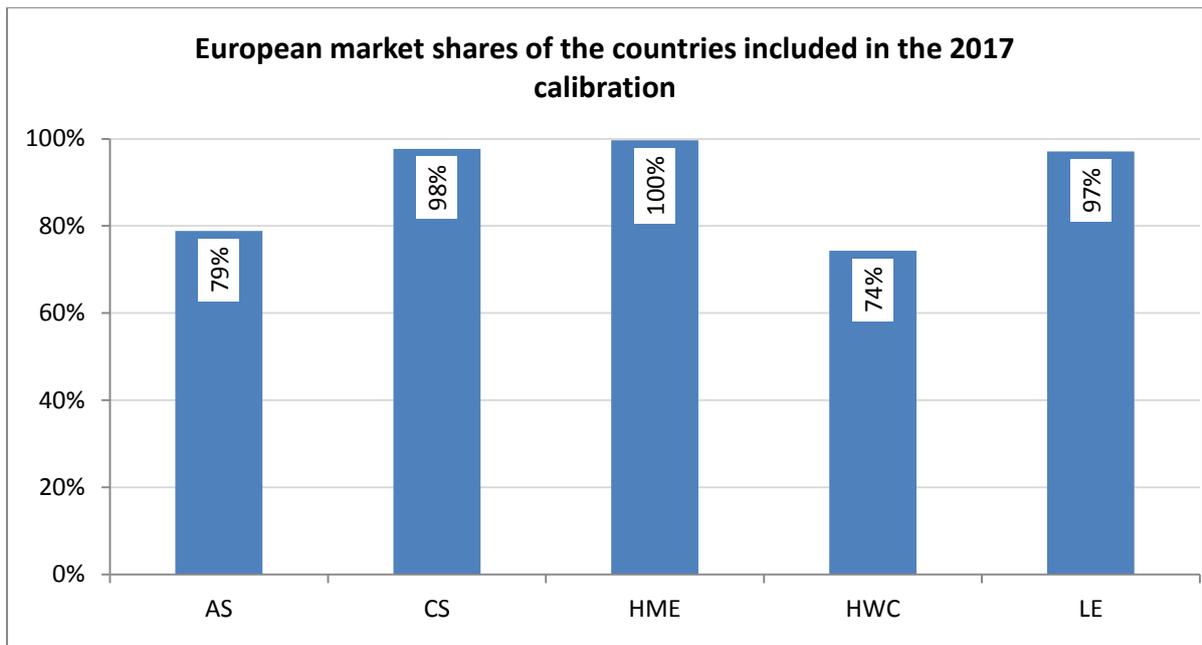


33. Except for the credit & suretyship line of business, volumes collected in 2017 were higher than those collected in 2011. Volume of the worker's compensation line of business is of the same range between the two data collections (1.1€bn in 2017 versus 1.6€bn in 2011).

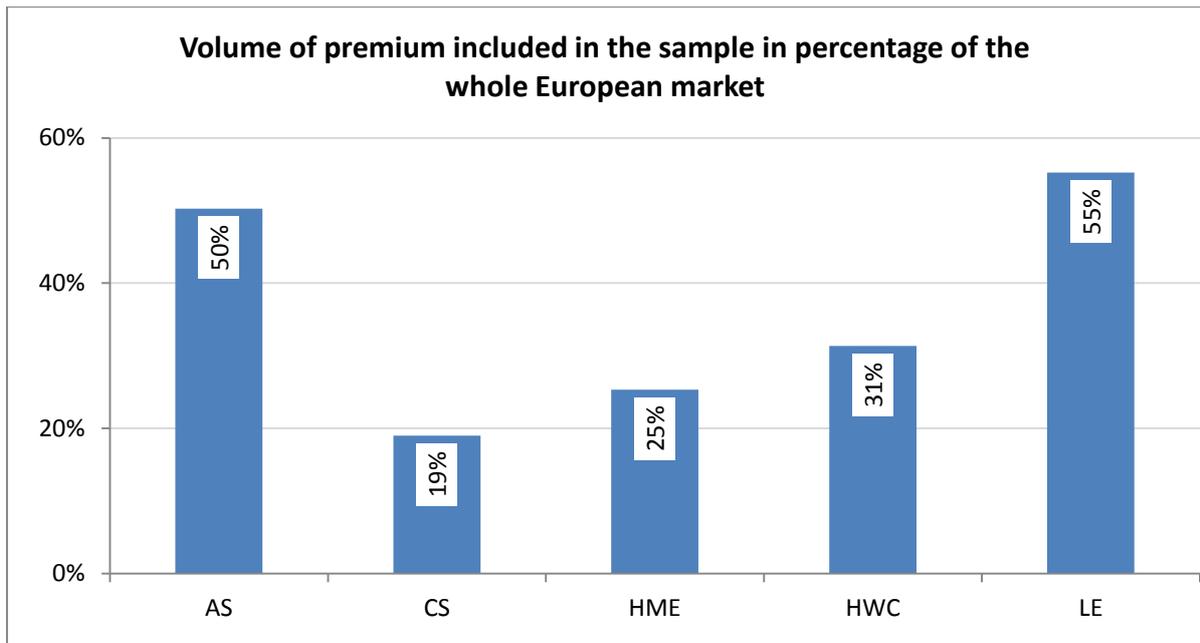




34. Representativeness can also be assessed by comparing the market share of the countries included in the sample. For instance, the twenty four countries included in the Assistance sample represent 79% of the whole European Assistance market in terms of premium.



35. Finally the size of the sample in terms of volume collected can be compared to the European market in order to conclude on the representativeness of the sample. For example, in the Assistance sample we capture 50% of the European market.



36. The table below sums up the evidence that advocates for the good representativeness of the sample.

	Representativeness			
	number of submission vs. 2011	volume vs. 2011	countries	market share
AS	+	+	+	+
CS	+	-	+	+
HME	+	+	+	+
HWC	-	-	+	+
LE	+	+	+	+

37. The credit & suretyship line of business that has a total volume lower than these collected in 2011 is nonetheless considered representative enough, because of:

- the high share that the sample represents (19% of the European market);
- the countries included in the sample that correspond to more than 95% of the total European volume;

- the higher number of contribution collected (25% more contribution in 2017 than in 2011).
38. The worker's compensation line of business where both number of submissions and the total volume are lower than those collected in 2011 is considered representative enough because of:
- the high share that the sample represents (31% of the European market);
 - the countries included in the sample that correspond to more than 70% of the total European volume.
39. As a conclusion, data collected is considered as sufficiently representative to derive conclusion on the five identified lines of business.

1.2.4. Type of data used

40. Data collection requested:
- raw data gross of reinsurance;
 - adjusted data gross of reinsurance, excluding catastrophe loss;
 - data net of reinsurance;
 - adjusted data net of reinsurance, excluding catastrophe loss;
 - impacts of salvage and subrogation.
41. Sufficient data was only received for raw data gross of reinsurance.
42. Calibration was therefore performed with data gross of reinsurance and without exclusion of catastrophe events a priori. In the different steps of the recalibration, outliers were excluded (please see below sub-section 1.3.2), which means that undertakings with extraordinary volatility were excluded. These extraordinary volatilities may have been due to catastrophe events. For the Lines of business considered in this exercise, catastrophe events are not expected to have a major impact on the results.
43. Premium calibration was moreover calibrated based on loss at the end of the first year, as in 2011.
44. In case of reserve the calibration, the 2011's calibration was performed on both data net and gross of reinsurance and the final advice was given net of reinsurance. In order to draw a sound comparison, this reserve calibration exercise will be compared to the 2011's outcome gross of reinsurance¹⁰. Furthermore, gross to net factors from the 2011's exercise are used to derive a final figure for this exercise.

¹⁰ Figures can be found in annex B of the Calibration of the Premium and Reserve Risk Factors in the Standard Formula of Solvency II, Report of the Joint Working Group on Non-Life and Health NSLT Calibration, EIOPA, 12 December 2011:
https://eiopa.europa.eu/Publications/Reports/EIOPA-11-163-C-Annex_6_2_Report_JWG_on_NL_and_Health_non-SLT_Calibration.pdf

		JWG (2011)		
		Method 2		Gross to net factor
		<i>gross</i>	<i>net</i>	
Reserve	AS	19,1%	19,1%	100%
	CS	52,6%	52,6%	100%
	HME	9,2%	5,3%	58%
	HWC	12,7%	11,4%	90%
	LE	12,3%	12,3%	100%

1.3. General approach for assessing of non-life premium and reserve risk standard deviation

45. The initial calibration of the non-life premium and reserve risk standard deviations was carried out by the Joint Working Group in 2011.

46. In order to assess whether the calibration performed in 2011 needed to be updated in the most reliable manner, it has been decided to apply the exact same methodology. This methodology is briefly described below and can be found in details in the report produced by the Joint Working Group¹¹. We also reproduced several of the various options considered back then (see the description of methodology 1 below).

1.3.1. Methods applied

47. The methods applied were based on both normal and log-normal parametrisation.

48. Premium risk used the following parametrization: x as earned premium and y as aggregate loss at the end of the first year. We used one definition of normal variance and two log-normal ones¹².

49. Reserve risk was based on the same methods as per premium risk with the following parametrization: x as total claims provision at the start of a given financial year and y as aggregate loss incurred in a given financial year for all earlier accidents years. We used one definition of normal variance and one log-normal.

50. The **CEIOPS final advice was based on normal parametrizations.**

1.3.2. Procedure to eliminate outliers

51. Elimination of outliers was performed in three automated steps.

52. For each type of calibration and for both premium and reserve risks we performed a first estimation of the parameters. We eliminate observations that generated outlying standardised residuals: being outside the interval that may be expected for standard normal random variables with the given sample size. This procedure was performed three times before performing the final calibration.

¹¹ https://eiopa.europa.eu/Publications/Reports/EIOPA-11-163-A-Report_JWG_on_NL_and_Health_non-SLT_Calibration.pdf

¹² With x earned premium and \bar{x} the sample mean, σ standard deviation, β loss ratio parameter, δ probability distribution of y , we have the following μ mean and the following ω variances:

$$\mu = \log(\beta x) - \frac{\omega}{2}$$

$$\omega_1 = \log\left(1 + \frac{\sigma^2((1-\delta)\bar{x}x + \delta x^2)}{\beta^2 x^2}\right) \text{ and } \omega_2 = \log(1 + \sigma^2((1-\delta)\bar{x}x^{-1} + \delta))$$

53. It should be highlighted that proceeding in this manner results in producing parameters with the low range of the possible outcomes.

1.3.3. Portfolio-size heterogeneity

54. In order to address the issue stemming from the fact that the calibration is performed assuming an average sized portfolio sample, the methodology of the CEIOPS introduces a kappa factor that generated a *standard deviation*, independent on the size of the sample. This kappa factor is meant to standardize the outcomes and to avoid that a too large SCR is calculated for the larger portfolios and a too small one for the smaller portfolios. In order to obtain a calibration at the appropriate level, the *unbiased sigma* is multiplied by the chosen kappa.

55. The value of the kappa factor would depend on whether the size is measured in terms of share of portfolios in the sample (*company approach*) or in terms of share of volume, i.e. policyholders that are insured by undertakings of the portfolio (*policyholder approach*).

56. The calibration performed by the JWG set the following limits:

- *company approach* - at least 65% of portfolios should be covered with a security level of at least 99.5%,
- *policyholder approach* - at least 95% of policyholders in term of volume should be covered with a security level of at least 99.5%.

57. Choice between the two approaches can have significant influence on the outcome.

58. The **CEIOPS final advice relied on the policyholder approach**.

1.3.4. Deriving a European parameter

59. Deriving a European calibration can be done in different manners, either by considering Europe as a whole market and performing a calibration on the whole European dataset (method 1¹³), or by considering that the European market is composed by the different national markets (method 2¹⁴). In order to reflect this, the two kinds of calibration were realized.

60. In method 1, the calibration can either be performed using the company approach or the policyholder approach.

61. In method 2, calibration is performed at the country level using the policyholder approach. The 95% of policyholders is defined with the European sample. The aggregation is made thanks to a weighted average using volume measures for each Line of business (premiums or reserve) from 2016 quantitative reporting as weights (see "25. Annex to chapter 1 – Weights used in the method 2").

¹³ Referred as the pan-European approach in 2011.

¹⁴ Referred as the combined approach in 2011.

62. A threshold was applied to only include in the analysis countries with at least three portfolios. Limit was set to two portfolios for worker’s compensation and credit and suretyship lines of business given the smaller number of undertakings doing this business. This threshold was set to five in 2011. We decreased it, in order to have more country included and a more representative sample.

63. The **CEIOPS final advice was based on the method 2.**

1.3.5. USP calibration to back test results

64. In parallel of the aforementioned methodologies, a calculation of the USP for each undertaking and each line of business was performed.

65. We used the prescribed legal methodologies described in Annex XVII of the Delegated Regulation.

66. In order to characterize our sample and to compare it to the standard formula calibration, we analysed the number of undertakings of the sample that were below or above the standard formula’s calibration. We considered that the USP methodology provided evidences for a recalibration when more than 60% of the total sample was below/above the current calibration.

67. The following table discloses the amount of USP for a given line of business that is below standard formula’s calibration. Only USP figures below 100% are taken into account. USP figures that are above 100% were considered as outliers and excluded from the ratio calculation. Graphs disclosing the results can be found in “22. Annex to chapter 1 – USP calibration”.

	Amount of USP below the standard formula calibration		
	Premium	Reserve LogN	Reserve Triangle
AS	51%	36%	28%
CS	19%	35%	31%
HME	41%	11%	9%
HWC	46%	22%	45%
LE	59%	46%	52%

68. *LogN method* refers to the *reserve risk method 1* of the paragraph C of Annex XVII. *Triangle method* refers to the *reserve risk method 2* of the paragraph D of Annex XVII of the Delegated Regulation. These are calculated using paid triangles.

1.4. Final recommendation

69. In the following table are summed up all the evidences gathered in this recalibration exercise and the representativeness is assessed. Details of the results can be found in "23. Annex to chapter 1 – Results of the calibration for premium risks" and "24. Annex to chapter 1 – Results of the calibration for premium risks".
70. In the column *Evidences provided for a recalibration*, an up arrow (\nearrow) means that the given methodology pleads in favour of a higher calibration, i.e. the outcome of the methodology in 2017 is higher than in 2011. A down arrow (\searrow) means that the methodology advocates for a lower calibration, i.e. the outcome of the methodology in 2017 is lower than in 2011. A double horizontal arrow (\leftrightarrow) means that the methodology suggests no change, i.e. outcomes from 2017 and 2011 are of the same range. Decision are mainly driven by the method 2 (in black), while method 1 (in dark grey) and USP¹⁵ (in light grey) are more indicative.
71. Figures for the *final calibration* column are derived from the method 2 which is identical to the method used to derive standard formula's calibrations, i.e. based on an aggregation of country normal sigma using the policyholder approach.
72. As stated in the section 1.2, data is considered as sufficiently representative to support a recalibration. EIOPA would nevertheless consider any further data at undertaking level that stakeholders may be willing to share. For this purpose, stakeholders are invited to either contact their relevant NSA or EIOPA (CP-17-006@eiopa.europa.eu), so that appropriate figures can be provided.

¹⁵ Outcomes and assessments of the USP calibration are explained in sub-section 1.3.5.

1.4.1. Premium

		Evidences provided for a recalibration			Standard formula	JWG calibration	Final calibration suggested
		method 2	method 1	USP calculations			
Premium	AS	↘	↔	↔	9%	9,3%	6,4%
	CS	↗	↗	↗	12%	11,7%	19,9%
	HME	↗	↗	↔	5%	5,0%	6,0%
	HWC	↗	↘	↔	8%	8,0%	9,6%
	LE	↗	↘	↘	7%	6,5%	8,3%

73. While the representativeness of the credit and suretyship line of business sample can be questioned because of the lower volume collected in 2017 compared to 2011 (see section 1.2), the congruent outcomes for all three kinds of calculation argue for an increase of the calibration.

1.4.2. Reserve

		Evidences provided for a recalibration			Standard formula	JWG calibration	Gross to net factor	Final calibration suggested
		method 2	method 1	USP calculations				
Reserve	AS	↗	↔	↗	20%	19,1%	100%	22,0%
	CS	↘	↔	↗	19%	52,6%	100%	16,4%
	HME	↗	↗	↗	5%	9,2%	58%	6,6%
	HWC	↔	↘	↗	11%	12,7%	90%	11,0%
	LE	↘	↘	↔	12%	12,3%	100%	5,5%

74. As detailed in sub-section 1.2.4, for the medical expense line of business a 58% gross to net factor was applied to the gross calibration in 2011. As this factor could not be assessed due to the lack of data net of reinsurance available in 2017, we applied the very same factor to the 2017 gross calibration ($11.3\% \times 58\% = 6.6\%$).

75. No change is suggested for the worker's compensation line of business, as advocated by the methodology 2 and after application of a gross to net factor of 90%.

76. Changes in the legal expenses line of business is mainly driven by the fact that the collected volumes of this line of business have drastically increased between 2011 and 2017. This is mostly due to the larger participation of Germany in the 2017 exercise in comparison to the 2011 data collection.

2. Volume measure for premium risk

2.1. Call for advice

EIOPA is asked to assess which standard parameters need to be changed amongst the following underwriting submodules and to suggest possible new calibrations where appropriate, making use of the experience gained and data gathered during the transitional period and the first year of application of Solvency II, also making use of relevant data provided by other parties:

- *The standard parameters for non-life premium and reserve risk, and the standard parameters for medical expense risk, that should be calibrated on the basis of extended data; in this context, the definition of the volume measure for premium risk should be reassessed for continued appropriateness.*

2.2. Legal basis

Directive 2009/138/EC¹⁶ (“Solvency II Directive”)

77. Article 105(2): Calculation of the Basic Solvency Capital Requirement

The non-life underwriting risk module shall reflect the risk arising from non-life insurance obligations, in relation to the perils covered and the processes used in the conduct of business.

It shall take into account of the uncertainty in the results of insurance and reinsurance undertakings related to the existing business as well as to the new business expected to be written over the following 12 months.

It shall be calculated, in accordance with point (2) of Annex IV, as a combination of the capital requirements for at least the following sub-modules:

- (a) the risk of loss, or of adverse change in the value of insurance liabilities, resulting from fluctuations in the timing, frequency and severity of insured events, and in the timing and amount of claim settlement (non-life premium and reserve risk);*

Delegated Regulation

78. Recital (43):

In order to avoid giving the wrong incentives to restructure long-term contracts as short-term renewable contracts, the volume measure for non-life and NSLT¹⁷ health premium risk used in the standard formula should be based on the economic substance of insurance and reinsurance contracts rather than on their legal form. The volume measure should, therefore, capture earned premiums

¹⁶ Directive 2009/138/EC of 25 November 2009 of the European Parliament and of the Council on the taking-up and pursuit of the business of Insurance and Reinsurance (Solvency II) (OJ L 335, 17.12.2009, p. 1)

¹⁷ Must be NSLT. It's an obvious typing error. The delegated regulation prescribes the premium risk for NSLT health insurance and not for SLT health insurance.

that are within the contract boundary of existing contracts and on contracts that will be written in the next 12 months.

79. Recital (45):

In relation to premium risk, the calculation of the capital requirement for non-life and health premium and reserve risk should be based on the larger of the past and the expected future earned premiums to take account of the uncertainty around the future earned premiums. However, where an insurance or reinsurance undertaking can reliably ensure that the future earned premiums will not exceed the expected premiums, the calculation should be based on the expected earned premiums only.

80. Article 115 (and 146): Non-life premium and reserve risk sub-module (and NSLT health premium and reserve risk sub-module)

The capital requirement for non-life premium and reserve risk shall be equal to the following:

$$SCR_{nl\ prem\ res} = 3 \cdot \sigma_{nl} \cdot V_{nl}$$

where:

(a) σ_{nl} denotes the standard deviation for non-life premium and reserve risk determined in accordance with Article 117;

(b) V_{nl} denotes the volume measure for non-life premium and reserve risk determined in accordance with Article 116.

Article 146 NSLT health premium and reserve risk sub-module

The capital requirement for NSLT health premium and reserve risk shall be equal to the following:

$$SCR_{(NSLT,pr)} = 3 \cdot \sigma_{NSLT_h} \cdot V_{NSLT_h}$$

where:

(a) σ_{NSLT_h} denotes the standard deviation for NSLT health premium and reserve risk determined in accordance with Article 148;

(b) V_{NSLT_h} denotes the volume measure for NSLT health premium and reserve risk determined in accordance with Article 147.

81. Article 116: Volume measure for non-life premium and reserve risk

1. *The volume measure for non-life premium and reserve risk shall be equal to the sum of the volume measures for premium and reserve risk of the segments set out in Annex II.*

2. *For all segments set out in Annex II, the volume measure of a particular segment s shall be equal to the following:*

$$V_s = (V_{(prem,s)} + V_{(res,s)}) \cdot (0,75 + 0,25 \cdot DIV_s)$$

where:

(a) $V_{(prem,s)}$ denotes the volume measure for premium risk of segment s ;

(b) $V_{(res,s)}$ denotes the volume measure for reserve risk of segment s ;

(c) DIV_s denotes the factor for geographical diversification of segment s .

3. For all segments set out in Annex II, the volume measure for premium risk of a particular segment s shall be equal to the following:

$$V_{(prem,s)} = \max[P_s; P_{(last,s)}] + FP_{(existing,s)} + FP_{(future,s)}$$

where:

(a) P_s denotes an estimate of the premiums to be earned by the insurance or reinsurance undertaking in the segment s during the following 12 months;

(b) $P_{(last,s)}$ denotes the premiums earned by the insurance or reinsurance undertaking in the segment s during the last 12 months;

(c) $FP_{(existing,s)}$ denotes the expected present value of premiums to be earned by the insurance or reinsurance undertaking in the segment s after the following 12 months for existing contracts;

(d) $FP_{(future,s)}$ denotes the expected present value of premiums to be earned by the insurance and reinsurance undertaking in the segment s for contracts where the initial recognition date falls in the following 12 months but excluding the premiums to be earned during the 12 months after the initial recognition date.

4. For all segments set out in Annex II, insurance and reinsurance undertakings may, as an alternative to the calculation set out in paragraph 3 of this Article, choose to calculate the volume measure for premium risk of a particular segment s in accordance with the following formula:

$$V_{(prem,s)} = P_s + FP_{(existing,s)} + FP_{(future,s)}$$

provided that the all of following conditions are met:

(a) the administrative, management or supervisory body of the insurance or reinsurance undertaking has decided that its earned premiums in the segment s during the following 12 months will not exceed P_s ;

(b) the insurance or reinsurance undertaking has established effective control mechanisms to ensure that the limits on earned premiums referred to in point (a) will be met;

(c) the insurance or reinsurance undertaking has informed its supervisory authority about the decision referred to in point (a) and the reasons for it.

For the purposes of this calculation, the terms P_s , $FP_{(existing,s)}$ and $FP_{(future,s)}$ shall be denoted in accordance with points (a), (c) and (d) of paragraph 3.

5. For the purposes of the calculations set out in paragraphs 3 and 4, premiums shall be net, after deduction of premiums for reinsurance contracts. The following premiums for reinsurance contracts shall not be deducted:

(a) premiums in relation to non-insurance events or settled insurance claims that are not accounted for in the cash- flows referred to in Article 41(3);

(b) premiums for reinsurance contracts that do not comply with Articles 209, 210, 211 and 213.

6. For all segments set out in Annex II, the volume measure for reserve risk of a particular segment shall be equal to the best estimate of the provisions for claims outstanding for the segment, after deduction of the amounts recoverable from reinsurance contracts and special purpose vehicles, provided that the

reinsurance contracts or special purpose vehicles comply with Articles 209, 210, 211 and 213. The volume measure shall not be a negative amount.

7. For all segments set out in Annex II, the default factor for geographical diversification of a particular segment shall be either 1 or calculated in accordance with Annex III.

82. Article 147: Volume measure for NSLT health premium and reserve risk

1. The volume measure for NSLT health premium and reserve risk shall be equal to the sum of the volume measures for premium and reserve risk of the segments set out in Annex XIV.

2. For all segments set out in Annex XIV, the volume measure of a particular segment s shall be equal to the following:

$$V_s = (V_{(prem,s)} + V_{(res,s)}) \cdot (0,75 + 0,25 \cdot DIV_s)$$

where:

(a) $V_{(prem,s)}$ denotes the volume measure for premium risk of segment s ;

(b) $V_{(res,s)}$ denotes the volume measure for reserve risk of segment s ;

(c) DIV_s denotes the factor for geographical diversification of segment s .

3. For all segments set out in Annex XIV, the volume measure for premium risk of a particular segment s shall be equal to the following:

$$V_{(prem,s)} = \max[P_s; P_{(last,s)}] + FP_{(existing,s)} + FP_{(future,s)}$$

where:

(a) P_s denotes an estimate of the premiums to be earned by the insurance or reinsurance undertaking in the segment s during the following 12 months;

(b) $P_{(last,s)}$ denotes the premiums earned by the insurance and reinsurance undertaking in the segment s during the last 12 months;

(c) $FP_{(existing,s)}$ denotes the expected present value of premiums to be earned by the insurance and reinsurance undertaking in the segment s after the following 12 months for existing contracts;

(d) $FP_{(future,s)}$ denotes the expected present value of premiums to be earned by the insurance and reinsurance undertaking in the segment s for contracts where the initial recognition date falls in the following 12 months but excluding the premiums to be earned during the 12 months after the initial recognition date.

4. For all segments set out in Annex XIV, insurance and reinsurance undertakings may, as an alternative to the calculation set out in paragraph 3, choose to calculate the volume measure for premium risk of a particular segment s in accordance with the following formula:

$$V_{(prem,s)} = P_s + FP_{(existing,s)} + FP_{(future,s)}$$

provided that all of the following conditions are met:

(a) the administrative, management or supervisory body of the insurance or reinsurance undertaking has decided that its earned premiums in the segment s during the following 12 months will not exceed P_s ;

(b) the insurance or reinsurance undertaking has established effective control mechanisms to ensure that the limits on earned premiums referred to in point (a) will be met;

(c) the insurance or reinsurance undertaking has informed its supervisory authority about the decision referred to in point (a) and the reasons for it.

For the purposes of this paragraph, the terms P_s , $FP_{(existing,s)}$ and $FP_{(future,s)}$ shall be denoted in accordance with points (a), (c) and (d) of paragraph 3.

5. For the purposes of the calculations set out in paragraphs 3 and 4, premiums shall be net, after deduction of premiums for reinsurance contracts. The following premiums for reinsurance contracts shall not be deducted:

(a) premiums in relation to non-insurance events or settled insurance claims that are not accounted for in the cash- flows referred to in Article 41(3);

(b) premiums for reinsurance contracts that do not comply with Articles 209, 210, 211 and 213.

6. For all segments set out in Annex XIV, the volume measure for reserve risk of a particular segment shall be equal to the best estimate for the provision for claims outstanding for the segment, after deduction of the amounts recoverable from reinsurance contracts and special purpose vehicles, provided that the reinsurance contracts or special purpose vehicles comply with Articles 209, 210, 211 and 213. The volume measure shall not be a negative amount.

7. For all segments set out in Annex XIV, the default factor for geographical diversification shall be either equal to 1 or calculated in accordance with Annex III.

2.3. Feedback statement on the main comments received to the discussion paper

Definition of $FP_{(future,s)}$

- a. Summary of the comments received

83. On the definition of the volume measure, the main issue under discussion was the gap that exists in the definition of one of the components of the volume measure, $FP_{(future,s)}$. The gap is defined by the exclusion of premiums to be earned during the 12 months after the initial recognition date of the contracts from this component.

84. The majority of the stakeholders acknowledged that the gap exists and should be corrected, however further adjustments should be made to the calculation of the volume measure in order to ensure consistency with the one year view assumption in the SCR calculation. By simply amending the gap from the volume measure it would imply a material increase of the non-life underwriting risk SCR and the referred consistency would no longer exist, according to several stakeholders. There are even a few stakeholders that support the current definition of the volume measure due to the risk of compromising this same consistency.

85. Some stakeholders even suggested that the component could be removed from the definition of the volume measure. The rationale for such removal is

the overestimation of the capital charge due to the application of the shock for several years (inappropriate for multi-year contracts and renewable annual contracts).

86. In order to fix the gap but at the same time keeping the one year view assumption in this calculation, some stakeholders proposed to change the calibration of the standard deviation to make it consistent with the envisaged result. The alternative is keeping the calibration and change the volume measure (assuming that the gap will be amended) to comply with that assumption.
87. There were other comments concerning the inconsistency between the scope of premium provision and that of SCR, the former only including existing business and therefore not recognizing the expected future profits from future business and the latter establishing additional capital to face risks arising from this future business.
88. A few stakeholders also asked for more clarity on the definition of "initial recognition date" since it could be interpreted either as the beginning of the coverage period or at the date the undertaking becomes a party to the contract that gives rise to the obligation. For instance if the renewal date is in the first day of each policy year and this is the interpretation of "initial recognition date", future premiums will be much lower than in a situation where this date is considered to be before the end of each policy year.
89. Some stakeholders raised concerns regarding amending the gap as it would introduce undesired variation in the volume measure and SCR throughout the year for contracts that are being renewed at a certain day or period in the year.

b. Assessment

90. On the removal of $FP_{(future,s)}$, the Solvency II Directive clearly sets out that future business should be reflected in the SCR calculation, therefore the removal would be difficult to reconcile with the requirements of the Solvency II Directive.
91. On the possibility of introducing an adjustment factor to the volume measure (once the gap is removed) and this way keeping some consistency with the one year view in the calculation of the premium risk capital charge, EIOPA considers that this is one appropriate way to proceed especially since it would not require changing the calibration for this specific purpose.
92. The calibration is based on earned premiums exposure and therefore not sensitive to the different types of risk that each component of the volume measure should represent i.e. it covers all sources of sub-risks arising from premium risk. An adjustment factor that would be applied to $FP_{(future,s)}$ reduce the weight of this component in the volume measure. The sources of risks that this component is exposed to in the scope of the calculation of the SCR and the proposed factor are discussed in the "analysis" part.
93. On the concept of "initial recognition date": EIOPA discusses this concept in the "analysis" part.

94. On the variation of the volume measure throughout the year: EIOPA also discusses this point below in the “analysis” part.

Risk-sensitivity of the volume measure

a. Summary of the comments received

95. The main issue under the discussion of the risk-sensitivity of the volume measure was the situation where an undertaking with lower and inadequate premiums will have a lower capital charge than an undertaking with higher and adequate premiums. A higher level of prudence in relation to premiums will usually lead to higher capital requirements.

96. In the discussion paper most of the stakeholders supported the idea of reviewing the definition of volume measure for decreasing their dependency on pricing strategy. Some stakeholders warned that method with lower dependency on pricing strategy could lead to additional complexity.

97. There were comments concerning the discrepancy between life and non-life standard formula calculation stemming from the fact that the SCR for life underwriting risk is calculated on base of risk premium while for non-life business it is calculated on base of gross premiums and thus depends heavily on pricing strategy as well as on level of commission included in gross premium which creates arbitrage opportunity.

98. Stakeholders proposed different methods for decreasing dependency on pricing strategy such as adjust or replace volume measure or adjust final SCR or own funds.

99. To adjust volume measure, different ratios (e.g. claims ratio, loss ratio, combined ratio, operational ratio, combined operation ratio) using historical data or future estimates were proposed to remove prudence margin from the volume measure or to decrease volume measure for commission.

100. Some stakeholders proposed to replace premiums as a volume measure with exposure units or with claims incurred or with risk premium or with cash out-flow.

101. A supplementary issue under the discussion of the risk-sensitivity of the volume measure was a question if there are any other issues regarding the definition of volume measure for premium risk.

102. Some stakeholders highlighted that the formula for calculating volume measure in Article 116(3) of the Delegated Regulation does not take into account potential significant economic impact of increasing cession and that the use of past 12 months’ premiums as a minimum cannot be justified because it decreases risk sensitivity.

103. The issues regarding long duration policies or multi-year policies were mentioned from some stakeholders. Volume measure for multi-year policies can reach a multiple of annual earned premium. They highlighted that diversification effects over time and cancellation options in case of claims of long duration are not properly considered.

104. Some stakeholders proposed that the volume measure should take into account loss absorbing effects of variable commission which may absorb the volatility of losses.
105. Some stakeholders highlighted that the volume measure has an element of double counting with natural catastrophe model as premium entered will have loadings for loss arising from natural catastrophe perils.
106. One stakeholder highlighted that Articles 116(3)(c), 116(3)(d), 147(3) and 147(3)(d) of the Delegated regulation are ambiguous and not precisely defined because they do not incorporate the idea of the Recital 43 that standard formula should capture earned premiums that are within the contract boundary of existing contracts and on contracts that will be written in the next 12 months.
107. One stakeholder required consistency between balance sheet and capital charge definition due to the gap between the perimeter of premiums underlying the assessment of the SCR and the perimeter of premiums underlying the assessment of the best estimate.
108. Some stakeholders highlighted that projection factor has increased from 2.58 to 3, which increase the capital requirements by approximately 16.3%.

b. Assessment

109. EIOPA considers methods which proposed adjustment of volume measure with different ratios as not appropriate because expected losses and profits are not to be recognised under the standard formula and they will make the calculations more complex.
110. Adjusting the volume measure with future estimates or replacing premiums as volume measure changes the volume measure which was used for calibration. EIOPA considers proposed methods as methods which require the recalibration of the standard parameters used in standard formula. Additionally, future estimates are not objective and increase complexity of standard formula from undertaking and supervision prospective.
111. Increasing complexity of the standard formula is not in line with EIOPA's goal which is not to add undue complexity to the standard formula calculation.
112. Discrepancy between life and non-life standard formula is because life risks are assessed using scenario based approach and non-life risks are assessed using factor based approach. At this stage EIOPA intention is not to fundamentally change the method of calculating capital requirements of premium risk and implement risk premium or other exposures which requires scenario based approach to calculate capital requirements.
113. EIOPA considers that the Delegated Regulation enables to take into account potential significant economic impact of increasing cession. EIOPA believes that in such events undertakings may, in accordance with Articles 116(4) and 147(4) of the Delegated Regulation, use only the estimate of the premiums

to be earned by the undertaking during the following 12 months (P_s) instead of the minimum of the estimate of the premiums to be earned by the undertaking during the following 12 months (P_s) and the earned premiums during the last 12 months ($P_{last,s}$). In case where net earned premiums during the following 12 months (P_s) are lower compared to net earned premiums during the last 12 months ($P_{last,s}$) as result of increased cession, undertakings should in fact establish effective control mechanisms to ensure that net earned premiums during the following 12 months will not exceed P_s . Besides establishing effective control and taking the decision that net earned premiums during the following 12 months will not exceed P_s the undertaking has to inform its supervisory authority about the decision and the reasons for it to apply Articles 116(4) or 147(4) of the Delegated Regulation. Stakeholder's suggestion requires recalculation of net earned premiums during the last 12 months ($P_{last,s}$) to new cession. EIOPA does not support the recalculation of the net earned premiums during the last 12 months ($P_{last,s}$) because these are the only values in the formulas in the Articles 116(3) and 147(3) of the Delegated Regulation which could be verified and supervised off-site.

114. EIOPA disagrees with the statement of stakeholders that diversification effects over time and cancelation options in case of claims of long duration are not properly considered. Diversification effects over time and cancelation options are taken into account in the value of expected present value of premiums to be earned by the undertakings (Article 116(3)(c) and (d) of the Delegated Regulation).
115. Loss absorbing effects of variable commission are contract specific and could not be part of general standard formula. Undertakings could take into account variable commission through using partial internal models.
116. Double counting was taken into account and excluded in the process of calibrating standard deviations for non-life premium and reserve risk.
117. Removing the difference between the perimeter of premiums underlying the assessment of the SCR and the perimeter of premiums underlying the assessment of the best estimate is not in line with the Solvency II Directive which prescribes that uncertainty in the results of undertakings shall relate to the existing and new business expected to be written over the following 12 months.

2.4. Advice

2.4.1. Previous advice

118. CEIOPS-DOC-67/10 "Calibration of non-life underwriting risk"¹⁸.

¹⁸ https://eiopa.europa.eu/CEIOPS-Archive/Documents/Advices/CEIOPS-DOC-67-10_L2_Advice_Non_Life_Underwriting_Risk.pdf

2.4.2. Analysis

Definition of non-life underwriting risk

119. The Solvency II regulation for the non-life and health underwriting risks consists of two elements:

- Premium risk;
- Reserve risk.

120. For reserve risk an undertaking assesses the extent to which best-estimate of the provision for claims outstanding at the beginning of a period plus the payments made to policyholders during that period deviate from the best-estimate of these contracts at the end of that period.

121. The definition of the risk measure for reserve risk is out of scope for this advice.

Different types of loss in premium and reserve risk

122. Premium risk arises when insurance obligations from policies exceed premiums thereof. Article 105(2) (second paragraph) of the Solvency II Directive refers that the SCR "*shall take account of the uncertainty in the results of insurance and reinsurance undertakings related to the existing insurance and reinsurance obligations as well as to the new business expected to be written over the following 12 months*". It clarifies that both existing and new business should be covered in the SCR calculation.

123. Recital 43 of the Delegated Regulation further refers that "*in order to avoid giving the wrong incentives to restructure long-term contracts as short-term renewable contracts, the volume measure for non-life and SLT health premium risk used in the standard formula should be based on the economic substance of insurance and reinsurance contracts rather than on their legal form. The volume measure should, therefore, capture earned premiums that are within the contract boundary of existing contracts and on contracts that will be written in the next 12 months*".

124. It can be interpreted that premium risk can give rise to expected and unexpected losses, as explained below:

- **Expected loss:** an undertaking knows upfront that premiums are insufficient to cover the expected payments on the insurance contract, e.g. underpricing of insurance policies;
- **Unexpected loss:** an undertaking experiences higher payments than the premiums due to adverse development of underwriting risk. There are two types of unexpected loss:
 1. permanent rise in costs e.g. inflation, change in legal environment;
 2. temporary rise in costs e.g. large event.

125. We discuss below which risks are included in each component of the volume measure for premium risk. Unexpected risk 1 covers unexpected increase in claim and expense costs that takes place during the following 12 months and has an influence also after that. Unexpected risk 2 in turn would

cover all other unexpected changes in cost of claims or expenses during the following 12 months. In non-life insurance the later would typically be the main source of volatility in the underwriting result for short term-business. Unexpected risk 1 would have a different impact on the volatility depending on the duration of the contract.

126. The next step is to try to understand how both losses can be considered in the scope of SCR calculation.

127. According to Article 101(3) of the Solvency II Directive the SCR "*shall cover existing business, as well as the new business expected to be written over the following 12 months. With respect to existing business, it shall cover only unexpected losses".*

Composition of the volume measure

128. The volume measure for non-life premium risk is given by the sum of the following 3 items:

1. P_s denotes an estimate of the premiums to be earned by the insurance or reinsurance undertaking in the segment s during the following 12 months. The claims corresponding to these premium would affect the own funds in the Solvency II balance-sheet over the year to come. P_s consists of the following parts:
 - a. unearned premiums from year t minus unearned premiums thereof at the end of year $t+1$
 - b. premiums written during year $t+1$ minus unearned premiums thereof at the end of year $t+1$

Since "a" represents existing business, only unexpected risks are to be taken into account.

Since "b" represents new business all risks are taken into account.

2. $FP_{(existing,s)}$ denotes the expected present value of premiums to be earned by the insurance or reinsurance undertaking in the segment s after the following 12 months for existing contracts. It corresponds to the part of the best estimate of premium provisions for existing contracts that will be calculated at the end of the 1-year horizon: this best estimate will affect the own funds of the Solvency II balance-sheet. $FP_{(existing,s)}$ is zero for one-year contracts.

It represents existing business, so expected losses should not be taken into account. Once the exposure relates to the risks arising after the next 12 months, the only source of unexpected losses that should be taken into account is permanent rise in costs.

3. $FP_{(future,s)}$ denotes the expected present value of premiums to be earned by the insurance and reinsurance undertaking in the segment s for contracts where the initial recognition date falls in the following 12 months but excluding the premiums to be earned during the 12 months after the initial recognition date. It corresponds to the part of the best estimate of

premium provisions for future contracts that will be calculated at the end of the 1-year horizon: this best estimate will affect the own funds of the Solvency II balance-sheet.

It incorporates new business and therefore expected losses are taken into account. Also unexpected losses are included, again those permanent rise in costs.

129. The pictures below sum up the different components of the volume measure given an existing policy at the beginning of year t (A) and a new policy issued during that year (B).

Figure 2.1: contracts with period longer than 1 year



Figure 2.2: 1-year insurance contract with initial recognition during the year

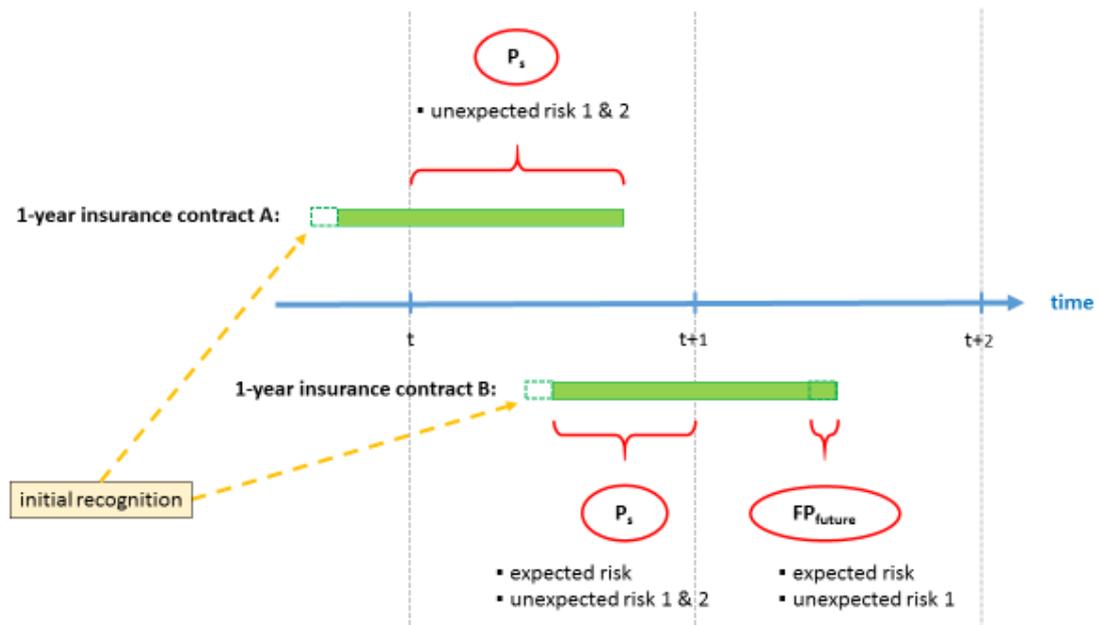
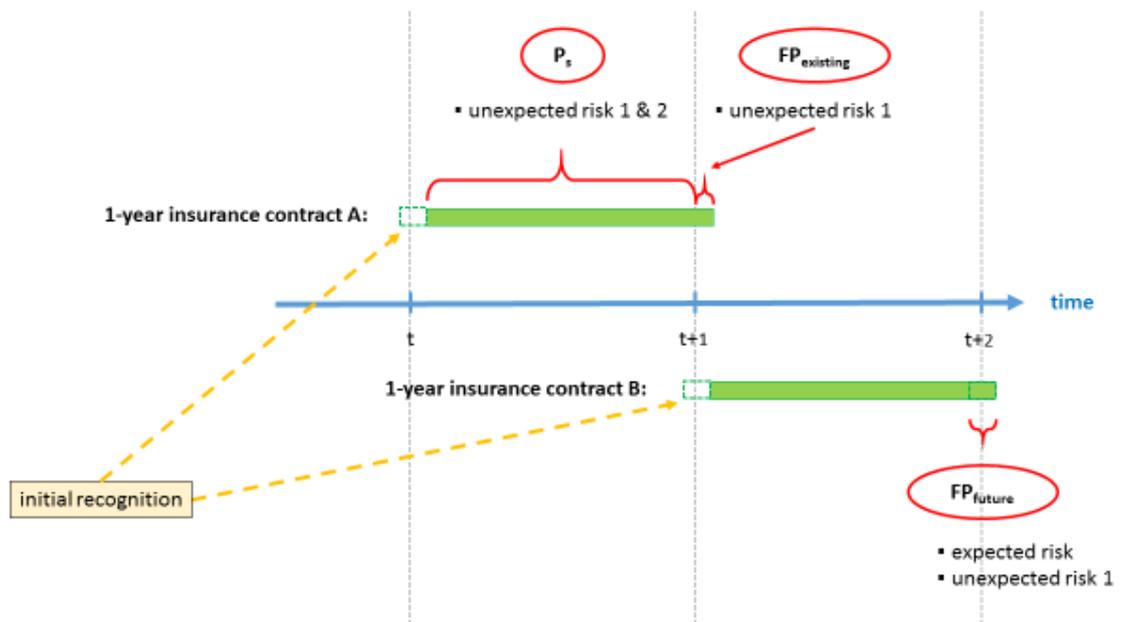


Figure 2.3: 1-year insurance contract with initial recognition towards the end of the year



Materialization of the risks in the Solvency II balance sheet

130. Several stakeholders pointed out in their feedback to the discussion paper that while for existing business the expected profit on future premiums is considered in the balance sheet (through the valuation of premium provisions) this does not hold for new business whereas the unexpected losses arising from it should be reflected in the SCR.

131. Next it is explained how premium risk materializes by each source of risks in relation to each component of the volume measure.

P_s (existing business (policy A))

Unexpected risk 1

- “permanent” increase in costs and expenses during the following 12 months (less premiums earned) exceeds the respective estimate in the premium provision at (t)

Unexpected risk 2

- “temporary” costs and expenses during the following 12 months (less premiums earned) exceed the respective estimate in the premium provision at (t)

$FP_{(existing,s)}$ (policy A)

Unexpected risk 1

- premium provision relating to this business at the end of the 12 months period (t+1) exceeds the respective estimate in the premium provision at (t)

P_s (future business (policy B))

Expected risk

- Realised value of costs and expenses during the following 12 months exceed the expected value of the respective premiums to be earned for that period

Unexpected risk 1

- Increase of “permanent” costs and expenses during the following 12 months in relation to the respective share of premiums to be earned for that period

Unexpected risk 2

- Increase of “temporary” costs and expenses during the following 12 months in relation to the respective share of premiums to be earned for that period

$FP_{(future,s)}$ (policy B)

Expected risk

- Expected value of costs and expenses after the following 12 months in relation to this future business exceed the expected value of the respective premiums to be earned after that period (this is not recognized in the balance sheet)

Unexpected risk 1

- Increase of “permanent” costs and expenses during the following 12 months and therefore affecting the period after the next 12 months, in relation to the respective share of future premiums to be earned after that period (having a higher premium provision in relation to this component than could be expected despite this expectation is not recognized in the balance sheet)

Contribution of premiums beyond next year to the volume measure

132. $FP_{(existing,s)}$ becomes positive and adds to the current Solvency II volume measure for two reasons:

- contracts provide coverage over a period longer than one year;
- an undertaking is already part of a one-year contract for which the coverage period has not yet started.

133. $FP_{(future,s)}$ becomes positive and adds to the current Solvency II volume measure for two reasons:

- contracts expected to be written provide coverage over a period longer than one year;
- an undertaking becomes part of a one-year contract in the coming 12 months, and the coverage starts later than the initial recognition date.

Calibration of the standard deviations for premium and reserve risks

134. For the initial calibration of premium risk in Solvency II CEIOPS¹⁹ has compared the premiums earned of European (re-)insurance undertakings for several different lines of business with the corresponding payments and remaining provisions for these risks. These comparisons were done per book year of earned premiums, such that a distribution and the corresponding volatility of the difference between these earned premiums and actual payments are calibrated.

135. The data used for the calibration compares the premiums earned in a single year with the claim payments for events in that specific year. In the calibration data multi-year contracts are thus split over multiple years of earned premiums and corresponding claim payments for events in that year.

136. The calibration of the premium risk factors does not differentiate between expected and *unexpected risks 1 and 2*.

137. In order to be in line with the calibration, the capital requirement for the period beyond the following 12 months should be lower than the one used for the following 12 months, due to the absence of *unexpected risk 2*. That means that the capital charges related to $FP_{(existing,s)}$ and $FP_{(future,s)}$ should be adjusted appropriately. This is in particular material for the $FP_{(future,s)}$ term, since $FP_{(existing,s)}$ is relevant mainly in case of multi-year contracts, which are

¹⁹ EIOPA does exactly the same exercise for the recalibration of premium and reserve risk for several selected lines of business in this advice.

fewer than shorter contracts. For multi-year contract, one would expect that an increase in “permanent” costs (i.e. *unexpected risk 1*) would have a bigger impact than on one-year contracts. Therefore the adjustment to the capital charges for $FP_{existing}$ appears less relevant than for $FP_{(future,s)}$.

138. In the rest of this section, we discuss two ways to reflect the lower risk associated with $FP_{(future,s)}$:

- Keeping the “gap” in the premiums (i.e. no change compare to the current Delegated Regulation);
- Having no gap but multiplying $FP_{(future,s)}$ by an adjustment factor *Alpha* that is lower than 1.

Option 1: no change to $FP_{(future,s)}$

139. Article 116(3)(d) provides that $FP_{(future,s)}$ “denotes the expected present value of premiums to be earned by the insurance and reinsurance undertaking in the segment *s* for contracts where the initial recognition date falls in the following 12 months but excluding the premiums to be earned during the 12 months after the initial recognition date.”

140. The exclusion of the premiums to be earned during the 12 months after the initial recognition introduces a gap in the premiums that contribute to FP_{future} . This gap reduces the amount of premiums in this term, hence it decreases the risk associated with $FP_{(future,s)}$.

141. The effect of the gap is relatively different for 1-year or multi-year contracts:

- For a 1-year (new) contract with initial recognition date and the beginning of insurance cover on 1st October, a calculation of the volume measure on 31st December results in:
 - $FP_{(future,s)}$ equals to 0 month of premium
 - P_s equals to 3 months of premium
 - and a volume measure of 3 months of premium

142. Therefore, the contribution of $FP_{(future,s)}$ to the volume measure is 0%.

- For a 2 years (new) contract with initial recognition date and the beginning of insurance cover on 1st October, a calculation of the volume measure on 31st December results in
 - $FP_{(future,s)}$ equals to 12 month of premium
 - P_s equals to 3 months of premium
 - and a volume measure of 15 months of premium

143. Therefore, the contribution of $FP_{(future,s)}$ to the volume measure is 80%.

144. This difference may again be interpreted as a difference in the materiality of *unexpected risk 1*: permanent increases in costs have a more material impact on multi-year policies.

Option 2: removing the gap and introducing an adjustment factor in $FP_{(future,s)}$

145. EIOPA considers changing the definition of $FP_{(future,s)}$ as follows: “denotes the expected present value of premiums to be earned by the insurance and reinsurance undertaking in the segment s for contracts where the initial recognition date falls in the following 12 months but excluding the premiums to be earned during the following 12 months”. This would remove the gap in the current definition.

146. As explained above, an adjustment factor $Alpha$ would then be introduced such that the definition of the volume measure for premium risk would be:

$$V_{(prem,s)} = \max[P_s; P_{(last,s)}] + FP_{(existing,s)} + \alpha \cdot FP_{(future,s)}$$

147. With $Alpha$ smaller than 1 to reflect the smaller risk associated with $FP_{(future,s)}$.

148. For the purpose of calibrating $Alpha$, a specific data request to undertakings was launched in order to gather data on the amounts of each component of the premium risk volume measure (only the aggregate result is reported by the QRTs) and the assessment of FP_{future} under the assumption that there would be no gap in its definition.

149. The following table provides an assessment of the impact in introducing different $Alphas$:

Alpha	Average impact on the volume measure in percentages
100%	+24%
90%	+20%
80%	+17%
70%	+13%
60%	+9%
50%	+6%
40%	+2%
30%	-2%
20%	-5%
10%	-9%
0%	-12%

150. The impact per line of business varies depending on the mix between 1-year contracts and multi-year contracts.

151. The table below shows the impacts per lines of business of the impacts on the volume measure if we fix $Alpha$ from 0% to 100% by increasing it by 10 basis points.

Line of business	Average impact on the volume measure in percentages for an Alpha of 30%
Assistance	+6%
Credit and Suretyship	+3%
Fire and other property damage	+2%
Income protection insurance and proportional reinsurance	+2%
Legal expenses	-2%
Marine, aviation, transport (MAT)	+4%
Medical expenses insurance and proportional reinsurance	+3%
Miscellaneous	+1%
Motor vehicle liability	+6%
Motor, other classes	+5%
Non-proportional reinsurance casualty	0%
Non-proportional reinsurance MAT	-1%
Non-proportional reinsurance property	+2%
Third-party liability	+3%
Workers' compensation insurance and proportional reinsurance	+5%

152. Given the limitations on the data requested for this purpose, there is still **work in progress concerning the data cleaning** and understanding of some unexpected behaviors shown in the data.²⁰ Once the data is completely validated, the final impacts will be derived and compared to the ones presented above.

153. Considering the results of this impact assessment it is possible to conclude that, in general, an adjustment factor ranging from 20% to 40% seems reasonable. Below, we set *Alpha* at 30% as **a proposal for discussion only** and analyze it in more detail. **It is important to note that further data cleaning may result in a different Alpha, either higher or lower.**

154. The effect of the adjustment factor would provide for the following difference between 1-year and multi-years contracts. With *Alpha* equals to 30%:

²⁰ This is the case for the LoB non-proportional health reinsurance.

- For a 1-year (new) contract with initial recognition date and the beginning of insurance cover on 1st October, a calculation of the volume measure on 31st December results in:
 - $FP_{(future,s)}$ equals to 9 months of premium
 - $Alpha \times FP_{(future,s)}$ equals to 2.7 months of premium
 - P_s equals to 3 months of premium
 - and a volume measure of 5.7 months of premium

155. Therefore, the contribution of $FP_{(future,s)}$ to the volume measure is 47%.

- For a 2 years (new) contract with initial recognition date and the beginning of insurance cover on 1st October, a calculation of the volume measure on 31st December results in
 - $FP_{(future,s)}$ equals to 21 months of premium
 - $Alpha \times FP_{future}$ equals to 8.4 months of premium
 - P_s equals to 3 months of premium
 - and a volume measure of 11.4 months of premium

156. Therefore, the contribution of $FP_{(future,s)}$ to the volume measure is 74%.

157. The introduction of an adjustment factor *Alpha* treats the risk stemming from 1-year policies and multi-year policies in a uniform way. It also avoids cut-off effects due to the gap (differences are smoothed).

Definition of initial recognition date

158. Questions were raised as to when one should recognise contracts contributing to $FP_{(future,s)}$.

159. As explained earlier, this term is linked to the part of the best estimate of premium provisions for future contracts that will be calculated at the end of the 1-year horizon: the best estimate will affect the own funds of the Solvency II balance-sheet.

160. The initial recognition date is therefore to be interpreted in the same way as initial recognition date for best estimate calculation purposes: Article 17 of the Delegated Regulation applies. The initial recognition date is the date at which *"the undertaking becomes a party to the contract that gives rise to the obligation or the date the insurance or reinsurance cover begins, whichever date occurs earlier."*

161. In accordance with this definition, the initial recognition date of the obligations stemming from renewals is generally the advance notice date. When such a contract is renewed, it should be treated as a new contract for the calculation of the volume measure and hence contribute to $FP_{(future,s)}$. This applies also to new contracts written during the following year. For instance, if a new contract is written in January of year t+1 and if there is a 3-months advance notice, then this contract may be renewed in October t+1 and the renewal should contribute to $FP_{(future,s)}$.

162. Recognising contracts at the time of the advance notice date has some implications. Depending when the notification date takes place compared to the beginning of the insurance cover the impact on the volume measure can be more or less material. The time period between the advance notification

and the beginning of the contract can be different depending on the Member State since it depends on insurance contract law and specific terms and conditions, which in turn has a consequence on the risk exposure.

163. In the Delegated Regulation existing insurance or reinsurance contract is defined as an insurance or reinsurance contract for which insurance or reinsurance obligations have been recognised. This implies that, if an undertaking has become a party to a contract before year $t+1$, the contract may contribute to $FP_{(existing, s)}$ even if insurance cover begins only during year $t+1$.

164. Since the recognition date is a single point in time across the year, the outcome of the volume measure calculation may vary along the year. See examples below.

Impact of options on FP_{future}

165. We discuss below the case of 1-year contract where the initial recognition date is on 1st January and where there is no advance notification. We compare the two options where there is no change to the definition of FP_{future} (option 1) and where the gap is removed (option 2). In the latter an adjustment factor of 30% is assumed to be used.

166. Let's consider an annually renewable 1-year insurance contract with renewal date on 1st January and there is no advance notification.

Option 1: no change to $FP_{(future, s)}$

167. With the current definition, $FP_{(future, s)}$ equals 0 throughout the year. P_s is always equal to 12 months of premium, therefore the volume measure is stable throughout the year.

Option 2: removing the gap and introducing an adjustment factor of 30% in $FP_{(future, s)}$

168. The volume measure consists of two parts: P_s and $FP_{(future, s)}$.

169. P_s would equal 12 months' earned premiums regardless of the time of the calculation. Earned premiums for the following 12 months calculated at the end of month M in year t would be a combination of

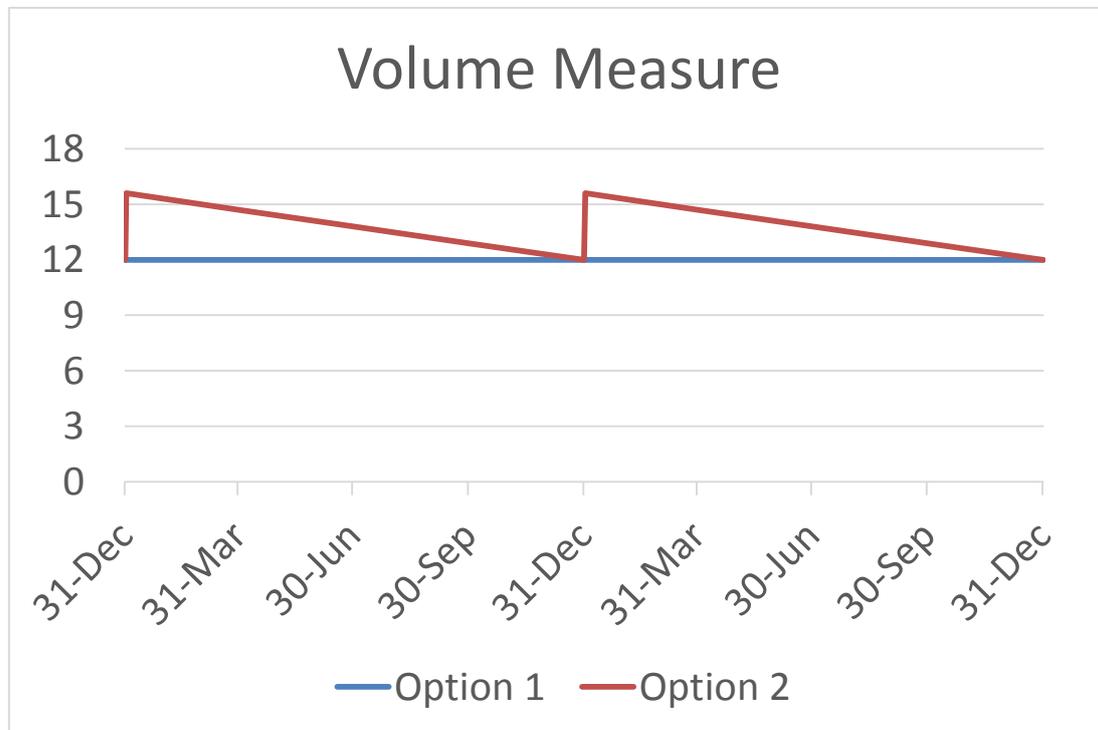
- earned premiums for existing contracts from the beginning of month M+1 until the end of year t
- earned premiums for the renewed contracts from the beginning of year t+1 until the end of month M.

170. $FP_{(future, s)}$ would be different depending on the date of calculation. Earned premiums for the renewals in year t+1 are included in P_s for the following 12 months. Therefore $FP_{(future, s)}$ consists only of

- earned premiums for the renewed contracts from the beginning of month M+1 in year t+1 until the end of year t+1 multiplied by the adjustment factor 30%.

171. This means that $FP_{(future, s)}$ reaches its peak at the beginning of the calendar year and gradually decreased to zero at the end of the year. This reflects the change in the risk exposure of the undertaking during the following 12 months.

172. The following graph illustrates the development of $FP_{(future, s)}$ depending on time of calculation.



Volume measure and contract boundaries

173. A question often raised is how $FP_{existing}$ and FP_{future} should be calculated and which time horizon should be considered for the projection of the respective premiums.

174. Recital 43 of the Delegated Regulation provides that the volume measure should “capture earned premiums that are within the contract boundary of existing contracts and on contracts that will be written in the next 12 months”. This clarifies that contract boundary Articles apply exactly in the same way either for existing business or for future contracts once they are recognized (i.e. after their recognition date, they contribute to the volume measure up to their contract boundary).

175. This is also consistent with the risk that these terms are capturing, since they correspond to the risk of the best estimate of premium provisions affecting in an adverse manner the own funds of the Solvency II balance-sheet.

2.4.3. EIOPA's advice

Definition of $FP_{(future,s)}$

176. EIOPA considers two different options for defining FP_{future} :

- Option 1: no change to $FP_{(future,s)}$
- Option 2: removing the gap and introducing an adjustment factor of 30% in $FP_{(future,s)}$

177. EIOPA would welcome stakeholders feedback on these two options, taking in particular into account:

- Difference between 1-year and multi-year contracts;
- The stability of the volume measure and its reflection of the risk exposure, taking into account Article 17 of the Delegated Regulation.

3. Recalibration of mortality and longevity risks

3.1. Call for advice

178. EIOPA is asked to assess:

The standard parameters for mortality and longevity risk in the life and health underwriting modules, which should be assessed for their continued appropriateness. EIOPA is also asked to investigate more granular approaches for longevity risk, with a view to a calibration differentiated by age groups. EIOPA is asked to assess the costs and benefits of these more granular approaches, in particular in view of their risk sensitivity and complexity.

3.2. Legal basis

179. Article 105(3) of the Solvency II Directive:

The life underwriting risk module shall reflect the risk arising from life insurance obligations, in relation to the perils covered and the processes used in the conduct of business.

It shall be calculated, in accordance with point (3) of Annex IV, as a combination of the capital requirements for at least the following sub- modules:

(a) the risk of loss, or of adverse change in the value of insurance liabilities, resulting from changes in the level, trend, or volatility of mortality rates, where an increase in the mortality rate leads to an increase in the value of insurance liabilities (mortality risk);

(b) the risk of loss, or of adverse change in the value of insurance liabilities, resulting from changes in the level, trend, or volatility of mortality rates, where a decrease in the mortality rate leads to an increase in the value of insurance liabilities (longevity risk);

180. Articles 137-138 and 152-153 of the Delegated Regulation: (Health) mortality risk sub-module and (Health) longevity risk sub-module.

3.3. Feedback statement on the main comments received to the discussion paper

Model selection

a. Main comments from stakeholders

181. Most stakeholders were in favour of using a Lee-Carter model. According to them, it is a well-known model often applied in the insurance industry. Other stakeholders suggested using as well another model to take account of cohort effects. The Cairns-Blake-Dowd model was provided as a possible alternative to compensate for the shortcomings of the Lee-Carter model. A combination of several models could be used to take into account model and parameter risks.

182. Some stakeholders suggested applying some level of prudence to take account of parameter and model risk.

a. Assessment

183. EIOPA has chosen to implement the Lee-Carter and the Cairns-Blake-Dowd models as a way to take into account model risk.

Data selection

a. Main comments from stakeholders

184. Stakeholders confirmed that the Human Mortality Database is a reliable source of data to calibrate mortality models. They also suggested that the data be complemented by other source of information using national specific database.

185. Stakeholders agreed that the mortality rates of the general population differ from the ones the insured population. However there is no consensus stemming from comments that mortality rates of the general population are higher or lower.

b. Assessment

186. EIOPA confirms its intention to use the Human Mortality Database (HMD) as one of the most reliable source of information for different countries. The use of this unique set of data has the advantage that all data are in the same format and procedures can be automated. EIOPA has also asked NSAs for national specific mortality tables but, in the end, has chosen to rely on the HMD.

187. Since EIOPA did not have access to insured population data, it has considered that the mortality rates are the same as the ones observed in the general population.

Derivation of stress factors and granularity of the stresses

a. Main comments from stakeholders

188. Most of stakeholders agreed with the methodology used by EIOPA in its discussion paper (EIOPA-CP-16/008) to derive longevity stresses.

189. Most of stakeholders seem to be in favour of more granular stresses, for instance per age group. However all did not agree and some expressed their preference for keeping the current design of the standard formula.

b. Assessment

190. EIOPA used the discussion paper methodology to derive mortality and longevity stresses.

191. EIOPA discusses the costs and benefits of using a more granular approach.

3.4. Advice

3.4.1. Previous advice

192. CEIOPS-DOC-42/09: "Life underwriting risk"²¹

3.4.2. Analysis

Life expectancy approach

193. Life insurance portfolios are in general undertaking specific. The nature of the insured population as well as the nature of the products in such portfolios do vary over different insurance undertakings. As a result the liabilities for such portfolios do vary and show different sensitivities with respect to mortality characteristics, cash flows patterns and interest rates used for discounting.

194. Mortality sensitivity can be measured by changes in life expectancies.

195. Define $q_x(t)$ to be the 1-year death rate, i.e. the probability that someone alive at January 1st of year t and who was born on January 1st of year $t-x$, has died before January 1st of year $t+1$.

196. Now given a series of (projected) mortality rates:

$$q_x(t), q_{x+1}(t+1), q_{x+2}(t+2), \dots$$

the expected future **cohort** life time at time t for age x is defined as:

$$e_x(t) = \frac{1}{2} + \sum_{k=1}^{\infty} \prod_{s=0}^{k-1} (1 - q_{x+s}(t+s))$$

197. Note that:

$$\begin{aligned} \prod_{s=0}^{k-1} (1 - q_{x+s}(t+s)) &= (1 - q_x(t))(1 - q_{x+1}(t+1)) \cdot \dots \cdot (1 - q_{x+k}(t+k-1)) \\ &= p_x(t)p_{x+1}(t+1) \cdot \dots \cdot p_{x+k}(t+k-1) = {}_k p_x(t) \end{aligned}$$

Or the k -year survival probability for a life aged x at time t .

198. Substituting this into the expression for $e_x(t)$ we arrive at:

$$e_x(t) = \frac{1}{2} + \sum_{k=1}^{\infty} {}_k p_x(t)$$

²¹ <https://eiopa.europa.eu/CEIOPS-Archive/Documents/Advices/CEIOPS-L2-Final-Advice-on-Standard-Formula-Life-underwriting-risk.pdf>

199. The **period** life expectancy is based on (observed) mortality rates within a period of one calendar year. By combining such mortality rates to calculate the life expectancy, one arrives at the period life expectancy. As a single life can only take one specific age in a single calendar year it is more logical to combine mortality rates in consecutive (future) calendar years to arrive at the **cohort** life expectancy.

200. The expected future **period** life time at age x is based on a similar formula, however uses a series of observed mortality rates in year t , i.e. $q_x(t)$, $q_{x+1}(t)$, $q_{x+2}(t)$, ..., and hence does not take into account future mortality rate improvements.

201. Given the definition of the expected future cohort lifetime at time t for age x it is straightforward to show the effect of an instantaneous decrease of 20% in mortality rates as currently applied in the standard formula for longevity risk, i.e.

$$e_x^{shocked}(t) = \frac{1}{2} + \sum_{k=1}^{\infty} \prod_{s=0}^{k-1} (1 - 0.8 \times q_{x+s}(t+s))$$

202. Estimating up-to-date cohort life expectancies requires estimates of current mortality rates as well as future developments of these rates, i.e. level and trend. Therefore a suitable stochastic mortality model is needed which appropriately captures these mortality rate characteristics.

Stochastic mortality models

203. Many common mortality models can be expressed in the standard framework of generalized linear or non-linear models comprising of four components:

1. A random component capturing the statistical behaviour of the number of deaths in the model;
2. A systematic component or predictor capturing the effects of age, calendar year and year-of-birth;
3. A link function associating the random component and the systematic component;
4. A set of parameter constraints as most stochastic mortality models are only identifiable up to a transformation and therefore require parameter constraints to ensure unique parameter estimates.

204. To demonstrate the proposed methodology two commonly used mortality models will be used. The results of both models will be combined to incorporate to some extent the effects of model risk.

205. The models used are the Lee Carter model and the Cairns-Blake-Dowd (CBD) model.

206. For both models the random component will be based on the Binomial distribution, i.e. the number of deaths of age x in calendar year t - $D_x(t)$ - follow the Binomial distribution:

$$D_x(t) \sim \text{Binomial}(E_x(t), q_x(t))$$

where $E_x(t)$ is the initial exposed to risk at age x in year t .

207. Note that:

$$\mathbb{E} \left[\frac{D_x(t)}{E_x(t)} \right] = q_x(t)$$

208. For the Lee Carter model the systematic component is defined as:

$$\eta_x(t) = a_x + b_x k_t$$

Where:

$$k_t = k_{t-1} + \theta + \varepsilon_t \quad \text{with } \varepsilon_t \sim N(0, \sigma^2)$$

209. For the CBD model the systematic component is defined as:

$$\eta_x(t) = k_{1t} + (x - \bar{x})k_{2t}$$

Where:

$$k_{it} = k_{it-1} + \theta_i + \varepsilon_{it}, \quad i=1,2 \quad \text{with } \begin{pmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{pmatrix} \sim N \left(\begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \sigma_1^2 & \sigma_{12} \\ \sigma_{12} & \sigma_2^2 \end{pmatrix} \right)$$

210. For both models the logit link function will be used, i.e.

$$\eta_x(t) = g \left(\mathbb{E} \left[\frac{D_x(t)}{E_x(t)} \right] \right) = g(q_x(t)) = \ln \left(\frac{q_x(t)}{1 - q_x(t)} \right) \Leftrightarrow q_x(t) = \frac{e^{\eta_x(t)}}{1 + e^{\eta_x(t)}}$$

211. As the CBD model is fully identifiable we don't need any restrictions on the parameters. However as the Lee Carter model is not fully identifiable we used the following parameter constraints to arrive at unique parameter estimates:

$$\sum_x b_x = 1, \quad \sum_t k_t = 0.$$

Data selection and estimation

212. For the current calibration, mortality data at the total level (males and females together) has been used from the Human Mortality Database (HMD) for the following countries:

France, Germany, Netherlands, Italy, Poland, Spain & United Kingdom.

213. The data is taken over the period 1985 – 2013/2014/2015 depending on the availability of the data in HMD.

214. Note: for Germany data has only been taken from 1990 onwards as being the first year for combined (former) West/East Germany data.

215. Both models have been estimated over the ages 40-90 for all countries using the "StMoMo"-Stochastic Mortality Modeling package from the R-software.

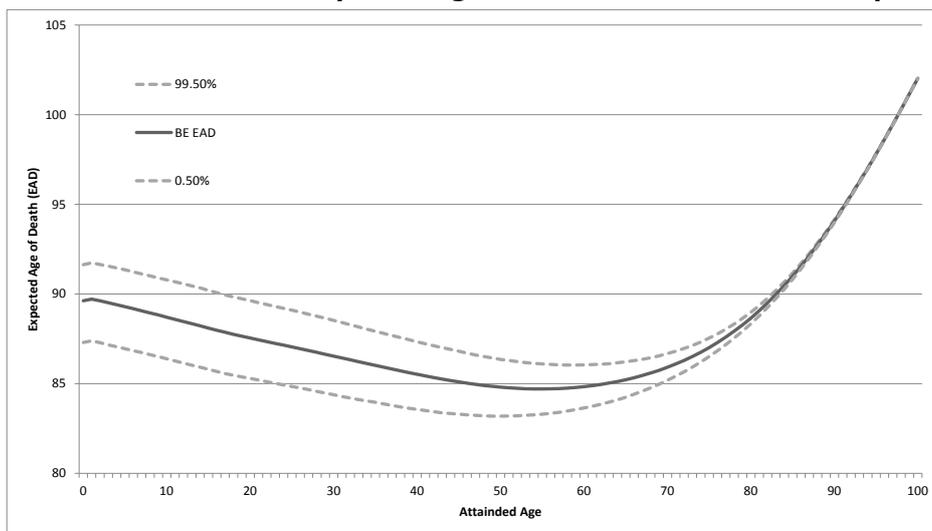
216. Using the Kannisto-rule all mortality tables have been "smoothly" extrapolated up to the age of 120 years old. After that age mortality rates are set equal to the mortality rate for age 120 years.

Calibrating age-dependent mortality and longevity stresses

217. Based on the parameter estimates for each model and country 5000 cohort mortality tables have been simulated. Based on these simulated tables the life-expectancies for each age have been calculated. Based on the 5000 life-expectancy outcomes for each age, country and model the 0.5%-percentile and the 99.5% percentile have been calculated.

218. The expected age of death (EAD) is defined as the attained age plus the life-expectancy for that age. Using the simulated life-expectancies Figure 3.1 shows an example of the best estimate EAD-values and the corresponding 0.5%/99.5% percentiles. Note that this figure corresponds to the analysis performed in EIOPA-CP-16-004: it is based on mortality parameters calibrated on Dutch population data.

Figure 3.1 – Distribution of expected age of death: best estimate and percentiles

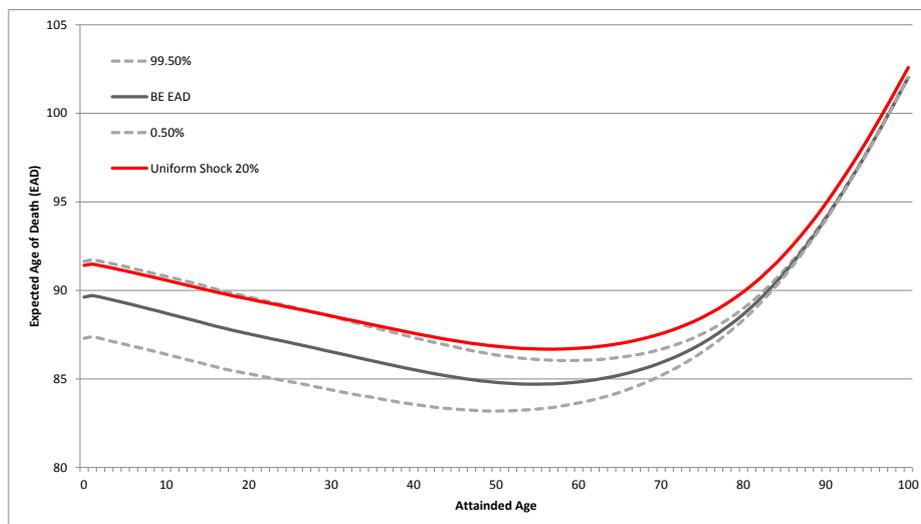


219. The downward sloping shape of the curve in Figure 3.1 is a result of younger persons benefiting more from future mortality improvements than older persons. The upward sloping shape to the right is a result from having attained this higher age already, i.e. the expected age of death is conditional on the attained age.

220. The best estimate of the expected age of death (BE EAD) is the most likely outcome or central forecast, ignoring the error terms for the future trend development.

221. The effect on the best estimate expected age of death taking account of the 20%-longevity shock from the standard formula is represented in Figure 3.2 by the red line:

Figure 3.2 – Expected age of death for an instantaneous decrease of 20% in mortality rates



222. For the next step the age dependent shocked life expectancy is defined according to:

$$e_x^h(t) = \frac{1}{2} + \sum_{k=1}^{\infty} \prod_{s=0}^{k-1} (1 - (1 + h(x)) \times q_{x+s}(t + s))$$

223. Each future mortality rate is being multiplied by a factor $1+h(x)$, which is only dependent of the age x at time t , being the start of the valuation.

224. Now for each age x the $h(x)$ -constant can be numerically solved for:

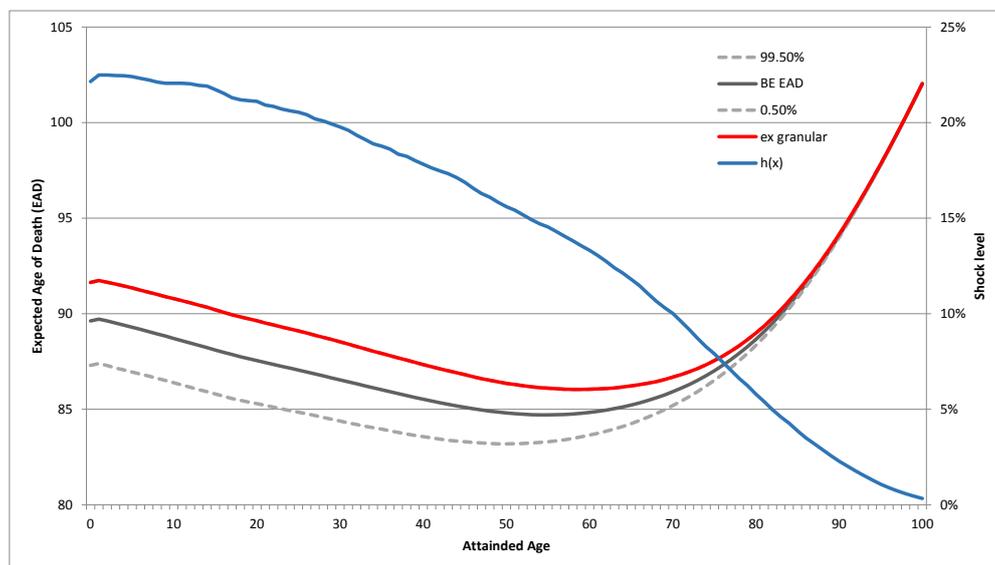
1. $e_x^h(t) = e_x^{99.5\%}(t)$, for longevity
2. $e_x^h(t) = e_x^{0.5\%}(t)$, for mortality

225. For each age x the squared errors $(e_x^h(t) - e_x^{99.5\%}(t))^2$ for longevity resp.

$(e_x^h(t) - e_x^{0.5\%}(t))^2$ for mortality are being minimized as function of the respective $h(x)$.

226. A typical example of the results for such a longevity-match are given in Figure 3.3.

Figure 3.3 - Expected age of death including an attained age depended shock

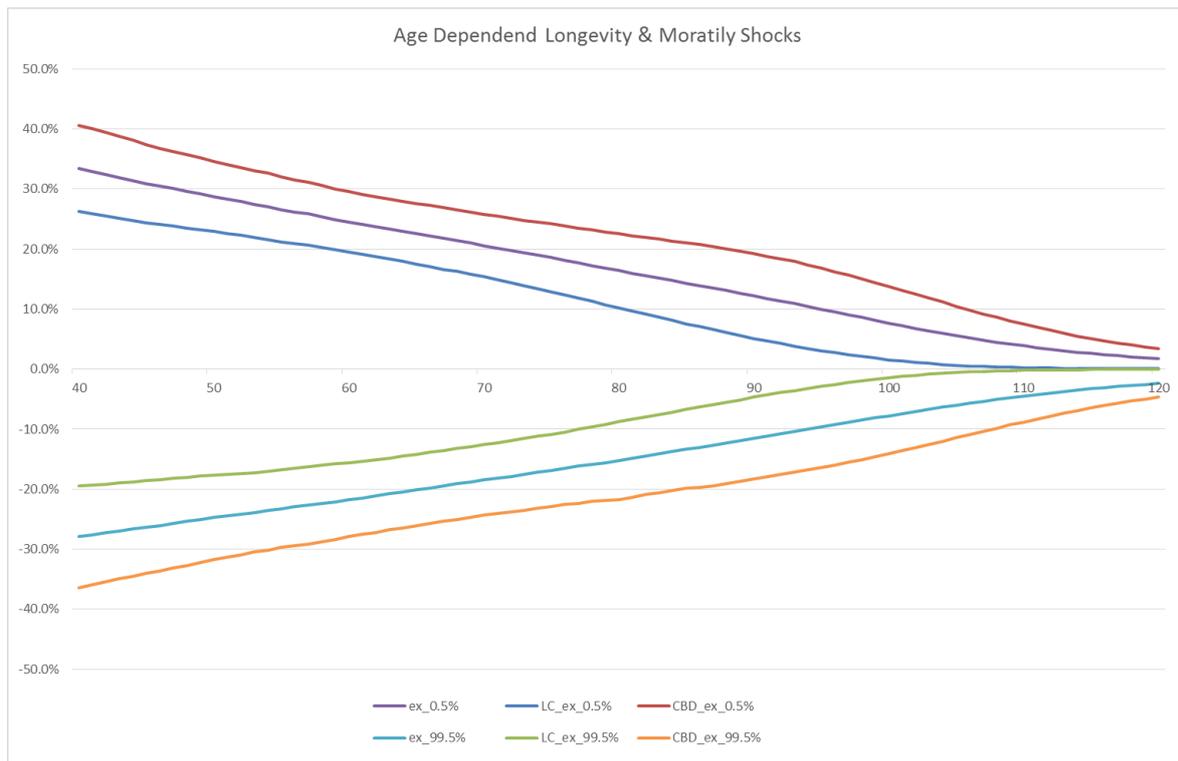


227. The results in Figure 3.3 are for illustration purposes only and taken from the original discussion paper (EIOPA-CP-16-008).

228. From the figure it is clear that for each age when applying the respective $h(x)$ for that age, the shocked life expectancy equals the 99.5% percentile for that age.

Results

229. In the final step the $h(x)$ for each model are combined into a weighted average $h(x)$ over all countries using the exposures per country²² as weights and finally the resulting weighted $h(x)$ are averaged over both models to take account of model error.



230. The positives $h(x)$ provide for mortality stresses, while the negatives $h(x)$ provide for the longevity stresses.

231. Both for mortality and longevity stresses, one can observe the results stemming from the Lee-Carter and from the CBD model. The final stresses are provided by the average of both models.

Analysis of results

232. Article 105 of the Solvency II Directive provides that mortality and longevity risks should reflect the risk of loss resulting from changes in the level, trend or volatility of mortality rates.

²² Exposure used is total population.

233. The work summarised above captures the risk of loss resulting from changes in level and trend. The level is captured due to the fact that we use the best estimate mortality tables as starting point for the calibration. The trend is captured due to the fact that we use the estimated trend for the forecast and development of future cohort mortality tables.

234. As for the risk of loss resulting from changes in the volatility and parameter uncertainty, it can be assumed to be captured by applying the two models on seven data sets and taking the average over all results.

235. The following limitations can be identified in the method:

- It is based on general population of the 7 countries and not on the insured population. However it is difficult to foresee whether this would have an increasing or decreasing effect. In general, insured people are wealthier and therefore tend to live longer, which could argue in favour of a prudence factor in the longevity stresses. On the other hand, some claim that the recent improvements in mortality benefit mainly the general population instead of the insured population only. Therefore one might argue that it is not necessary to account for additional prudence here.
- It does not take into account events that are not in the data, such as new cures. These events are required to be modelled in the best estimate calculation via Article 29 of the Delegated Regulation ("expected future developments in the external environment"). But these are best estimate expected future developments and do not necessarily correspond to the future developments for the SCR. These events are not taken into account into the calculation.
- The stresses defined above are "equivalent stresses". The mortality/longevity risk that affects the own funds corresponds to changes in the mortality rates used in the best estimate calculation. These mortality rates are defined via a mortality table which gives, for each entry age, the 1-year probability of dying every year of the best estimate projection until the age limit (e.g. 120 years old). In theory, there should be one stress for each age and each year of the projection. However, given the complexity it would introduce, we define an equivalent stress that is applied to all mortality rates of an insured person over the projection. The outcome is the same as if we would have defined a mortality stressed table.

236. We observe that for age close to 60 years old, the longevity stress of 20 % is confirmed. Given the uncertainties described above that are not fully taken into account, the 20 % stress appears appropriate.

237. For mortality stresses, the results provide for a stress of 25 % for age 60 years old, which is higher than the current stress of 15 %. EIOPA would welcome further evidence from stakeholders on the appropriateness of the mortality stress factor.

Granularity

238. The stresses provided in the current Delegated Regulation are not very granular: they are single stresses that apply to all mortality rates, whatever their differences. The *Best Estimate* is expected to be calculated with much more granularity. One could think of different mortality rates per

- Age or age groups (e.g. 10 or 5 years);
- Gender;
- Type of products;
- Socio-economic factors such as job or wealth;
- Geographical localisation.

239. As one can observe in the results displayed in the graphs that the stresses are different depending on the age of the insured person. In particular younger persons would need to have higher stresses given that they benefit more from future mortality improvements than older persons. It appears that more granular stresses per age group would provide for a more risk-sensitive SCR calculation.

240. On the other hand, several difficulties have been identified if more granular stresses are provided.

241. First are implementation costs by (re)insurance undertakings which have currently implemented a unique stress factor.

242. Second are costs due to complexity. The *Best Estimate* is calculated on the basis of a much greater granularity. Against this granularity, stresses per age groups appear not sufficiently granular at all. The age plays a role in the different stresses, but so do other factors identified above (gender, socio-economic factors ...) The granularity of the *Best Estimate* depends on each undertaking so that it fits its risk profile. The model points are different from one undertaking to another. For instance, age groups can be different (4 years, 5 years, 10 years). Further granularity in the SCR should not match the granularity of the *Best Estimate*. Also, the age bands that would be defined in a more granular SCR stress could impact the model points designed to calculate *Best Estimates*. Say in the *Best Estimate* the mortality rates are calculated for age bands of 10 years and that in the SCR it is defined for age bands of 5 years for instance; or the other way around.

243. Finally, one of the key objectives of this SCR review is to simplify, where possible, the standard formula. Increasing granularity in an arbitrary manner compared to the *Best Estimate* would cause more complexity and implementation costs than benefits.

3.4.3. EIOPA's advice

Mortality and longevity stresses

244. EIOPA advises to maintain the 20 % stress for longevity risk, which appears appropriately calibrated.

245. EIOPA advises to increase the mortality stress factor for mortality risk to 25 %, so that it is appropriately calibrated.

Granularity

246. EIOPA does not advise improving the granularity of the mortality and longevity stresses: the added complexity due to the interaction with the *Best Estimate* model points, the implementation costs and the fact that it would not be in line with simplifying the standard formula provide for more arguments against than in favour.

4. Health catastrophe risk

4.1. Call for advice

The Delegated Act provides simplifications for many, but not for all, calculations in the standard formula. For example, no simplifications are provided for the non-life lapse risk submodule and the submodules of the non-life catastrophe risk.

EIOPA is asked to:

- *Provide information on the current use of the existing simplifications and, where relevant, on reasons why these simplifications are not used.*
- *Suggest improvements for the existing simplifications and explore and propose methods and criteria for further simplifications, in order to ensure that simple and easy to apply methodologies are provided for all standard formula calculations, bearing in mind the need to strengthen a proportionate application of the requirements.*

(...)

The counterparty default risk module and as the non-life catastrophe risk submodule require complex calculations.

EIOPA is asked to:

- *Provide information on the relative significance of capital requirements related to these modules.*
- *Assess if this complexity is proportionate to the nature, scale and complexity of these risks, in particular for small and medium-sized undertakings.*
- *Where appropriate, develop suggestions for simpler structures for these modules, respecting their existing scope.*

4.2. Composition of the CAT WS

247. In order to gain a sound basis for any decision on Catastrophe risk sub-modules, EIOPA decided to include external stakeholders from the Cat risk modelling community in the relevant EIOPA working structure, the Catastrophe risk work-stream (CAT WS).

248. The CAT WS is composed of:

- 13 experts from NSAs and EIOPA staff
- 3 model vendor representatives
- 5 insurance industry representatives
- 5 reinsurance industry representatives
- 2 academics
- 1 European Commission representative as observer

249. The CAT WS prepared all EIOPA decisions on simplifications and recalibrations by in-depth analysis.

4.3. Legal basis

Solvency II Directive

250. Article 105: Calculation of the Basic Solvency Capital Requirement, and in particular paragraph (4):

The health underwriting risk module shall reflect the risk arising from the underwriting of health insurance obligations, whether it is pursued on a similar technical basis to that of life insurance or not, following from both the perils covered and the processes used in the conduct of business.

It shall cover at least the following risks:

[...]

(c) the risk of loss, or of adverse change in the value of insurance liabilities, resulting from the significant uncertainty of pricing and provisioning assumptions related to outbreaks of major epidemics, as well as the unusual accumulation of risks under such extreme circumstances.

251. Article 109: Simplifications in the standard formula

252. Article 111: Implementing measures, and in particular paragraph (1)(l)

Delegated Regulation

253. Article 144: Health underwriting risk module

1. The health underwriting risk module shall consist of all of the following sub-modules:

[...]

(c) the health catastrophe risk sub-module.

254. Article 88: Proportionality

4.4. Feedback statement on the main comments received to the discussion paper

Mass-accident risk simplification

a. Summary of the comments received

255. Several stakeholders believe that this sub-module has several difficulties linked to the estimation of benefits payable in all the scenarios and especially for the scenario "disability that lasts 10 years".

256. In some countries, disability is temporary for a certain period of time before being permanent. Where this period is shorter than 10 years, stakeholders requested clarifications as to the application of this scenario and whether it should automatically lead to a permanent disability.

b. Assessment

257. EIOPA understands the concerns about the “disability that lasts 10 years” scenarios due to the fact that it appears uncertain whether people who are disabled for up to 10 years would recover.

258. As a simplification measure, it was proposed to delete this scenario. As a consequence, mass-accident risk and concentration risk would only rely on 4 scenarios: accidental death, permanent disability, 1 year disability and medical expenses.

259. The consequences is that people who were subjected to the 10 years disability scenario effect in the previous calibration, are now either subjected to the 1 year disability scenario (in majority) or subjected to permanent disability (in minority). See the advice part for further explanations.

Accident concentration risk simplification

a. Summary of the comments received

260. Some stakeholders indicated that the information related to the buildings with the highest concentration is not necessarily known or difficult to reconstruct on the basis of the usual policy information. Therefore for the sake of prudence and as an approximation, it is sometimes considered to be the biggest insurance policy where the insured are supposed to work all together in the same building.

b. Assessment

261. EIOPA has investigated whether there could be simplifications for the accident concentration sub-module. However no simplification leading to an appropriate assessment of the risks was found. Please refer to the analysis part.

Pandemic risk simplification

a. Summary of the comments received

262. A number of stakeholders commented on the pandemic risk sub-module:

- a. It would be complicated to make assumptions or estimates about, e.g., the hypothetical number of days in hospital, admissions in an intensive care unit, hospitalizations out of place of residence and other circumstances that could modify the value of benefits payable by the health insurance company.
- b. It would be difficult to assess the benefits for the scenario-type “no formal medical care requested”.
- c. It would be difficult to estimate the unit claim cost in the case where the policy covers workers that are usually travelling or working abroad.

b. Assessment

263. EIOPA has analysed the drivers of the medical costs per claim per example case of France:

- Hospitalisation costs : hospitalisation days, income protection, state intervention on an occasional basis
- Consultation costs : number/degree of consultation, request for multiple sources
- 'no formal medical care' : pharmaceutical costs due to products buying that do not require a prescription by a doctor

264. The results were found to vary across Member States, such that a unified approach/parametrisation would be neither appropriate, nor risk-sensitive.

4.5. Advice

4.5.1. Previous advice

265. CEIOPS-DOC-43/09 "CEIOPS' Advice for Level 2 Implementing Measures on Solvency II: SCR standard formula - Health underwriting risk module"²³

266. CEIOPS DOC 79/10: "Catastrophe Task Force Report on Standardised Scenarios for the Catastrophe Risk Module in the Standard Formula"²⁴

4.5.2. Analysis

Mass accident risks

267. Following the difficulties in implementing the "10a disability" scenario outlined above, EIOPA investigated whether this scenario is actually needed.

268. EIOPA and the CAT task force (CTF) had calibrated a total of 5 scenarios in its 2010 study (see for reference CEIOPS DOC 79/10 Catastrophe Task Force report on standardised scenarios for the catastrophe risk module in the standard formula).

269. In its calibration, the CTF focused on data collected from the World Trade Center attack ("World Trade Center Cases in the New York Workers' Compensation System", New York State Workers' Compensation Board, September 2009). The following table summarizes the outputs of the CTF work:

- first column represents the World Trade Center figures as per the study mentioned;
- second column represents the initial calibration discussed at CEIOPS based on these figures;
- third column represents final view of CEIOPS and is the actual standard formula calibration.

²³ <https://eiopa.europa.eu/CEIOPS-Archive/Documents/Advices/CEIOPS-L2-Final-Advice-on-Standard-Formula-Health-underwriting-risk.pdf>

²⁴ <https://eiopa.europa.eu/CEIOPS-Archive/Documents/Reports/CEIOPS-DOC-79-10-CAT-TF-Report.pdf>

Table 4.1: CEIOPS calibration

		WTC figures		Initial proposal		Final proposal	
Accidental death		12 %		12 %		10 %	
Permanent disability	Total	3.2 %	0.2 %	1 %	1 %	1.5 %	1.5 %
	Partial		3 %		0 %		0 %
Temporary disability	1 year	6 %	NA	9 %	6 %	18.5 %	5 %
	10 years		NA		3 %		13.5 %
Medical/injuries		3.5 %		25 %		30 %	

270. The initial work performed by CEIOPS consisted first in splitting partial permanent disability into both total permanent disability and temporary disability, and then in splitting temporary disability between a 1 year scenario and a 10 years scenario.

271. On a second step, some figures were stressed in order to take into account three main drawbacks of the World Trade Center data highlighted by CEIOPS:

- there was a low occupancy of the buildings at the time of the attack, leading to an underestimation of temporary disability and injuries;
- bombings generate more permanent injuries than building collapses, leading to an underestimation of permanent and temporary disabilities;
- many injured people are uninsured or did not claim, leading to an underestimation of injuries.

This puts into question the need to have a “permanent disability” scenario and a “disability that lasts 10 years” scenario.

272. Indeed, in some member states, disability is temporary for a certain period of time before being permanent. The scenario introduces complexity since a judgment needs to be made whether the person disabled during 10 years would recover or not.

273. As a simplification measure, it was proposed to delete this scenario. As a consequence, mass-accident risk and concentration risk would only rely on 4 scenarios: accidental death, permanent disability, 1 year disability and medical expenses.

Accident concentration risk simplification

274. EIOPA has considered two options for simplification of the accident concentration sub-module:

1. For the ‘largest number of persons’ of Article 162 (3) of the Solvency II Delegated Regulation, it was considered to use the biggest collective contract as a proxy, where this type of contract is part of an undertaking’s portfolio.

Even if this approach can be considered reasonable on a number of cases, it is not systematic. The following example provides a case where this simplification would not be appropriate:

The calculation was carried out according to the standard formula calculation of gross exposure for accident concentration risk. Costs involved were assumed to be constant, since hospital costs were found to be comparably stable. The number of insured people was adapted to match the different contracts.

A change in the gross exposure was also included in the scenario when accepting the largest policy as a proxy.

The example used was that of an insurance company which has group insurance agreements for a majority of the people working in the public sector (hospitals, elderly care and schools). Using 'the largest policy' as a proxy would imply that all employees working for the public sector would be involved in one accident. This was not regarded as a reasonable assumption, as the number of insured individuals rose to 600,000. The gross exposure was roughly estimated to be 300 times larger. It was found that a strict application of the 'biggest collective contract' option would give unreasonable results, since it cannot be assumed that group insurance policies follow geographical patterns.

2. For 'the persons that are working in the same building' of Article 162 (3)(c), a major hit to the headquarter of the undertaking was considered.

Sensitivity analyses carried out showed that this simplification would not result in an appropriate outcome in a certain number of cases. In an example based on real undertaking data, the number of insured people dropped from 200 to 20, compared to the current Standard Formula approach. This resulted in a drop of the SCR of around 90%, which showed that this simplification is not appropriate.

275. The two main proposals for simplification turned out not to be appropriate in a number of cases. Therefore no simplification is proposed for this calculation.

Pandemic risk simplification

276. EIOPA has considered two simplifications for pandemic risk:

- a. A first simplification could be to allow for grouping the countries where the exposure is assessed as not proportionate.
- b. A second possibility could be to provide maximal unit claim costs per scenario and country. This would allow undertakings for which the risk is not proportionate to take these maximal costs.

277. EIOPA's analysis concluded that hospitalization costs, consultation costs and the concept of 'no formal medical care' vary drastically across Member States, such that a unified approach/parametrisation would be neither appropriate, nor risk-sensitive.

278. The variation is driven by the idiosyncratic features, cost structures and chargeabilities of the national health care system in each Member State.

279. Against this background, EIOPA concluded that it should be proposed that the maximum unit claim costs should be determined individually by each NSA.

280. EIOPA provides some ideas to NSAs, how the cost drivers could be captured on a national basis:

281. Possible Methodologies are

- For hospitalisation costs :
 - Fixed amount per hospitalisation day based on past claims ;
 - Mean annual hospitalisation cost per person ;
 - (not) accounting for income protection ;
 - Mean, quantile or maximum costs ;
 - (not) modelling state intervention ;
- For consultation costs ;
 - Fixed amount per consultation based on past claims ;
 - Number of consultations =1, when assuming that not all infected will consult a practitioner ; or >1 when assuming pandemically infected request crossed advices ;
- No formal medical care :
 - Zero costs when no formal medical care is covered ;
 - Mean annual pharmaceutical costs, depending on cover.

4.5.3. EIOPA's advice

Mass accident risks

282. Due to the difficulties regarding application of the "disability that lasts 10 years" scenario, it is proposed to delete this scenario. As a consequence, mass-accident risk and concentration risk would only rely on 4 scenarios: accidental death, permanent disability, 1 year disability and medical expenses.

283. In order to delete the 10 years disability scenario and to remain consistent with initial data and the previous CEIOPS calibration, it is proposed to:

- not modify the 10 % accidental death scenario and the 30% medical expenses scenario;
- retain 3.5 % for the permanent disability scenario, which appears consistent with World Trade Center data, even if for the sake of simplicity only total permanent disability is to be modelled;
- retain 16.5 % for the temporary (1 year) disability scenario, in order to stick to the global 60 % injured people hypothesis.

284. The consequence is that people who were subject to the 10 years disability scenario effect in the previous calibration, are now either subjected to the 1 year disability scenario (in majority) or subjected to permanent disability (in minority).

285. The following table recaps this new calibration.

Table 4.1: Comparison of calibrations with WTC observation

	WTC figures	CTF proposal	New EIOPA proposal
Accidental death	12 %	10 %	10 %
Permanent disability	3.2 %	1.5 %	3.5 %
Temporary disability (1 year)	6 %	18.5 %	16.5 %
Medical/injuries	3.5 %	30 %	30 %

5. Man-made catastrophe risk

5.1. Call for advice

The Delegated Act provides simplifications for many, but not for all, calculations in the standard formula. For example, no simplifications are provided for the non-life lapse risk submodule and the submodules of the non-life catastrophe risk.

EIOPA is asked to:

- *Provide information on the current use of the existing simplifications and, where relevant, on reasons why these simplifications are not used.*
- *Suggest improvements for the existing simplifications and explore and propose methods and criteria for further simplifications, in order to ensure that simple and easy to apply methodologies are provided for all standard formula calculations, bearing in mind the need to strengthen a proportionate application of the requirements.*

(...)

The counterparty default risk module and as the non-life catastrophe risk submodule require complex calculations.

EIOPA is asked to:

- *Provide information on the relative significance of capital requirements related to these modules.*
- *Assess if this complexity is proportionate to the nature, scale and complexity of these risks, in particular for small and medium-sized undertakings.*
- *Where appropriate, develop suggestions for simpler structures for these modules, respecting their existing scope.*

5.2. Composition of the CAT WS

286. In order to gain a sound basis for any decision on Catastrophe risk sub-modules, EIOPA decided to include external stakeholders from the Cat risk modelling community in the relevant EIOPA working structure, the Catastrophe risk work-stream (CAT WS).

287. The CAT WS is composed of:

- 13 experts from NSAs and EIOPA staff
- 3 model vendor representatives
- 5 insurance industry representatives
- 5 reinsurance industry representatives
- 2 academics
- 1 European Commission representative as observer

288. The CAT WS prepared all EIOPA decisions on simplifications and recalibrations by in-depth analysis.

5.3. Legal basis

Solvency II Directive

289. Article 105: Calculation of the Basic Solvency Capital Requirement, and in particular paragraph (2):

The non-life underwriting risk module shall reflect the risk arising from non-life insurance obligations, in relation to the perils covered and the processes used in the conduct of business.

It shall take account of the uncertainty in the results of insurance and reinsurance undertakings related to the existing insurance and reinsurance obligations as well as to the new business expected to be written over the following 12 months.

It shall be calculated, in accordance with point (2) of Annex IV, as a combination of the capital requirements for at least the following sub-modules:

[...]

(b) the risk of loss, or of adverse change in the value of insurance liabilities, resulting from significant uncertainty of pricing and provisioning assumptions related to extreme or exceptional events (non-life catastrophe risk).

290. Article 109: Simplifications in the standard formula

291. Article 111: Implementing measures, and in particular paragraph (1)(l):

Delegated Regulation

292. Article 119: Non-life catastrophe risk sub-module

1. The non-life catastrophe risk sub-module shall consist of all of the following sub-modules:

[...]

(c) the man-made catastrophe risk sub-module;

293. Article 128: Man-made catastrophe risk sub-module

1. The man-made catastrophe risk sub-module shall consist of all of the following sub-modules:

(a) the motor vehicle liability risk sub-module;

(b) the marine risk sub-module;

(c) the aviation risk sub-module;

(d) the fire risk sub-module;

[...].

294. Article 88: Proportionality

5.4. Fire risk sub-module

5.4.1. Feedback statement on the main comments received to the discussion paper

a. Summary of the comments received

295. Stakeholders believe that Fire CAT is too complex and its complexity lies in the need to identify the highest total exposure within a radius of 200 meters. For instance it was mentioned that the data concerning all insured buildings within a radius of 200m are usually not available.

296. Some stakeholders considered it also to be too conservative due to the length of the radius (200 meters) and due to the assumption of total loss: "a circle of 200m radius with 100% of losses correspond of having more than 2 big trucks full of explosive".

297. In addition, feedback was also provided on the use of Possible Maximum Loss and/or Estimated Maximum Loss measure instead of sum insured. However, stakeholders were divided as to whether these would be more appropriate measures because of the subjectivity they introduce. Therefore they have not been considered further.

b. Assessment

298. EIOPA has addressed the task to develop an alternative calculation for the fire risk submodule, aiming at its simplification.

299. Investigation by EIOPA suggests that difficulties and cost in assessing the value of the exposure can arise from the following:

- a) Technology to automate the 200m calculation based on a geocoded portfolio can be expensive, unavailable or lack accuracy
- b) Undertakings are manually assessing the exposure
- c) Large amount of data cleansing/validation required due to;
 - a. Inconsistencies between underwriting process and fire risk submodule calculations
 - b. Incorrect data collection
 - c. Changes or additions to address/postcodes

5.4.2. Advice

5.4.2.1. Previous advice

300. CEIOPS-DOC-41-09 "CEIOPS' Advice for Level 2 Implementing Measures on Solvency II:SCR standard formula – Article 111 Non-Life Underwriting Risk"²⁵.

²⁵ <https://eiopa.europa.eu/CEIOPS-Archive/Documents/Advices/CEIOPS-L2-Final-Advice-SCR-Non-Life-Underwriting-Risk.pdf>

301. CEIOPS DOC 79/10: "Catastrophe Task Force Report on Standardised Scenarios for the Catastrophe Risk Module in the Standard Formula"²⁶

5.4.2.2. Analysis

302. EIOPA discussed the feedback and analysed different alternatives for simplification.

303. These covered using the largest exposure measure with an adjustment for conflagration, using the simplification of QIS 5 (a factor based approach), to reflect market share, building density and reconstruction costs and to limit the scope of the identification to the largest concentration of risk within a 200m radius circle to, at a minimum, the top five exposures per risk type (industrial, commercial, residential).

304. EIOPA main goal was to reduce the calculation burden, while maintaining an adequate level of risk sensitivity and incentivising better risk management practices. In addition, EIOPA also believes it is important for undertakings to understand their exposures and risks. Therefore the principles underlying the current approach have been assessed appropriate: a scenario based approach using the sum insured as input parameter.

305. Whilst having considered to reduce the 200m radius for exposure inclusion, it was decided to discard such alternative approach as it would not appropriately cover all risks that the scenario comprises.

5.4.2.3. EIOPA's advice

306. EIOPA believes that the existing methodology is an appropriate approach and recommends that this remains the default calculation.

307. However, it is also recognised that there are a number of difficulties with the current methodology and therefore EIOPA recommends that a simplified calculation should be made available, under the framework of Article 88 of the Delegated Regulation.

308. In this respect, EIOPA recommends, for the identification of the largest risk concentration within a 200m radius circle around exposure address and as a simplified calculation, to allow for reducing the number of considered buildings to – at a minimum – the top five exposures per risk type (residential, commercial, industrial).

²⁶ <https://eiopa.europa.eu/CEIOPS-Archive/Documents/Reports/CEIOPS-DOC-79-10-CAT-TF-Report.pdf>

5.5. Marine risk sub-module

5.5.1. Feedback statement on the main comments received to the discussion paper

a. Summary of the comments received

309. EIOPA received the following feedback on the issue of Marine risk: "If one has no oil tankers or oil/gas platforms insured the calculation is straightforward since it does not fit the scenario and would result in zero capital. This makes the methodology disputable."

b. Assessment

310. Currently, the scenarios in Solvency II Delegated Regulation are 'tanker collision', and 'platform explosion'. Since Article 130 of the Delegated Regulation refers to 'tankers/platforms insured by the undertaking', it can happen that there is no CAT charge at all for companies active in marine: i.e. a particular undertaking has marine exposure by providing cover for other vessels than 'tankers' or 'platforms' or for other types of events than 'collision' or 'explosion'.

311. For such undertakings, there is clearly a risk (cf. Costa Concordia for instance) that the scenarios given in the Delegated Regulation EU/2015/35 would falsely result in zero modelled claims according to the calculated SCR.

312. Specifically in relation to Protection & Indemnity Clubs, there might be some of them which do not insure 'tankers' or 'platforms', but only cargo ships for instance, or Cruise ships.

5.5.2. Advice

5.5.2.1. Previous advice

313. CEIOPS-DOC-41-09 " CEIOPS' Advice for Level 2 Implementing Measures on Solvency II:SCR standard formula – Article 111 Non-Life Underwriting Risk"²⁷.

314. CEIOPS DOC 79/10: "Catastrophe Task Force Report on Standardised Scenarios for the Catastrophe Risk Module in the Standard Formula"²⁸.

5.5.2.2. Analysis

315. As described in the response to the SCR review discussion paper, what is required is not a simplification, but rather a wider range of exposures to be taken into account when assessing the risk of a given portfolio, namely vessels beyond oil tankers and drilling platforms/rigs.

²⁷ <https://eiopa.europa.eu/CEIOPS-Archive/Documents/Advices/CEIOPS-L2-Final-Advice-SCR-Non-Life-Underwriting-Risk.pdf>

²⁸ <https://eiopa.europa.eu/CEIOPS-Archive/Documents/Reports/CEIOPS-DOC-79-10-CAT-TF-Report.pdf>

316. This could be inspired by events like the 2012 Costa Concordia disaster at the Italian Mediterranean sea shore, where over 30 fatalities, numerous casualties and a complex salvage procedure might have resulted in claims comparable to those of some vessel/platform catastrophes.
317. One could add an additional term into the original formula to include cruise/cargo/bulker/other, which would render a likewise arbitrary restriction.
318. As the types of physical risks to other vessels (as a collective term for cargo ships, cruise ships and further, unspecified large watercraft) are exposed to, are different to those born by oil platforms, but largely similar to oil tankers and rigs, it seems justified and straightforward to extend the coverage of the SCR_{tanker} term to vessels in general (" SCR_{vessel} ") within the calculation of Marine risk SCR in Article 130 (1) of the Delegated Regulation.
319. $SCR_{(vessel,t)}$ could have been potentially included in the calculation of L_{vessel} for the relevant heads of damage. This would normally be Sue & Labour, Total Loss and Removal of Wreck i.e. 3x the TL SI. Under a marine policy there can be considerable expenditure in trying to save a vessel (Sue & Labour). The vessel can subsequently be lost (Total Loss). The wreck may be a navigation or environmental hazard and then need removing (Removal of Wreck). Allowing for all relevant heads of damage recognises that the vessel SI is not the maximum amount payable under a marine policy and is in the spirit of a 1:200 year event. Also, this allows for variation in policy form to include only those heads of damage insured. Where such risk is included in contracts, it should be integrated to $SI_{(liab,t)}$. This clarification can be provided via Q&A.

5.5.2.3. EIOPA's advice

320. EIOPA suggests a change under Article 130 of the Delegated Regulation to replace the "tanker" scenario with "vessel" type to allow for the SCR to arise from any source, Bulker, Container ship, Roll on Roll off, Cruise Ship, Fishing vessel etc. This will fit better with the needs of small companies not insuring global vessels.
321. The change from a tanker specific scenario to any vessel type will include all insurance entities writing marine business without adding any complexity to the formula.
322. The threshold introduced (where the maximum hull value insured is less than EUR 100,000 then no consideration need be calculated in relation to SCR_{vessel}) prevents very low exposure, such as pleasure craft or rigid inflatable boats ("ribs"), from entering the marine risk SCR.
323. All ships have potential pollution liability exposure and therefore there is no need to modify the formula for non-tankers.

5.6. Motor vehicle liability risk sub-module

5.6.1. Feedback statement on the main comments received to the discussion paper

a. Summary of the comments received

324. Several stakeholders expressed some doubts as regards the specifications of this sub-module on limited and unlimited liability. It seems apparently difficult to apply in practice this distinction in some cases.

325. According to the Motor Insurance Directive (2009/103/EC)²⁹ the claim amount depends on the statutory limits in the country where an accident occurred. It is not sufficiently clear how the number of vehicles insured by the undertaking should be allocated to those with policy limit "above EUR 24 Million" and those with policy limit "below or equal to EUR 24 Million", as required by Article 129 (1)(a) and (b) of the Delegated Regulation, if the statutory policy limit is below EUR 24 Million ("limited") in the home country of the undertaking but greater than EUR 24 million ("unlimited") in the neighbouring countries.

b. EIOPA Assessment

326. All possible cases under the scenario of Article 129 of the Delegated Regulation, including claims from vehicles insured under the domestic <24mn EUR limited cover regime being involved in accidents happening abroad under a >24mn EUR limited cover or unlimited regime, have actually been covered in the current Standard Formula approach:

327. In the Article 129 formula on the Motor vehicle liability risk sub-module

$$L_{\text{motor}} = \max\left(6\,000\,000; 50\,000 \cdot \sqrt{N_a + 0,05 \cdot N_b + 0,95 \cdot \min(N_b; 20\,000)}\right)$$

328. The term N_b (the number of contracts under the domestic <24mn EUR limited regime) enters in two parts, where, roughly speaking, the weights of which add up to 1. Apparently, the part $0,05 \cdot N_b$ contributes to the overall loss in the same way as N_a , with the latter being the number of >24mn EUR/unlimited contracts. This amounts precisely to assuming that 5% of the vehicles insured under the domestic <24mn EUR limited regime trigger claims from "unlimited EU Member States", which contribute to motor losses in the same way as the N_a unlimitedly insured vehicles. For 95% of the contracts under limited cover, a cap is introduced by the term $\min(N_b; 20\,000)$ in the loss equation. This cap represents the limited cover.

329. Consequently, there is no need to further split N_b with respect to undertaking-specific assumptions on the likelihood of 2.a. cases happening to

²⁹ Directive 2009/103/EC of the European Parliament and of the Council of 16 September 2009 relating to insurance against civil liability in respect of the use of motor vehicles, and the enforcement of the obligation to insure against such liability, OJ L 263.

their portfolio, as the structure of L_{motor} already takes into account what the CAT TF assumed to be a EU-wide average for the split of claims for limited cover contracts between domestic and abroad accidents (95% vs, 5%).

330. EIOPA regards as sufficient to clarify the application of the MTPL Standard Formula approach according to the previous section through EIOPA's Q&A process on the Delegated Regulation (<https://eiopa.europa.eu/regulation-supervision/q-a-on-regulation>).

331. Furthermore, EIOPA proposes to investigate the potential introduction of a parameter reflecting the split of N_b between limited vs. unlimited cover events for the undertaking's individually observed split (currently 95% and 5% are uniformly imposed).

332. Such additional parameter would add some complexity to the Standard Formula approach to MTPL risk, but would most likely increase the risk-sensitivity of the approach.

5.7. Identification of largest man-made catastrophe exposures on gross against net of reinsurance basis risk sub-module

5.7.1. Feedback statement on the main comments received to the discussion paper

a. Summary of the comments received

333. A majority of respondents was in favour of changing the basis for the calculation of the SCR calculation within Marine, Fire and Aviation ("MFA") sub-modules to net of reinsurance – as opposed to the current gross of reinsurance approach.

334. Stakeholders were in most cases referring to the accurate "risk retained" view, which the net approach would implement.

335. Few stakeholders raised concerns regarding additional complexity the net approach could introduce, whereas others explicitly excluded that this could be an issue, as undertakings would currently have to track their reinsurance arrangements anyway for purposes of SCR calculation.

b. Assessment

336. EIOPA investigated whether the identification of the largest risk exposure within the MFA sub-modules should be altered to be carried out on a net of reinsurance basis.

337. At present, the identification is carried out gross of reinsurance, as prescribed in recital 49 of the Delegated Regulation.

338. The largest risk exposures for the scenarios defined in the MFA submodules are:

- Marine risk: tanker/vessel with maximum sum insured and offshore platform with maximum sum insured;
- Aviation risk: aircraft with maximum sum insured;

- Fire risk: buildings within a radius of 200 meters with maximum sum insured.

339. EIOPA has given consideration to the issue and discussed different options.

5.7.2. Advice

5.7.2.1. Previous advice

340. CEIOPS-DOC-41-09 " CEIOPS' Advice for Level 2 Implementing Measures on Solvency II:SCR standard formula – Article 111 Non-Life Underwriting Risk"³⁰.

341. CEIOPS DOC 79/10: "Catastrophe Task Force Report on Standardised Scenarios for the Catastrophe Risk Module in the Standard Formula"³¹.

5.7.2.2. Analysis

342. The issue of the distortion caused by carrying out the SCR calculation on a straight gross basis was raised in [EIOPA's Discussion Paper on the Review of Solvency II](#) in December 2016. The following example, provided by EIOPA, illustrates the issue.

³⁰ <https://eiopa.europa.eu/CEIOPS-Archive/Documents/Advices/CEIOPS-L2-Final-Advice-SCR-Non-Life-Underwriting-Risk.pdf>

³¹ <https://eiopa.europa.eu/CEIOPS-Archive/Documents/Reports/CEIOPS-DOC-79-10-CAT-TF-Report.pdf>

EXAMPLE: Fire risk

Let's assume that a (re)insurance undertaking has the following risk exposures:

1. Exposure 1: set of buildings with the sum insured equal to 10m EUR, no reinstatement premium, reinsurance arrangement covers 9.5m XL 0.5m EUR;
2. Exposure 2: set of buildings with the sum insured equal to 5m EUR, no reinstatement premium, proportional reinsurance arrangement covers 70% of the exposure.

The following table clearly shows that the largest concentration of risk is different on a gross and net of reinsurance basis.

	Gross	Net
Exposure 1	10M EUR	0.5M EUR
Exposure 2	5M EUR	1.5M EUR

Impact of different types of reinsurance

343. Reinsurance cover for individual policies had the potential to distort the SCR calculation, as shown in EIOPA's example.

344. However, it was noted that impact of reinsurance covers for groups of policies (e.g. treaty covers) would, in most cases, not distort the calculation as the exposure for each policy would either be reduced proportionally or capped at a chosen level. For example, per risk XL contracts will reduce all exposures above a given level to the retention point.

Complexity and costs

345. It was believed that an undertaking's exposures, net of any per policy reinsurance, would likely be data that was readily available to each undertaking. Using this information in the identification of the largest risk exposure was therefore considered to be relatively trivial.

346. However, it was noted that introducing the requirement to identify the largest risks, net of all reinsurance could result in significant added complexity, in particular, for the fire risk submodule. The identification of the largest risk exposure would then strictly require undertakings to review every 200m radius where they had exposure and to apply the full reinsurance program to ascertain the highest net exposure. This could increase the calculation burden significantly for some undertakings.

347. It would create further complexity for undertakings which planned to use the proposed simplification for the fire risk submodule but which also had a reinsurance program with a maximum retention level which applied to

multiple policies. In this case, there could be tens or hundreds of risks with the same maximum size.

Other considerations

348. Several other considerations were discussed which were relevant in the formation of the proposal.

349. Guideline 12 (1.29) of the existing [EIOPA Guidelines on application of outwards reinsurance arrangements to the non-life underwriting risk submodule](#) (EIOPA-BoS-14/173 EN), stipulates that undertakings should be able to satisfy their NSA that the purchase of outwards reinsurance has not been materially influenced by whether the risk is identified as the gross loss event or a contribution to this gross loss.

350. Undertakings are required to detail their top ten fire risk exposures as part of their existing reporting requirements.

351. Insurers may be using multiple covers in their reinsurance program.

5.7.2.3. EIOPA's advice

352. Having taken into consideration all of the aspects discussed during the SCR review exercise, EIOPA recommends that the identification of the largest risk exposures within the Marine, Fire and Aviation risk sub-modules are altered to be carried out "net of reinsurance where that reinsurance cover alters the relative ranking of the exposure within the undertaking's portfolio, based on the size of the exposure. For example, facultative covers."

353. EIOPA believes that this strikes an appropriate balance between increased risk sensitivity and complexity of the standard formula. EIOPA expects this will remove the distortion within the SCR calculation in the majority of cases.

354. However, it notes that there could be examples of reinsurance programs where the distortion may persist. In these cases, the undertaking shall carry out the identification of the largest exposure within the Marine, Fire and Aviation risk sub-modules on the basis of gross exposures. The undertaking shall highlight the respective issue through their ORSA and coordinate with the responsible supervisor to ensure consistent and harmonised application of the principle.

6. Natural catastrophe risk

6.1. Call for advice

The Delegated Act provides simplifications for many, but not for all, calculations in the standard formula. For example, no simplifications are provided for the non-life lapse risk submodule and the submodules of the non-life catastrophe risk.

EIOPA is asked to:

- *Provide information on the current use of the existing simplifications and, where relevant, on reasons why these simplifications are not used.*
- *Suggest improvements for the existing simplifications and explore and propose methods and criteria for further simplifications, in order to ensure that simple and easy to apply methodologies are provided for all standard formula calculations, bearing in mind the need to strengthen a proportionate application of the requirements.*

(...)

The counterparty default risk module and as the non-life catastrophe risk submodule require complex calculations.

EIOPA is asked to:

- *Provide information on the relative significance of capital requirements related to these modules.*
- *Assess if this complexity is proportionate to the nature, scale and complexity of these risks, in particular for small and medium-sized undertakings.*
- *Where appropriate, develop suggestions for simpler structures for these modules, respecting their existing scope.*

6.2. Composition of the CAT WS

355. In order to gain a sound basis for any decision on Catastrophe risk sub-modules, EIOPA decided to include external stakeholders from the Cat risk modelling community in the relevant EIOPA working structure, the Catastrophe risk work-stream (CAT WS).

356. The CAT WS is composed of:

- 13 experts from NSAs and EIOPA staff
- 3 model vendor representatives
- 5 insurance industry representatives
- 5 reinsurance industry representatives
- 2 academics
- 1 European Commission representative as observer

357. The CAT WS prepared all EIOPA decisions on simplifications and recalibrations by in-depth analysis.

6.3. Natural Catastrophe risk sub-modules simplification

6.3.1. Legal basis

Solvency II Directive

358. Article 109: simplifications in the standard formula

Insurance and reinsurance undertakings may use a simplified calculation for a specific sub-module or risk module where the nature, scale and complexity of the risks they face justifies it and where it would be disproportionate to require all insurance and reinsurance undertakings to apply the standardised calculation.

Simplified calculations shall be calibrated in accordance with Article 101(3).

359. Article 111: implementing measures and in particular paragraph (1)(l):

the simplified calculations provided for specific sub-modules and risk modules, as well as the criteria that insurance and reinsurance undertakings, including captive insurance and reinsurance undertakings, shall be required to fulfil in order to be entitled to use each of those simplifications, as set out in Article 109;

Delegated Regulation

360. Article 88: proportionality

1. For the purposes of Article 109, insurance and reinsurance undertakings shall determine whether the simplified calculation is proportionate to the nature, scale and complexity of the risks by carrying out an assessment which shall include all of the following:

(a) an assessment of the nature, scale and complexity of the risks of the undertaking falling within the relevant module or sub-module;

(b) an evaluation in qualitative or quantitative terms, as appropriate, of the error introduced in the results of the simplified calculation due to any deviation between the following:

(i) the assumptions underlying the simplified calculation in relation to the risk;

(ii) the results of the assessment referred to in point (a).

2. A simplified calculation shall not be considered to be proportionate to the nature, scale and complexity of the risks where the error referred to in point (b) of paragraph 2 leads to a misstatement of the Solvency Capital Requirement that could influence the decision-making or the judgement of the user of the information relating to the Solvency Capital Requirement, unless the simplified calculation leads to a Solvency Capital Requirement which exceeds the Solvency Capital Requirement that results from the standard calculation.

6.3.2. Feedback statement on the main comments received to the discussion paper

a. Summary of the comments received

361. Not all stakeholders agreed that simplifying the natural catastrophe risk sub-modules would be appropriate.

362. The stakeholders that disagreed to simplify the sub-modules explained that:

- a. The complexity of these risks requires a matching complex/granular approach so that risk can be appropriately captured;
- b. Undertakings have already put in place procedures to fit into the SF approach to catastrophe risks as it is, therefore significant changes in these sub-modules would cause additional costs to undertakings and work already done would not be useful anymore; this was especially pointed out regarding the geocoding/spatial allocation of exposure.
- c. The loss of risk-sensitivity in the calculation may have, as a consequence, an increase in the SCR in some cases. That would be in particular true for diversified portfolio and where diversification benefits could disappear.

363. Other stakeholders argued that the high number of parameters may cause implementation issues for small or medium-sized undertakings. In cases where the exposure is not material, these stakeholders do not see the added value of such complexity.

b. Assessment

364. The concerns regarding potential duplication of work on geocoding of exposure were recognised. On the other hand it was also recognised that there are difficulties in spatially allocating exposure to risk zones. Examples given include insurance cover for pipelines, ranging across several risk zones with different risk profiles, or generally "mobile exposure", such as covered under transport insurance.

365. It is therefore proposed that the final simplification is an optional simplification under the framework of Article 88 of the Delegated Regulation, rather than a replacement of the current SF approach.

6.3.3. Advice

6.3.3.1. Previous advice

366. CEIOPS-DOC-79/10: "Catastrophe Task Force Report on Standardised Scenarios for the Catastrophe Risk Module in the Standard Formula"³².

6.3.3.2. Analysis

367. EIOPA has considered the following options:

- 1) Use of risk zones that are less granular than the ones currently used, but more granular than the current regions (typically defined on country level)
- 2) Use of the risk factor for the region without consideration of risk zones for the (non-allocated part of the) undertaking's exposure

³² <https://eiopa.europa.eu/CEIOPS-Archive/Documents/Reports/CEIOPS-DOC-79-10-CAT-TF-Report.pdf>

- 3) Use of the risk factor for the region without consideration of risk zones and applying a factor for prudence for the (non-allocated part of the) undertaking's exposure
- 4) Allocation of the (non-allocated part of the) undertaking's exposure in the region to the average of the industry within the region with subsequent application of the "normal" standard formula approach
- 5) Allocation of the (non-allocated part of the) undertaking's exposure in the region to the CRESTA zone with the highest risk weight in the region
- 6) Allocation of the non-allocated part of the undertaking's exposure in the region on country level to the average of the undertaking within the region with subsequent application of the "normal" standard formula approach

6.3.3.3. EIOPA's advice

368. After discussion of the different simplification options, EIOPA has assessed option 5, mapping non-allocated exposure to the zone with the highest zonal weight, as the most appropriate.
369. In particular, the simplification of option 5 meets the conditions in Article 88 of the Delegated Regulation in all realistic settings; furthermore the approach is easy to follow and obvious without the necessity of additional explanations. Possible formulations are either
- If a sum insured (*SI*) for windstorm/hail/EQ/flood/subsidence risk for region/country *r* cannot be mapped to a specific zone *i*, then *SI* should be added to the SI_j of the zone *j* in the region *r* that has the highest risk weight
- or
- If a sum insured (*SI*) for windstorm/hail/EQ/flood/subsidence risk for region *r* cannot be mapped to a specific zone *i*, but there is information about a specific set of zones in the region ($j_1 \dots j_n$) where *SI* can possibly be (and the others zones can be excluded), then *SI* should be added to SI_j of the zone $j \in (j_1 \dots j_n)$ that has the highest risk weight of the subset of zones. In case *SI* can only be allocated to the region ($j_1 \dots j_n$), then this is regarded as the risk zone with highest weight in the region.
370. EIOPA would welcome stakeholders' feedback as to which option is preferable.

6.4. Recalibration of Natural Catastrophe Scenarios

6.4.1. Legal basis

Solvency II Directive

371. Article 105: Calculation of the Basic Solvency Capital Requirement, and in particular paragraph (2):

The non-life underwriting risk module shall reflect the risk arising from non-life insurance obligations, in relation to the perils covered and the processes used in the conduct of business.

It shall take account of the uncertainty in the results of insurance and reinsurance undertakings related to the existing insurance and reinsurance obligations as well as to the new business expected to be written over the following 12 months.

It shall be calculated, in accordance with point (2) of Annex IV, as a combination of the capital requirements for at least the following sub-modules:

[...]

(b) the risk of loss, or of adverse change in the value of insurance liabilities, resulting from significant uncertainty of pricing and provisioning assumptions related to extreme or exceptional events (non-life catastrophe risk).

372. Article 111: Implementing measures, and in particular paragraph (1):

In order to ensure that the same treatment is applied to all insurance and reinsurance undertakings calculating the Solvency Capital Requirement on the basis of the standard formula, or to take account of market developments, the Commission shall adopt implementing measures providing for the following:

(a) standard formula in accordance with the provisions of Articles 101 and 103 to 109;

[...]

(c) the methods, assumptions and standard parameters to be used when calculating each of the risk modules or sub-modules of the Basic Solvency Capital Requirement laid down in Articles 104, 105 and 304[...]

(d) the correlation parameters[...]

[...].

Delegated Regulation

373. Article 114: Non-life underwriting risk module

374. Article 119: Non-life catastrophe risk sub-module

1. The non-life catastrophe risk sub-module shall consist of all of the following sub-modules:

(a) the natural catastrophe risk sub-module;

[...]

375. Article 120: Natural catastrophe risk sub-module

1. The natural catastrophe risk sub-module shall consist of all of the following sub-modules:

(a) the windstorm risk sub-module;

(b) the earthquake risk sub-module;

(c) the flood risk sub-module;

(d) the hail risk sub-module;

[...]

376. Article 121: Windstorm risk sub-module

377. Article 122: Earthquake risk sub-module

378. Article 123: Flood risk sub-module

379. Article 124: Hail risk sub-module

380. Article 126: Interpretation of catastrophe scenarios

6.4.2. Feedback statement on the main comments received

381. The relevance of the recalibration of the parameters for Natural Catastrophe sub-modules was ascertained by an information request to national insurance associations from December 2016 to March 2017, coordinated by Insurance Europe. The associations were asked to provide indications for the material inappropriateness of the current calibration.

382. Based on analysis of the evidence received, it was assessed which parameters need to be recalibrated.

6.4.3. Advice

6.4.3.1. Previous advice

383. CEIOPS-DOC-41/09: "CEIOPS' Advice for Level 2 Implementing Measures on Solvency II: SCR standard formula – Article 111 Non-Life Underwriting Risk"³³.

³³ <https://eiopa.europa.eu/CEIOPS-Archive/Documents/Advices/CEIOPS-L2-Final-Advice-SCR-Non-Life-Underwriting-Risk.pdf>

384. CEIOPS-DOC-79/10: "Catastrophe Task Force Report on Standardised Scenarios for the Catastrophe Risk Modul in the Standard Formula"³⁴.

385. CEIOPS-SEC-40/10: "QIS5 Calibration Paper"³⁵.

6.4.3.2. Analysis

Recalibrated scenarios

386. Analysis of the feedback received from national supervisors and insurance associations during the information request mentioned under 6.4.2 showed a case for recalibration of the following scenarios:

Country	Risks	Country factors to be recalibrated?	Zone relativities/ aggregation matrices to be recalibrated?
Czech Republic	Hail	Not currently in DR	Not currently in DR
Finland	Windstorm	Not currently in DR	Not currently in DR
Greece	Earthquake	Yes	Yes
Slovenia	Windstorm	Not currently in DR	Not currently in DR
	Hail	Not currently in DR	Not currently in DR
Sweden	Windstorm	Yes	Yes - specific zones highlighted
Hungary	Flood	Yes	Yes – specific zones highlighted
	Windstorm	Not currently in DR	Not currently in DR
Slovakia	Earthquake	Yes	Yes
Spain	Windstorm	Yes	-
Germany	Windstorm	Yes	Not priority
	Flood	Yes	Not priority
Italy	Earthquake	Yes	-

387. The Standard Formula (SF) uses three sets of parameters per scenario to determine the NatCat SCR of an insurer, based on the particular exposure that must be allocated to risk zones³⁶:

- *risk factor* for a region/country ("Q" in SF notation): representing the loss of an average industry portfolio (i.e. with diversification in the given country and with average policy conditions) being hit by a 1-in-200-years event of the respective peril (severity of hazard, vulnerability, policy conditions and spatial concentration of insured property); like in the initial

³⁴ <https://eiopa.europa.eu/CEIOPS-Archive/Documents/Reports/CEIOPS-DOC-79-10-CAT-TF-Report.pdf>

³⁵ http://ec.europa.eu/internal_market/insurance/docs/solvency/qis5/ceiops-calibration-paper_en.pdf

³⁶ The country factors and risk zone weights are given in terms of occurrence-losses, i.e. they are not losses aggregated over a certain period of time; to obtain the losses that correspond to the SF definition, scenarios are to be applied using the sets of parameters;

calibration, it should be aimed at cross-border consistency of the “Q” values (“neighbouring Qs” should to the extent possible reflect the differences and similarities in risks for portfolios in neighbouring countries) for those perils that affect several countries at the same time (typically windstorm and flood);

- *risk zone weights* (“W” in SF notation): addressing spatial allocation of insurance losses due to a 1-in-200a event to a segmentation of the country (administrative zones, like the CRESTA zones) where it deviates from a ‘countrywide average portfolio’. For some zone r , $W_r < 1$ means that, on average, there is less risk in zone r , than the average risk at country level; $W_r > 1$ means there is more risk; $W_r = 1$ means that exposure in zone r bears exactly the countrywide average risk; W_r needs to be consistent with the risk in neighboring zones (but only those within the same country) in terms of hazard, vulnerability, policy conditions and concentration of exposure.
- *zone correlations* ($\text{Corr}_{\text{peril,region}}$): the values $\text{Corr}_{\text{peril,region},i,j}$ are organised in a symmetric $n \times n$ matrix, with n being the number of zones within a given region/country; they reflect the correlation of 1-in-200y insurance losses for each pair i, j of zones ($\text{Corr}_{\text{peril,region},i,j} \in \{0, .25, .5, .75, 1\}$), including the zone i itself ($\text{Corr}_{\text{peril,region},i,i} = 1$).³⁷ Due to the way $\text{Corr}_{\text{peril,region}}$ matrices are constructed, they are so-called ‘aggregation matrices’, as they are calibrated in an iterative approximation process.³⁸

388. Some members proposed to have only physical hazard correlations represented by $\text{Corr}_{\text{peril,region}}$ instead of its current meaning. Advocators of this view were arguing that Articles 121 – 125 of the Delegated Regulation, by wording of respective paragraphs (1)(b), would support such approach this view.

389. EIOPA is of the opinion that this view largely ignores the vulnerability of exposure to the peril and the distribution of exposure to the peril, which both determines to a large extent the insurance losses caused by an event. The current Standard Formula approach captures the vulnerability and distribution of exposure implicitly in both the regional risk factor and the zonal calibration. This is needed, as the exposure vulnerability and exposure concentration varies across zones and regions, similarly to the exposure volume, but not as a function thereof. Moving implicit vulnerability to only one of these granularity levels (either ‘zone’, or ‘region’) would reduce the risk sensitivity of the Standard Formula approach.

390. Arguably, the meaning of the elements of $\text{Corr}_{\text{peril,region}}$ is difficult to understand and some of the values might seem counterintuitive when

³⁷ In principle $\text{Corr}_{\text{peril,region},i,j} = 0$ means statistical independence of insurance losses in two distinct zones, and $\text{Corr}_{\text{peril,region},i,j} = 1$ means (deterministic) dependence (insurance losses in zone i means also parallel losses of same relative size in zone j and vice versa).

³⁸ They are not calculated like Pearson correlations (values between -1 and +1). This would make no sense, as there would be no meaning to any negative value of elements in $\text{Corr}_{\text{peril,region}}$ (by definition, no peril causes increases in the value of exposure).

comparing them with pure hazard correlations. In order to increase plausibility in this – misinterpreting – context, it could be considered to slightly emphasise the hazard correlation component already present in $Corr_{\text{peril,region}}$ by mixing it with a pure hazard correlation matrix and adjusting risk zone weights accordingly. It is currently analysed whether the properties of such approach in terms of interpretability, robustness and feasibility justify future deviation from the current approach.

Recalibration process

391. EIOPA used the expertise of various stakeholders with professional background in Catastrophe risk modelling or management for performing the recalibration of the Standard Formula NatCat scenarios.

392. These stakeholders contributed by providing input on the specific scenarios to the responsible expert group (the “Catastrophe risk work-stream”, CAT WS), by discussing the available information and by deciding on a recommendation for recalibrated values. The subsequent results were approved by EIOPA’s members for consultation.

393. Details of the recalibration process can be found in “29. *Annex to chapter 6 – Description of recalibration process*”.

Specific information per recalibrated scenario

394. For each scenario, experts discussed the proposed calibration values against the background of additional information on the models that were used to calculate the proposed parameter value, such as a country risk factor for a given scenario.

395. An example of what this additional information comprises, “31. *Annex to chapter 6 – Example of model information*” provides the documentation of the German Windstorm scenario. Such documentation is produced for each recalibrated scenario.

396. In the case of the Spanish Windstorm scenario additional model input was provided in order to take into account the specificities of the Spanish ‘Consortio de Compensación de Seguros’. Please see “30. *Annex to chapter 6 – Spanish Windstorm country factor recalibration*” for further details.

Cross-border consistency of country risk factors

397. The perils of windstorm and flood occur across national boundaries. Hence recalibration of these perils in only selected countries gives rise to potential inconsistencies in capital requirements vis a vis those countries in which there has not been a recalibration.

398. EIOPA proposes two options for addressing these potential inconsistencies:

- a. that recalibrations are also carried out for the neighbouring countries in respect of windstorm and flood. Indeed to prevent simply moving the boundary of the potential inconsistency, these perils would be

recalibrated for all member states where the risk of inconsistency arises or

- b. that the extent of recalibrations for the selected countries is constrained by the need to maintain broad consistency with the calibrations of neighbouring countries.

399. EIOPA will consider further which option will be pursued taking account of factors such as capacity and data availability.

400. In the meantime it is important to emphasise that the recalibrations proposed below are highly provisional, since neither option a. nor option b. has not yet been applied to them. In particular, it is important that stakeholders realise that the recalibrations provided below may be adjusted upwards.

401. In various instances, the significantly lower recommendations for future country risk factors (main SCR determinants in the Standard Formula, see below) were challenged by stakeholders. These reductions were suggested by the consulted models across the board and were explained by model owners as being due to:

- Progress in meteorological, physical, engineering (i.e. in relation to vulnerability) and other sciences,
- Progress in modelling (adopted scientific results, manageable computational burden, available observation data),
- Changes in vulnerabilities (differences in construction due to emerged building codes, improvements in hazard prevention/risk mitigation measures),
- Data availability (exposure, damages, losses)
- The Solvency II requirement for approval of internal models and the related validation work has forced undertakings to ask more and more specific questions on Cat risk models to vendors. The vendors, as a result, have had to significantly improve their client documentation. Many reinsurance brokers and reinsurers have set up or increased the level of resourcing in their Cat risk research and model evaluation teams. Again, this has increased the pressure on the model vendors to implement up-to-date scientific findings to their models.

6.4.3.3. EIOPA's advice

402. It is important to emphasise that the recalibrations proposed below are highly provisional, due to the outstanding decisions on ways to ensure cross-border consistency (i.e. neither option a. nor option b. has yet been applied to the new factors). **In particular, it is important that stakeholders realise that the recalibrations provided below may be adjusted upwards.**

Provisional recalibrated country factors:

403. Following the recalibration process outlined above, the following provisional recalibrations were achieved:

404. *Scenario specific risk factors*

- DE_WS: 0.07% (previous value: 0.09%)
- FI_WS: 0.06% (new scenario)
- HU_WS: 0.02% (new scenario)
- SE_WS: 0.085% (previous value: 0.09%)
- SI_WS: 0.05% (new scenario)
- ES_WS: 0.01% (previous value: 0.03%)
- GR_EQ: 1.75% (previous value: 1.85%)
- IT_EQ: 0.77% (previous value: 0.80%)
- SK_EQ: 0.16% (previous value: 0.15%)
- DE_FL: 0.195% (previous value: 0.20%)
- HU_FL: 0.275% (previous value: 0.40%)
- CZ_HL: 0.045% (property, new scenario)
- SI_HL: 0.08% (property, new scenario)

405. *Updated aggregation matrix for Windstorm scenarios on region/country level:*

	AT	BE	CH	CZ	DE	DK	ES	FI	FR	UK	HU	IE	IS	LU	NL	NO	PL	SE	SI	GU	MA	SM	RE
AT	1.00	0.25	0.50	0.25	0.25	0.00	0.00	0.00	0.25	0.00	0.50	0.00	0.00	0.25	0.25	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00
BE	0.25	1.00	0.25	0.25	0.50	0.25	0.00	0.00	0.50	0.50	0.00	0.25	0.00	0.75	0.75	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00
CH	0.50	0.25	1.00	0.25	0.25	0.00	0.25	0.00	0.50	0.00	0.25	0.00	0.00	0.25	0.25	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00
CZ	0.25	0.25	0.25	1.00	0.25	0.00	0.00	0.00	0.25	0.00	0.25	0.00	0.00	0.25	0.25	0.00	0.25	0.00	0.25	0.00	0.00	0.00	0.00
DE	0.25	0.50	0.25	0.25	1.00	0.50	0.00	0.00	0.50	0.25	0.00	0.25	0.00	0.50	0.50	0.25	0.50	0.00	0.00	0.00	0.00	0.00	0.00
DK	0.00	0.25	0.00	0.00	0.50	1.00	0.00	0.00	0.25	0.25	0.00	0.00	0.00	0.25	0.50	0.50	0.25	0.50	0.00	0.00	0.00	0.00	0.00
ES	0.00	0.00	0.25	0.00	0.00	0.00	1.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FI	0.00	1.00	0.00	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00												
FR	0.25	0.50	0.50	0.25	0.50	0.25	0.25	0.00	1.00	0.25	0.00	0.00	0.00	0.50	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UK	0.00	0.50	0.00	0.00	0.25	0.25	0.00	0.00	0.25	1.00	0.00	0.50	0.00	0.25	0.50	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HU	0.50	0.00	0.25	0.25	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00
IE	0.00	0.25	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.50	0.00	1.00	0.00	0.25	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LU	0.25	0.75	0.25	0.25	0.50	0.25	0.00	0.00	0.50	0.25	0.00	0.25	0.00	1.00	0.50	0.25	0.25	0.00	0.00	0.00	0.00	0.00	0.00
NL	0.25	0.75	0.25	0.25	0.50	0.50	0.00	0.00	0.50	0.50	0.00	0.25	0.00	0.50	1.00	0.25	0.25	0.00	0.00	0.00	0.00	0.00	0.00
NO	0.00	0.00	0.00	0.00	0.25	0.50	0.00	0.25	0.00	0.25	0.00	0.00	0.00	0.25	0.25	1.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00
PL	0.00	0.25	0.00	0.25	0.50	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.25	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
SE	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	1.00	0.00	0.00	0.00	0.00	0.00
SI	0.50	0.00	0.25	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00
GU	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	0.00
MA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	0.00
SM	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	0.00
RE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00

406. Updated aggregation matrix for Hail scenarios on region/country level:

	AT	BE	CZ	FR	DE	IT	LU	NL	CH	SI	ES
AT	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BE	0.00	1.00	0.00	0.00	0.00	0.00	0.25	0.25	0.00	0.00	0.00
CZ	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FR	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DE	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
IT	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
LU	0.00	0.25	0.00	0.00	0.00	0.00	1.00	0.25	0.00	0.00	0.00
NL	0.00	0.25	0.00	0.00	0.00	0.00	0.25	1.00	0.00	0.00	0.00
CH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
SI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00
ES	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00

407. As only windstorm and hail scenarios were newly introduced, the region level aggregation matrices for earthquake and flood did not need any update.

Recalibrated zonal weights:

408. Following the recalibration process outlined above, recalibrations for zonal risk weights of the following scenarios are proposed:

- Windstorm
 - a. Finland (new scenario)
 - b. Hungary (new scenario)
 - c. Sweden
 - d. Slovenia (new scenario)
- Earthquake
 - a. Greece
 - b. Slovakia
- Flood
 - a. Hungary
- Hail
 - a. Czech Republic (new scenario)
 - b. Slovenia (new scenario)

409. The listing of the recalibrated zonal risk weights (CRESTA relativity factors) and the respective aggregation matrices for these scenarios can be downloaded from the EIOPA web page: https://eiopa.europa.eu/Publications/Consultations/EIOPA-CP-17-006_Section_6.4.3.3_Provisional_Zonal_Calibration_NAT_CAT.xlsx

410. The zonal recalibrations for some of the scenarios are currently subject to validation.

6.5. Contractual limits and natural catastrophe risk

6.5.1. Legal basis

Delegated Regulation

411. Recital 54

In order to capture the actual risk exposure of the undertaking in the calculation of the capital requirement for natural catastrophe risk in the standard formula, the sum insured should be determined in a manner that takes account of contractual limits for the compensation for catastrophe events.

6.5.2. Feedback statement on the main comments received

a. Summary of the comments received

412. Stakeholders claimed that evidence of historical events and their related losses, as well as the results of evaluations carried out by specialised software, showed inappropriate results for some scenarios. In particular it was concluded that the standard formula approach did not adequately incorporate the presence of policy conditions (indemnity limits and deductibles) for certain scenarios. Some stakeholders believe that the sum insured used as input in the CAT risk calculations should be adjusted to take account of specific contractual limits.

b. Assessment

413. EIOPA has assessed whether it would be possible to take into account not average – as is the case now –, but rather individual risk profiles regarding contractual limits.

414. As individual contractual limits and deductibles are currently not explicitly entering the SCR calculation within the relevant NatCat risk sub-modules, a complete re-design of the SF approach would be needed for every affected sub-module. Such new approach would severely increase the complexity of the design of the standard formula, as it would need to start from the individual contract level, or at least from homogeneous contract level. Thus, there would be no difference anymore compared to the complexity of (partial) internal models.

415. That is why EIOPA believes that only an adjustment to the end results should be proposed.

6.5.3. Advice

6.5.3.1. Previous advice

416. CEIOPS-DOC-41/09: "CEIOPS' Advice for Level 2 Implementing Measures on Solvency II: SCR standard formula – Article 111 Non-Life Underwriting Risk"³⁹.

417. CEIOPS-DOC-79/10: "Catastrophe Task Force Report on Standardised Scenarios for the Catastrophe Risk Module in the Standard Formula"⁴⁰.

418. CEIOPS-SEC-40/10: "QIS5 Calibration Paper"⁴¹.

6.5.3.2. Analysis

419. As explained in the EIOPA document about "The underlying assumptions in the standard formula of the Solvency Capital Requirement calculation": *"the calibration of the natural catastrophe risk submodule is based on average conditions for any given country-peril combination"*.

420. The risk weights and risk factors defined in Articles 120-125 of the Delegated Regulation have been calibrated by taking account of national market average contractual limits and national market average deductibles. The intention was to apply the risk factors directly to the undertaking's sum insured without contractual limits and without deductibles, so that the SCR per peril is calibrated at the appropriate level for each country.

421. Recital 54 of the Delegated Regulation provides further guidance at undertaking level: *"In order to capture the actual risk exposure of the undertaking in the calculation of the capital requirement for natural catastrophe risk in the standard formula, the sum insured should be determined in a manner that takes account of contractual limits for the compensation for catastrophe events."*

422. The purpose of the recital seems to better take into account individual risk profiles. However it is difficult to put in place in practice at individual level, since the input of the formula of Articles 120-125 should be the sum insured gross of deductibles and contractual limits.

423. This would require a radical change in the calibration process, making it difficult since historical losses would not be usable anymore, but even more importantly would severely increase the complexity of the design of the standard formula, since the relationship between catastrophe losses and contractual limits on policies is non-linear.

³⁹ <https://eiopa.europa.eu/CEIOPS-Archive/Documents/Advices/CEIOPS-L2-Final-Advice-SCR-Non-Life-Underwriting-Risk.pdf>

⁴⁰ <https://eiopa.europa.eu/CEIOPS-Archive/Documents/Reports/CEIOPS-DOC-79-10-CAT-TF-Report.pdf>

⁴¹ http://ec.europa.eu/internal_market/insurance/docs/solvency/qis5/ceiops-calibration-paper_en.pdf

424. Thus, only an adjustment to the end results would make sense.

6.5.3.3. EIOPA's advice

425. The proposal is referred to as an "ex-post adjustment" and would work as follows for each peril:

- 1) Calculate, for each zone, the corresponding gross loss by applying the following formula: *country factor times zonal relativity times sum insured gross of deductibles and contractual limits*. Using the notation of the Delegated Regulation, with a region r and a zone i :

$$GrossLoss_{(peril,r,i)} = Q_{(peril,r)} \times W_{(peril,r,i)} \times SI_{(peril,r,i)}$$

- 2) Define the maximum gross exposure in the zone i , using the undertaking-specific policy conditions: $MaxGrossExposure_{(peril,r,i)}$
- 3) Take the minimum between 1) and 2) as the maximum loss for the zone i :

$$MaxLoss_{(peril,r,i)} = \min(GrossLoss_{(peril,r,i)}, MaxGrossExposure_{(peril,r,i)})$$

- 4) Calculate the loss for the region r by using the aggregation matrix:

$$L_{(peril,r)} = \sqrt{\sum_{(i,j)} Corr_{(peril,r,i,j)} \times MaxLoss_{(peril,r,i)} \times MaxLoss_{(peril,r,j)}}$$

426. This adjustment allows taking into account the specific exposure of undertakings that sell contract with policy conditions different than the average undertaking. In the case where the written policy of the undertaking limits more greatly the sum insured than the average undertaking in case of catastrophic event, the "ex-post adjustment" avoids that the SCR of this specific undertaking becomes unrealistically large.

427. In some cases, the contractual limits may vary more greatly within a given zone. In that specific case, such an "ex-post adjustment" may be performed at a more granular level than for zones: for instance by group of homogeneous contracts.

428. Where undertakings make use of the proposed option and in particular in the case of further granularity, they should disclose it in their ORSA, with appropriate quantitative information: e.g. results of both 1) and 2) of above; the reduction in SCR to the respective contracts at the level of region, risk zone or homogeneous contract level.

7. Interest rate risk

7.1. Call for advice

429. The review of interest rate risk module is an EIOPA own initiative issue. In a questionnaire sent to NSAs during 2016, several NSAs suggested a review of the current interest rate risk module given the new interest rate environment. After having received the first call of advice EIOPA has identified interest rate risk as one of the most material own initiative issues for which it intends to provide a technical advice to complement the request from the European Commission.

7.2. Legal basis

Solvency II Directive

430. Article 105 (5a)

Delegated Regulation

431. Article 103: Simplified calculation of the capital requirement for interest rate risk for captive insurance undertakings

432. Article 165: General Provisions

433. Article 166. Increase in the term structure of interest rates

434. Article 167. Decrease in the term structure of interest rates

Guidelines

435. Guideline 4 of the "Guidelines on the treatment of market and counterparty risk exposures in the standard formula".

7.3. Feedback statement on the main comments received to the discussion paper

a. Summary of the comments received

436. Some stakeholders pointed out the review of the interest rate risk module is interconnected with the RFR/UFR and LTG projects. They suggest doing a comprehensive review of all elements of the long-term guarantee package in 2021.

437. Some stakeholders argued the interest rate risk module should not be reviewed in isolation without looking into the entire market risk module including the correlations.

438. Some stakeholders argued the Solvency II principle of avoiding procyclicality should be considered when interest rate risk is assessed.

b. Assessment

439. In the “*Discussion Paper on the review of specific items in the Solvency II Delegated Regulation*” EIOPA identified several shortcomings with the current approach. An improvement of the interest rate risk submodule is deemed necessary and in the scope of the SCR review. EIOPA recognizes that there is a connection of the interest rate risk with other market risk modules, particularly through the inherent correlations. However, in this review process the focus is to properly resolve the main issues identified in the discussion paper.

Issues identified with the current relative approach

a. Summary of the comments received

440. The majority of the stakeholder’s agrees with the main issues identified in “*Discussion Paper on the review of specific items in the Solvency II Delegated Regulation*”. They also argue that the current relative approach is inappropriate in a low yield environment with negative interest rates in terms of underestimating the interest rate risk. Some of the stakeholders provided even further evidence of the inappropriateness of the current approach by including further results on the comparisons to historic data or results from internal models.

441. However, some other stakeholders tend to disagree with the main issues identified. Some of them argue from a macroeconomic perspective. A relative approach implies a lower capital requirement in a low yield environment and a higher capital requirement in a higher interest rate environment, which would lead to a reduction of procyclicality. Other stakeholders argue that the data period considered in the backtesting exercise indicating the problems of the current approach is too short and ask for further evidence.

442. Several stakeholders argue that the introduction of a minimum downward shock would not sufficiently resolve the issues identified. Some of them claim the 1% minimum shock would not be sufficient. Other stakeholders see more general issues with the introduction of a minimum downward shock. The calibration of a static minimum downward shock would to some extent be artificial and would require a more frequent recalibration. Some stakeholders argue that the minimum downward shock should not be static, but rather depend on the interest rate level.

443. Several stakeholders argue that the existence of a lower bound on interest rates should to be taken into account in the review of the interest rate risk module.

444. Some stakeholders point out that in a potential recalibration the performance of a new approach in a higher interest rate scenario should be taken into consideration as well.

445. Some stakeholders suggested to additionally review the correlations with other market risk modules arguing that correlations can flip in a low yield environment.

b. Assessment

446. EIOPA considers that comparisons to historic data provide sufficiently clear evidence that the current relative approach underestimates the real interest rate risk in a low yield environment. As already stated above, some stakeholders in addition provided further evidence about the inappropriateness of the relative approach in the current interest rate environment.
447. EIOPA considers a minimum downward shock as a simple solution that could at least partly resolve the main issues identified. It is noted that a proper calibration of a minimum downward shock might face a challenge, but with the available historical data, a sufficiently prudent minimum shock can be determined. EIOPA has considered both a static minimum downward shock and a more implicit dynamic type of a minimum shock, which depends on the interest rate level. Moreover, EIOPA has also determined a static lower bound on interest rates in one methodology. For further details on the minimum shock, please refer to the analysis section.
448. EIOPA recognizes the importance that a new methodology also provides adequate shocks in a higher interest rate environment. In all analysed methodologies, (see the analysis section for further details) a relative stress prevails in a higher yield environment. This is considered as an appropriate feature of the methodologies proposed.
449. EIOPA notes that the yield environment can also affect market risk correlations. However, an assessment of these correlations is not in the current scope of the review and will rather be part of future reviews.

Data issues

a. Summary of the comments received

450. Many stakeholders consider the EIOPA data set as one reasonable data set for the calibration, particularly because of the consistency to the valuation of liabilities. Those arguing against mainly consider the too short data history as a main drawback and suggest using data sets with a longer period.
451. Several stakeholders suggested to shock input data used to derive the smooth risk-free curve (e.g. swap data or zero coupon government bond data), particularly because this approach would ensure market consistency. Some stakeholders suggested to take the compounding convention for par swap yield fixed legs into consideration when converting to spots. It is further proposed to avoid spurious/illiquid points (11, 13, 14, 16 – 19 years) when calibrating spot curves.
452. Several stakeholders emphasized that for the interest rate SCR calculation the stress factors should only be applied until the last liquid point (LLP) and afterwards the extrapolation should be applied. The main argument is that only such an approach would ensure consistency with the valuation of own funds.

b. Assessment

453. The EIOPA data set contains historical risk-free curves for a variety of currencies. The entire data history goes up to 17 years of daily observations depending on the currency. Moreover, the data history captures different interest-rate environments. Accordingly, the data set can be considered as an appropriate data set to perform the calibrations.
454. EIOPA notes that the direct calibration on input data would be more market consistent. However as some stakeholders pointed out, such an approach has the drawback that a stress could not directly be performed on the illiquid points. The smooth EIOPA risk-free curves do not have that disadvantage. Moreover, the difference between stressing liquid points on input data or on the smooth risk-free curve should not be considerable. Accordingly, a stress on the smooth risk-free curves deems appropriate.
455. EIOPA notes the point that an extrapolation with the Smith-Wilson methodology after the LLP would better ensure consistency with the valuation of the basic own funds. However, several counterarguments against an extrapolation can be provided. First, EIOPA has performed simulations with different UFR values indicating that the maximum annual change at the 90Y tenor point is at most 19 %. Accordingly, EIOPA considers that the 20% relative shock at the 90y maturity is appropriate. Second, an extrapolation would introduce additional complexity: from a practical point of view each undertaking would need to implement the Smith-Wilson methodology, unless EIOPA would do it which is not possible from a legal point of view because of the absence of empowerment in the Solvency II Directive. Third, there would also be a risk of not taking into account the changes in forward rates observed before the extrapolation that have a significant impact on the risk-free rates and hence underestimating the changes.

Mathematical approaches to derive the stressed risk-free curves

a. Summary of the comments received

456. The majority of stakeholders prefer keeping the principal component analysis in the methodology arguing it is a well-suited statistical tool to deal with highly dimensional and particularly highly correlated data.
457. Some stakeholders consider the affine approach as a suitable candidate to overcome the problems with the current relative approach, while others are rather reluctant to include such an approach. Some stakeholders provide the actuarial argument in favour of the affine approach that an affine form seems to fit in well with a 'normal distribution' of interest rates at low interest levels, and a 'lognormal distribution' at higher interest rates. Some stakeholders suggested to estimate the parameters of an affine model a and b with a quantile regression.
458. Several stakeholders are reluctant to introduce the intensity-based approach. They mainly argue that the approach overestimates interest rate risk.

459. Several stakeholders suggested using a relative shifted-approach to measure interest rate risk in the standard formula. Some stakeholders suggested applying a lognormal-shifted approach.

b. Assessment

460. EIOPA considers principal component analysis as an appropriate statistical tool to capture the high correlation in the data. The principal component analysis has been applied in the initial calibration of the relative stress factors. The same relative stress factors are used as input data in two methodologies at hand, see the analysis section. In the calibration of the shifted type approaches, principal component techniques were applied as well.

461. EIOPA does not consider the affine approach to be fully appropriate as a stand-alone approach. The affine approach in particular tends to overestimate interest rate risk in a higher yield environment. However, EIOPA considers that a properly calibrated simple affine approach is one appropriate model for a low yield environment. Accordingly, one methodology analysed builds upon the affine approach in the low yield environment.

462. EIOPA considers that the intensity-based approach is not an appropriate approach to model interest rate risk in the standard formula. This approach tends to significantly overestimate the interest risk.

463. EIOPA has taken the suggestions about the shifted approach into consideration and has provided a detailed analysis about this approach, for details see the analysis section.

7.4. Advice

7.4.1. Previous advice

464. In the initial CEIOPS' Advice for Answers to the European Commission on the second wave of Calls for Advice in the framework of the Solvency II project the following was included:

*3.22 The multiplicative stress approach where the current interest rate is multiplied with a fixed stress factor to determine the stressed rates leads to lower absolute stresses in times of lower interest rates. This may underestimate in particular the deflation risk. In order to capture deflation risk in a better way, the floor to the absolute decrease of interest rates in the downward scenario could be introduced. As a pragmatic proposal, the absolute decrease could have a lower bound of one percentage point. If the interest rate for maturity 10 years is 2, the shocked rate would not be $(1-34\%)*2\%=1.32\%$, which is likely to underestimate the 200 year event, but $2\%-1\%=1\%$, which can be considered to be a more reasonable change.*

7.4.2. Analysis

465. EIOPA has analysed three potential approaches, which intend to mitigate the identified drawbacks of the current relative approach raised in the

“Discussion Paper on the review of specific items in the Solvency II Delegated Regulation”:

1. Shifted approach
2. A symmetric 200 basis point (bp) minimum shock with a static interest rate floor
3. A combined approach

466. In the following, the analysis of each of the mentioned approaches is presented below.

Shifted approach

467. EIOPA has mainly focused its analysis on the relative shifted approach, but has also taken the proposal from stakeholders of a shifted-lognormal approach into account.

468. Intuitively the shifted approach works as such that the current interest rate is shifted upwards in a first step. In a second step, based on this shifted spot rate, a relative stress is performed. Finally the relatively stressed shifted spot rate is shifted downwards by the same initial shift amount.

469. Formally, the stressed spot rates are given by

$$r_t^{up} = (r_t - \theta) * (1 + s^{shift,up}(\theta)) + \theta. \quad (1)$$

$$r_t^{down} = (r_t - \theta) * (1 - s^{shift,down}(\theta)) + \theta, \quad (2)$$

where θ is a potentially maturity-dependent shift vector and $s^{shift,up}(\theta)$, $s^{shift,down}(\theta)$ are the relative stress-factors, which itself depend on the shift-vector θ . EIOPA has mainly considered a constant shift vector for simplicity reasons.

470. The calibration of the constant parameter shift vector θ in the relative stress factor approach was performed by minimizing the absolute difference of the stressed curve (up scenario) and EIOPA’s SCR interest up curve under the constraint $-1 \leq \theta \leq m < 0$, where m is the smallest negative rate in the calibration data set of the corresponding currency.

471. Apart from the calibration of the constant shift vector, a sensitivity analysis has been performed for different levels of the shift parameter.

472. This sensitivity analysis (outlined below) provides the following main insights:

- In a moderate and higher interest rate environment, the shift approach is very similar to the purely relative approach since in such an environment the relative component of the shift approach dominates. Accordingly, the shifted approach seems to work appropriately in such interest rate scenarios.

- In a low yield environment, the shifted approach significantly deviates from the relative approach. The implicit additive component prevails here and provides a sufficient correction to avoid an underestimation of interest rate risk.
- Overall, the sensitivity towards changes of the shift parameter are rather low to modest except at the shorter end of the term structure in a low yield environment.

Figure 7.1: Comparison of the current relative (solid line) and the shifted relative stress factor approach (dotted and dashed lines) for shift parameters $\theta = -3, -5$ and -10% based on a calibration on 30.12.2005 for the EURO. "Shift_rel_up, theta=-0.1" denotes the interest rate up curve calibrated by the shifted approach with $\theta = -10\%$, respectively.

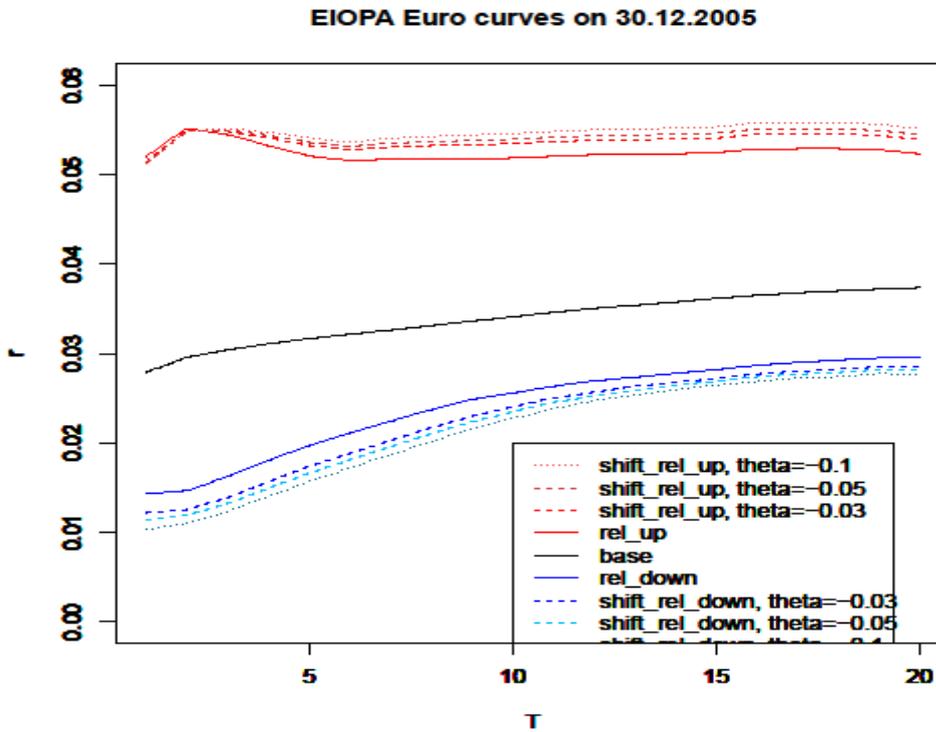
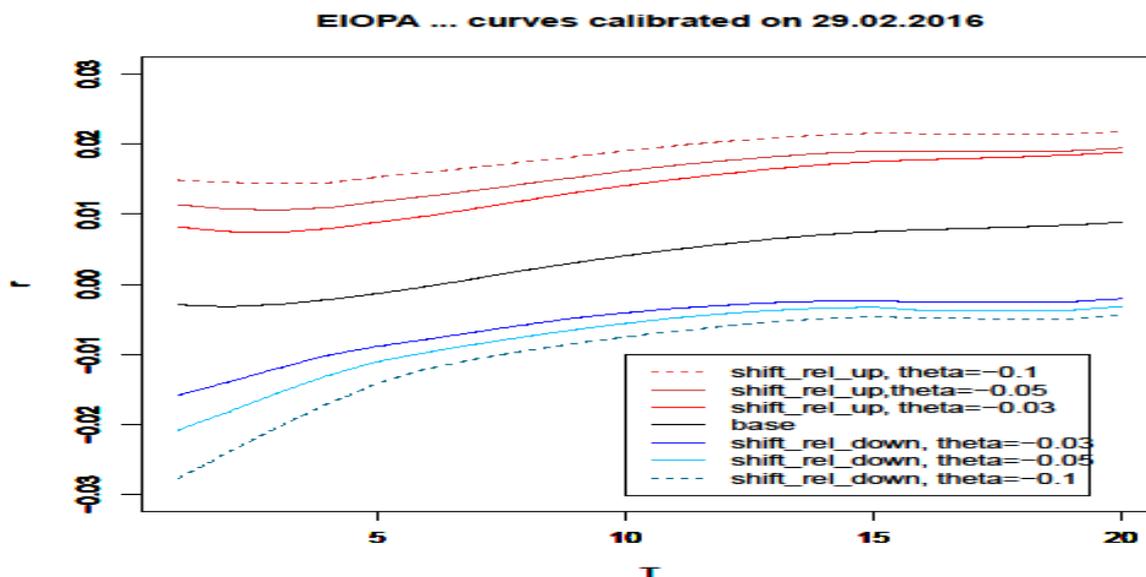


Figure 7.2: Comparison of the shifted relative stress factor approaches for shift parameters $\theta = -3, -5$ and -10 % based on a calibration on 29.02.2016



473. Given this first analysis, several advantages of the shifted approach have been identified: it is a relatively simple and data-driven approach (all parameters can be estimated with the available EIOPA RFR data set) that can be used to model interest risk in a variety of interest rate environments.

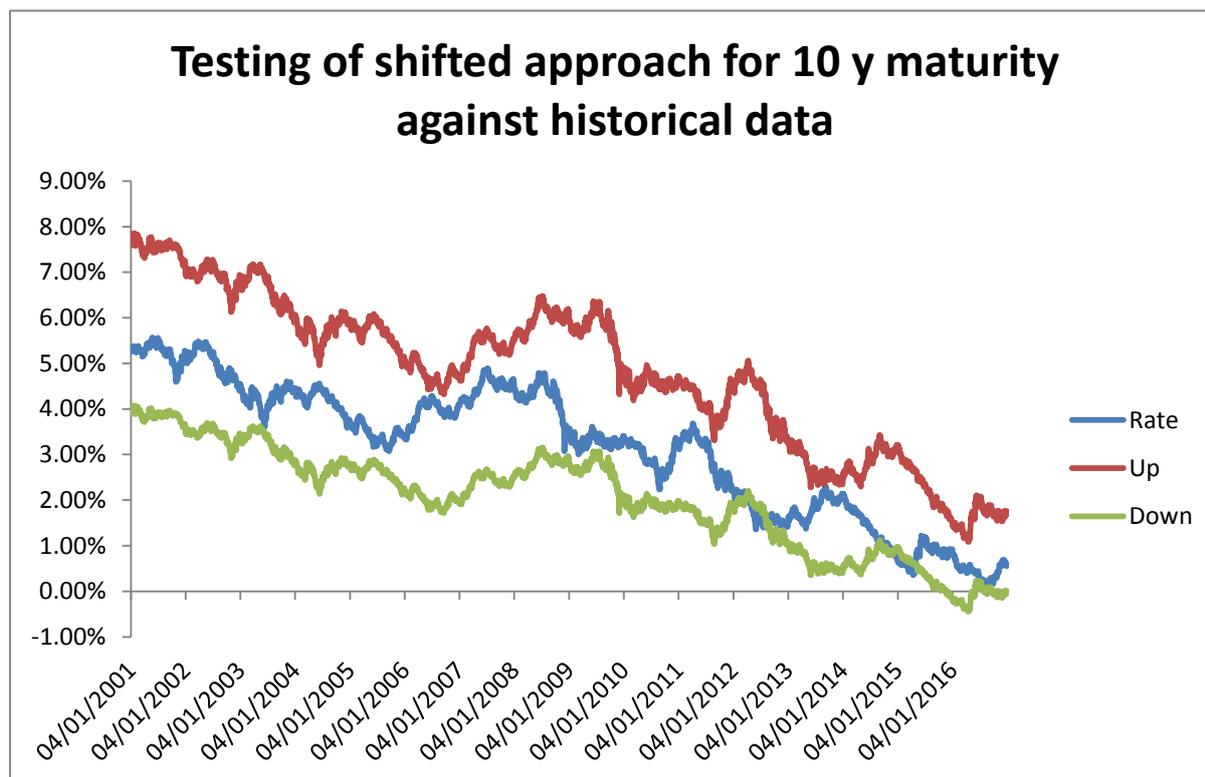
474. However, an in-depth analysis of historic data showed some shortcomings of the shifted approach. In figure 7.3 below, the testing against historic interest rate movements derived from daily observations is shown for the 10 years maturity for the EURO.⁴² In blue, the observed rates are shown and in green and red the downward and upward stressed rates predicted one year before are displayed. One can observe that the blue line crosses the green line several times clustered in three events over the past 10 years: in 2016, 2014 and 2011. This was assessed as non-appropriate for a model that should reflect appropriately the 1-in-200-years event: it would mean that the 1-in-200-years event occurred 3 times over the last 10 years.

475. If one would count daily breaches instead of considering clustered breaches, one would end up with 210 daily breaches for the test against historic interest rate movements in figure 7.3. Given that the data period considered in that test contains approximately 4200 data points and a 0.5 % quantile would allow for at most 21 daily breaches, the qualitative conclusion stated in the paragraph above would remain unchanged.

476. The qualitative results from the testing against historic rates hold also for different maturities and currencies. The lognormal shifted approach shows qualitatively the same results in the comparison to historic data as the relative shifted approach.

⁴² A thorough testing against historic interest rate movements for different currencies and tenor points is included as an appendix to the discussion paper.

Figure 7.3: Comparison of the shifted approach for the 10 years maturity for the EURO to historic data. The shift is here of 3.5%.



477. For the reasons explained above, EIOPA would not advise to retain the shifted-approach as the methodology to derive the interest rate stresses.

A symmetric 200 basis point (bp) minimum shock with a static interest rate floor (Proposal A)

478. In a high-yield environment, the current relative approach of the Delegated Regulation captures in a sufficient appropriate manner the interest rate risk. Stakeholders are also mostly of the same opinion. Therefore, it was concluded to build on the existing model and adjust it for different yield-environments in a simple and prudent way.

479. In a moderate-yield environment, one has observed substantial decreases in annual interest rates that are underestimated by the current relative approach. In the figure 7.4 below, the annual movements of daily observed RFR for different maturities are illustrated in dependence of the interest rate level. Each colour indicates a different calendar year. For instance, in turquoise, we observe the annual movements that occurred during 2008; in pink, the annual movements that occurred during 2015. One can observe that spot rates in 2011 (blue colour) have decreased significantly of around -2% (sometimes more). One can also observe that this decrease happened to several maturities, but not necessarily to all at the same time.

480. Given the evidence of these significant decreases a minimum decrease of -2% was introduced as a simple way to ensure that the SCR is not underestimated. The same is applied to an increase of rates:

$$r_t^{down}(m) = \min[r_t(m) - 2\% ; r_t(m) \cdot (1 - s^{down}(m))] \quad (3)$$

$$r_t^{up}(m) = \max[r_t(m) + 2\% ; r_t(m) \cdot (1 + s^{up}(m))] \quad (4)$$

481. The absolute minimum shocks are phased out linearly after 20 years to reach 0% at 90 years. That means:

- Between 1 and 20 years, the absolute shocks are 2 %.
- From 90 years onwards, absolute shocks of 0 % are applied (only the relative shocks will be used to calculate the interest rate risk).
- Between 20 and 90 years, a linear decrease of the absolute shock between 2 % and 0 % is applied (e.g. at 55 years, absolute shock of 1 %).

482. In order to mitigate the effect of the model on negative interest rates and to particularly take account of the fact that negative interest rates around -2% have not been observed, a static floor to interest rates is introduced in the downward scenario.

483. That means that rates cannot decrease below this floor. The upward shock is kept at +2%. Using equations (3) and (4), we get:

$$r_t^{down,minshock} = \max(\text{floor}(m), \min[r_t(m) - 2\% ; r_t(m) \cdot (1 - s^{down}(m))]) \quad (5)$$

$$r_t^{up,minshock} = \max[r_t(m) + 2\% ; r_t(m) \cdot (1 + s^{up}(m))] \quad (6)$$

484. The calibration of the floor was based on the lowest rates observed across maturities: the lowest rates were reached for CHF and maturity 2 years at -1.22%. By adding a prudence factor, the floor is set up at -2%. This allows having a downward shock even if rates reach again their lowest value. One can however observe that the minima reached for CHF and maturities 10, 15 and 20 years are not as low as -1.22%. By drawing the minima, one can observe a curve that looks like a linear function. For simplicity reason, the floor proposed is the following:

- A minimum rate of -2 % for maturity 1 year
- Minimum rates of -1 % for maturities 20 years and onwards
- Between maturities 1 and 20 years, a minimum floor based on a linear interpolation

Figure 7.4: Absolute annual changes of the EUR interest rates for selected tenor points in dependence of the corresponding interest rate level.

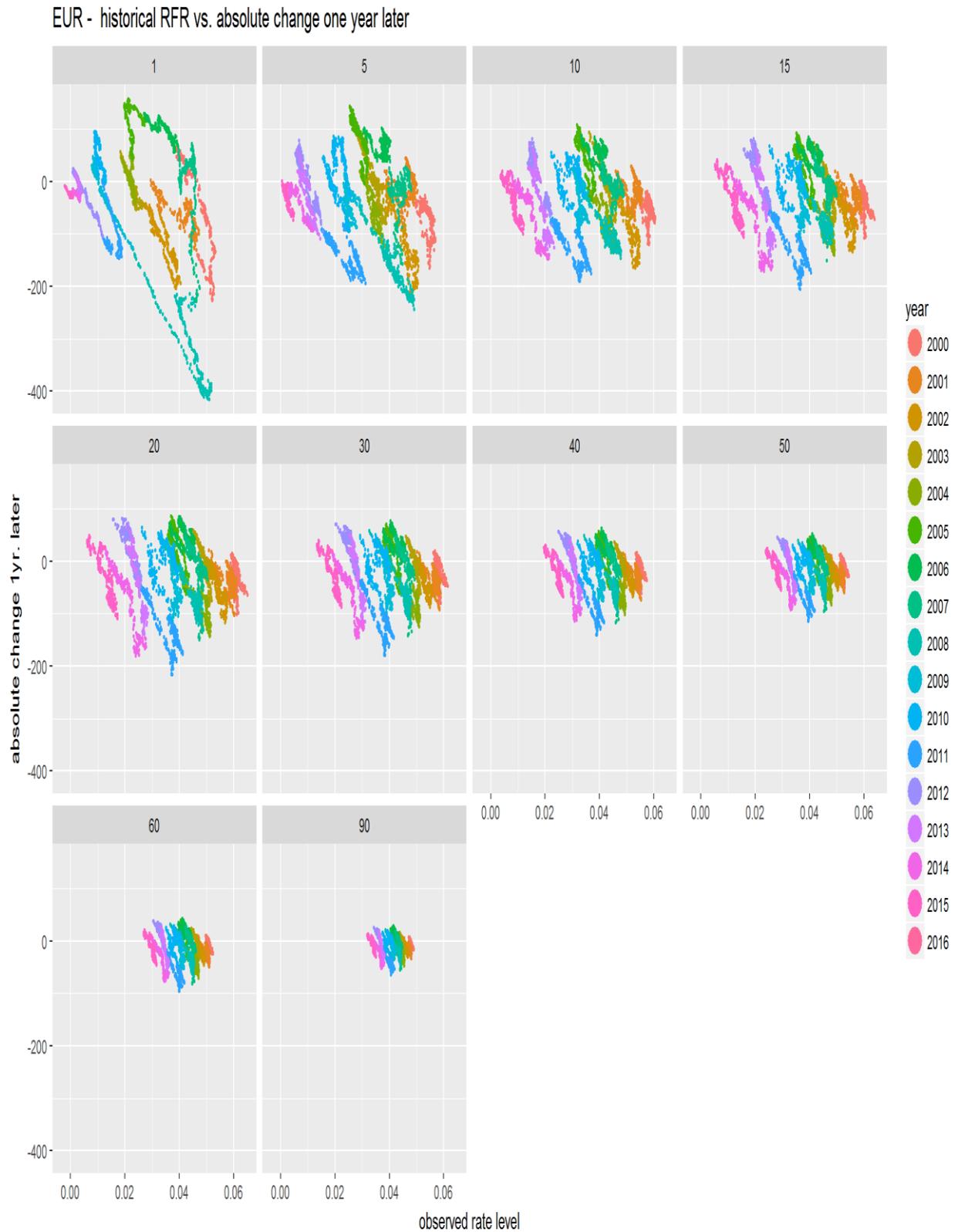
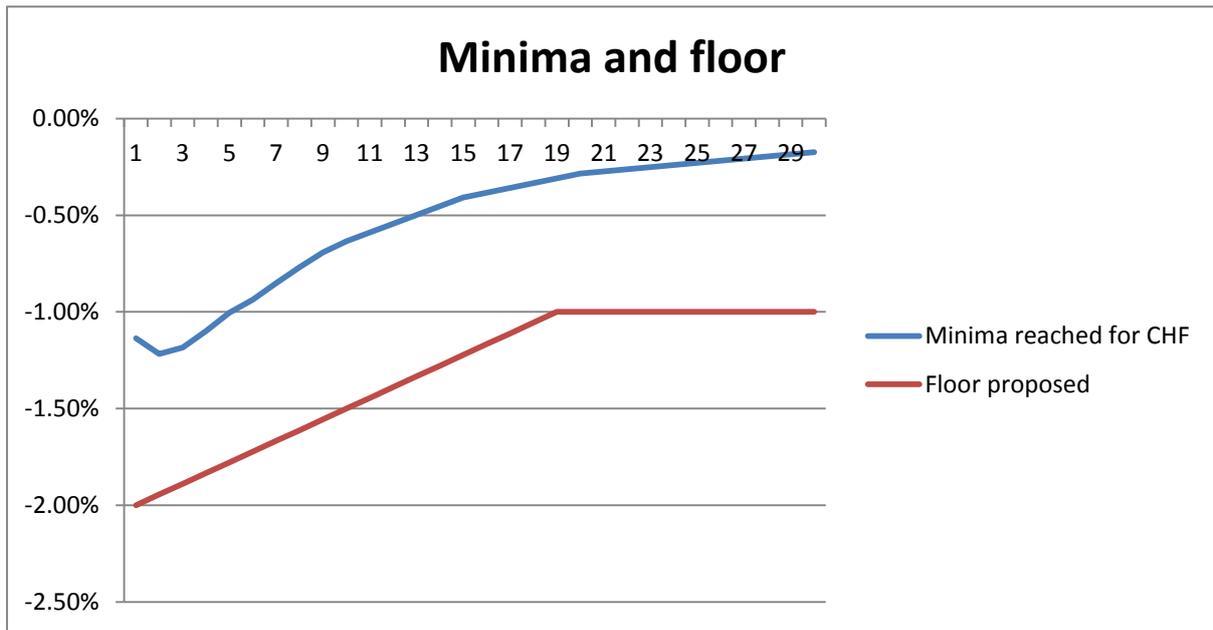
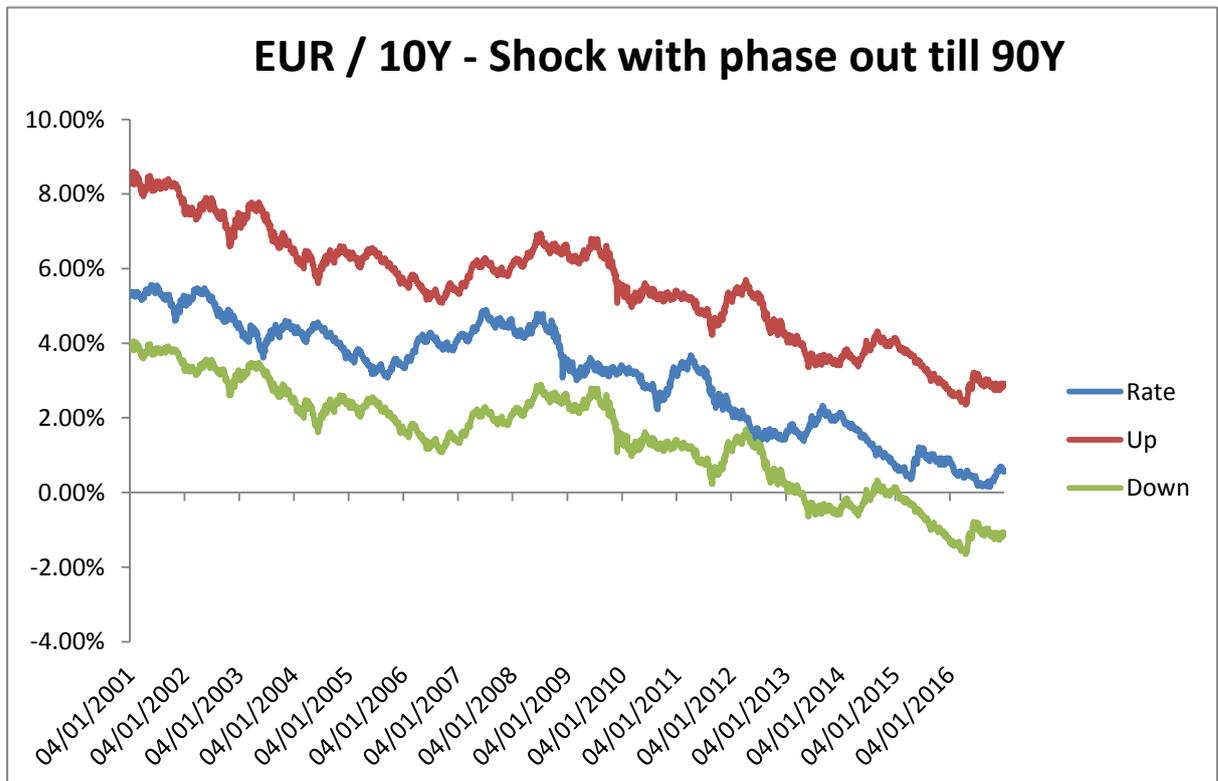


Figure 7.5: minima reached for CHF and floor proposed



485. With the introduction of these minimum absolute shocks of 2%, the model performs better in the above presented comparison to historic data. This can for instance be observed for the 10-year EURO maturity in figure 7.6.

Figure 7.6: Comparison of Proposal A for the 10 years maturity for the EURO to historic data.



486. To summarize, the main advantages of Proposal A are:

- It is a very simple approach. The model can be applied for all currencies and does not require a more frequent recalibration.
- The model shows a sufficient performance in the comparison to historic data. It thus does not result in a systematic underestimation of interest rate risk in either interest rate scenario.

A combined approach (Proposal B)

487. The starting point of the combined approach is the observation that the model under Proposal A captures interest rate risk appropriately in a high yield and a moderate yield environment. As already stated above, in a high yield environment the relative approach is a sensible approach to model interest rate risk. In a moderate yield environment, where interest rates lie somewhere between 3 and 4 %, the largest annual movements in interest rates have been observed. This can further be seen in the second column in table 7.1, which displays the interest rate level before the maximum annual change. A 200 bps minimum shock is therefore a simple and prudent approach to capture interest rate risk in the moderate yield environment.

Table 7.1: Maximum 1 year changes observed for the euro RFR

Maximum observed annual changes for the euro				
Maturity (A)	Rate one year before the shock (B)	Rate after shock (C)	Absolute annual change (D=B-C)	Date w.r.t. rate after shock (E)
1	5,1%	1,0%	4,1%	02.07.2009
5	4,9%	2,5%	2,4%	02.07.2009
10	3,3%	1,4%	1,9%	04.06.2012
15	3,6%	1,6%	2,1%	04.06.2012
20	3,7%	1,6%	2,2%	04.06.2012
30	3,8%	2,0%	1,8%	05.06.2012
40	3,9%	2,5%	1,4%	05.06.2012
50	3,9%	2,8%	1,1%	05.06.2012
60	4,0%	3,0%	0,9%	05.06.2012
90	4,1%	3,4%	0,6%	05.06.2012

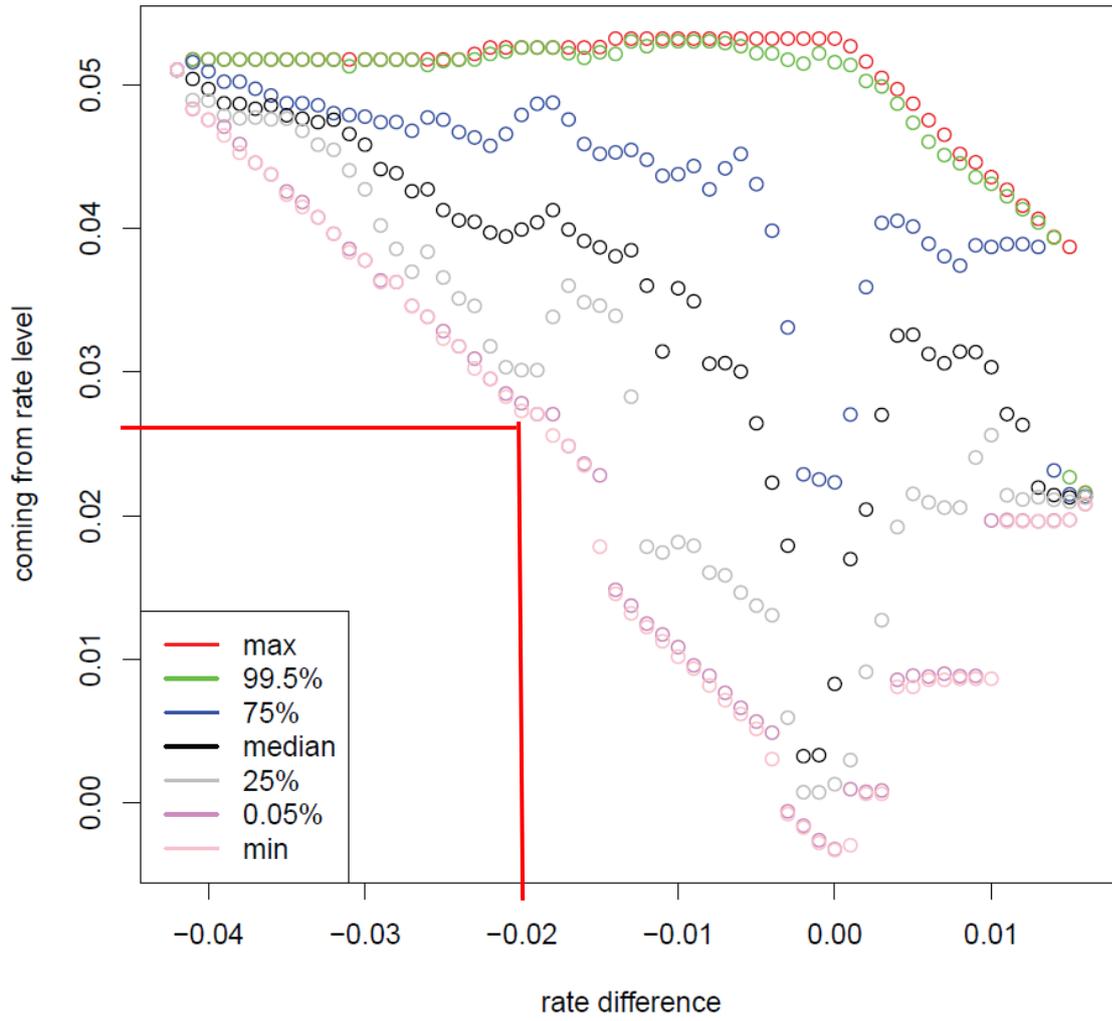
488. However, in a low yield environment the introduction of a considerable minimum shock can be challenged to be an overly prudent approach. As the scatterplots in figure 7.4 above already indicate, for very low and negative interest rates no extreme annual movements above 100 bps have been observed. Moreover, one has not observed any negative interest rates significantly below -1 %.

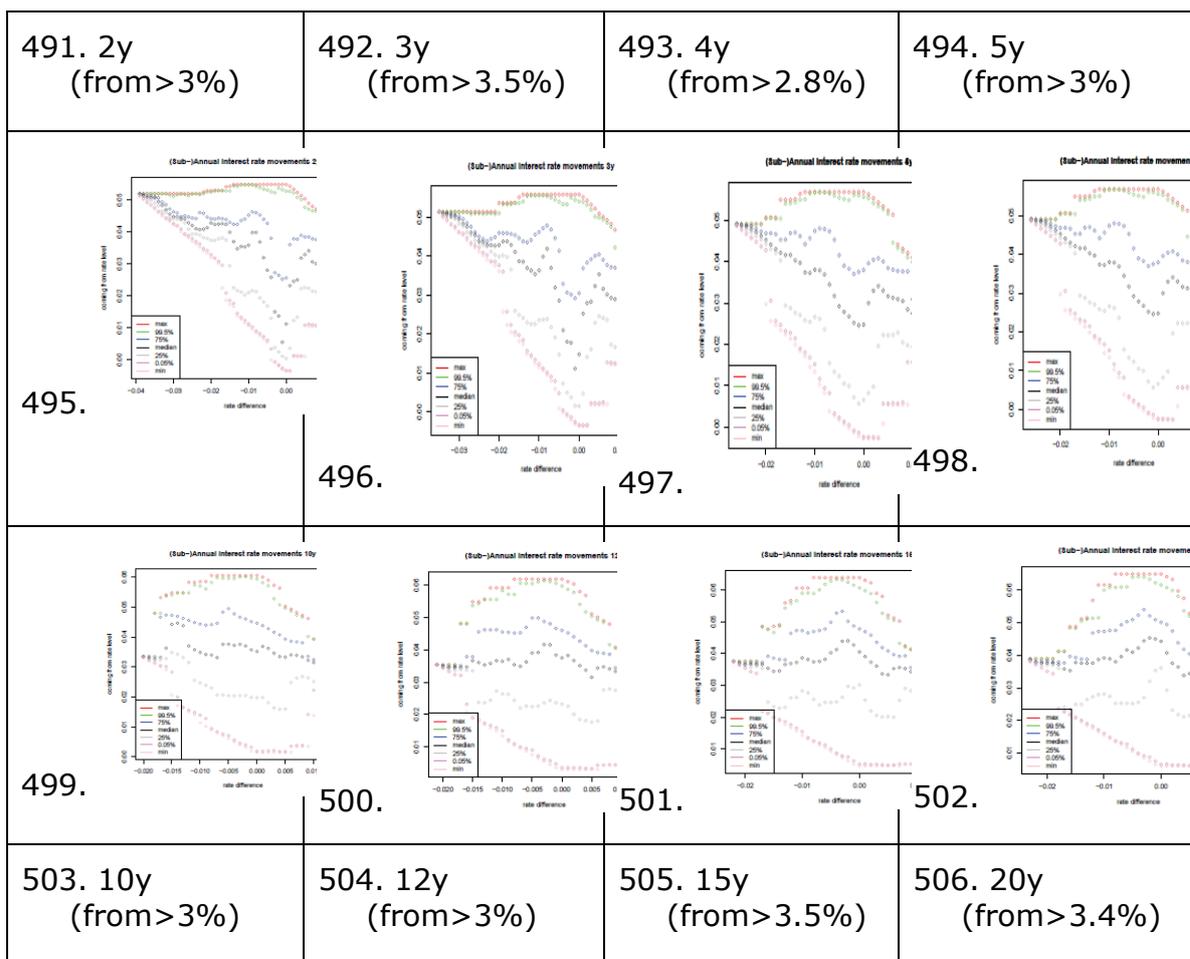
489. Figure 7.7 below provides further insights on the low yield environment. The interest rate change (rounded to 0.1%=10bp) is marked on the x-axis. Due to rounding, groups of width 10bp are formed. The values above each point (corresponding to the y-axis) are the level of the interest rate from where this absolute change was observed ("from rates"). Each group of "from-rates" is displayed in terms of empirical quantiles. The min (pink) and max (red) show the total range of "from-rates", while the other colors depict the quantiles as indicated in the legend.⁴³ To illustrate how the figure is to be read, let us as an example: fix an absolute change of the risk-free rate of -200 bp on the x-axis. Then we can observe from the figure that the lowest interest rate level from where an absolute decrease of 200 bp of the 1y risk-free rate was observed, was approximately 2.75% and the highest interest rate level from where an absolute decrease of 200 bps was observed, was about 5.1%. The figure provides two very useful insights. First, the red rectangle highlights the 200 bps corridor (x-axis) and shows that absolute changes of -200 bp did occur, but only from interest rates above 2.75%.

490. Second, focusing on the low yield environment and thus mainly looking at the lowest and the 5 % quantile points (in pink and purple) for absolute decreases and "from rates" below 3%, one can observe an affine pattern of the absolute changes of the risk-free rates in a low yield environment. Similar plots for other maturities are depicted as icons below. They confirm the stated results for the 1y maturity.

1. ⁴³ It is important to note that the sub-annual approach provides an extremely conservative measure due to very high inter-correlation of the data. The quantiles refer to daily observations in a database of $4434 \times (4434 - 1) / 2$ individual changes between each date in the data history and each date later than that.

(Sub-)Annual Interest rate movements 1y





507. Figure 7.7: On the x-axis all (sub-)annual changes (that means, all changes of interest rates that occurred within a year) are depicted. The y-axis refers to the corresponding interest rate levels that lead to the subannual absolute change. The quantiles in the legend refer to the interest rate level that lead to the (sub-)annual change.

508. The idea of the combined approach is henceforth to keep the notion of Proposal A in the moderate and high interest rate environment, but to add an affine model in a low yield environment.

509. More specifically, the affine stress is defined as

$$r_t^{down,affine}(m) = \min(r_t(m), r_t(m)(1 - s^{down}(m)))^{44} - 1\% \quad (7)$$

$$r_t^{up,affine}(m) = \max(r_t(m), r_t(m)(1 + s^{up}(m))) + 1.4\%, \quad (8)$$

where the relative maturity-dependent shock factors $s^{down}(m)$ and $s^{up}(m)$ are taken from Article 166 and Article 167 of the Delegated Regulation. The maturity and currency-independent additive stress components of -1 % and

⁴⁴ The Min and Max operators would just apply for negative interest rates.

+1.4 % in the affine model were statistically estimated with the EIOPA RFR data set for different EEA currencies. A thorough statistical derivation is presented in the appendix. The affine stress contains an asymmetric additive stress component. The additive stress component is higher in the upward scenario than in the downward scenario. Economically, the higher additive component in the interest rate up scenario implies that in the low yield environment where the affine shock prevails, a large increase in interest rates is more likely than a large decrease.

510. As under Proposal A, either additive component is phased out linearly after the 20 years to reach 0 % at the 90 years.

511. That means:

- Between 1 and 20 years, the additive components are -1 % (+1.4%).
- From 90 years onwards, additive components of 0 % are applied (only the relative shocks will be used to calculate the interest rate risk).
- Between 20 and 90 years, a linear decrease of the additive components between -1% (+1.4%) and 0 % is applied.

512. The affine stress is combined with Proposal A in such a way that

- a pure relative stress applies in a high yield environment,
- the high absolute changes (particularly downward changes) of about 200 bp are captured in a moderate yield environment,
- the affine model applies in a low yield environment.

513. More formally, we denote the combined shock as $r_t^{up,down,minshock}$. The combined stresses are defined as the following, using equations (5), (6), (7) and (8):

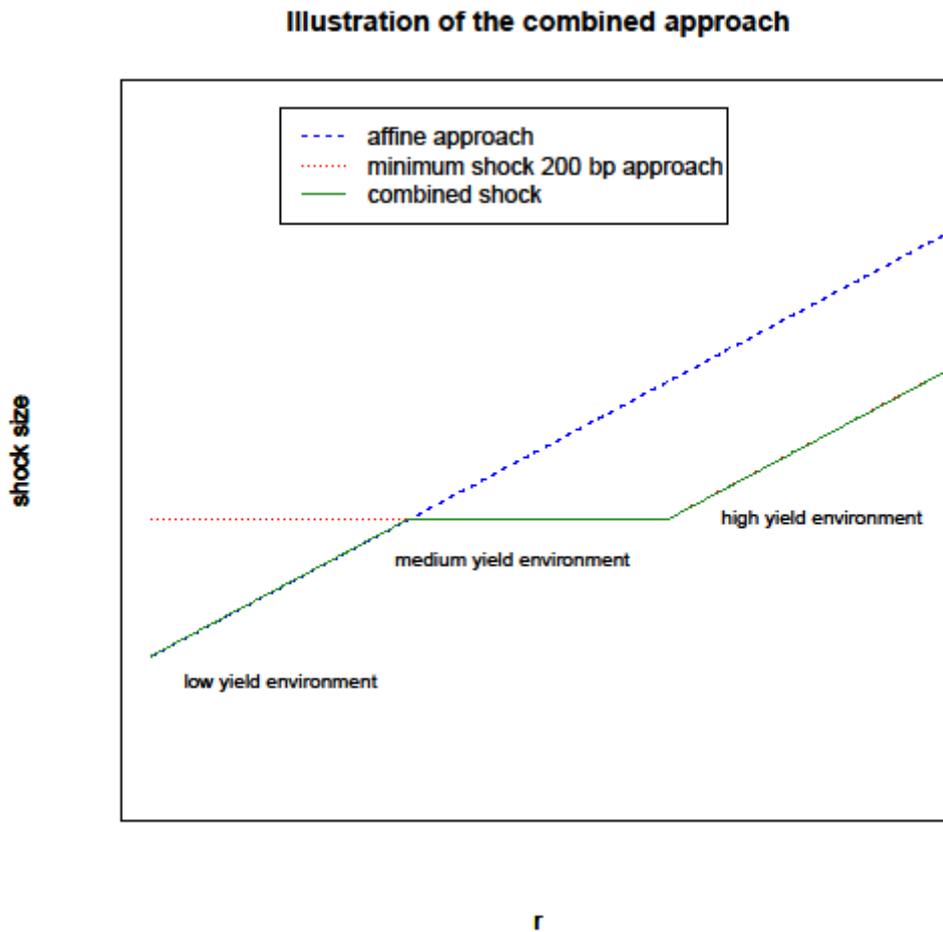
$$r_t^{down,combined}(m) = \max\left(r_t^{down,affine}(m); r_t^{down,minshock}(m)\right) \quad (9)$$

$$r_t^{up,combined}(m) = \min\left(r_t^{up,affine}(m); r_t^{up,minshock}(m)\right). \quad (10)$$

514. Accordingly, the combined stress is the larger (the lower) of the affine stress and the stress under Proposal A in the interest rate down (up) scenario. The formula-based specification of the combined stress has the advantage that an interest-rate environment (low yield or medium yield) need not to be defined a priori. Moreover, with the combined approach there is no need to define a static lower bound. The affine model determines an implicit dynamic lower bound that adjusts with the interest rate evolution.

515. The following figure 7.8 illustrates schematically how the combined approach works:

Figure 7.8: Graphical illustration of the combined approach. On the y-axis the absolute shock size is depicted and on the x-axis the interest rate level is depicted.



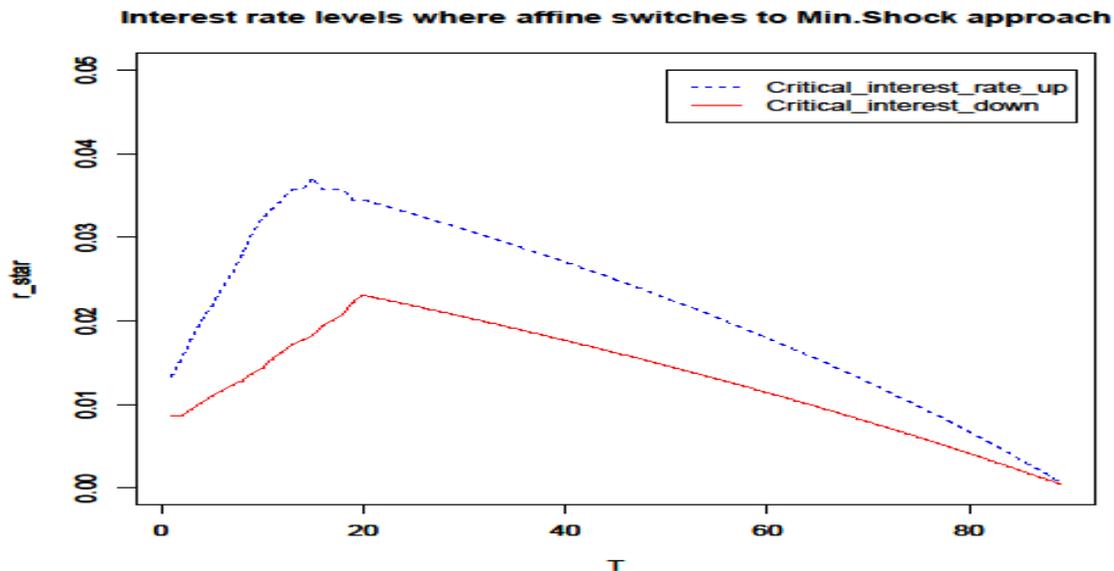
516. On the y-axis, the absolute shock size is depicted. Under the affine stress, the absolute shock size is a linear function of the interest rate level with a slope of $s^{up,down}(m) r_t$, while for the minimum shock proposal the absolute shock size is constant at 200 bp and then becomes linear with the same slope as the shock size of the affine approach. On the x-axis, the interest rate level is depicted.

517. The figure illustrates that in a low yield environment, the affine stress would be applied, in a moderate yield environment a parallel 200 bp stress would apply whereas in a high yield environment a purely relative stress prevails.

518. Figure 7.9 shows the specific interest rate levels for each tenor point from 1 y to 90 y where the affine model switches into the model under Proposal A. The figure should be interpreted as such that for all interest rate levels below the blue (red) line the affine shock would prevail in the down (up) scenario. The figure confirms that the switching from the affine into the minimum shock occurs in a moderate yield environment. More specifically, one can observe that for most tenor points the affine shock turns into the minimum shock at the latest at an interest level of about 3.5 % in the interest down

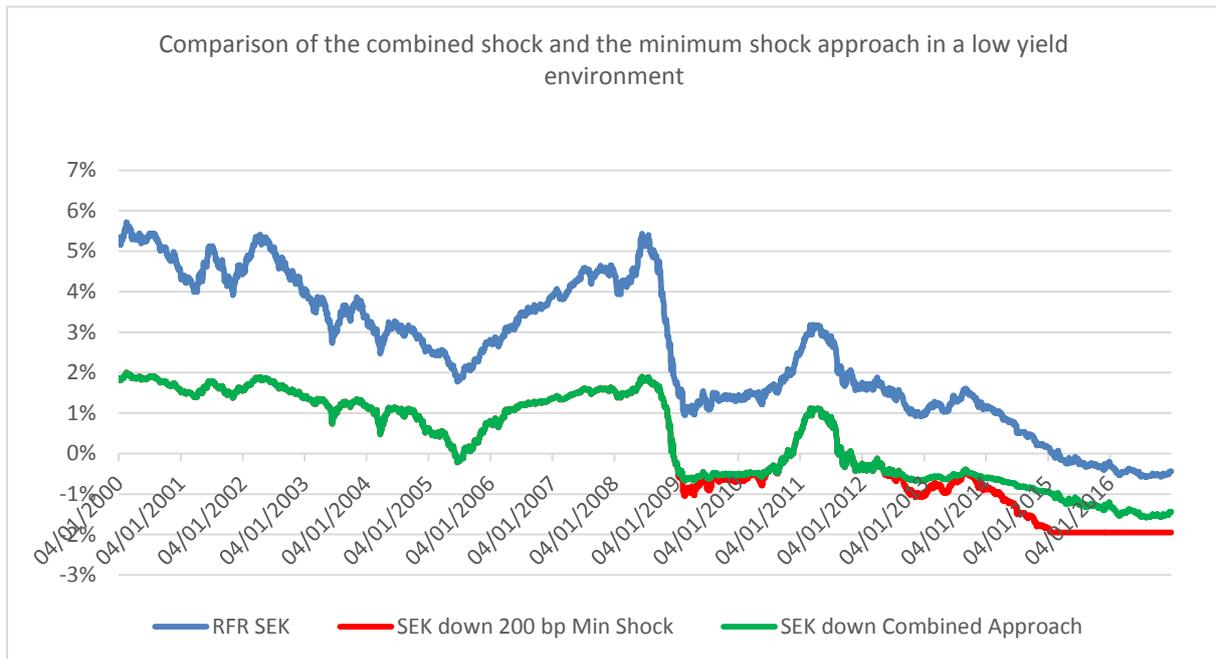
scenario. Due to the larger additive component in the interest rate up scenario, the switching occurs earlier than in the interest rate down scenario.

Figure 7.9: Interest rate levels where the affine shock turns into the 200 bp minimum shock approach for the interest rate down scenario (dotted blue line) and interest rate up scenario (red line). On the x-axis the tenor point is depicted, while the y-axis shows the critical interest rate level where the switching occurs.



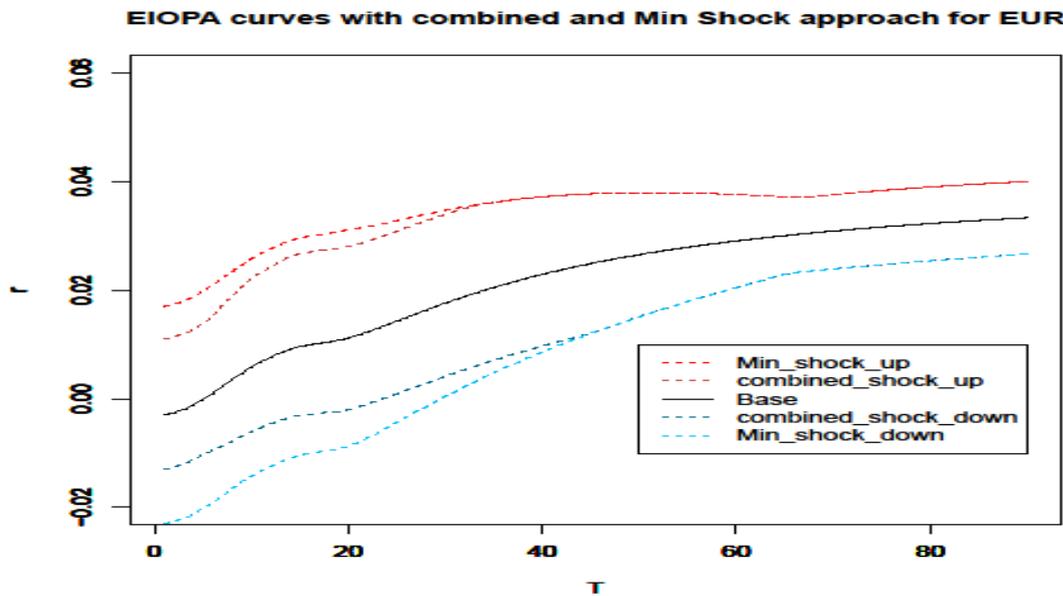
519. The proposal B is first compared with Proposal A in a representative comparison to historical data for the 2y maturity for the Swedish krona SEK in figure 7.10. The results are shown for the interest rate down scenario. Firstly, the figure shows that the combined shock exhibits the same performance in the comparison to historic data as the model under Proposal A. It does not result in more clustered breaches than Proposal A. This result holds for different tenor points and currencies. Secondly, the figure nicely illustrates the dampening effect of the combined approach in a low yield environment. The downward shock under Proposal A (red line) substantially drops from the end of 2014 and reaches the interest rate floor of almost -2%. The combined approach (green line) ensures that in this low yield environment the affine shock component dominates and thus dampens the interest rate down movements substantially without resulting in an underestimation of interest rate risk.

Figure 7.10: 2y SEK RFR and shocked downward curves from 01.01.2010 until 30.12.2016.



520. Proposal B can further be compared with Proposal A for a fixed valuation data as in figure 7.11. From this figure, one can see that in a low yield environment, the affine shock dominates and the minimum and relative shock become just relevant for the longer extrapolated part of the term structure. This observation can be made for all currencies in the low yield environment as inter alia the EUR, CHF, SEK, CZK, GBP. On the other hand, for currencies, which are not in the low yield environment, the combined shock coincides with the shock under Proposal A.

Figure 7.11: EIOPA EUR curves with the minimum and combined shock approach on 30.12.2016



521. To summarize, the main advantages of the combined approach are:

- The model is still relatively simple and it shows a sufficient performance in the comparison to historic data.
- It is partially data driven since the included affine model is estimated on historical data.
- It contains an implicit dynamic lower bound for interest rates, which adjusts with the interest evolution. Accordingly, a static lower bound needs not to be set to avoid too negative interest rates.
- The model is risk-sensitive, particularly in the low yield environment. Historical movements of interest rates in a low yield environment tend to follow an affine shape.

7.4.3. EIOPA's advice

522. EIOPA deems the current relative approach inappropriate to measure interest rate risk in a low yield environment with negative interest rates. Accordingly, EIOPA proposes to modify the methodology.

523. Given the results from the comparison to historic data, EIOPA does not consider the shifted approach as an appropriate candidate to model interest risk in a sufficiently prudent manner. These results indicate there is a significant risk that the shifted approach might underestimate the real interest rate risk in certain interest rate environments.

524. EIOPA considers both Proposal A (Minimum shock approach with a static floor) and Proposal B (Combined approach) as simple and appropriate adjustments to the current methodology, which mitigate the shortcomings of the current approach in a low yield environment with negative interest rates.

525. Consequently, EIOPA advises to adjust the current interest rate risk module according to either Proposal A or Proposal B.

8. Market risk concentration

8.1. Call for advice

EIOPA is asked to report on assumptions currently made by insurance and reinsurance undertakings when calculating the market risk concentration submodule and their impact.

8.2. Legal basis

Solvency II Directive

526. According to Article 105(5)(f) the market risk concentration risk submodule covers additional risks to an insurance or reinsurance undertaking stemming either from lack of diversification in the asset portfolio or from large exposure to default risk by a single issuer of securities or a group of related issuers.

Delegated Regulation

527. The provisions for the calculation of the capital requirement for market risk concentration are set out in Articles 182 to 187.

8.3. Feedback statement on the main comments received to the discussion paper

528. In the following the feedback from stakeholders on the assumptions made in the calculating of the capital requirement for market risk concentration is summarised. The number of respondents was quite limited and not all respondents answered all questions. EIOPA followed up with individual stakeholders to get additional clarifications where necessary.

Scope of exposures included in the market risk concentration submodule

- a. Summary of the comments received

529. No substantial comments were received on the statement in the discussion paper that the scope of the market risk concentration risk sub-module covers all assets held by an insurance or reinsurance undertaking except those listed in Article 184(2) of the Delegated Regulation. Areas where apparently different practices exist are the treatment of derivatives and of funds where a look-through is not possible (see separate sections below).

Treatment of funds where the look-through approach is not possible

- a. Summary of the comments received

530. A number of respondents said that funds where a look-through is not possible should not be taken into account provided they are sufficiently diversified. Others treat such funds as single name exposures to the fund management company.

Treatment of risk-mitigating techniques

a. Summary of the comments received

531. It seems that most respondents do not take into account the value of collateral or risk mitigation techniques when calculating the capital requirement for market risk concentration. This might be different for derivatives that are not used for hedging. An example would be if a long position in an equity index future is used to gain exposure to equities as an alternative to a direct investment in the index.

b. Assessment

532. The source for different interpretations is probably the provision in Article 184(2)(d) of the Delegated Regulation which excludes exposures covered in the counterparty default risk module from the scope of the market risk concentration sub-module.

533. On this basis one could argue that derivatives are excluded. On the other hand one could point out that the counterparty default risk module covers the risk of the counterparty defaulting or its credit quality deteriorating but not the potential market concentration risk in the underlying of the derivative.

534. From a risk perspective the treatment of a direct investment in a stock should not differ from the treatment of an equivalent exposure through a long future position. It should also be possible to reduce the market risk concentration risk charge by entering into a derivative which (partially) offsets exposures resulting from debt or equity investments. In order to support this view legally the argument could be made that the term "exposure" is not defined in the Solvency II framework and that the exposure covered in the counterparty default risk module is the (adjusted) value of the derivative but not the exposure to the underlying.

Definition of exposure at default

a. Summary of the comments received

535. There is no definition of "exposure at default" in the Solvency II legal framework. Based on the comments received there seems to be generally agreement that for an asset in the scope of the market risk concentration risk sub-module the exposure at default should normally equal the value of the asset as determined in accordance with Article 75 of the Solvency II Directive.

Definition of single name exposure

a. Summary of the comments received

536. There is no definition of "single name exposure" in the Solvency II legal framework. Based on the answer provided by stakeholders no general statements about the assumptions used for determining whether exposures belong to a single name exposure are possible.

537. Regarding the question whether exposures to separate counterparties that are owned by the same public entity should be considered as a single name exposure, the answers were split. Two respondents say that they treat such cases not as a single name exposure. One respondent seems to do a relatively elaborated analysis based on criteria for interconnectedness from the Basel framework. One respondent does an “automated approach” based on LEI.

Interpretation of Article 186(2) to (5) of the Delegated Regulation

a. Summary of the comments received

538. Respondents mentioned different assumptions that they use to calculate the risk factor g_i :

- Unrated exposures belonging to a single name exposure which does not exclusively consist of exposures to a single solo insurance undertaking are assigned to a CQS of 5.
- The risk factor is computed based on the CQS for the group (which is calculated based on the external rating of the group).
- An weighted average CQS is computed in a “consistent” way with Article 186(2) of the Delegated Regulation (“Reverse Mapping approach”)

539. In terms of the assumptions used to determine if a credit assessment by a nominated ECAI is not available for an exposure, a few participants responded that if no rating for the issue is available, they use the rating of the issuer.

540. Based on the responses it seems that the assumptions used for the application of Articles 199(4) to (7) of the Delegated regulation do not differ from those used for Article 186(2) to (5) of the Delegated Regulation.

b. Assessment

541. The topic will be further discussed in the analysis section below.

Other responses

a. Summary of the comments received

542. Some stakeholders used the opportunity to provide general comments on the market risk concentration sub-module making the following suggestions:

- All strategic participations should be excluded from the sub-module;
- The rounding-up of the average credit quality step should be changed to rounding;
- Sectorial and/or geographical concentration should be taken into account;

- The exclusion of exposures to central government and central banks should not be contingent on the currency in which the asset is denominated.
- There should be a more favourable treatment of stocks in this sub-module (as stocks do not have an external rating they are assigned to the CQS 5).

8.4. Advice

8.4.1. Previous advice

543. CEIOPS gave recommendations on the design and calibration of the market risk concentration sub-module in the advice on the structure and design of the market risk module and the QIS5 calibration paper.^{45,46}

8.4.2. Analysis

544. The stakeholder answers to the public consultation show that different assumptions are used in the application of Article 186(2) to (5) of the Delegated Regulation. EIOPA is considering the following options:

- EIOPA provides clarification on the provisions applicable according to the current legal rules.
- EIOPA proposes to the European Commission a change to the rules as described below.

545. The different assumptions used when applying the provisions seem to result from different understandings with respect to the following questions:

- What does the term "single name exposure to an insurance or reinsurance undertaking" mean? In particular, does the single name exposure have to consist exclusively of exposures to a single solo insurer? If not, which other cases are covered (e.g. exposures to an insurance group)?
- What does it mean that a credit assessment by a nominated ECAI for the single name exposure is not available (no issuer rating, no rating for any of the exposures, etc.)?

546. The examples for single name exposures in the table below will help to illustrate the current calculation of the risk factor g_i for exposures to (re)insurance undertakings and/or financial institutions as well as possible alternatives:

⁴⁵ CEIOPS (2009): CEIOPS' Advice for Level 2 Implementing Measures on Solvency II: SCR Standard Formula Article 109 - Structure and Design of Market Risk Module. CEIOPS-DOC-40/09

⁴⁶ CEIOPS (2010): QIS5 Calibration Paper. CEIOPS-SEC-40-10.

SNE	SNE Description	Exposures⁴⁷	Credit Rating	Solvency ratio
1	Insurer with SCR Ratio=x1 and without credit rating	Insurer 1	NA	x1
2	Insurance group with SCR Ratio=x2	Insurer 2	CQS 3	y2
		Insurer 3	NA	z2
3	Financial group without credit rating	Fin. Institution 1	NA	-
		Insurer 4	NA	y3
4	Insurance group without credit rating and w/ solvency regime not equivalent	Non SII Insurer 1	NA	-
		Non SII Insurer 2	NA	-

547. In the following the treatment of these SNE in the market risk concentration risk sub-module based on the Delegated Regulation is described. Then possible alternatives are set out and assessed.

Current Delegated Regulation

548. According to the current Delegated Regulation the following rules should be applied to "mixed" exposures:

549. If a SNE does not exclusively consist of exposures to a single solo insurer, credit or financial institution, the risk factor for the market risk concentration should be determined with the weighted average CQS according to Article 186(1) of the Delegated Regulation. The weighted average CQS should be computed according to Article 182(4) of the Delegated Regulation and exposures without a CQS shall be assigned a CQS of 5 according to Article 182(5) of the Delegated Regulation in that calculation.

550. If a SNE consists exclusively of exposures to a single insurer, credit or financial institution, the risk factor should be determined according to Article 186(2) to (6) of the Delegated Regulation as applicable.

551. The following table sets out the consequences for the treatment of the example introduced above:

⁴⁷ Insurers 1 to 4 are regulated by Solvency II regime. Non-SII insurer 1 has a regime equivalent to Solvency II, while the regime for Non-SII insure is not equivalent to Solvency II.

SNE	SNE Description	Risk Factor g_i calculation
1	Insurer w/ SCR Ratio= $x1$ and without credit rating	Article 186 (2) or (3) based on the Solvency ratio= $x1$
2	Insurance group with SCR Ratio= $x2$ and without credit rating	Article 186 (1) weighted CQS= weighted average of 3 and 5 (CQS of insurers 2 &3, respectively)
3	Financial group without credit rating	Article 186 (1) weighted CQS= 5
4	Insurance group not compliant with SII and without credit rating	Article 186 (1) weighted CQS= 5

552. With the current rules the treatment of the exposures to a solo insurer differs depending on whether or not it is part of a larger single name exposure. This can be illustrated with the following example:

553. A is an insurance undertaking with a solvency ratio of 196% for which a credit assessment by a nominated ECAI is not available. Insurer B is calculating its SCR and has exposures to A.

- Situation 1: A is part of a group and B has exposures to other parts of the group. Then the exposures to the insurer are assigned in accordance with Article 182(5) a CQS of 5.
- Situation 2: Insurer A is not part of a group. This means that according to Article 186(2), a risk factor of 12% is assigned to the exposures to A (corresponding to the risk weights for CQS 0 and 1).

554. This means that exposures to A may be assigned different risk factors depending on whether they belong to a group or not. The treatment of exposures to A would also change if B would exit all other exposures to the group.

Alternative Option 1 – Reverse mapping

555. If one wanted to apply for some exposures the mapping from the solvency ratio to risk weights as set out in Article 186 (2) to (5) of the Delegated Regulation and for others the mapping from credit quality steps to risk weights as set out in Article 186(1) there would be different possibilities.

556. One solution would be a reverse mapping from solvency ratios to credit quality steps consistent with Article 186 whose resulting CQS are used to compute the weighted average CQS. The calculation would involve the following steps:

- i. All the exposures explicitly captured by Article 186 (2) to (5) are mapped to a CQS consistent with the risk factor assigned Article 186 (2) to (5) and the table from Article 186 (1)
- ii. The remaining unrated exposures of the SNE receive a CQS of 5 in accordance with Article 182 (5);
- iii. The weighted average CQS for the SNE is computed as required by Article 182 (4);
- iv. The SNE is assigned a risk factor according to Article 186 (1).

557. The crucial element in this approach is the "mapping table". Below an example for such a mapping is set out:

Table 8.1 - (Re)insurance undertakings subject to the Solvency II regime and without credit rating

Solvency Position	CQS
MCR not met	5
SCR ratio > 95%	5
95% ≤ SCR < 100%	4
100% ≤ SCR < 122%	3
122% ≤ SCR < 175%	2
175% ≤ SCR < 196%	1
SCR ratio ≥ 196%	0

Table 8.2 - other exposures without credit rating

Type of exposure	CQS
(re)insurance undertakings referred to in Article 186 (4)	3 (or 4) ⁴⁸
Credit or Financial institution referred to in Article 186 (5)	3 (or 4)

558. With this option the result for the example provided above would be as following:

⁴⁸ According to Articles 186 (4) and (5) the risk factor for exposures to the entities referred to in Table 2 is 64.5%. However, Article 186 (1) maps all exposures with CQS 3 and CQS 4 to risk factors of 27% and 73% respectively. As 64.5 % is between these two values it is not clear whether CQS 3 or CQS 4 should be used.

SNE	SNE Description	Exposures	Credit Rating	Solvency ratio	CQS map
1	Insurer w/ SCR Ratio=x1 and without credit rating	Insurer 1	NA	x1	N/A (Article 186 (2) or (3) applies)
2	Insurance group with SCR Ratio=x2 and without credit rating	Insurer 2	3	y2	3
		Insurer 3	NA	z2	Table 8.1
3	Financial group without credit rating	Fin. Institution 1	NA	-	3
		Insurer 4	NA	y3	Table 8.1
4	Insurance group without credit rating and w/ solvency regime not equivalent	Non SII Insurer 1	NA	-	3
		Non SII Insurer 2	NA	-	5

559. One drawback of the described approach are the “jumps” in the mapping. For example a solvency ratio of 122 % is mapped to CQS 2 while the result for a slightly lower solvency ratio of 121 % is CQS 3. This could be avoided by using an interpolation.

Alternative Option 2 – Average Risk factor

560. With this approach a weighted average risk factor instead of a weighted average CQS is calculated for a SNE based on the following steps:

- i. All rated exposures in the SNE are assigned a risk factor in accordance with Article 186 (1);
- ii. All the exposures currently captured by Article 186 (2) to (5) are assigned the risk factor defined by the applicable Article;
- iii. All the remaining unrated exposures, receive a risk factor of 73%, as defined in Article 186 (6);
- iv. The risk factor for the SNE is computed as the average of the risk factors of all exposures that belong to that SNE, weighted by the value of each exposure.

561. Under this option, the following risk factors would result for the example:

SNE	SNE Description	Exposures	Credit Rating	Solvency ratio	Risk factor for exposure	Risk factor for SNE
1	Insurer with SCR Ratio=x1 and without credit rating	Insurer 1	NA	x1	Article 186 (2) or (3)	Average of the risk factors for exposures weighed by value of exposures
2	Insurance group with SCR Ratio=x2 and without credit rating	Insurer 2	3	y2	Article 186 (1)	
		Insurer 3	NA	z2	Article 186 (2) or (3)	
3	Financial group without credit rating	Fin. Institution 1	NA	-	64,5%	
		Insurer 4	NA	y3	Article 186 (2) or (3)	
4	Insurance group without credit rating and w/ solvency regime not equivalent	Non SII Insurer 1	NA	-	64,5%	
		Non SII Insurer 2	NA	-	73%	

562. With this option the solvency ratios for solo insurers, credit or financial institution can be reflected for "mixed" exposures. It avoids the "jumps" in the capital requirements as described in the previous option.

Assessment of the alternatives

563. In principle there seem to be two possibly partially contradicting objectives that have to be considered in the assessment:

- i. The calculation of the market risk concentration submodule shall be in line with the requirement of Article 101(3) of the Solvency II Directive.
- ii. Where available and appropriate, alternatives to external ratings should be used to assess risk (avoid overreliance, costs).

564. On the one hand, the current treatment may result in higher risk charges than warranted by the credit risk of the counterparty. Alternatively, the counterparty would have to acquire a rating.

565. There is also the issue of consistency: Consider the case where a single name exposure comprised so far only exposures to a single insurance

undertaking but then a new exposure to another insurer or a non-insurer is added. Under the current rules the treatment would change completely and all exposures to the original insurer would have to be treated as unrated.

566. Similarly, in the case of two solo insurers representing two SNE one would use the respective solvency ratios while the approach is different in case they belong to one group.

567. On the other hand, while there are limitations of external ratings it is not obvious that solvency ratios work produce more accurate results: The mapping between solvency ratio and CQS involves an element of judgement. Moreover, an external rating based on an in-depth analysis may reflect the credit risk better than the solvency ratio. Finally, the historical accuracy of external ratings can be assessed based on a long data series of default and recovery rates while this is not the case for solvency ratios.

568. If one considered that external ratings reflect the credit risk better than solvency ratios this would support to limit the use of the latter. There might also be an issue with "cherry-picking" if no rating is acquired because the application of the solvency ratio produces a lower capital requirement.

569. Essential elements for the decision are the relevance of such cases and the impact on the regulatory capital requirement that a change would have. Based on the analysis so far "mixed" exposures seem to occur in the following situations:

- i. The insurer takes out reinsurance with several solo reinsurers within a group (to which the insurer does not belong).
- ii. The insurer has exposures to several entities within its own group.

8.4.3. EIOPA's advice

570. Based on the responses provided by stakeholders EIOPA will consider whether it is necessary to provide clarifications on the application of any of the current legal provisions and if so, what the appropriate form would be.

571. EIOPA will also further analyse whether it should recommend maintaining the current treatment of "mixed" exposures in the Delegated Regulation or should suggest a change. In the latter case based on the analysis so far the best alternative seems to be the Alternative Option 2:

572. The calculation of the risk factor for single name exposures which include exposures to single solo insurer, credit or financial institution should be determined in the following steps:

- i. All rated exposures in the SNE are assigned a risk factor in accordance with Article 186 (1) of the Delegated Regulation;
- ii. All the exposures currently captured by Article 186 (2) to (5) of the Delegated Regulation are assigned the risk factor defined by the applicable article;
- iii. All the remaining unrated exposures, receive a risk factor of 73%, as defined in Article 186 (6) of the Delegated Regulation;
- iv. The risk factor for the SNE is computed as the average of the risk factors of all exposures that belong to that SNE, weighted by the value of each exposure.

573. In case of such a change for the market risk concentration the same provisions should be propagated to Article 199(4) to (7) of the Delegated Regulation.

9. Currency risk at group level

9.1. Call for advice

574. The European Commission's call for advice requested EIOPA to investigate if the approach taken to group currency risk adequately covers the risk to which the group is exposed, taking into account the incentives given to the group's risk management, and suggest modifications where appropriate.

The application of the accounting consolidation based method to calculate the Solvency Capital Requirement under the standard formula with respect to the calculation of currency risk (under the empowerment in Article 234 of Directive 2009/138/EC).

The calculation of currency risk within the standard formula may penalize holding own funds to cover a related undertaking's Solvency Capital requirement in the currency in which this undertaking's assets and obligations are denominated.

EIOPA is therefore asked to:

- *Provide information on currencies chosen by insurance groups to hold their own funds.*
- *Investigate if the approach taken to group currency risk adequately covers the risk to which the group is exposed, taking into account the incentives given to the group's risk management, and suggest modifications where appropriate.*

9.2. Legal basis

Delegated Regulation

575. Article 188 (1) of the Solvency II Delegated Regulation defines capital requirement for currency risk as the sum of the capital requirements for currency risk for each foreign currency. For each foreign currency, the capital requirement for currency risk is determined by the loss in basic own funds arising from a stress of 25% to the value of foreign currency against local currency (see Article 188 (2)).

576. Where the consolidated group SCR is calculated on the basis of the standard formula, the local currency is the currency used for the preparation of the consolidated accounts, as per Article 337 of the Solvency II Delegated Regulation.

9.3. Feedback statement on the main comments received to the discussion paper

a. Summary of the comments received

577. A number of respondents commented that a group with exposure to multiple currencies would be increasing its risk if it chose to hold all its capital in the reporting currency since if the group did incur the losses implied by the group SCR, a portion of those losses would have to be settled in a currency different from the reporting currency. The current treatment is therefore – quote – “perverse” in the sense that it encourages groups to hold capital in the reporting currency even though this increases risk. Groups should not be penalised for foreign currency exposures which are held to meet undertakings’ local capital requirements.

578. A few commented that the current methodology incentivises hedging currency risk at the group level (i.e. hedging in the currency used to prepare consolidated accounts) even though the firm may be backing local liabilities with local currency at the solo level or foreign exchange (“FX”) risk may be hedged at the solo level. This makes no economic sense and it can actually create real FX risk because hedging the currency exposure at group level can potentially expose the group to insolvency.

579. Some respondents proposed that the standard formula should be modified to take into consideration the proportion of the diversified SCR of the undertaking in that currency, where a methodology for allocating the diversification benefits has to be devised as the SCR is calculated in aggregate. Two respondents proposed a formula which they argued would result in sound risk management practices such as either pro-rating own funds across different currencies according to liability exposures or holding all surplus in group currency should not generate FX translation risk capital. This formula is set out below:

$$25\% * [\text{Max}(0, (\text{Exp}_{fi} - \text{LFX}_{\text{maxfi}})) + \text{Max}(0, (\text{LFX}_{\text{minfi}} - \text{Exp}_{fi}))]$$

where

Exp_{fi} is the value of the aggregate asset exposure for foreign currency i

$\text{LFX}_{\text{minfi}}$ is the local Minimum Foreign Currency requirement = *local liabilities + any local SCR*

$\text{LFX}_{\text{maxfi}}$ = local Maximum Foreign Currency requirement = Total assets * $\{\text{LFX}_{\text{minfi}} / \sum_{i=1}^n \text{LFX}_{\text{minfi}}\}$

b. Assessment

580. EIOPA does not find the argument referred to above convincing as it is not clear that holding assets in the group reporting currency to back local capital requirements and liabilities would reduce the capital because SCRs for the solo undertakings would increase in such cases. Holding all surplus assets in the group reporting currency or pro-rata based on own funds across different

currencies would expose the group to the risk of having the surplus assets in the wrong currency in the event of a stress.

581. EIOPA is concerned that the requirements of the Prudent Person Principle may not be satisfied if assets are not held locally. Article 132 of the Solvency II Directive requires that all assets, in particular those covering the MCR and the SCR, shall be invested in such a manner as to ensure the security, quality, liquidity and profitability of the portfolio as a whole. In addition, the localisation of those assets shall be such as to ensure their availability.

582. EIOPA disagrees with the argument that hedging FX risk at the group level can create FX risk for the group. It is possible to hedge FX risk at the level of the group without impacting the SCR of solo undertakings, e.g. by entering in to suitable risk mitigation contracts. It is a commercial decision to determine whether the cost of hedging is justified to reduce the currency risk capital requirement at the group level.

583. The formula proposed will overstate diversification benefits for two reasons. Firstly, it assumes that all surplus above what is needed to cover local liabilities and local capital requirements is pro-rata based on a certain measure. Secondly, it assumes that all surplus above local liabilities and local capital requirements is held in the local currency of the group. In other words, it excludes surplus assets (i.e. assets in excess of liabilities and local capital requirements) from a currency risk capital charge. This approach can be justified where surplus is not fungible across the group.

9.4. Advice

9.4.1. Analysis

Currencies chosen by insurance groups to hold their own funds

584. A total of 294 groups were assessed as there were issues with data quality of some groups. Of this set, 38 groups have more than 50% of their assets in foreign currencies (25 groups with more than 60% in foreign currencies).

585. Exposure to number of currencies, in which assets are held, varies widely across groups. The maximum exposure by a group is to 60 different currencies and median is 4. There are 24 groups with exposure to 30 or more currencies, 9 groups with exposure to 40 or more currencies and 5 groups with exposure to 50 or more currencies.

586. Overall, groups have most exposure to Euro dominated assets, followed by sterling and USD. The following table summarises exposure by currency of assets for the top 10 currencies in terms of the amount held.

Table 10.1: Total exposure

Currency	Total Exposure €bn
EUR	9,829.23
GBP	886.15
USD	784.96
SEK	144.95
CHF	90.89
NOK	72.98
JPY	67.15
DKK	57.19
ZAR	28.60
AUD	26.67

587. As a foreign currency (other than the currency used to prepare consolidated accounts), group have most exposure to assets denominated in USD, followed by Euro and Swiss Franc. The table below summaries the results for the top 10 foreign currencies in terms of the amount held.

Table 10.2: Exposure as currency other than the local currency

Currency	Exposure as foreign currency €bn
USD	776.25
EUR	201.08
CHF	90.89
GBP	72.30
JPY	67.15
SEK	40.97
DKK	33.68
ZAR	28.60
AUD	26.67
CAD	26.29

Note: Exposures where no currency was mentioned or it was stated as "local" in the look-through template were ignored in this assessment.

Options for amending the standard formula

588. EIOPA has considered different options for determining the currency risk capital requirement at the group level.

589. The first option considered was to exclude assets that cover locally the MCR from the currency risk charge at group level. However it is difficult to propose a simple way to take account of individual MCR when assessing the currency risk of assets determined through the accounting-consolidation process.
590. A further disadvantage is that groups with significant exposures to foreign currencies would not have benefited from this option, which is close to the current treatment. The data analysis showed that some groups may have such significant exposure.
591. Therefore another option has been envisaged for these groups with significant exposures to foreign currencies, for which the current treatment could be seen as too penal.
592. Groups could be given flexibility to select a 'local' currency other than the one used for their consolidated accounts. This choice would need to be based on objective criteria, such as being the currency in which a material amount of the group's technical provisions or own funds are denominated.
593. The reason to allow this treatment would be that in principle a group can change the currency in which it creates its consolidated financial statements.
594. For example, consider a European group that many years ago started operating in South America. It still reports in Euro, but its Brazilian operation have grown enormously, and currently the amount of own funds / TPs in Brazilian Real are about 60% of OFs & TPs on current FX rates. Its Euro exposure is now 10%, with another 10% each in Swedish Krona, Swiss Francs, and Venezuelan Bolivar. In this case it is arguably too penalising to ask for the group to calculate the charge on the assumption that the Real and other currencies depreciate by 25% against Euro. The group may still have its financial accounts in Euro, but economically the real risk for them is how other currencies move against the Real. So it would be fair for them to calculate the group FX charge as if the Real were the local currency, even if the Euro is still the currency of financial statements.
595. The reason to allow this treatment would be that in principle the group can change the currency of financial statements to Real, and create its consolidated financial statements in Real. But rather than require them to do this, the NSA may be content for them to carry on using Euro as the reporting currency, but recognise that the real source of FX risk is how other currencies perform against the Real.
596. This would option would allow groups to determine the FX risk capital requirement based on a more appropriate source of FX risk.
597. It would however "only" benefit groups with significant exposure to one particular currency but use a different currency to prepare consolidated financial statements.
598. For these groups with less significant exposure, the current standard formula appears an appropriate trade-off between simplicity of calculation at group level and risk sensitivity. Indeed:

- The 25% charge is based on a diversified portfolio of currency exposures. Therefore, it implicitly takes diversification into account but it is a simplification.
- If diversification was to be allowed then it would require determining pairwise currency risk charges and correlations. EIOPA considers that the pairwise currency risk charges can be a lot higher than 25% for some currency pairs and therefore, may not reduce the capital requirement.
- Assets denominated in a different currency than the group reporting currency may be worth less when they are needed to be transferred. Changes in exchanges rates against the group reporting currency can affect solvency ratio of a solo entity and therefore it makes sense to measure the foreign exchange risk against the group reporting currency in most cases.

9.4.2. EIOPA's advice

599. EIOPA has found that currency exposure can vary considerably from one group to another.

600. A total of 294 groups were assessed as there were issues with data quality of some groups. Of this set, 38 groups have more than 50% of their assets in foreign currencies (25 groups with more than 60% in foreign currencies).

601. Exposure to number of currencies, in which assets are held, varies widely across groups. The maximum exposure by a group is to 60 different currencies and median is 4. There are 24 groups with exposure to 30 or more currencies, 9 groups with exposure to 40 or more currencies and 5 groups with exposure to 50 or more currencies.

602. If the current standard formula seems an appropriate trade-off between simplicity of calculation at group level and risk sensitivity in cases where the exposure is not important, this may be different for groups with significant exposure.

603. Therefore EIOPA advises to provide these groups with the flexibility to select a 'local' currency other than the one used for their consolidated accounts, for the purpose of the calculation of the currency risk sub-module. This choice would need to be based on objective criteria, such as being the currency in which a material amount of the group's technical provisions or own funds are denominated.

10. Unrated debt

10.1. Call for Advice

604. EIOPA is asked to provide clear and conclusive criteria applicable to bonds and loans for which no credit assessment by a nominated ECAI is available, in order to identify certain instruments, which would then be allowed to receive the calibration associated with credit quality step 2.

605. Where EIOPA identifies alternative criteria which would identify instruments with a better or a lower risk profile, these two types of criteria should also be provided. The corresponding instruments would then be allowed to receive the calibration associated with credit quality step 1 and 3 respectively.

606. Such criteria can be related to the financial state of the debtor, in particular on the basis of its financial statements.

607. Such criteria can also be related to the features of the instrument concerned, in particular to its position in the credit hierarchy in case of default and to the transparency offered to investors as regards the debtor.

608. In addition to features potentially considered by ECAIs when providing a credit assessment, such criteria can also be related to the insurer's own risk management system, to ensure their ability to manage properly risks related to investments in bonds and loans for which no credit assessment by a nominated ECAI is available.

609. The criteria related to the debtor and to the instrument concerned should be designed to ensure that sufficient risk-sensitivity is introduced, given that no credit assessment by a nominated ECAI is available, and considering that the criteria related to the risk management would result in reinforced risk management by insurance undertakings compared to investments in bonds and loans for which a credit assessment by a nominated ECAI is available.

10.2. Legal basis

610. The treatment of bonds and loans for which a credit assessment by a nominated ECAI is not available in the spread risk sub-module is set out in Article 176(4) and (5) of the Delegated Regulation. The rules for deciding whether a credit assessment by a nominated ECAI is available can be found in Article 5 Delegated Regulation.

10.3. Feedback statement on the main comments received to the discussion paper

Scope

- a. Summary of the comments received

611. Some stakeholders pointed at what they consider inconsistencies in the treatment of commercial real estate (CRE). For CRE they suggested an approach similar to the Basel II slotting table.

612. Other types of debt that stakeholder suggested for consideration were corporate debt and mortgage loans.

b. Assessment

613. Please see section "Scope of the Analysis".

Methods

a. Summary of the comments received

614. Some stakeholders suggested allowing internal ratings by insurer based on relevant information like financial ratios, competitive position of the borrower, quality of management, terms of the debt item etc. The proposals included also possible requirements on the process. There was also the suggestion to derive criteria that use only financial ratios of the borrower.

615. Another proposal was to allow the use of "proxy ratings". The reference could be the issuer rating of the borrower, the rating for another debt item of the borrower or the rating for a similar borrower.

b. Assessment

616. EIOPA is considering an approach in which the internal assessment of the borrower and the debt item by the insurer is an integral part.

617. An assessment based exclusively on the financial ratios of the borrower seems not sufficiently risk sensitive.

618. The Delegated Regulation already allows in certain cases the use of "proxy" ratings (including issuer ratings). The use of ratings for other borrowers would only produce accurate results if the risk was sufficiently similar. This assessment would be quite involved.

619. "Notching" (i.e. the adjustment of the credit quality step for an externally rated debt item to account for differences in seniority and other risk relevant factors) for cases not covered in Article 5 of the Delegated Regulation creates similar problems.

Risk relevant factors

620. Stakeholders identified a number of risk relevant factors like subordination, guarantees, collateral and covenants.

Information on unrated debt

621. Stakeholders provided a meaningful amount of information on the characteristics of unrated debt.

10.4. Advice

10.4.1. Previous advice

622. CEIOPS provided advice on the treatment of unrated debt in the spread risk sub-module in the CEIOPS Advice on the calibration of the market risk module and the QIS5 Calibration Paper.^{49,50}

10.4.2. Analysis

10.4.2.1. Scope of the Analysis

623. The call for advice does not further specify which unrated debt should be considered. EIOPA has focused on debt issued by corporates as there are already specific rules for unrated qualifying mortgages, sovereign exposures and infrastructure project debt.

Types of borrowers

624. The aim was to cover all industry sectors unless this results in high complexity or insufficient accuracy.

625. Debt issued by corporates from the financial sector was however excluded from the analysis as there are already provisions for these exposures based on the solvency ratio in Commission Delegated Regulation (EU) 2015/35 (in the following "Delegated Regulation"). The same line of reasoning applies for infrastructure corporates.

626. Borrowers in the same group as the insurer calculating its capital requirement were also excluded from the scope. As debt of financials is not considered this should have no material impact.

Types of debt

627. Both loans and bonds were considered.

628. In terms of credit quality the call for advice also mentions debt with a risk similar to rated debt with credit quality steps ("CQS") 1 and 3 but puts the emphasis on credit quality step 2 (which would normally correspond to "A" for several Credit Rating Agencies)⁵¹. EIOPA has focused on CQS 2 because in contrast with CQS 3 there is a substantial difference between the current and potential regulatory risk charge. At the same time there are very few unrated corporates with a risk similar to rated debt with CQS 1.

⁴⁹ CEIOPS (2010): CEIOPS' Advice for Level 2 Implementing Measures on Solvency II: SCR Standard Formula Article 111b Calibration of Market Risk Module. CEIOPS-DOC-66/10.

⁵⁰ CEIOPS (2010): QIS5 Calibration Paper. CEIOPS-SEC-40-10.

⁵¹ Commission Implementing Regulation (EU) 2016/1800.

629. The possible approaches would only apply to debt items for which a credit assessment by a nominated ECAI is not available in accordance with Article 5 of the Delegated Regulation (in the following for the sake of brevity “unrated debt”).

630. In terms of seniority only senior exposures were considered as this reduces the complexity of the assessment. Moreover, junior exposures are unlikely to have the targeted low credit risk.

10.4.2.2. Approaches

631. Based on its analysis EIOPA has identified two possible approaches for identifying unrated debt with a credit risk comparable with rated debt assigned to CQS 2. The first one follows the specifications in the additional request for technical advice as regards unjustified constraints to financing from the 21st of February 2017 with criteria and processes which form the basis for the assessment by the insurer (“internal assessment approach”).

632. The second approach is based on the request in the additional request to explore methods for reducing reliance on external ratings. One of the stakeholder proposals was that where a bank and insurer co-invest in loans the insurer can use results from the approved internal model of the bank to determine its regulatory capital charge on these loans. As mentioned in the first consultation paper published in July, EIOPA decided to analyse this approach in the context of the work on the second part of the call for advice.

10.4.2.3. Internal assessment approach

633. Accounting and market based methods provide valuable information. Nevertheless, also qualitative information (e.g. on competitive position and quality of management) is of crucial importance. All of them should be part of the assessment. But regulation can never cover all relevant aspects and reflect all specificities of individual borrowers. Therefore this has to be complemented by an internal assessment process of the insurer.

634. On the basis of these considerations EIOPA is considering the following approach:

635. In order to qualify for the same spread risk charge as rated debt assigned to CQS 2 an unrated corporate debt item has to meet all of the following conditions:

1. Selected financial ratios of the borrower meet certain requirements.
2. The yield on the debt of the borrower does not exceed the yield observable in the market for rated debt with CQS 2 by a too wide margin.
3. The borrower and the specific debt item meet additional conditions (e.g. place of incorporation, history of operations).
4. The insurer performs an additional assessment demonstrating that the debt has a risk similar to rated debt with CQS 2 (“internal process”).

636. There might be incentives for the insurer to come to an overly optimistic assessment in its internal process as the outcome influences the level of

capital requirements. Combined with requirements on the process the first three conditions provide safeguards against such biases.

637. EIOPA has considered the question whether the only possible outcome of the above process should be a more favourable treatment or whether for debt with very low credit quality there could actually be an increase in the risk charge. EIOPA decided against this as there would only be a meaningful difference to the current treatment for unrated debt with a risk similar to CQS 5 or 6. It seems reasonable to assume that the allocation of insurers to debt with such low credit quality is rather limited in accordance with the prudent person principle.

638. With the internal assessment approach unrated debt may not qualify despite being secured by collateral of good quality and issued by corporates with a risk comparable to investment grade, as not all requirements on the company level are met.

639. Beyond the cases in which the provisions in Article 176(5) of the Delegated Regulation may be applicable, EIOPA will analyse whether it should be possible for such collateralised debt to qualify for the same treatment as rated debt with CQS 2.

640. Any evidence that stakeholders can provide on the importance of collateralised corporate debt for the investments of insurers in general and in particular in cases where the provisions in Article 176(5) of the Delegated Regulation are not applicable would be very useful. In addition, suggestions how collateral could be reflected in the internal assessment approach for debt which does not meet all the requirements would be welcome.

641. The following sections discuss the details of the individual components described above.

Financial ratios

A. Introduction

642. Financial ratios are one essential input for the assessment of credit risk.

643. Based on the financial ratios of companies with different external ratings EIOPA is working on criteria for the financial ratios of the borrower that should be met for the debt to be treated as rated debt with a CQS of 2. The calibrations presented in the following sections can change as a result of stakeholder comments and the on-going analysis performed by EIOPA.

Advantages and disadvantages of criteria based on financial ratios

644. Statistically there is a clear connection between financial ratios and credit risk. Moreover, criteria on financial ratios are relatively objective and easy to evaluate. This allows the insurer to avoid unnecessary costs as no other criteria have to be evaluated if the financial ratio criteria are not met.

645. On the other hand, financial ratios will vary depending on the applicable accounting rules. Even for companies subject to the same rules financial ratios may not be fully comparable due to differences in accounting policies.

Allowing adjustments can mitigate this but also introduces an element of judgement.

The objective in determining the specific criteria

646. The requirements on financial ratios should not be met by too many debt issues with a higher credit risk than CQS 2 ("false positives"). At the same time there should not be too many "false negatives" (i.e. CQS 2 debt issues that does not qualify). Otherwise the insurer has limited incentives to perform the assessment (especially as the number of CQS 2 corporate exposures is limited). It has also to be considered that there are other criteria as well as the internal assessment process of the insurer to "sort out" higher credit risk debt.

647. One could develop different criteria on the financial ratios for each industry sector or at least groups of industry sectors. EIOPA decided instead to aim for one single set of criteria applicable to all industry sectors. This reduces the complexity and avoids the necessity to calibrate the ratios for individual industry sectors on a limited amount of data.

Selection of ratios

648. The selection of possible ratios is based on the ratios that rating agencies, central banks providing credit assessments and internal models for credit risk use. In addition, there was a systematic search for possible ratios in the literature on replicating external ratings. A list of possible financial ratios that EIOPA is considering can be found in "33. Annex to chapter 10 – Possible financial ratios".

649. Additional input from stakeholders on other financial ratios that EIOPA should consider would be very useful.

650. Ratios can be based on the most current financial ratios or on averages over a number of years (for example five). Both possibilities have advantages and were explored. Profits of a company may for example be exceptionally high or low in a single year so that averages could better reflect the economic situation. They also produce a more stable assessment. At the same time averages are slow to response to changes in fundamentals.

651. The ratios were calibrated based on IFRS accounting figures as well as non-European GAAP figures. If the borrower uses local GAAP the insurer would have to demonstrate why the ratios calculated on this basis are sufficiently similar.

652. In its further work before delivering the advice in February EIOPA will try to identify financial ratios that are relevant for assessing the credit risk but at the same time do not vary substantially between different accounting rules. For example ratios based on averages over a number of years can mitigate the effect of differences in revenue and expense recognition. Also ratios based on cash flows rather than profit and loss figures have the potential to reduce the differences across accounting systems.

653. EIOPA will also explore whether demonstrating that the financial ratios based on local GAAP are sufficiently similar can be made easier. In this area suggestions from stakeholders would be very useful.

654. The calculation of the ratios should be based on the audited financial statements. If the insurer has no access to this information then the debt should not be eligible for a potentially more favourable treatment.

Approaches for determining the relevant financial ratios and their relevance

655. EIOPA has explored two possible approaches for deriving the relevant financial ratios and their respective “weights” in the financial ratio requirement. Both are described in the following sections.

656. The preliminary calibrations derived with them have been based on 2016 financial ratios of European and non-European non-financial companies with a publically available external rating. Ideally, the analysis would only use European data to reflect geographical specificities and to avoid the use of non-IFRS figures. But the total number of European companies with an external rating is limited. Moreover, the ratings agencies use one global methodology. Expanding the dataset to previous years seems in principle desirable. But the financial ratios associated with a specific rating change over time. Moreover, the additional information is limited in case the financial ratios are calculated based on averages over a number of years. EIOPA will therefore consider the merits of looking at longer periods.

657. The relative weight of industry sectors for companies with external rating will most likely deviate from the allocation that insurers investing in unrated debt choose. This is an area for further analysis until February for which additional input from stakeholders would be very useful.

658. EIOPA has retrieved financial ratios for European and non-European companies which had a rating by Fitch, Moody’s or Standard & Poor’s at the end of 2016.

659. In order to broaden the database EIOPA will consider the additional use of external ratings by other ECAIs. For the same reason the alternative of using probabilities of default (or ratings inferred from them) will be explored. One idea could for example be to calculate probabilities of default using the Bloomberg function DRSK and to map them to credit quality steps. In this area input from stakeholders would be very useful.

B. “Threshold approach”

Introduction

660. With this approach the debt item is only eligible if all selected financial ratios for a borrower are below or above certain thresholds. This approach is followed by one central bank recognized as an ECAI. The catalogue developed by the German insurance association for internal ratings also uses thresholds (though with the possibility of an “override”).

661. The potentially relevant financial ratios are selected from the financial ratios used by ECAIs and central banks. Based on individual company data the

thresholds are chosen so that as many “A”-rated corporates as possible qualify while the vast majority of corporates with lower ratings does not meet the requirement.

Currently considered financial ratios and threshold values

662. The work to derive the specific ratios and thresholds is ongoing. The values below provide therefore a “snapshot” but not necessarily the final advice:⁵²

Category	Financial ratio	Condition	Threshold value
Margins	EBITDA/Revenue	>	15 %
	Pre-tax Income/Revenue	>	10 %
	Net Income/Revenue	>	1 %
Financial autonomy	Net Debt/EBITDA	<	1.5
	Free Cash Flow/Total Debt	>	15 %
	Interest Expense/EBITDA	<	15 %
Solvency	Total Equity/Total Assets	>	10 %
	Net Debt/Total Equity	<	1.5
Liquidity ⁵³	Quick ratio	<	0.65

663. The table should be read as follows: The borrower meets the requirements if EBITDA/Revenue>15 %, Pre-tax Income/Revenue>10 % and so on.

664. With the values presented above, the number of European corporates rated “BBB/Baa” or lower which meet all requirements is in the single digits. At the same time the number of corporates with a better rating that would qualify is higher but in the low double digits. The further work will focus on increasing this number without allowing too many “false positives”.

⁵² All ratios are calculated based on a 12 month period.

⁵³ It may seem counterintuitive that higher liquidity should result in a borrower not qualifying. But it can actually be observed that liquidity ratios are higher for companies with a lower rating (see for example page 358 in: Amdouni, W./Soumare, I. (2014): An analysis of the determinants of S&P ratings assigned to Canadian firms: Application of a multinomial logit. Journal of Risk Management in Financial Institutions. Vol. 7, 4). Possible explanations could be that companies with lower credit risk need lower liquidity buffers as they have easier access to credit and are in many cases more profitable (i.e. are able to generate the cash for making debt payments out of their operations). As mentioned previously EIOPA will further analyse what the most appropriate ratios are.

Advantages of the approach

665. Requiring compliance with all ratios avoids the necessity to determine a relative weighting for each financial ratio.

666. The approach could be easily modified to allow flexibility with respect to the most suitable financial ratio for a certain category. One possibility would be that in each category the criterion for at least one financial ratio in this category has to be met. For example, in some cases the Total Debt/EBITDA ratio may be more relevant for measuring the debt coverage, in others the Net Debt/EBITDA ratio.

667. Another advantage is the possibility to reflect that below or above a certain threshold no compensation of a poor financial ratio with a higher value for another one may be possible.

C. “Weighted-average” approach

668. With this approach a weighted average of the selected financial ratios is calculated and the borrower qualifies if the value exceeds a threshold value. Thus weaker ratio can be compensated with stronger ones.

669. Moody’s and S&P use weighted financial ratios. The approach has also been used in a number of scientific papers that tried to replicate ratings and in internal credit risk models.⁵⁴

Currently considered financial ratios and threshold value

670. The work to derive the specific ratios and thresholds is ongoing. The values below provide therefore a “snapshot” but not necessarily the final advice.

671. Based on a large dataset of rated companies different possible criteria were derived to separate exposures with higher and lower credit quality using logistic regressions.

672. The following table shows two possible criteria:⁵⁵

⁵⁴ For example: Amdouni, W./Soumare, I. (2014): An analysis of the determinants of S&P ratings assigned to Canadian firms: Application of a multinomial logit. *Journal of Risk Management in Financial Institutions*. Vol. 7, 4. Page 353–369; Kaplan, R.S./Urwitz, G. (1979): Statistical Models of Bond Ratings: A Methodological Inquiry. *The Journal of Business*. Vol. 52. No. 2 (Apr., 1979). Page 231-261.

⁵⁵ Unless further specified the ratios are calculated based on the latest annual financial statements.

Alternative	Criterion
1	$-5.9433 - 0.006819 \times \text{Total Debt/Total Equity} + 0.15085 \times \text{Return on Assets} - 0.42796 \times \text{Current Ratio} + 0.036297 \times \text{Capital Expenditure/Sales} + 1.0475 \times \text{Log Total Assets} \geq -0.85$
2	$0.82247 - 0.0029426 \times \text{Total Debt/Free Cash Flow} - 0.018042 \times \text{Total Debt/Total Capital} - 0.046637 \times \text{Sales average Growth 5 years} + 0.041957 \times \text{Net Margin} + 0.077745 \times \text{5 year average Return on Assets} - 3.2132 \times \text{Coefficient of Variation Net Sales 5 years} - 1.118 \times \text{Coefficient of Variation 5 years TotalDebt/EBITDA} + 0.89236 \times \text{No Net Loss In Last 5 years} \geq 0$

673. With the first alternative the number of false positives is in the very low double digits while half of the A-rated companies are recognised. With the second alternative nearly 4 out of 5 investment grade issues pass but also on third of non-investment grade issues.

Advantages of the approach

674. While data mining has obviously to be avoided, the approach allows testing different financial ratios very quickly for their effectiveness using statistical software packages. This makes it also comparably easier to find the optimal trade-off between "false positives" and "false negatives". With the approach it can be reflected that within certain ranges a poor value for one ratio maybe compensated with a higher value for another one.

Yield criterion

Rationale

675. The lender requires a yield that reflects the perceived credit risk of the borrower and has a substantial economic incentive to demand an adequate compensation for the risk. Therefore the yield on the debt should not deviate too much from the yield for comparable traded bonds with an external rating corresponding to CQS 2.

676. At the same time the insurer may invest in unrated debt because of its perceived better risk/return profile compared to traded bonds (e.g. a somewhat higher yield compared with CQS 2 bonds for a "CQS 2 like" risk). One reason may be compensation for the higher illiquidity of the debt.

The criterion

677. In order to reflect these considerations EIOPA is considering the following criterion:

678. The yield on the debt the insurer invests in as well as on other similar debt that the borrower issued in the previous three years should not exceed the respective applicable threshold defined in the next paragraph.

679. The respective relevant threshold for a debt item is the average of the yields at the time of the issuance for two indices which meet the following requirements:

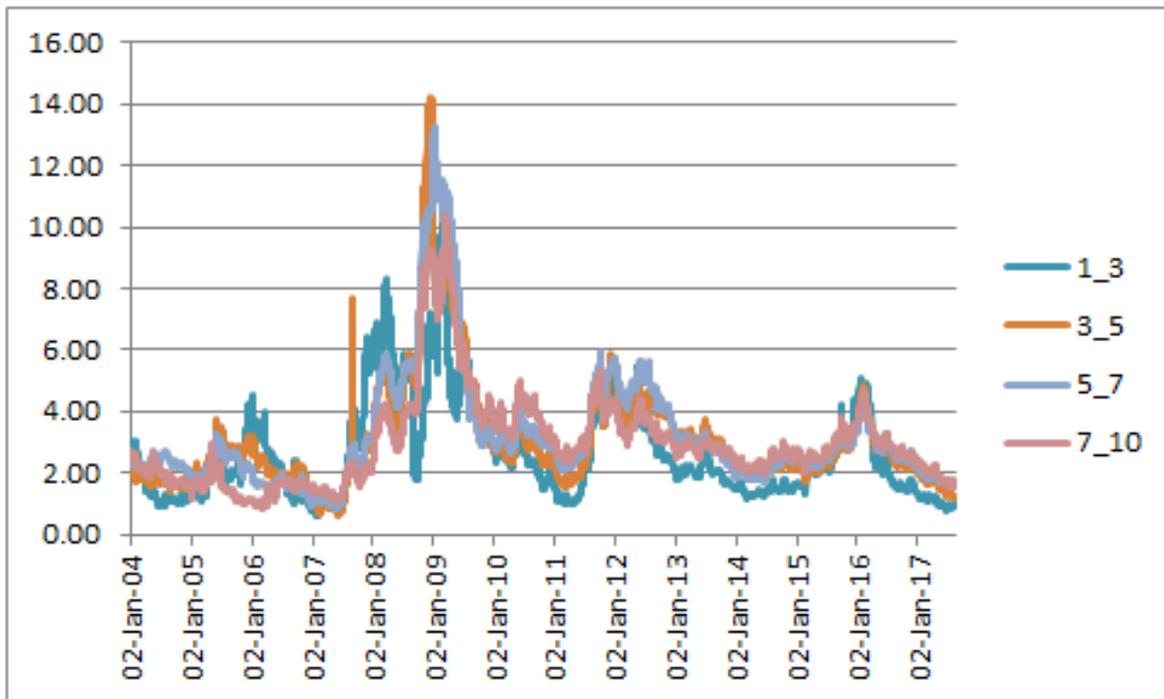
1. Broad index of externally rated traded bonds

2. The constituent bonds and the debt item are denominated in the same currency
3. The bonds have a CQS of 2 and 4 ("BB"/"Bb") respectively.

680. EIOPA is considering whether the additional requirement of a similar maturity to the debt item is necessary to reflect varying yield differences across maturities. The index values serve as proxies for the "market" yield. The conditions on the indices ensure that the components are sufficiently similar to the debt item.

681. The following example explains how the criterion works: The insurer provides a loan which yields 4 %. The borrower has not issued comparable debt in the last three years. Based on broad indices for "A"- and "BB"-rated bonds such bonds yield at this time on average 3.5 % and 6 % respectively. The yield criterion is met as the yield for the loan is below the average of 4.75 %. At a later stage the borrower takes out another comparable loan with a yield of 5 %. If the yield for "A"- and "BB" rated bonds at this point in time were 2.5 % and 7.5 % respectively (i.e. on average 5%), the yield criterion would still be met. But if the values were 2.5 and 5 % (i.e. on average 3.75%) instead the debt instrument would no longer qualify.

682. The following graph shows the development in the difference between the yields for Markit iBoxx EUR Non-Financials indices for A- and BB-rated bonds and different "maturity buckets" over time:



Differences in the yields of A- and BB- rated bonds with different maturities between 2004 and 2017.

683. If the loan underwritten by the insurer does not meet the yield criterion then it cannot qualify at a later stage. In contrast, if the yield criterion is violated at a later stage because the borrower issues subsequent debt with

too high a yield, compliance with the yield criterion can be restored at a later stage.

684. EIOPA has considered the incentive problem that linking the treatment of a loan to the conditions of this loan may create for the insurer. Based on the analysis so far the risk of an “under-pricing” by the insurer seems limited.

Areas of further work

685. There are times where the difference in yields between “A”- and “BB”-rated bonds is relatively small (like in early 2007 or currently). If the yields for “A”- and “BB”-rated debt were for example 3 % and 4 % respectively, then debt with a yield of 3.6 % would not meet the criterion even though the additional yield could represent an illiquidity premium. Therefore EIOPA is considering whether in such situations an alternative criterion should apply (e.g. “A” – yield plus x basis points). In this area input by stakeholders would be very useful.

686. With the criterion above the following situation can arise: There are two otherwise identical borrowers. One of them prefers more frequent issuances of debt with lower respective amounts. The risk of not meeting the yield criterion is higher for this borrower because there are more observations available. EIOPA will analyse how problematic this is and what possible remedies could be. In this area input by stakeholders would be useful.

Additional conditions

687. In addition to the financial ratio and yield criteria a debt item should meet further conditions.

688. Compared with infrastructure projects, qualitative factors like the quality of management have a higher relevance for the credit risk.⁵⁶ The operating environment for a corporate is normally also more dynamic and the competitive position more difficult to assess.

689. It is therefore very challenging if not impossible to capture all credit risk relevant factors adequately in a restricted list of easily checkable criteria. The alternative is a more principle-based approach with a meaningful element of judgement on a case-by-case basis.

690. The analysis so far indicates that this assessment should be incorporated in the internal process of the insurer described in the following section. The insurer has to identify the relevant risk drivers and to decide for each of them what constitutes the attributes characteristic for debt with a risk similar to CQS 2 rated debt.

691. There are nevertheless criteria that are relevant for all companies and that can be easily verified. There is consequently no need to incorporate them in the internal assessment of the insurer.

⁵⁶ One reason why the quality of management is more important is that the field of possible actions is wider.

692. Based on the analysis so far EIOPA is considering the following criteria:

Borrower

- Corporate with limited liability
- Incorporated in EEA
- Majority of revenues are generated in EEA or OECD countries
- Has Operated for at least 10 years without credit event
- Has been larger than a Small- Sized Enterprise as defined by the Commission Recommendation (2003/361/EC) in the last three years⁵⁷
- The borrower is contractually obliged to provide audited financial data to the lender at least semi-annually and to notify him of any material events that could affect the credit risk.

Debt item

- Senior debt. The item and other pari passu instruments are senior to all other claims except for statutory claims, trustees and derivatives counterparties.
- Bonds or loans that provide a redemption payment on the date of maturity or before, as well as a return payment, in the form of a regular coupon payment on a fixed or floating interest rate basis; structured notes, collateralised securities and derivatives are excluded

Internal process of the insurer

Rationale

693. The credit risk depends on many – often qualitative - factors whose relevance can differ meaningfully across industry sectors. Moreover, many of them are difficult if not impossible to capture with a restricted list of easily verifiable criteria.

694. Therefore the internal process of the insurer is essential to “sort out” debt items with a credit quality lower than CQS 2 that meet the other criteria. The insurer can adjust its process to the specifics of the debt it underwrites (e.g. in terms of sectors).

695. The partial reliance on the internal process of the insurer also allows keeping the other criteria relatively “light”.

696. Irrespective of regulatory requirements an insurer investing in unrated corporate debt needs the ability to separate debt items with higher and lower credit risk and has consequently already implemented internal processes for this. The idea is therefore to build on these existing processes.

⁵⁷ http://ec.europa.eu/growth/smes/business-friendly-environment/sme-definition_en

697. The internal assessment is in principle independent from the evaluation of the criteria in the three previously described steps. For example, the insurer may consider that different financial ratios are relevant for a specific industry sector.

Requirement for the process

698. The internal process should produce an assessment whether a debt item can be treated as a rated item assigned to CQS 2 for the purpose of calculating the regulatory capital.

699. Given its importance a robust process producing reliable outcomes is crucial.

700. One factor to consider though is that EIOPA is planning to provide guidance on internal assessments as mentioned in the first consultation paper published in July 2017.⁵⁸ Providing specifications in the context of the call for advice could pre-empt the results of this future work. In addition, more time to analyse this complex topic thoroughly may be beneficial.

701. Based on these considerations the best approach seems to specify only some high-level requirements for the process which are then to be complemented later by the planned guidance.

702. In the following possible high level criteria are set out:

- i. The undertaking has to produce its own internal credit assessment of the debt item and allocate it to one of the two categories credit quality steps 3 and lower or credit quality step 2 and higher.
- ii. The internal assessment and the allocation shall reliably identify “qualifying” debt items. For qualifying debt items the treatment as bonds and loans with an assigned credit quality step 2 determined in accordance with Title I Chapter I section 2 in the spread risk sub-module adequately reflects the risks.
- iii. The assessment has to cover all factors with a material effect on the credit risk associated with the debt item.
- iv. The factors considered for the internal credit assessment shall include but not be limited to:⁵⁹
 - competitive position
 - quality of management
 - financial policy
 - country risk (where relevant)
 - covenants

⁵⁸ See paragraphs 132 to 139 in EIOPA (2017): Consultation Paper on EIOPA’s first set of advice to the European Commission on specific items in the Solvency II Delegated Regulation. EIOPA-CP-17/004.

⁵⁹ The final list should include all major credit risk factors.

- history of the company (number of years in operations etc.)
 - diversification/size
 - ...
- v. The assessment should use all relevant information (both quantitative and qualitative)
 - vi. The internal assessment and the allocation for each debt item has to be well documented.
 - vii. The process takes into account the characteristics of comparable companies with an external rating.
 - viii. The internal assessment is independent from the underwriting function.
 - ix. The internal assessment is subject to a regular validation.⁶⁰

Other requirements

703. More generally, the call for advice asks EIOPA to consider whether the adoption of qualitative criteria for a reinforced risk management system compared to the case of investments in rated bonds and loans is warranted.

704. The general requirements set out in the Articles 41 and 44 of the Solvency II Directive and in the Articles 259 and 260 of the Delegated Regulation for risk management are already applicable to all kind of investments. But similar to the approach for infrastructure (Article 261bis of the Delegated Regulation) additional risk management provisions specifically tailored to investments in unrated debts may be necessary.

705. The provisions might cover the adequate due diligence to be put in place by undertakings prior to making an investment in “qualifying” unrated debts. Examples could be requirements on the process (e.g. qualified staff, appropriate controls etc.). One could also require specific procedures and policies for early remedial action on deteriorating credits, managing problem credits and workout situations (as required for infrastructure debt).

Estimated effects on the capital requirements

706. The possible effect of introducing lower risk charges for debt that meets certain requirements on the Solvency Capital Requirement depends on the proportion of unrated debt relative to the total investments, the credit quality of the unrated debt and the accurateness of the method.

707. Based on data from the annual reporting unrated debt issued by corporates outside the financial and real estate sector represents a low single digit percentage of all investments by European insurers.

708. Information on the credit quality of unrated debt is naturally difficult to obtain. The following table shows a possible distribution based on the rating categories for rated companies and a 2014 Bundesbank publication:⁶¹

⁶⁰ EIOPA will consider how the AMSB should be involved in the validation process.

CQS	2	3	4	5 and 6
%	10 %	40 %	35 %	15 %

709. This overestimates probably the credit quality of unrated debt as these are often small(er) entities.

710. Under the strong assumption that the above distribution is correct and an assumed rate of 20 % "false positives" (i.e. 20 % of unrated debt items with a credit risk higher than CQS 2 qualify) and 40 % "false negatives" (i.e. 40 % of debt items with a credit risk of CQS 2 or lower do not qualify), the spread risk charge for a portfolio of unrated debt with modified duration of 5 years would decrease from 15 % to an average to 13.08 %. With lower credit quality of the portfolio the impact would actually be smaller as fewer items would qualify.

10.4.2.4. Use of results from approved internal banking or insurance models

Introduction

711. The second approach that EIOPA is considering is a stand-alone alternative to the internal assessment approach described previously.

712. This option was considered by EIOPA in response to a submission to EIOPA's Call for Evidence. While EIOPA is currently investigating the viability of such an approach it has also identified practical and prudential concerns. These include the extent to which banks will be willing to provide access to proprietary models and the appropriateness of using bespoke models approved in the context of a specific credit institution for wider regulatory purposes in a different industry sector.

713. There are insurers that invest alongside banks in portfolios of unrated corporate loans. The bank underwrites the loans and performs the associated administrative tasks. The insurer purchases a part of the portfolio with the same rights as the bank (i.e. no differences in terms of seniority, collateralisation, etc.)

714. If the bank has an approved IRB model for quantifying the credit risk a standard formula insurer could use outputs of the internal model (probability of default ("PD") and potentially loss given default)⁶² to determine whether the debt can be treated as rated debt with a certain credit quality step for the purpose of the spread risk sub-module. This "mapping" could be based on a table that is similar to the one used for producing the Implementing Technical

⁶¹ Deutsche Bundesbank (2015): The Common Credit Assessment System for assessing the eligibility of enterprises. Monthly Report. January 2015. Page 44.

⁶² The internal model may also produce an ordinal scale indicating the credit quality. EIOPA will consider in its further work until February whether there should be specific provisions for this case.

Standard on ECAI mappings⁶³ or an “inversion” of the table in Article 199(2) of the Delegated Regulation.^{64,65}

715. The discussion below focuses on the use of IRB models. But most considerations apply as well for the use of the results of an approved (partial) internal model developed by an insurer. The question of “mapping” may actually not arise in case the model already produces a credit quality step.

Requirements for the approach

716. The insurer outsources the underwriting and the assessment of the credit risk to the bank. This creates a classical principal-agent situation. The insurer needs sufficient information about the underwriting process, the properties of the loans and the functioning of the IRB model to limit the resulting risks. Moreover, there have to be proper incentives for the bank to underwrite loans with low credit risk.

717. Based on the analysis so far EIOPA is considering the following criteria:

i. Underwriting process

- a. Only IRB banks in the EU or EEA are eligible
- b. Bank and insurer agree beforehand about the type of loans to be underwritten and the applicable assessment criteria.
- c. The borrowing entity is a corporate established in the EU or EEA with a majority of revenues from EEA or OECD countries which has been larger than a Small-Sized Enterprise as defined by the Commission Recommendation (2003/361/EC) in the last three years.

ii. Transparency criteria

- a. The bank provides sufficient details about the underwriting process, in particular criteria, organisational structure and controls.
- b. The bank provides data on all loan applications (i.e. also those rejected)
- c. The bank provides details on why a loan application was accepted/rejected

iii. Criteria for avoidance of cherry-picking/Adverse selection

- a. The bank retains an exposure of at least 50 % of the nominal value of the loans.
- b. The same underwriting criteria are applied to the loans into which the bank and insurer co-invest as to other comparable loans that the bank underwrites alone.
- c. The insurer invests in all loans that are in the pre-defined scope.

⁶³ Commission Implementing Regulation (EU) 2016/1800.

⁶⁴ In the former case ratings were allocated to different CQS based on average historical default rates.

⁶⁵ This table maps the credit quality steps to probabilities of default for the purpose of calculating the capital requirement for counterparty default risk on type 1 exposures.

iv. Criteria on transparency regarding the functioning of the model

The bank provides the insurer with information that allows to understand the internal model and its limitations, as well as its adequacy and appropriateness, in particular:

- Information on model description (i.e. input/risk factors, risk parameter quantification/method, history and methodology)
- Information on model use (i.e. internal use, reporting, calculation of own funds requirements)
- Information on model validation and other processes to ensure the appropriateness of the model (i.e. validation framework and results, internal audit results)

718. It seems appropriate that the bank maintains an exposure of at least 50 % of the nominal value of the loans as it underwrites them and provides the insurer with the assessment of their credit risk. In contrast securitisations would currently typically be externally rated (i.e. there is a third party involved).

719. As with the use of external ratings the insurer remains of course responsible for compliance with all the applicable requirements (e.g. prudent person principle).

720. The insurer should question the results of the internal model as it should do with external ratings.

721. EIOPA will analyse until February whether it makes sense to narrow down the currently considered scope further (it could for example be required that the corporate has operated for at least 10 years with no credit event as in the internal assessment approach).

722. Stakeholder input on any existing arrangements that would meet the criteria above as well as any comments on the criteria, particularly in relation to the availability of data in order to assess the adequacy and appropriateness of the model would be very useful.

“Mapping” between the output of the internal model and credit quality steps

723. The approved internal model produces a probability of default for a borrower. In order to transform this into a credit quality step a mapping is needed.

724. One potential source for this mapping could be the Delegated Regulation (Article 199(2)). Alternatively the criteria developed for the joint ESA Implementing Technical Standard on the mapping between external credit ratings and CQS could be used.

725. The question arises whether the PD produced by an internal model is always suitable for deriving a credit quality step or whether additional conditions are necessary.

726. One possible requirement could be that the CQS resulting from the PD mapping is sufficiently close to the CQS that would result if a credit assessment by an ECAI was available. Alternatively it could be required that the one-year default rate is sufficiently close to the default rate for externally rated debt with the corresponding CQS.

727. Deviations between the rating derived from the PD mapping and a (hypothetical) ECAI rating could occur for the following reasons:

728. IRB models are normally calibrated for a 12-month period. Modelling one-year default probabilities may result in different factors weights than for a medium-term default forecast (which the rating agencies in many cases target). While for the short term interest coverage ratios and liquidity ratios may dominate other factors like margins, competitive position and quality of management become more important in the longer term.

729. The relevance of these differences depends on the weights for the factors. IRB models do not necessarily rely exclusively on quantitative factors. Moreover, in case the IRB model uses a so called "shadow rating" (i.e. a replication of external rating agency methodologies) the considered factors and their weights are actually very similar.

730. The aspect described above is of course interlinked with the fact that rating agencies produce in most cases a through-the-cycle rating while IRB models are normally point-in-time. But also in the latter case longer-term negative prospects are typically taken into account while long-term projections of improvement are seldom considered.

731. Another problem could arise in case the IRB model - though overall appropriate - would not adequately reflect the risk of the particular loan portfolio the insurer co-invests in. This could be tackled within the validation process.

732. In its further work until February EIOPA will consider whether requirements to ensure that the PD mapping produces adequate results are necessary. It will also be analysed whether there should be some level of discretion for the insurer when performing the mapping.⁶⁶

733. In this area input by stakeholders would be useful.

Advantages and disadvantages of the approach

734. The approach has a number of potential advantages:

⁶⁶ For example the case may arise that only a mapping based on modified PDs produces adequate results.

1. The IRB bank has invested meaningful resources and expertise in the modelling of credit risk.
2. The IRB model has to meet high regulatory requirements, is regularly updated and is subject to supervisory approval.
3. The additional costs are minimal.

735. But there are also a number of possible disadvantages:

1. The insurer has outsourced underwriting and assessment of the loan
2. Unless the bank is willing to share the necessary information on underwriting, quality of the loans and internal model the insurer is not able to properly assess the risks.
3. The results for the same debt item can differ widely across internal models. As a result there is a trend in banking regulation to reduce reliance on internal models.
4. The bank may use its informational advantage to the detriment of the insurer.
5. In case problems in the banking sector result from insufficient regulatory capital calculated with internal models they are potentially transmitted to the insurance sector thus increasing interconnectedness.

736. EIOPA will weigh the pros and cons very diligently before deciding whether the use of the results of internal models can be recommended.

10.4.2.5. Limit on the scope of application

737. The combination of conditions in the internal assessment approach should ensure that very few debt items with a risk higher than for rated debt with CQS 2 qualify. But there are necessarily limits to its accuracy. Moreover, the insurer has a certain - albeit limited - degree of influence on its regulatory capital requirement.

738. Also the use of results from an approved internal model has limitations that were previously discussed.

739. Based on the analysis so far EIOPA considers that the total amount of unrated debt which is assigned a different risk factor than set out in Article 176(4) and (5) of the Delegated Regulation as a result of one of these approaches should be limited to 5 % of all investments.

740. Such limit is in line with the freedom of investment as stated in Article 133 of the Solvency II Directive: the insurer is free to invest as much in unrated debt as it wants as long as all applicable legal requirements are met (e.g. the prudent person principle). It simply does not benefit from the more favourable treatment in terms of regulatory capital if the 5 % are exceeded. In this context it seems worth mentioning that Article 111(4) in the original

text of the Solvency II Directive of 25 November 2009 contained an empowerment for the European Commission to adopt implementing measures to lay down quantitative limits. While the legal means would be different in this case the introduction of such a limit under certain conditions seems therefore to be reconcilable with the freedom of investment principle which was already included in the original text.

10.4.3. EIOPA's advice

Internal assessment approach

741. Bonds and loans described in the section "Scope" where all the requirements outlined in the section "Criteria" are met may be assigned the risk factor for CQS 2. This is subject to the restriction that the sum of the debt items where the risk charge is determined with the internal assessment approach and the debt items where the risk charge is determined based on the results of an approved internal does not exceed 5 % of all investments.

Scope

No external rating

742. Debt items for which a credit assessment by a nominated ECAI is not available in accordance with Article 5 of the Delegated Regulation.

Types of borrowers

743. Debt issued by corporates

744. All industries except for financial and infrastructure sector

745. Borrowers is not part of the same group as the insurer

Types of debt

746. Both loans and bonds

747. Only senior exposures

Criteria

General framework

748. The debt item complies with the following conditions:

- i. The financial ratios of the borrower meet the requirements set out in the section "Criteria financial ratios".
- ii. The yields on the debt of the borrower comply with the conditions set out in the section "Criterion yield".
- iii. The borrower and the debt item meets the requirements in the section "Additional conditions".

- iv. The internal process complying with the requirements set out in the section "Criteria internal process" demonstrates that the debt has a risk similar to rated debt with CQS 2.

Criteria financial ratios

749. Threshold approach: The relevant financial ratios of the borrower are all above or below the respective threshold as applicable.

750. Weighted average approach: The weighted average of the relevant financial ratios of the borrower is larger or equal to a threshold value.

Criterion yield

751. The yield on the debt the insurer invests in as well as on other similar debt that the borrower issued in the previous three years should not exceed the respective applicable threshold defined in the next paragraph.

752. The respective relevant threshold for a debt item is the average of the yields at the time of the issuance for two indices which meet the following requirements:

- i. Broad index of externally rated traded bonds
- ii. The constituent bonds are denominated in the same currency as the debt item
- iii. The bonds have a CQS of 2 and 4 respectively.

Additional conditions

Borrower

- Corporate with limited liability
- Incorporated in EEA
- Majority of revenues are generated in EEA or OECD countries
- Has operated for at least 10 years without credit event
- Has been larger than a Small- Sized Enterprise as defined by the Commission Recommendation (2003/361/EC) in the last three years
- The borrower is contractually obliged to provide audited financial data to the lender at least semi-annually and to notify him of any material events that could affect the credit risk.

Debt item

- Senior debt. The item and other pari passu instruments are senior to all other claims except for statutory claims, trustees and derivatives counterparties.

- Bonds or loans that provide a redemption payment on the date of maturity or before, as well as a return payment, in the form of a regular coupon payment on a fixed or floating interest rate basis; structured notes, collateralised securities and derivatives are excluded

Criteria internal process

- i. The undertaking has to produce its own internal credit assessment of the debt item and allocate it to one of the two categories credit quality steps 3 and lower or credit quality step 2 and higher.
- ii. The internal assessment and the allocation shall reliably identify “qualifying” debt items. For qualifying debt items the treatment as bonds and loans with an assigned credit quality step 2 determined in accordance with Title I Chapter I section 2 in the spread risk sub-module adequately reflects the risks.
- iii. The assessment has to cover all factors with a material effect on the credit risk associated with the debt item.
- iv. The factors considered for the internal credit assessment shall include but not be limited to:⁶⁷
 - competitive position
 - quality of management
 - financial policy
 - country risk (where relevant)
 - covenants
 - history of the company (number of years in operations etc.)
 - diversification/size
 - etc.
- v. The assessment should use all relevant information (both quantitative and qualitative)
- vi. The internal assessment and the allocation for each debt item has to be well documented.
- vii. The process takes into account the characteristics of comparable companies with an external rating.
- viii. The internal assessment is independent from the underwriting function.
- ix. The internal assessment is subject to a regular validation.

⁶⁷ The final list should include all major credit risk factors.

Use of result approved internal models

753. Where the insurer and a bank agree ex-ante on co-investing in loans the insurer may determine the risk factors for all loans underwritten under this agreement in accordance with the requirements set out in the section "Determination of the credit quality step" provided the conditions set out in the section "Criteria on governance and risk management" are met. This is subject to the restriction that the sum of the debt items where the risk charge is determined with the internal assessment approach and the debt items where the risk charge is determined based on the results of an approved internal does not exceed 5 % of all investments. It is not possible to apply the approach only to a subset.

754. The risk factor for loans may be higher than determined in accordance with Article 176(4) and (5) of the Delegated Regulation.

755. The insurer remains responsible for compliance with all the applicable requirements (e.g. prudent person principle) and should question the results of the internal model.

Criteria on governance and risk management

i. Underwriting process

- a. Only IRB banks in the EU or EEA are eligible
- b. Bank and insurer agree beforehand about the type of loans to be underwritten and the applicable assessment criteria.
- c. The borrowing entity is a corporate established in the EU or EEA with a majority of revenues from EEA or OECD countries which has been larger than a Small- Sized Enterprise as defined by the Commission Recommendation (2003/361/EC) in the last three years.

ii. Transparency criteria

- d. The bank provides sufficient details about the underwriting process, in particular criteria, organisational structure and controls.
- e. The bank provides data on all loan applications (i.e. also those rejected)
- f. The bank provides details on why a loan application was accepted/rejected

iii. Criteria for avoidance of cherry-picking/Adverse selection

- d. The bank retains an exposure of at least 50 % of the nominal value of the loans.
- e. The same underwriting criteria are applied to the loans into which the bank and insurer co-invest as to other comparable loans that the bank underwrites alone.
- f. The insurer invests in all loans that are in the pre-defined scope.

iv. Criteria on transparency regarding the functioning of the model

The bank provides the insurer with information that allows to understand the internal model and its limitations, as well as its adequacy and

appropriateness, in particular:

- Information on model description (i.e. input/risk factors, risk parameter quantification/method, history and methodology)
- Information on model use (i.e. internal use, reporting, calculation of own funds requirements)
- Information on model validation and other processes to ensure the appropriateness of the model (i.e. validation framework and results, internal audit results)

Determination of the credit quality step

756. The credit quality step is determined based on a mapping of the probability of default that the model produces based on a pre-defined table.

757. There will be possibly further criteria on the internal model in order to ensure that the mapping produces adequate results.

11. Unlisted equity

11.1. Call for Advice

758. EIOPA is asked to provide clear and conclusive criteria applicable to portfolios of equity from the European Economic Area (EEA) which are not listed, in order to identify those instruments which could benefit from the same risk factor as listed equity.

759. Such criteria can be related to the characteristics of the portfolio, in particular the diversification achieved, either directly or through funds, and the transparency offered to the investor on the company in question, either by the fund manager or by the company itself. The consideration taken for environmental, social and governance aspects could also be taken into account.

760. Such criteria can also be related to the asset management skills and strategy and to the insurer's own risk management system, to ensure their ability to pursue investments in unlisted equity and to manage properly risks related to them, either directly or through funds.

761. These criteria should ensure that insurers have the ability to finance the development of companies in the EEA, regardless of their size or of the range of products offered, where they decide to dedicate sufficient resources to pursue and manage these investments and where these investments offer sufficient transparency.

11.2. Legal basis

762. Unlisted equities other than strategic equity investments and investments in qualifying infrastructure are part of the type 2 equities as defined in Article 168(3) of the Delegated Regulation. The capital requirement for these type 2 equities is set out in Article 169(2)(b) of the Delegated Regulation.

11.3. Feedback statement on the main comments received to the consultation paper

763. EIOPA published in April 2017 a call for evidence to gather stakeholder input on the topics of the additional request for technical advice.

Scope

a. Summary of the comments received

764. Some stakeholders argued that the scope of the call for advice is too narrow and that a better treatment than type 1 for unlisted equities would be warranted (see section "Suggested approaches").

b. Assessment

765. Irrespective of any other advantages or disadvantages of expanding the scope of the call for advice, based on the analysis so far EIOPA is not

convinced of the merits of the proposed methods to derive an alternative lower risk charge.

Risk relevant factors

a. Summary of the comments received

766. Some stakeholders voiced the view that the characteristics of private equity (longer holding period, different governance structure, investment strategy etc.) result in a different risk profile compared to listed equities and that these particularities should be taken into account. It was also argued that the risk of forced sales for private equity is very limited and can be managed.

767. Some stakeholders emphasised the importance of diversification and proper due-diligence before the investment is made.

768. Some stakeholders saw transparency and high quality information as a necessary condition before and after the investment is made but considered this as not sufficient to lower investment risk substantially.

769. Some stakeholders considered leverage and size to be relevant risk factors but emphasised that there are no significant differences in terms of the risk relevant factors between listed and buyout companies.

b. Assessment

770. Based on the analysis so far EIOPA is not convinced that the mentioned specificities of private equity are relevant for the risk measurement under Solvency II (see section "Specificities of private equity").

771. The look-through approach that EIOPA is currently considering is only applicable for sufficiently diversified portfolios.

772. EIOPA agrees on the importance of due-diligence but considers based on the analysis so far that the existing provisions under Solvency II are sufficient.

773. EIOPA agrees that transparency and disclosure are important and is considering to include requirements in these areas in the advice.

Suggested approaches

a. Summary of the comments received

774. One stakeholder suggested a calibration below the type 1 risk charge based on a study performed by CEPRES where the risk was measured with a large dataset based on annual net asset value (NAV) VaRs each calculated with 100.000 stress test scenarios.

775. These investments should be in the form of an Alternative Investment Funds. Not more than 30% of the NAV should be allocated to one investment and the AIF portfolio should contain on average 6 to 8 investments. Information and reporting obligations under AIFMD should be relevant. Some other requirements were suggested.

776. Another stakeholder suggested two possible simple approaches: First an extension of the type 1 equities definition to listed and unlisted companies in EEA and OECD. Second, a risk charge for unlisted equities that is not more than 5 % higher than the type 1 risk charge.

b. Assessment

777. With respect to the first proposal please see the section "Specificities of private equity".

778. EIOPA agrees that the proposed two other approaches are simple but has doubts whether they are also sufficiently risk sensitive.

Further information

779. Stakeholders provided a meaningful amount of information on investments in private equity (investment vehicles, due diligence, etc.)

11.4. Advice

11.4.1. Previous advice

780. CEIOPS provided advice on the treatment of unlisted equities in the equity risk sub-module in the CEIOPS Advice on the equity risk sub-module and the QIS5 Calibration Paper.^{68,69}

11.4.2. Analysis

Scope

781. The call for advice restricts the scope to equity investments in companies in the EU/EEA.

782. The possible approaches that EIOPA is considering cover different possibilities for insurers to invest in unlisted equities: direct investment, private equity ("PE") fund and PE fund of funds.

783. EIOPA has aimed to cover all industry sectors. In order to achieve sufficient accuracy in the risk measurement it might though be necessary to exclude for example equity investments in banks and insurers.

784. Based on data from the annual reporting unlisted equities other than strategic participations, investments in financials and equities backing unit linked business represent a low single digit percentage of all investments by European insurers.

⁶⁸ CEIOPS (2010): CEIOPS' Advice for Level 2 Implementing Measures on Solvency II: Article 111 and 304. Equity risk sub-module. CEIOPS-DOC-65/10.

⁶⁹ CEIOPS (2010): QIS5 Calibration Paper. CEIOPS-SEC-40-10.

General approach to identity qualifying unlisted equities

785. Based on the analysis so far EIOPA is considering the following approach:

786. A "look-through" to the underlying companies (of course unnecessary for direct investments) is performed. If the risk profile of the unlisted companies is sufficiently similar to the listed companies which were used to derive the type 1 risk charge and if the investment vehicle does not add material risks then the equity investment can be treated as type 1 equities.

787. This approach focuses on the underlying risks and compliance with the criteria can be easily checked. At the same time the assumption is made that the risks resulting from illiquidity can be adequately managed so that the risks of similar listed and unlisted companies are not materially different. In addition it has to be ensured that the measurement of similarity is sufficiently accurate.

788. Stakeholders suggested an alternative approach based on the risk management by the insurer which would have to implement certain internal processes and procedures to benefit from a more favourable treatment. Those internal process and procedures may include, but not be limited to:

- An assessment of the sufficient diversification in the portfolio of unlisted companies (in terms of sector, geography, etc.)
- A sound monitoring of the portfolio companies including frequent valuations
- Regular stress testing

789. While there are currently doubts that this approach would be sufficiently risk sensitive EIOPA might reconsider its position based on further work and the responses to the consultation.

Look-through approach: Introduction

790. Unlisted equities are not traded on exchanges. This makes it more difficult to exit or adjust a position. Unlisted equities should not benefit from the absence of market prices (e.g. by using private valuations for the risk measurement). The look-through approach assumes that taking a public company private or listing a previously private company does not necessarily alter the risk. At the same time the assumption is made that the risks resulting from the illiquidity can be largely mitigated. This is similar to the approach taken for debt in the Delegated Regulation where no distinction is made between traded bonds and loans with the same credit quality step.

791. The approach includes conditions on the vehicle used to gain exposure in order to avoid the creation of additional risks.

792. EIOPA is exploring two possibilities for measuring the fundamental risk of the underlying companies which are described in the next two sections.

Beta method

Overview

793. The beta method uses the hypothetical beta of a portfolio of unlisted equity to determine its riskiness. It consists of the following simple steps:

794. First, the hypothetical beta for each individual unlisted equity investment is calculated using a pre-defined function with selected financial ratios of the company as inputs ("beta function"). Second, the portfolio beta is calculated as the average of the individual betas weighted by the book values of the equity stakes. Third, if the beta of the portfolio does not exceed the cut-off value of 0.85, then the type 1 charge is applied.

795. Beta measures the change in the excess individual stock return of an individual stock in response to a 1% change in the excess stock market return.⁷⁰ It is a well-known measure of the systematic (i.e. the non-diversifiable) risk of (a portfolio of) stocks. The lower the beta, the lower the systematic risk. Beta is often used in both academia⁷¹ as well as practice.

796. Beta is calculated by dividing the covariance between the return on an individual stock and the stock market return by the variance of the stock market return. Since individual stock returns are unavailable for unlisted equity EIOPA is working on a function to calculate the beta for an unlisted firm based on its financial ratios. This function is calibrated using betas and financial ratios for listed firms.

797. EIOPA based the calibration on a data set that excludes financial companies since their financial ratios are very different from non-financial companies. This means that the beta approach is not accurate for financial companies. Therefore, insurers cannot use the beta approach for financial companies and instead have to apply the type 2 charge as set out in the current regulation.

Calibration

798. EIOPA will continue its work on the beta function. The results presented below are therefore preliminary and the final recommendation may be different.

799. The viability of the method was tested based on data downloaded from Bloomberg for the non-financial companies in the Stoxx 600 index. The data included the company betas for the period 2014 to 2016 based on monthly returns and the MSCI Europe index as market proxy. It also contains a large amount of firm characteristics on leverage, growth, margins, returns, stability, liquidity and size.

⁷⁰ The excess return is the return in excess of the risk-free rate.

⁷¹ The Nobel Prize in Economics in 1990 was in part awarded for work on beta.

800. A linear regression was estimated with OLS using the beta as dependent variable and a constant and a selection of the firm characteristics as independent variables. The latter were selected based on their statistical explanatory power and correlation with other firm characteristics.

801. Table 1 shows the results for one suitable model. It contains one constant and 11 variables that are all statistically significant and have sufficient explanatory power. With an overall R² of 35% the fit is sufficient if the portfolio contains enough assets (see analysis in the following section).

802. The beta for an individual company can be calculated by multiplying the values in the column "coef" with the company specific values and then adding up these products. Hence, the beta is equal to $0.7834 + 0.4592 * \text{Total Debt/Enterprise Value} - 0.0134 * \text{Average Operating Margin 5 years} - 0.022 * \text{Total Debt/Average EBITDA 5 years} + 0.0028 * \text{Book Value Growth 5 years} - 0.0070 * \text{Sales Growth 5 years} + 0.5314 * \text{Coefficient of Variation Net Sales 5 years} + 0.0070 * \text{Average EBITDA Margin 5 years} + 0.9266 * \text{Total Debt/Funds from Operations} + 0.0567 * \text{Coefficient of Variation EBITDA 5 years} / \text{Total Interest Expense} - 0.0100 * \text{Net Debt/Average Retained Cash Flows 5 years} - 0.0939 * \text{Average Cash Flows from Operations 5 years} / \text{Total Current Liabilities}$.^{72,73}

OLS Regression Results							
Dep. Variable:	Beta monthly observed three years	R-squared:	0.353				
Model:	OLS	Adj. R-squared:	0.333				
Method:	Least Squares	F-statistic:	17.85				
Date:	Wed, 06 Sep 2017	Prob (F-statistic):	2.60e-28				
Time:	18:35:08	Log-Likelihood:	33.020				
No. Observations:	372	AIC:	-42.04				
Df Residuals:	360	BIC:	4.987				
Df Model:	11						
Covariance Type:	nonrobust						
	coef	std err	t	P>|t|	[0.025	0.975]	
const	0.7834	0.031	24.979	0.000	0.722	0.845	
Total Debt / EV	0.4592	0.065	7.027	0.000	0.331	0.588	
Avg T12M Operating Margin	-0.0134	0.004	-3.831	0.000	-0.020	-0.007	
Total Debt /Avg EBITDA	-0.0222	0.004	-5.915	0.000	-0.030	-0.015	
Book value growth 5 years	0.0028	0.001	2.187	0.029	0.000	0.005	
Sales 5Yr Avg. Growth	-0.0070	0.002	-3.328	0.001	-0.011	-0.003	
Coefficient of variation net sales	0.5314	0.155	3.436	0.001	0.227	0.836	
Avg EBITDA Margin	0.0070	0.003	2.660	0.008	0.002	0.012	
Total Debt/FFO	0.9266	0.383	2.422	0.016	0.174	1.679	
Coefficient of variation EBITDA/Total Interest Expense	0.0567	0.020	2.821	0.005	0.017	0.096	
Net deb/Avg Retained cash flow	-0.0100	0.003	-3.794	0.000	-0.015	-0.005	
Average CFO/total current liabilities	-0.0939	0.041	-2.287	0.023	-0.175	-0.013	
Omnibus:	5.755	Durbin-Watson:	2.079				
Prob(Omnibus):	0.056	Jarque-Bera (JB):	7.437				
Skew:	-0.112	Prob(JB):	0.0243				
Kurtosis:	3.656	Cond. No.	984.				
Warnings:							
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.							

Table 1: regression results

⁷² The Enterprise Value for the ratio Total Debt/EV was calculated based on market values for equities. EIOPA will explore whether book-value based measures for leverage produce similar results.

⁷³ It is difficult to interpret the sign and size of individual coefficients, since a coefficient measures the effect of a change in one variable given that all other variables stay constant. For example, the coefficient of 0.4592 for Total Debt/EV implies that the predicted beta increases by 0.4592 if Total Debt / EV increases by 1 given that all other variables stay constant. The predicted beta itself is accurate even when more variables change.

Cut-off point

803. As mentioned above a cut-off point of 0.85 is used, i.e. the type 1 shock is only applied if the portfolio beta does not exceed this value.

804. The cut-off value of 0.85 is chosen for two reasons: first, the lower type 1 shock should only be applied to relatively safe portfolios of unlisted equity. Portfolios with a beta of 1 have average risk, while diversified portfolios with betas not higher than 0.85 are relatively safe.

805. Second, as it is not easy to distinguish between portfolios with a beta just above and just below the cut-off point a relatively low value provides a very high degree of certainty that portfolios with betas higher than 1 do not qualify.

Accuracy of the method

806. The accuracy of the method is analyzed in the following way: first, one million portfolios are created by randomly selecting non-financial Stoxx 600 companies. Second, the resulting portfolios are sorted into brackets based on their observed historical portfolio beta. Third, for each portfolio it is decided whether a type 1 or type 2 shock should be applied based on the portfolio beta estimated with the formula above and a cut-off point equal to 0.85. Fourth, the percentage of correctly assigned types based on the same cut-off value for each bracket is calculated.

807. Table 2 illustrates the accuracy of the method. The lower and upper bound for the portfolio beta for each bracket is shown in the first two columns. The last four columns provide the percentage of correctly assigned types for portfolios consisting of 2, 10, 20 and 50 equity investments with higher percentages indicating better accuracy. A value of 0.99 means for example 99%.

Lower Bound	Upper Bound	2 Equities	10 Equities	20 Equities	50 Equities
-10.000	0.650	0.845510	0.922775	0.953194	0.981203
0.650	0.675	0.795292	0.887810	0.931568	0.962704
0.675	0.700	0.759322	0.865213	0.915675	0.961165
0.700	0.725	0.717115	0.841927	0.894519	0.953173
0.725	0.750	0.699388	0.805314	0.861877	0.928362
0.750	0.775	0.692729	0.764543	0.812914	0.890302
0.775	0.800	0.671387	0.714995	0.752150	0.824549
0.800	0.825	0.646501	0.657711	0.674652	0.725918
0.825	0.850	0.603737	0.595202	0.592014	0.598367
0.850	0.875	0.453715	0.472878	0.503887	0.547730
0.875	0.900	0.463593	0.541728	0.596894	0.689120
0.900	0.925	0.481130	0.610173	0.689343	0.806236
0.925	0.950	0.506951	0.675995	0.766932	0.886740
0.950	0.975	0.539708	0.738945	0.834275	0.940610
0.975	1.000	0.561371	0.791860	0.890259	0.968192
1.000	1.025	0.610334	0.845850	0.924112	0.983352
1.025	1.050	0.643135	0.881618	0.953575	0.989933
1.050	1.075	0.693361	0.913204	0.966754	0.995000
1.075	1.100	0.732523	0.937304	0.980048	1.000000
1.100	1.125	0.767718	0.958837	0.982618	1.000000
1.125	1.150	0.764403	0.973713	0.992233	1.000000
1.150	1.175	0.813921	0.980490	1.000000	1.000000
1.175	1.200	0.820072	0.984490	0.991525	1.000000
1.200	10.000	0.951035	0.990417	1.000000	1.000000

Table 2: Correct allocation for different portfolio betas

808. The table shows several important results: First, as already mentioned the method does not work well in distinguishing between type 1 and type 2 shocks around the cut-off point where only slightly above 50% of the portfolios are assigned to the correct type. The table also illustrates the case for a relatively low cut-off point: 98% of the 50-asset portfolios in the (1.00, 1.05] beta bracket do for example not qualify for the type 1 treatment. The drawback is of course that several relatively safe portfolios do not meet the requirement. As an example the correct type 1 shock is only applied to 82% of the 50-asset portfolios in the (0.775, 0.800] bracket.

809. Another important result is that the accuracy improves with higher diversification. For example, 56% of the two equities portfolios in the bracket (0.975, 1.000] receive the correct type 2 treatment, but for 50-equities portfolios this figure is 97%. This suggests that for sufficiently diversified portfolios imprecisions in the beta formula are averaged out.

810. In summary, the method correctly disqualifies riskier portfolios with higher betas which allows the identification of safer portfolios in a prudent way.

811. Based on the analysis each equity investment should not represent more than 10 % of the total value for the unlisted equity portfolio since the method

is more accurate and beta is a more valid risk measure for more diversified portfolios.

Areas of further work

812. EIOPA intends to perform a similar analysis for smaller listed companies which are closer in size to the typical unlisted companies.

813. Another area of further work is to test the stability and accuracy of the method over multiple time periods.

814. Finally, EIOPA will explore whether the formula can be simplified by removing some variables (thus trading some explanatory power for an easier application of the method).

Advantages and disadvantages of the beta approach

815. Beta is well-established in both academia and financial industry and is easy to measure. The systematic risk reflected by beta is the relevant risk in larger portfolios. As demonstrated above the historical betas can be replicated with a sufficient degree of accuracy. Compared with the stressed loss approach the beta approach takes into account more factors and is therefore potentially more accurate.

816. A disadvantage of the beta approach is that it does not purely measure tail risk. At the same time it avoids a calibration that is based on a single crisis which might not be representative for future ones.

817. Furthermore, higher systematic risk directly implies higher drops in extreme events since systematic risk is the relevant risk measure in larger portfolios. A preliminary analysis shows that there is a strong relation between beta and the drop in the stock price during the financial crisis of 2007-2008: Higher betas (more systematic risk) were associated with more negative returns during the financial crisis.

Stressed period loss method

General idea

818. EIOPA is asked to develop criteria for identifying unlisted equities which can be treated as type 1 equities. The type 1 risk charge was calibrated based on the market prices of large listed "blue chip" companies. The behaviour of equity prices during the Global Financial Crisis (in the following "GFC") has a meaningful impact on this calibration. The approach compares the price behaviour of listed proxies for the unlisted companies during the GFC with the behaviour for the companies in the MSCI Europe. This index was used in the type 1 equity calibration.

819. The approach has similarities to methods for measuring the performance of private equity relative to listed equities (so called "Public Market Equivalents" or "PME").

820. The three risk drivers considered are size, industry sector and leverage.

Description of the method

821. The overall risk for equity investors is determined by business and financial risk. Business risk results for example from the behaviour of competitors, customers, suppliers etc. Financial risk arises as equity investors have only a residual claim on the cash flows generated by the company.
822. Stakeholders from the private equity industry have emphasised the very significant degree of diversification across individual companies that can be achieved by investing in a number of PE funds. With a sufficient degree of diversification, the individual business risk of companies can be largely eliminated leaving the industry sector and general market risk.
823. Financial risk cannot be diversified away.
824. The necessary parameters for the method are derived in the following steps:
825. First the risk for different industry sectors without the effect of financial risk ("unleveraged sector risk") is determined. The risk measure used is the percentage loss in the aggregated enterprise value (i.e. the value of equity and debt) of companies in these sectors in the 12-month period between 6/03/2008 and 6/03/2009. This is the loss that equity investors with a diversified industry sector portfolio would have suffered in case the companies had been fully financed with common equity.
826. In the chosen period equities suffered one of the largest 12-month losses during the GFC.
827. In the next step the results are divided by the 12-month loss of the MSCI Europe between 6/3/2008 and 6/3/2009. This produces the relative unleveraged sector risks.
828. Based on these parameters the decision can be made whether the portfolio of unlisted equities qualifies for the type 1 treatment:
829. For each company in the unlisted equity portfolio the applicable relative unleveraged sector risk factor is adjusted by taking into account the effect of the company-individual leverage. This produces the relative leverage-adjusted company risk.
830. This process produces for each company a percentage figure indicating the risk relative to the companies that were used for the type 1 risk charge calibration. By calculating a weighted average of these percentages based on the portfolio weights, the risk of the whole portfolio relative to the MSCI Europe companies can be derived ("relative portfolio risk"). If the risks are

similar (i.e. the percentage is equal or lower than a threshold value (e.g. 100 %) ⁷⁴) then the type 1 risk charge can be applied to the portfolio.

831. The approach is easy to implement. All the information needed is for each unlisted company the industry sector and financial leverage.

Calibration of factors

832. In a first step, the tickers for all companies listed in Western Europe and the Eastern European Member States of the EU with a market cap not exceeding 1.000 Million EUR on 6/3/2008 are retrieved using the EQS screen in Bloomberg.

833. The further calculations are then performed for all companies where all the necessary financial data from Bloomberg is available.

834. The calculations are performed in EUR. EIOPA will consider whether an adjustment is necessary to eliminate the effects of exchange rate fluctuations as these risks are covered in the currency risk sub-module. The enterprise value for each company at a given data is calculated as following:

835. Market Cap Equity+ Long and Short Term Debt - Cash and marketable securities + Minority non-controlling interest + Preferred equity

836. Where all quantities other than Market Cap Equity are determined based on book values. The enterprise values for all companies in a specific industry sector are then added up separately for the four market cap buckets 0-15 m, 15-150 m, 150-300 m and 300-1000 m EUR.^{75,76} Based on their weighted average the percentage loss in enterprise value over the 12 months for the industry sector can be calculated.

837. The enterprise value might have changed as a result of payments to or from lenders and shareholders. For example, the company may have issued new shares or paid down debt. Not correcting for these transactions would result in an under- respectively overestimation of the change in the enterprise value. Consequently, an adjustment is made for the cash flows from financing activities.

838. The effect of debt on taxes is another possible area for an adjustment. If the company were 100 % financed by common equity then there would be no "tax shield" (i.e. the tax payment would be higher as interest payments are normally tax deductible). One could adjust the calculation of the unleveraged sector risk accordingly and then incorporate the effect on the relative

⁷⁴ As with the beta method EIOPA will consider whether the threshold value should be lower than 100 %.

⁷⁵ According to page 34 in Invest Europe (2017): 2016 European Private Equity Activity. Statistics on Fundraising, Investment and Divestment, equity investments in buyouts of "Small" (<€15m), "Mid-market" (€15m - €150m), "Large" (€150m - €300m) and "Mega" (> €300m) companies represented approximately 8, 54, 23 and 15 % of the total.

⁷⁶ Based on the analysis so far the unleveraged sector risk seems to be not very sensitive to changes in the upper market cap limit.

leverage-adjusted company risk based on the company specific leverage and tax rate. But based on the analysis so far the effect on the final results would not be meaningful.

Practical application of the method

839. In the following the process for deciding whether the type 1 risk charge can be applied is described in detail:

First step:

840. Each unlisted company is allocated to an industry sector. On this basis the individual relative unleveraged sector risk can be determined with a simple table. The following table sets out the preliminary results for the relative unleveraged sector risk factors:

Industry Sector	Relative Unleveraged Sector Risk
Consumer Discretionary	0.72
Consumer Durables & Apparel	0.83
Media	0.71
Consumer Services	0.68
Retailing	0.92
Automobiles & Components	0.59
Industrials	0.64
Capital Goods	0.67
Transportation	0.34
Commercial & Professional Services	0.88
Information Technology	0.94
Technology Hardware & Equipment	0.98
Software & Services	0.90
Semiconductors & Semiconductor	1.09
Consumer Staples	0.47
Food Beverage & Tobacco	0.49
Food & Staples Retailing	0.45
Household & Personal Products	0.67
Health Care	0.55
Health Care Equipment & Services	0.51
Pharmaceuticals, Biotechnology	0.55

Second step:

841. For each company the relative leverage-adjusted company risk is calculated with the formula:

842. Relative unleveraged sector risk times $(1 + (\text{Long and Short Term Debt} - \text{Cash and marketable securities} + \text{Minority non-controlling interest} + \text{Preferred equity}) / \text{Equity})$

where the inputs are based on the most recent book values for the company.

Third step:

843. The relative portfolio risk is calculated as a weighted average of the relative leverage-adjusted company risks based on the book values of the equity stakes.

844. If the percentage is 100 % or lower the type 1 risk charge can be applied.

Scope of application

845. The method assumes that the insurer holds for a certain industry sector a sufficiently diversified portfolio. It should only be applied for the unlisted companies in sectors where each equity investment does not represent more than 5 % of the total exposure to this sector.⁷⁷ For the other sectors the type 2 risk charge should be applied.

846. Based on the available information EIOPA has chosen the industry sectors to which European PE has the highest allocation.⁷⁸ For the other sectors (e.g. materials) the type 2 risk charge could be applied. An alternative would be to derive also for them the relative sector risk factors.

Areas of further work

847. In the following areas EIOPA will consider the merits of further changes before delivering the advice:

- i. Inclusion of the effects of taxes and dividends
- ii. More granularity in terms of industry sectors
- iii. With the current approach the leverage is measured based on book values. An adjustment factor could be introduced to reflect the fact that market and book value of equity may deviate.
- iv. The leverage measured on the basis of book values depends on the accounting rules for the individual company. One could consider searching for measures of leverage that are less sensitive to differences in accounting rules.
- v. When calculating the relative unleveraged sector risk the 12-month losses in enterprise value of all companies in the sector are currently weighted based on enterprise values. Alternatives could be averages or medians.

⁷⁷ Until February EIOPA will analyse whether a higher percentage is justified.

⁷⁸ See page 50-52 in Invest Europe (2017): 2016 European Private Equity Activity. Statistics on Fundraising, Investment and Divestment.

848. In these areas input by stakeholders would be useful.

Advantages and disadvantages of the stressed loss method

849. Solvency II does not look at the “normal” risk but at the tail-risk. The type 1 calibration, which represents the benchmark, is to a large part driven by the behaviour of stocks during the global financial crisis. In the more recent past the GFC seems the best proxy for a 1 in 200 year event. The approach is relatively simple using as risk drivers only size, industry sector and leverage.

850. At the same time there is the possibility that the next crisis is substantially different.

Requirements on the investment vehicle in the look-through approach

851. In addition to the requirements on the underlying companies in the beta or stressed period loss method the investment vehicle should meet certain conditions to avoid the creation of material additional risks.

852. These requirements are discussed in the following:

Underlying investments

853. The approach covers investments in the common equity of companies that are unlisted.

854. The company should be established in the EU or EEA with a majority of revenues from EEA or OECD countries which has been larger than a Small-Sized Enterprise as defined by the Commission Recommendation (2003/361/EC) in the last three years.

855. The latter requirement is introduced to to exclude companies which are very small or do not yet have marketable products.

856. The call for advice refers to companies in the EU/EEA. Therefore the majority of staff that the company employs should be located in the EU/EEA.

857. Similar to unrated debt EIOPA is considering whether it should be recommended that the application of the look-through is restricted to 5 % of all investments.

Vehicle

PE

858. For PE investments the requirements in the Directive 2011/61/EU of the European Parliament and of the Council (“AIFM Directive”) seem a reasonable starting point as this is an established format and covers areas like disclosure and governance. This does not necessarily mean that the fund has to qualify as an alternative investment fund. EIOPA will further analyse whether certain requirements can be relaxed. An argument could be that the investments are relatively simple compared with other alternative investments like certain hedge funds strategies. Moreover, the considered approach entails a look-through to the underlying portfolio companies.

859. As the underlying companies are illiquid the fund should be closed-end.

860. Whether the fund should be allowed to use a moderate amount of leverage on the fund level has to be further explored. On the one hand leverage on the fund level increases the risk and its use by PE funds seems to be very limited. On the other hand the look-through approach allows taking into account the effect of leverage. If a look-through should not be possible then according to the Delegated Regulation the type 2 risk charge would be applicable.

861. Another requirement is that the fund intends to hold the investments over a period of several years.

862. In this area input by stakeholders would be very useful.

Diversification

PE

863. Exiting from the investment is not easy and there are significant differences in the performance of funds. Therefore the insurer should spread its investment across at least 25 independent fund managers.

Transparency

PE

864. The insurer should have all information necessary to assess the performance of the fund manager (e.g. P&L, cash flows and profits of the portfolio companies at a meaningful level of aggregation) as well as for a proper due-diligence before investing.

865. There should be independent annual valuations of the portfolio companies.

866. The described requirements may overlap with existing requirements on Alternative Investment Funds. But as mentioned above it will be explored further whether all requirements from these legal frameworks are necessary.

Direct investments

867. Requirements do not seem necessary as the insurer directly investing in a company should be able to obtain the necessary information.

Own risk management

PE

868. As it is very difficult to exit these illiquid investments and the abilities of the managers are very important the insurer should perform proper due diligence (including on the past performance of managers). The insurer needs also the necessary expertise for investing in unlisted equities. Finally, the performance of the investments should be regularly monitored.

869. Based on the analysis so far EIOPA considers the already existing provisions in these areas to be sufficient.

870. It is not easy to exit unlisted equity investments. For PE funds there may also be cash calls. Therefore the management of liquidity risks is very important. This should also include provisions for the case that the investment has to be sold.

Direct investments

871. The considerations are very similar to the previous ones with the difference that the insurer has to select companies instead of funds. Moreover, there is not the risk of cash calls.

872. The table below summarises the considerations above:

Dimension	Criteria
Underlying investments	Common equity of unlisted companies. Majority of company staff located in EU/EEA. Company established in the EU or EEA with a majority of revenues from EEA or OECD countries which has been larger than a Small- Sized Enterprise as defined by the Commission Recommendation (2003/361/EC) in the last three years.
Vehicle	PE Requirements from the AIF as starting point Closed-end Unleveraged or moderately leveraged Intended holding period of several years
Diversification	PE At least 25 independent fund managers.
Transparency	PE Necessary information for assessment of fund manager performance and due-diligence available Independent annual valuation of portfolio companies
Own risk management	Proper due-diligence (PE: including past performance of managers) Expertise in investments in unlisted companies Regular monitoring of investment Management of liquidity risks.

ESG factors

873. One of the factors that the call for advice asks EIOPA to consider is the consideration taken for environmental, social and governance aspects.

874. Respondents to the call for evidence mentioned that a number of PE funds is managed according to ESG criteria (e.g. the Principles for Responsible Investment).⁷⁹

875. Compliance with ESG criteria could be ensured by requiring a declaration of the investment managers that they conform to certain ESG standards. A more restrictive but also more expensive alternative would be to require an external assessment.

⁷⁹ <https://www.unpri.org/about>

Specificities of private equity

876. Stakeholders from the private equity industry argue that there are certain specificities of private equity investments that justify a reduction in the calibration.

877. One argument for a lower risk is the supposed better corporate governance compared to public companies. This could result in a better risk profile over the medium to long term. But there can be doubts whether there is a reduction over a period of 12-months relevant for the Solvency II risk measurement.

878. Another argument is the degree of diversification that can be achieved with PE investments. While diversification in terms of the number of companies reduces the risk some other aspects have to be considered as well: The listed companies that were used for the calibration of the type 1 risk charge are much larger and therefore more diversified in terms of business lines and geography than typical companies in which PE funds invest. Moreover, the marginal risk reduction from investing in additional companies decreases with the number of investments (i.e. the diversification benefit from adding another company to an existing portfolio of 100 companies is much lower than for a portfolio with 20 companies).

879. Some stakeholders have argued that the evaluation of the risk for private equity should be based on Net Asset Values (i.e. mark to market or mark to model valuations). The topic has been discussed in detail in the Long Term Investments report that EIOPA published in 2013.⁸⁰ Based on the analysis so far EIOPA would maintain the position expressed then: it does not seem warranted to give PE credit for the fact that the investment is illiquid and that market prices are not available.

11.4.3. EIOPA's advice

880. Investments in the unlisted equity of companies in the EU/EEA either direct or through a private equity fund or private equity fund of funds where the conditions set out in the sections "Criteria on underlying equity investments and vehicle" and "Look-through criterion" are met should be considered as type 1 equities.

881. For companies from industry sectors which are not covered in the look-through criterion the type 2 equity risk charge should be applied.

Criteria on underlying equity investments and vehicle

882. The table below summarises the considerations above:

⁸⁰ EIOPA (2013): Technical Report on Standard Formula Design and Calibration for Certain Long-Term Investments. EIOPA/13/513.

Dimension	Criteria
Underlying investments	Common equity of unlisted companies. Majority of company staff located in EU/EEA. Company established in the EU or EEA with a majority of revenues from EEA or OECD countries which has been larger than a Small- Sized Enterprise as defined by the Commission Recommendation (2003/361/EC) in the last three years.
Vehicle	PE Requirements from the AIF as starting point Closed-end Unleveraged or moderately leveraged Intended holding period of several years
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Own risk management	Proper due-diligence (PE: including past performance of managers) Expertise in investments in unlisted companies Regular monitoring of investment Management of liquidity risks.

Look-through criterion

Beta approach

883. The approach can only be applied for portfolios of 10 or more equity investments

The beta of the portfolio of unlisted equity portfolio is determined in the following steps:

- i. The hypothetical beta for each individual unlisted equity investment is calculated using a pre-defined function.
- ii. The portfolio beta is calculated as the average of the individual betas weighted by the book values of the equity stakes.

884. The look-through criterion is met if the beta of the portfolio does not exceed the cut-off value of 0.85

Stressed loss approach

885. The approach can only be applied for industry sectors where the largest allocation does not represent more than 5 % of the sector allocation.⁸¹

886. The relative portfolio risk is calculated in the following steps:

- i. Each unlisted company is allocated to an industry sector. On this basis the individual relative unleveraged sector risk is determined based on the table below.

⁸¹ Until February EIOPA will analyse whether a higher percentage is justified.

ii. For each company the relative leverage-adjusted company risk is calculated with the formula:

Relative unleveraged sector risk times $(1 + (\text{Long and Short Term Debt} - \text{Cash and marketable securities} + \text{Minority non-controlling interest} + \text{Preferred equity}) / \text{Equity})$

where the inputs are based on the most recent book values for the company.

iii. The relative portfolio risk is calculated as a weighted average of the relative leverage-adjusted company risks based on the book values of the equity stakes.

887. If this value is 100 % or lower the look-through criterion is met.

888. Table with preliminary results for the relative unleveraged sector risk factors:

Industry Sector	Relative Unleveraged Sector Risk
Consumer Discretionary	0.72
Consumer Durables & Apparel	0.83
Media	0.71
Consumer Services	0.68
Retailing	0.92
Automobiles & Components	0.59
Industrials	0.64
Capital Goods	0.67
Transportation	0.34
Commercial & Professional Services	0.88
Information Technology	0.94
Technology Hardware & Equipment	0.98
Software & Services	0.90
Semiconductors & Semiconductor	1.09
Consumer Staples	0.47
Food Beverage & Tobacco	0.49
Food & Staples Retailing	0.45
Household & Personal Products	0.67
Health Care	0.55
Health Care Equipment & Services	0.51
Pharmaceuticals, Biotechnology	0.55

12. Strategic equity investments

12.1. Call for Advice

889. EIOPA is asked to provide information on the application of the criteria of the Delegated Regulation for the identification of strategic equity investments by insurance and reinsurance undertakings as well as by National Supervisory Authorities ("NSAs"). Within the context of the Capital Markets Union, EIOPA is in particular asked to provide information on the investments currently covered by this asset class and by each Member State, notably in terms of size and sector of the underlying corporates, the purpose for the insurance undertaking of the investments, and in terms of size and type of the share and of holding period by the insurance or reinsurance undertaking.

12.2. Legal basis

Delegated Regulation

890. The Delegated Regulation – with particular reference to Articles 169 to 171 – sets out specific risk factors for strategic equity investments, provided they satisfy certain criteria. This reduced calibration should reflect the likely reduction in the volatility of their value arising from their strategic nature and the influence exercised by the participating undertaking on those related undertakings.

891. Equity investments of a strategic nature can benefit from a reduced risk charge of 22 %, when they meet the requirements of Article 171 of the Delegated Regulation.

Article 171 - Strategic equity investments

For the purposes of Article 169(1)(a) and (2)(a) and of Article 170(1)(b) and (2)(b), equity investments of a strategic nature shall mean equity investments for which the participating insurance or reinsurance undertaking demonstrates the following:

(a) that the value of the equity investment is likely to be materially less volatile for the following 12 months than the value of other equities over the same period as a result of both the nature of the investment and the influence exercised by the participating undertaking in the related undertaking;

(b) that the nature of the investment is strategic, taking into account all relevant factors, including:

(i) the existence of a clear strategy to continue holding the participation for long period;

(ii) the consistency of the strategy referred to in point (a) with the main policies guiding or limiting the actions of the undertaking;

(iii) the participating undertaking's ability to continue holding the participation in the related undertaking;

(iv) the existence of a durable link;

(v) where the insurance or reinsurance participating company is part of a group, the consistency of such strategy with the main policies guiding or limiting the actions of the group.

Guidelines

892. EIOPA has also developed guidelines⁸² on this topic (below is an extract).

Guideline 3 - Identification of a strategic participation (set of guidelines on treatment of related undertakings, including participations)

Participating undertakings should identify strategic participations in accordance with Article 171 of Commission Delegated Regulation 2015/35 as follows:

(a) participating undertakings using the standard formula to calculate their SCR should identify strategic participations regardless of whether their participation is in an insurance or reinsurance undertaking, in a financial or credit institution or in any other related undertaking;

(b) participating undertakings using an internal model to calculate their SCR need to identify strategic participations in financial and credit institutions only for the purpose of assessing whether Article 68(3) of Commission Delegated Regulation 2015/35 applies.

For the purpose of demonstrating their compliance with the requirements of Article 171 of Commission Delegated Regulation 2015/35, participating undertakings should not divide a participation into different parts, treating some parts as strategic and others not. Where a particular participation has been identified as strategic:

(a) in the case of a participation in a financial or credit institution, all investments in its own funds are strategic;

(b) in the case of any other related undertaking, all equity investments in the participation are strategic.

In demonstrating that the value of the equity investment is likely to be materially less volatile, in accordance with Article 171(a) of Commission Delegated Regulation 2015/35, participating undertakings should ensure that:

(a) consistent and appropriate valuations are applied over time both to the participation and to the other equities selected as a basis of comparison;

(b) they consider the impact of their influence on the participation's value.

In demonstrating that the nature of the investment is strategic, in accordance with Article 171(b)(i) to (iii) of Commission Delegated Regulation 2015/35,

participating undertakings should:

(a) indicate the period for which the strategy of holding the participation is intended to apply;

(b) consider the impact of market conditions on the main policies;

⁸² https://eiopa.europa.eu/Publications/Guidelines/TRU_Final_document_EN.pdf

(c) identify any significant factors affecting, or constraints on, the participating undertaking's ability to maintain its strategy and how these could or would be mitigated.

In demonstrating the existence of a durable link, in accordance with Article 171(b)(iv) of Commission Delegated Regulation 2015/35, participating undertakings should consider the following criteria:

(a) whether a stable relationship between the two undertakings exists over time;

(b) whether that stable relationship results in a close economic bond, the sharing of risks and benefits between the undertakings or exposure to risks from one to the other;

(c) the form of the relationship between the two undertakings, which may include ownership, joint products or distribution lines, cross-selling, the creation of joint ventures or other long term operational or financial links.

In accordance with Article 171(b)(v) of Commission Delegated Regulation 2015/35, a participating undertaking that is part of a group should regard the main policies guiding or limiting the actions of the group as those defined by the ultimate parent undertaking or, if different, by the undertaking which sets the main policies for the group as a whole.

Participating undertakings should document their consideration of the matters set out in Article 171 of Commission Delegated Regulation 2015/35 and paragraphs 1.21 to 1.25, including any other relevant factors, together with relevant supporting material.

12.3. Responses provided by NSAs on strategic equity investments

893. In order to provide the European Commission with the information and advice requested on strategic equity investments, EIOPA sent a questionnaire to the NSAs. The outcome of the questionnaire is summarised below.

12.3.1. Specific information on the strategic equity investments

894. NSAs mention that at this stage there is limited information about these investments because there is so far not a lot of experience with this standard formula item. Those NSAs that have analysed the issue report that only a limited number of undertakings in each market apply the provisions for strategic equity investments – with particular reference to Articles 169 to 171 of the Delegated Regulation.

895. It is often mentioned that strategic investments are not material in certain markets. However, other NSAs have identified undertakings with a significant proportion of their assets in strategic investments (over 50%). Often, the undertakings have a very large proportion of the participating equity (100% or close to it) and the participated entities are insurance undertakings within the same insurance group.

12.3.2. Information on the criteria of Article 171 of the Delegated Regulation

Volatility assessment

896. According to 171 (a), in order to qualify an equity investment as “strategic”, the insurer must demonstrate that the equity investment is likely to be materially less volatile for the following 12 months than the value of other equities over the same period as a result of both the nature of the investment and the influence exercised by the participating undertaking in the related undertaking.

897. The majority of NSAs that have analyzed the issue mentioned that it is difficult to demonstrate that those criteria are met, particularly for unlisted equity investments. The demonstration of the lower volatility in the next 12 months has proven to be difficult for undertakings which intend to hold these participations over a longer time period.

898. NSAs with experience on strategic equity investments report that for non-listed equities the lower volatility is often demonstrated by comparing financial statements or historical returns with those of competitors. For listed equities often an annual comparison between the volatility of the value of the strategic equity investment and the value of a benchmark index or a competitor is performed.

899. Several NSAs rely, often exclusively, on qualitative information, such as the nature of the participated business and whether it is complementary to the undertaking (the most mentioned sectors are support services such as real estate, reinsurance, claims management, sales and marketing), the influence of the undertaking (by voting rights, presence in the AMSB, involvement on policymaking) or material transactions or the provisioning of essential technical information.

Clear strategy to hold

900. NSAs report that undertakings mainly use already available information to prove the existence of a clear decisive strategy to continue holding the participation for long period such as the group strategic plan, ORSA, contingency plans, documents on governance, management actions, ALM policy, investment policy or internal agreements between the participating and the related undertaking.

901. In some cases also past movements in the held share of the capital, the voting rights of the participating company in the related company or the nature of the participation as a proxy for the strategy to hold the investment (complementary business model) are taken into account.

Ability to hold for a long period

902. Concerning the undertakings’ ability to continue holding the participation for a long period, NSAs evaluate the financial strength of the undertaking, often based on cash-flow projections, the general ALM management and liquidity risk management of the undertaking.

903. It is also reported that in some cases liquidity stress tests are conducted to ensure that, even in stressed situations, the undertaking would be able to keep holding the participation.

Durable link

904. Regarding the existence of a durable link, several NSAs take into account the influence of the undertaking in the administrative, management or supervisory body (AMSB) or policy-making processes of the strategic participation. This is often verified in the undertaking's strategic plan or ORSA.

905. In addition, also the integration of the participation within the undertaking's strategy or business model, including material transactions or the provisioning of essential technical information, the sharing of risks and benefits or exposure to risks or joint products or distribution lines, cross-selling arrangements and the creation of joint ventures are considered.

906. A few NSAs also regard the holding of a significant share of voting rights or equity in the strategic participation (over 50%) as a valid durable link. In other cases the durable link is demonstrated by referring to the governance structure.

Consistency with the group strategy

907. For most of the NSAs with experience on the issue, the consistency of the strategy of the participating company to continue holding the participation for a long period with the main policies guiding or limiting the action of the group is guaranteed by a strategic and planned dialogue among entities, that allows highlighting benefits and risks.

908. In particular, the consistency is often demonstrated on the basis of strategies included in the business plan, business models, contingency plans, management actions, ALM policy, investment risk management policy, or liquidity risk management policy of the group.

909. In many cases it can be proved that the nature of the investment is driven by the group strategy, which defines the investments strategy and the related governance.

910. It is also highlighted that all entities within the group are subject to a "College of Supervisors", in turn promoting supervisory convergence.

911. There was also the observation that when the majority of holdings are insurance undertakings already supervised, or ancillary service undertakings, there might be no reasons to require insurance companies to provide specific evidence of consistency with the group strategy.

912. Further criteria/evidence considered where demonstrating the strategic nature of an equity investment, compared to those considered by the Article 171 of the Delegated Regulation.

913. Further criteria/elements considered where demonstrating the strategic nature of an equity investment, as reported by NSAs, are indicated below:

- the existence of a prospective liquidity analysis embedded in the ORSA based on the ability of holding the strategic investment over the long term even in stressed market conditions;
- assessing the long-term nature of the investments by referring to the historical experience (for how long has the equity investment already been held) or by requiring a specific number of years of holding the participation;
- regarding the degree of control, introducing a minimum threshold of the share in the capital;
- specifying what kind of index or equity is appropriate to analyze volatility;
- assessing the undertaking's right to appoint director(s) in the participated entity;
- requiring a clear business rationale for the strategic equity investment (joint venture or investment in a business that provides key services to the company);
- asking the company's AMSB to evaluate the strategy (e.g. within the mid-term planning) and to give the declaration of its intentions in its future business plan.

12.3.3. Quantitative analysis

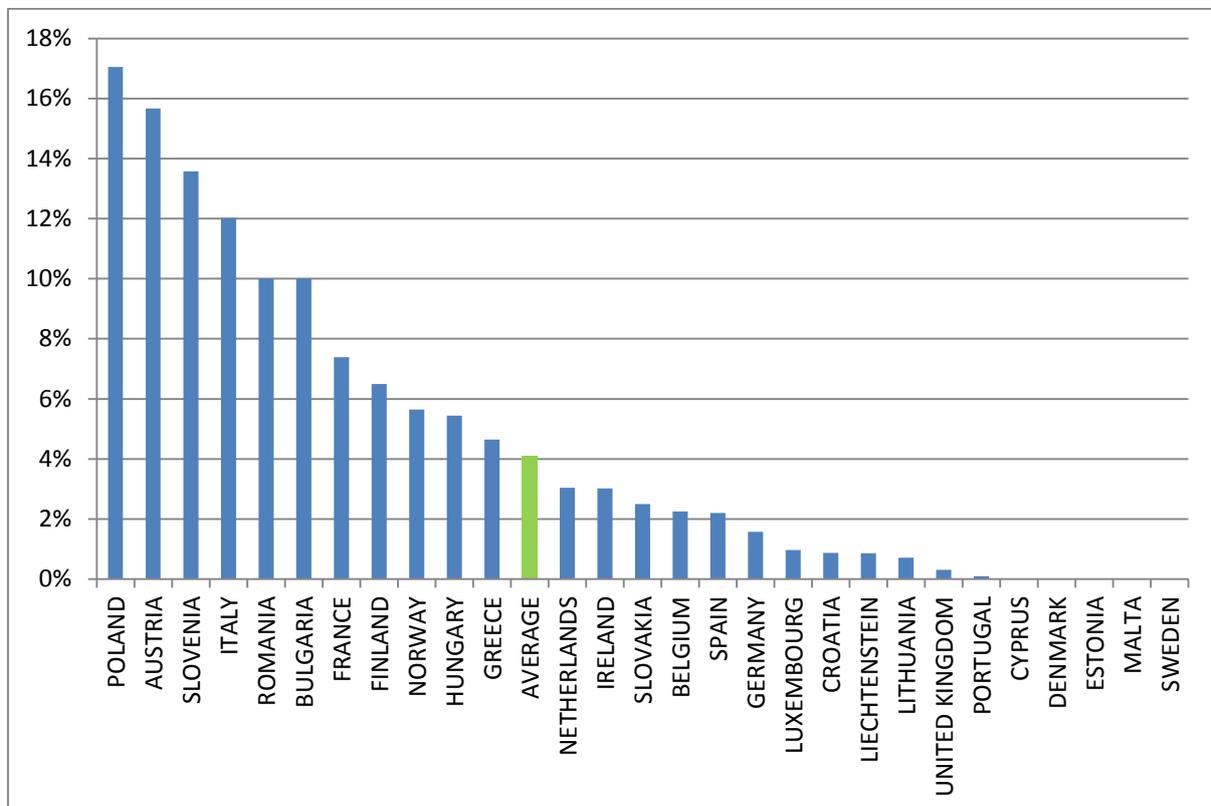
914. A survey launched to NSA’s identified 2,666 strategic participations by European insurance undertakings. A little less than 60 percent could be located in the EIOPA database, totalling 155 billion euro in assets.

915. Please note that changes to the graphs might occur in the final advice due to on-going work on data quality.

Proportion of strategic equity investments of total investments

916. In proportion to the investments, strategic participations account for more than 10 percent of the total investments in Poland, Austria, Slovenia, Italy, Romania and Bulgaria. The average amount of strategic investments is four percent of the total investments.

Figure 12.1. Proportion of strategic equity investments of total investments

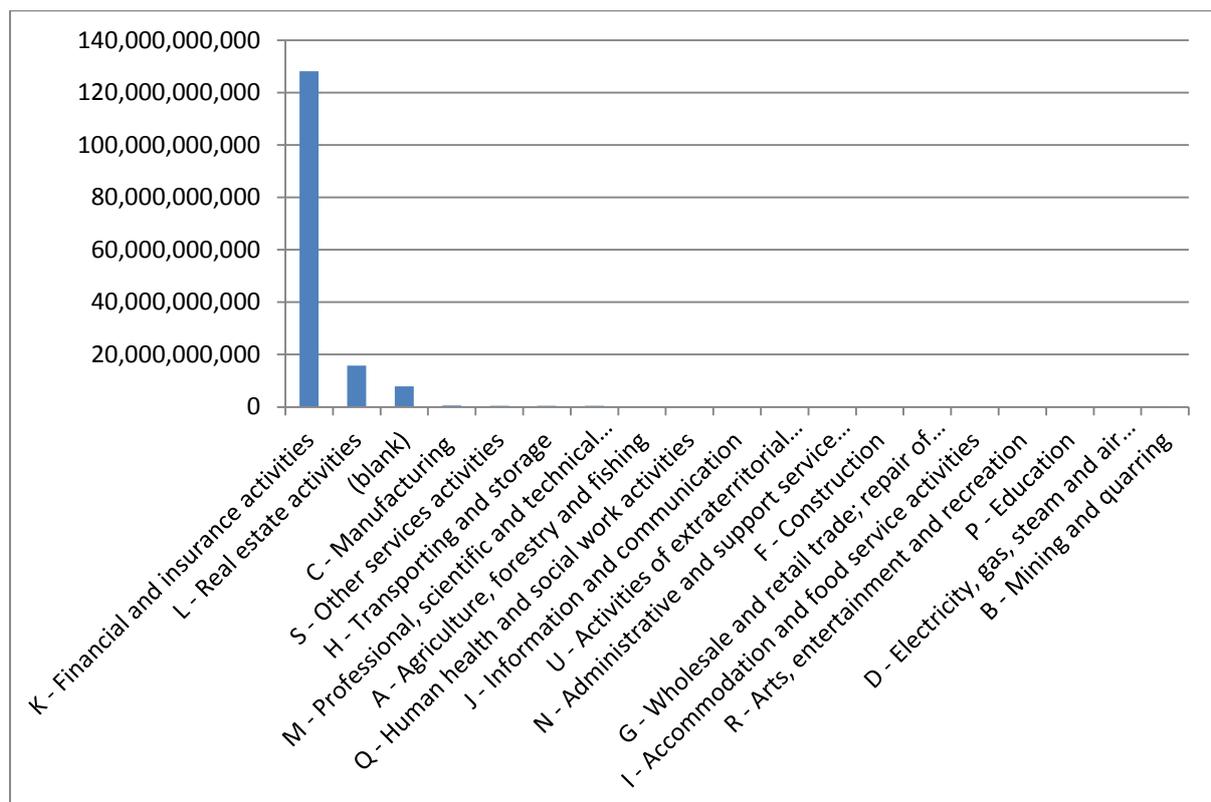


Sector of the strategic participations

917. Data analysis shows that the vast majority of these strategic investments are related to investments in financial and insurance activities, followed to a lesser extent by investments in real estate. Strategic participations in other sectors account for less than one percent of the total (see figure 12.2).

918. 40 percent of these strategic participations in financial and insurance activities relate to investments in life insurance, 25 percent to activities in holdings and 16 percent to strategic participations in the non-life insurance industry.

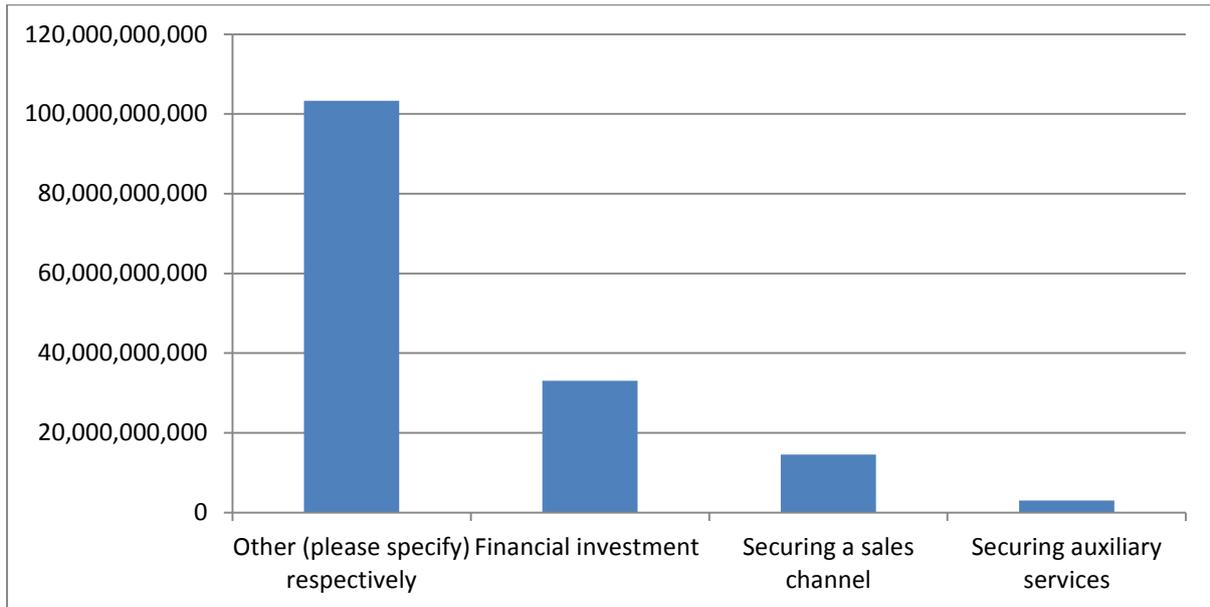
Figure 12.2. Sectors of the strategic participations (weighted)



Purpose of the strategic participations

919. The result varies significantly from one country to another. If one considers the overall invested amounts, the majority of investments cannot be defined by the broader categories financial investments or securing sales channels or auxiliary services (see figure 12.3). A significant part of the investments under the category "Other" appears to correspond to subsidiaries or other holdings of undertakings within a group. If one counts the number of strategic equity investments, in some countries the purpose of the majority of the strategic equity investments is to hold a "financial investment".

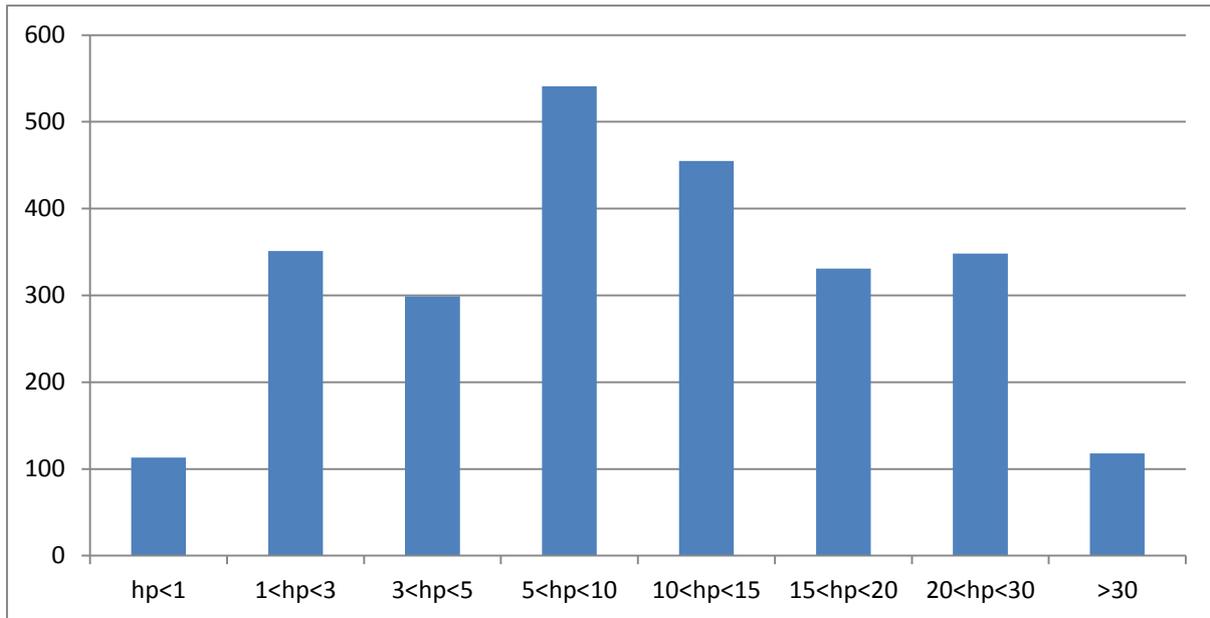
Figure 12.3. Purpose of the strategic participations (weighted)



Past holding period of strategic participations

920. Most of the 2,666 strategic participations were held for a period shorter than 10 years (see figure 12.4). In fact, there seems to be less strategic participations held for a longer time. Similar conclusions could be drawn considering the amount that was invested. However, the invested amount tends to be higher on average the longer a strategic participation had been held.

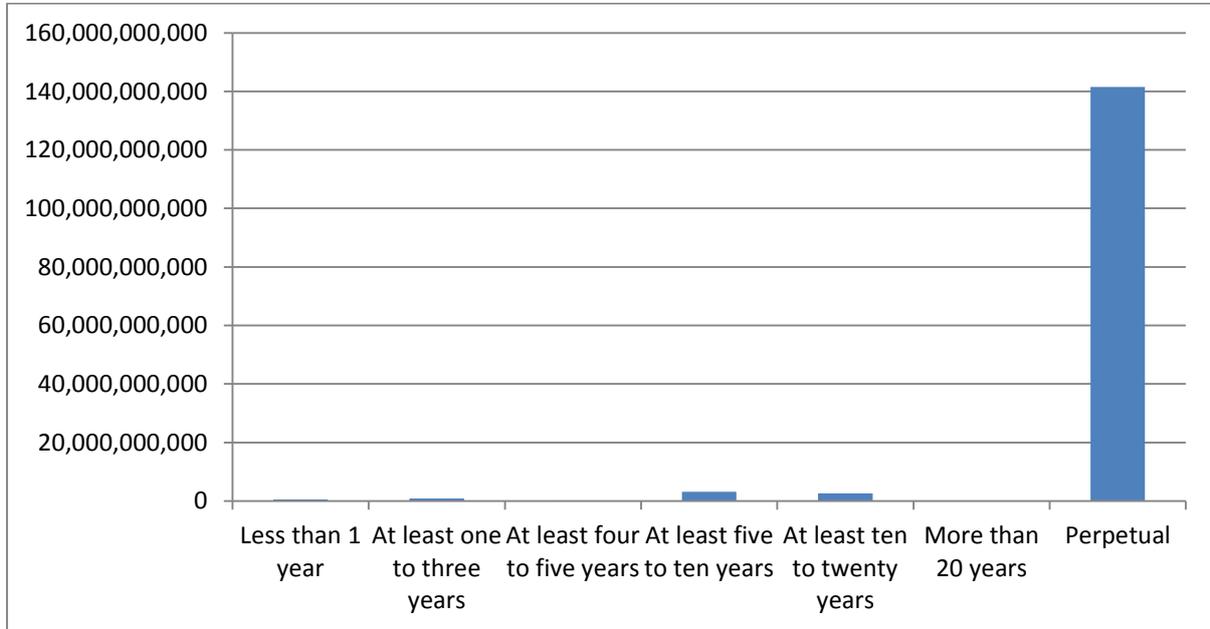
Figure 12.4. Past holding period of strategic participations (by number of responses)



Expected holding period of strategic participations

921. In contrast to the period strategic participations are held, most of these are not expected to be sold in the (near) future. Indeed both in weighted terms or in absolute numbers, respectively 90 (see figure 12.5) and 80 percent of the strategic participations had an undefined expected holding period.

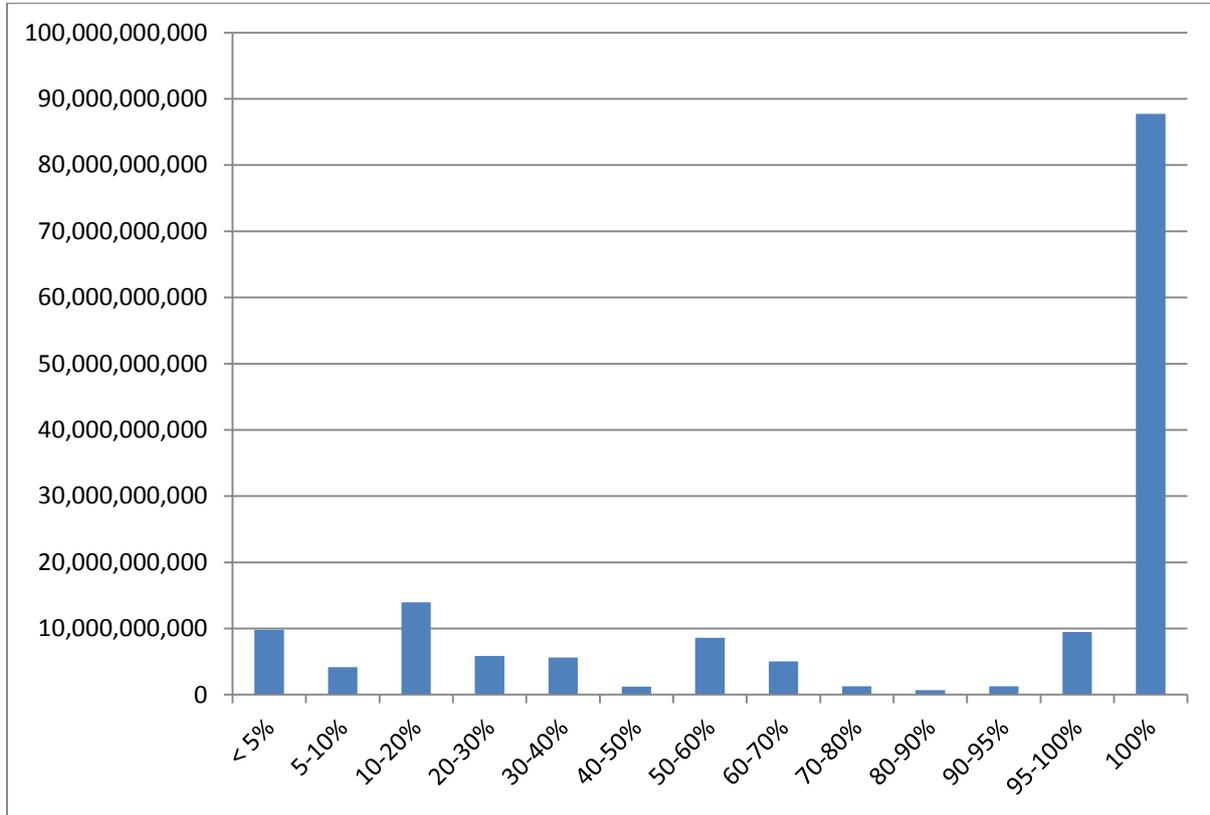
Figure 12.5. Expected holding period of strategic participations (weighted)



Equity of the strategic participation held by (re)insurers

922. The weighted average percentage of total equity of the strategic participation held (by the participating undertaking) is 73 percent. However, almost half of the undertakings hold strategic participations of (close to) 100 percent. 15 percent of the undertakings hold strategic participations of less than 10 percent (see figure 12.6).

Figure 12.6. Percentage of total equity of the strategic participation (weighted)



13. Simplification of the counterparty default risk

13.1. Call for advice

The counterparty default risk module and the non-life catastrophe risk submodule require complex calculations.

EIOPA is asked to:

- Provide information on the relative significance of capital requirements related to these modules.*
- Assess if this complexity is proportionate to the nature, scale and complexity of these risks, in particular for small and medium-sized undertakings.*
- Where appropriate, develop suggestions for simpler structures for these modules, respecting their existing scope.*

13.2. Legal basis

Solvency II Directive

923. Article 104(1) of the Solvency II Directive sets out that there shall be a counterparty default risk module in the standard formula. Article 105(6) describes the scope of this module.

Delegated Regulation

924. Articles 189 to 202 and the simplifications in Articles 107 to 112.

Guidelines

925. Guidelines 8 and 9 in the EIOPA Guidelines on treatment of market and counterparty risk exposure.

13.3. Feedback statement on the main comments received to the discussion paper

Risk-mitigating derivatives

- a. Summary of the comments received

926. An input from stakeholders was that there is no clear definition of a risk-mitigating derivative.

927. Some stakeholders only include derivatives that are not used for exposure steering in the counterparty default risk module due to the wording in Article 189(a) of the Delegated Regulation.

- b. Assessment

928. The lack of a clear definition can lead to diverging practises across Europe when it comes to handling derivatives in the standard formula. Therefore, it is important that there is no ambiguity regarding which derivatives are included in the module.

929. The definition of a risk-mitigating derivative is closely related to the definition of a risk-mitigation technique. In the first call for advice, stakeholders also requested a clarification of what constitutes risk-mitigation techniques. Whether the risk-mitigation technique is related to a hedging strategy or an individual contract is crucial for understanding the term “risk-mitigating derivative”. The legal definition of a risk-mitigation technique is currently being assessed.

930. The materiality of the issue will be analysed further in the analysis section.

931. All derivatives should be treated in the counterparty default risk module, irrespective of whether they are risk-mitigating or not. This could be clarified in the Delegated Regulation.

Collateral

a. Summary of the comments received

932. Several stakeholders report that the Delegated Regulation is not clear on how to account for collateral when the collateral is posted on the net exposure to the counterparty.

b. Assessment

933. Article 192(1) of the Delegated Regulation provides that the loss-given-default shall be equal to the sum of the loss-given-default on each of the exposures to counterparties belonging to the single name exposure. Therefore, it is clear that the present calculation of loss-given-default should be carried out for each derivative. The paragraph also states that the loss-given-default shall be net of the liabilities towards counterparties belonging to the single name exposure given certain conditions are met.

934. However, undertakings with contractual netting agreements post collateral on the net exposure to the single name exposure. Since undertakings have to calculate the loss-given-default according to Article 192(1) of the Delegated Regulation, undertakings with contractual netting agreements with their counterparties have to artificially divide the collateral between the exposures to the counterparty. EIOPA recognises the issue and will look further into it in the analysis section.

Grouping of exposures

a. Summary of the comments received

935. Several stakeholders asked for a potential amendment of Article 110 of the Delegated Regulation in a way that would also allow for grouping of single name exposures in the risk-mitigating effect calculation of Article 196 of the Delegated Regulation.

936. Moreover, some stakeholders required to allow for grouping of derivatives in the calculation for the risk mitigating effect of market risk. In other words, the stakeholders suggest allowing for a LGD calculation at counterparty level instead of doing it separately for each and every single derivative contract.

b. Assessment

937. Article 110 of the Delegated Regulation allows for a computation of LGD for a grouping of single name exposures. However, the method for calculating this is not entirely clear (especially how to account for the risk-mitigating effect and collateral). A clarification on how the undertakings are supposed to calculate LGD for a group of single name exposures could be an improvement.

938. The calculation of the risk-mitigating effect on single name exposures, i.e. grouping of derivatives, is relevant in relation to accounting for contractual netting agreements and will be looked further into in the analysis section.

Condition on the 60 % of the counterparty's assets subject to collateral in Article 192(2) of the Delegated Regulation

a. Summary of the comments received

939. Several stakeholders argued that the 60 % condition in the LGD calculation for reinsurance arrangements is difficult to assess. Some stakeholders suggested to consider the condition as fulfilled when the reinsurer's rating is above a fixed credit quality step (CQS 3). This feature should be taken into account through the external rating process.

b. Assessment

940. EIOPA would propose an optional simplification which could be applied in order to avoid the assessment of the 60 % condition in Article 192(2) of the Delegated Regulation.

Fixed risk-weight for bank exposures

a. Summary of the comments received

941. Several stakeholders argued that for cash at bank exposures, there can be some issues regarding knowing the final counterparty. Stakeholders mention that this could be the case in clearing processes and when applying the look-through approach on investment funds. They claimed that it is too difficult to assign a proper CQS to these exposures.

942. The stakeholders instead propose to align the treatment with the ICS treatment either by using the same stress factor of 0.4% or by using a more conservative rate e.g. 2% as a fixed risk charge for cash at bank.

943. Stakeholders pointed out that the suggested treatment would reduce reliance on ratings.

b. Assessment

944. EIOPA suggests not following this proposal. Stakeholders have not provided any assessment of the materiality of the issue and it is not possible to assess the materiality from the QRTs. Moreover, introducing a fixed risk-weight for cash would constitute a structural break in the general type 1 exposure calculation.

Calculation of the hypothetical SCR

a. Summary of the comments received

945. Several stakeholders find it unclear how the life, health and non-life sub-modules should be aggregated and whether correlation factors should be used in the calculation of the hypothetical SCR.

946. Article 196 of the Delegated Regulation uses the wording "(...) capital requirement for underwriting or market risk (...)". Reinsurance recoverables have influence on both underwriting risk (e.g. catastrophe risk) and market risk (interest rate risk, currency risk). It is not clear how the "or" in Article 196 should be interpreted in this case.

b. Assessment

947. EIOPA will suggest clarifying the assumptions that should be used in the calculation of the hypothetical SCR.

948. EIOPA agrees that it is not possible to see how the risk-mitigating effect on underwriting risks is supposed to be calculated directly from Article 196 as reinsurance contracts may cover both market risks and underwriting risks.

949. Article 192 of the Delegated Regulation clearly states for each definition of LGD whether the risk-mitigating effect should be calculated on the basis of the underwriting risk or on the basis of the market risk. None of the LGD-formulas have defined the risk-mitigating effect on the basis of both underwriting risk and market risk, although reinsurance contracts may cover both risks. The "or" in Article 196 means that only the effect of one of these two modules is reflected in the calculation of the risk-mitigating effect.

950. EIOPA does not intend to suggest a clarification on this matter, since the definition of the risk-mitigating effect is general and the use of the method depends on the context it is used in.

Simplified calculation for the risk-mitigating effect of reinsurance arrangements

a. Summary of the comments received

951. Several stakeholders suggested to include a former QIS5 and CEIOPS advice simplified formula for the determination of the risk-mitigating effect of reinsurance obligations. It was further suggested to apply the formula per LOB if the reinsurance arrangement affects different LOBs and then to calculate the sum over all affected LOB to determine the total risk mitigating

effect. If in addition market risks are affected by the reinsurance arrangement a correlation of 25 % was proposed.

952. A stakeholder suggested a slightly modified formula compared to the original formula used for the QIS5:

$$\sqrt{\begin{aligned} & (NL_{cat}^{hyp} - NL_{cat}^{without})^2 + (3\sigma_{prem} (P_{lob}^{hyp} - P_{lob}^{without}))^2 + (3\sigma_{res} recoverables)^2 \\ & + 9\sigma_{prem} \sigma_{res} (P_{lob}^{hyp} - P_{lob}^{without}) recoverables \\ & + 1,5\sigma_{res} (NL_{cat}^{hyp} - NL_{cat}^{without}) recoverables \\ & + 1,5\sigma_{prem} (NL_{cat}^{hyp} - NL_{cat}^{without})(P_{lob}^{hyp} - P_{lob}^{without}), \end{aligned}}$$

b. Assessment

953. EIOPA finds the suggestion to include a closed-form optional simplification for the risk-mitigating effect of reinsurance arrangements useful. The proposal is thus analysed in the analysis section and a specific simplification is suggested.

Simplified calculation for type 1 exposures in Article 200 of the Delegated Regulation and correction of an error

a. Summary of the comments received

954. The capital requirement for type 1 exposures is currently calculated as follows:

$$SCR_{def,1} = \begin{cases} 3 \cdot S & \text{if } S \leq 0.07 \cdot T \\ 5 \cdot S & \text{if } 0.2T \geq S > 0.07 \cdot T \\ T & \text{otherwise} \end{cases}$$

where the standard deviation S of the loss distribution of the type 1 exposures is calculated as:

$$S = \left(\sum_{j=1}^n \sum_{k=1}^n \omega_{ij} \cdot LGD_i \cdot LGD_j \right)^{1/2}$$

where n denotes the number of different counterparties, T denotes the sum of all LGD and

$$\omega_i = PD_i(1 - PD_i) \quad i = 1, \dots, n$$

$$\omega_{ij} = \frac{PD_i(1 - PD_i)PD_j(1 - PD_j)}{1.25 \cdot (PD_i + PD_j) - PD_i \cdot PD_j} \quad i \neq j \quad i, j = 1, \dots, n$$

955. A NSA recommended streamlining and simplifying the formula for the type 1 exposures in Article 200 of the Delegated Regulation to avoid the split between 3S and 5S.

956. Accordingly, the formula in Article 200 could be streamlined and Article 200(1) and Article 200(2) could be merged by calculating

$$SCR_type\ 1 = \min(3S, T).$$

957. The main simplification would be that undertakings would no longer need to analyse and account for the step change between the 3S and the 5S.

958. Several undertakings have also noted the lack of justification for the step change from 3S to 5S in the calculation in Article 200. Some undertakings report volatile behaviour in the formula due to this step change.

959. Undertakings also report an inconsistency in Article 201(2) where it is unclear whether the sum for V_{inter} covers $j=k$ or not.

b. Assessment

960. EIOPA recognizes that the step change from 3S to 5S might have some undesirable features from a risk management perspective. However, simply reducing $SCR_type\ 1$ to $\min(3S, T)$ could still underestimate the counterparty default risk in specific situations. EIOPA therefore proposes to include a prudent optional simplified calculation instead.

961. The motivation for the step change is described in the CEIOPS advice. It is assumed that if the portfolio is sufficiently diversified or the credit quality of the counterparties is high, the loss distribution is skewed and can be captured by a lognormal distribution. However, CEIOPS found that if a portfolio is dominated by a single or a small number of exposures with a high probability of default, the distribution will be significantly more skewed than the lognormal distribution. Therefore, CEIOPS advised for a quantile factor of 5 when the loss distribution exceeded a certain percentage of the overall loss-given-default for the type 1 exposures.

962. The formula for V_{inter} is correct, so the word "different" should be deleted from point (a) in Article 201(2) of the Delegated Regulation.

Simplified approach for the loss distribution calculation in Article 201 of the Delegated Regulation

a. Summary of the comments received

963. A stakeholder suggested simplifying the variance calculation in Article 201 of the Delegated Regulation: Instead of differentiating between the different variance types the stakeholder proposed to follow a more simplified approach by assuming that a single default event follows a Bernoulli distribution and that then the total variance is derived by assuming certain correlations between different counterparties. Specifically the stakeholder suggested to:

1. Calculate the probability of default (PD) and loss-given-default (LGD) for each counterparty as currently
2. Calculate the variance of the expected loss distribution as a Bernoulli trial
i.e. $(1-PD) * PD * LGD^2 = \sigma^2$.
3. Calculate the overall variance of the expected loss distribution V by adding the σ values together via a correlation matrix, with e.g. 0.25 off the diagonal.

$$V = \sum_i^n \sigma_i^2 + 2 \sum_{i < j}^n \sigma_i \sigma_j \rho_{i,j}$$

The correlation is either constant (in the simplest case) or a correlation matrix is determined for different types of counterparties (banks, reinsurance obligations etc.).

4. Finally calculate the 1-in-200 year expected loss by taking $3\sqrt{V}$

b. Assessment

964. This is a very simple credit risk modelling approach. Unlike the current approach, it does not sufficiently capture two important empirical findings:

1. Default probabilities vary over time
2. There is significant dependence across defaults

965. The implementation of the variance formula for type 1 exposures is not considered as the major complexity of the counterparty default risk module. Accordingly, EIOPA suggests not following the proposal.

13.4. Advice

13.4.1. Previous advice

966. Many of the recommendation in CEIOPS' Advice for Level 2 Implementing Measures on Solvency II: SCR standard formula – Counterparty default risk are already implemented in the Delegated Regulation.

967. CEIOPS' advice clarifies that the class of type 1 exposures is intended to cover the exposures which may not be diversified and where the counterparty is likely to be rated. The class of type 2 exposures is intended to cover exposures which are usually diversified and where the counterparty is likely to be unrated.

13.4.2. Analysis

Relative significance of the counterparty default risk module

968. EIOPA has been asked to assess the relative significance of the counterparty default risk module. For this purpose, EIOPA has used the gross solvency capital requirement for the counterparty default risk and the BSCR from the annual QRTs.⁸³

969. To analyse this question in depth, the relative significance have been calculated for each type and size of undertaking.

970. The size of each undertaking has been determined on the basis of the technical provisions. A small undertaking is defined as an undertaking that has technical provisions below the 25 percentile whereas large undertakings are undertakings with technical provisions above the 75 percentile. The rest of the undertakings are defined as medium-sized undertakings. The size of the undertakings is determined both irrespective of type of undertaking and for each type of undertaking.

971. The relative significance of the counterparty default risk module is calculated for each undertaking as the gross solvency capital requirement for the counterparty default risk module in relation to the BSCR.⁸⁴ The average relative significance for each segment can be found in the table below:

⁸³ Data has been cleaned e.g. undertakings that did not report any counterparty default risk even though they have derivatives and cash on their balance sheet are excluded. If these undertakings were to enter the analysis, they would decrease the relative significance of the module. 242 out of 2712 undertakings have been excluded.

⁸⁴ BSCR is after diversification, therefore the sum of the resulting risks from each of the modules will exceed BSCR.

Average SCR CDR/BSCR Type	Small	Medium	Large	All
Life	16%	10%	10%	11%
Non-life	22%	18%	12%	17%
Composite	17%	13%	10%	13%
Total	21%	15%	10%	15%

Undertakings with full internal models are excluded

972. The figures indicate that the relative significance of the counterparty default risk is greater for smaller undertakings. Differences are also observed between life and non-life undertakings, where the relative significance of the counterparty default risk seems greater for non-life undertakings.

973. It is important to note that there is large variation in the relative significance of the counterparty default risk. This is valid for all sizes of undertakings. 14 % of all undertakings (accounting for 6 % of the total TP) have a relative significance greater than or equal to 30 %.

974. Comparing these figures with findings in the QIS4-report as well as other analysis, the module has a higher relative significance than previously observed. As with QIS4, there are considerable differences between jurisdictions. However, on average, the counterparty default risk is not a major risk for the undertakings.

975. The European Commission has asked EIOPA to assess if the complexity of the counterparty default risk module is proportionate to the nature, scale and complexity of these risks, in particular for small and medium-sized undertakings. In the table above, the relative significance shows that the risk is significant for all types of undertakings but it cannot be seen as the main risk relative to the BSCR.

976. Undertakings report that the counterparty default risk module is the most burdensome module of all the modules compared to the significance of the capital requirement.

Use of simplifications

977. 14% of all undertakings⁸⁵ use one or more of the simplifications for the counterparty default risk module. The QRTs do not provide detailed information on which of the six simplifications each undertaking is using. The use of simplifications has also been analysed for each size of undertaking, cf. the table below.

⁸⁵ Undertakings with full internal models are excluded.

Size of undertaking	Percentage of undertakings using one or more simplifications in the counterparty default risk module
Small	7 %
Medium	16 %
Large	16 %

Undertakings with full internal models are excluded

978. The table shows that undertakings use the simplifications for the counterparty default risk module irrespective of size. However, small undertakings use the simplifications to a lesser extent. This finding may be due to several factors: Maybe the existing simplifications are not simple enough so that it makes sense for the small undertakings to use them. Another explanation could be that not all simplifications are reported. It is worth noting that 85% of the small undertakings are non-life undertakings.

979. The use of simplifications differs significantly between jurisdictions.

980. Previously, EIOPA has requested NSAs to provide information on the use of the specific simplifications, also on each of the six simplifications for counterparty default risk. Based on this information, each of the six simplifications are being used by undertakings in at least 10 different member states and each of the six simplifications are being used by at least 45 undertakings. Some simplifications are used by substantially more undertakings.

981. The information from the NSAs also shows that the simplifications for the counterparty default risk module are among the most used simplifications.

982. Since the simplifications are used to a wide extent, this could indicate that new simplifications would be used as well. Furthermore, the findings underline the complexity of the module.

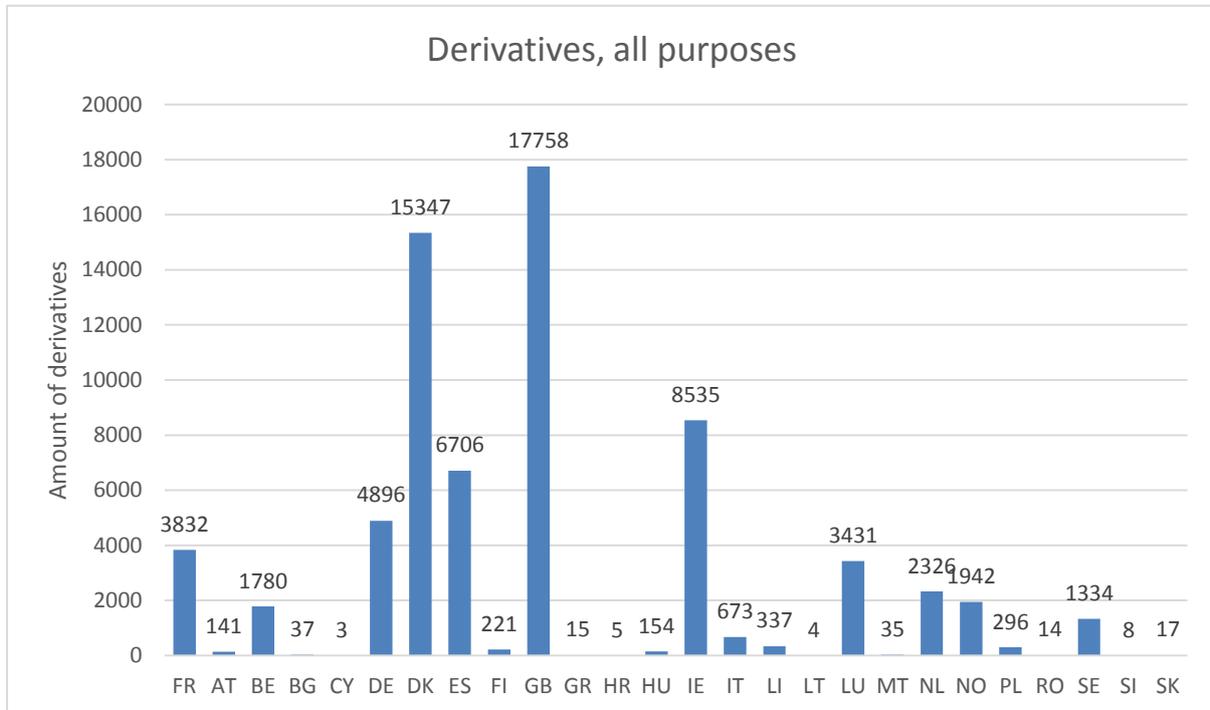
An overview on the use of derivatives

983. Stakeholders raised several issues that have relevance for the treatment of derivatives in the counterparty default risk module. Therefore, this section analyses the undertakings' use of derivatives to assess the materiality of the issues. The analysis will cover several aspects including the use of derivatives for hedging risks.

984. The following sections outline possible changes in the treatment of derivatives regarding grouping, collateral etc. The following chapter 15 discusses the implications of EMIR.

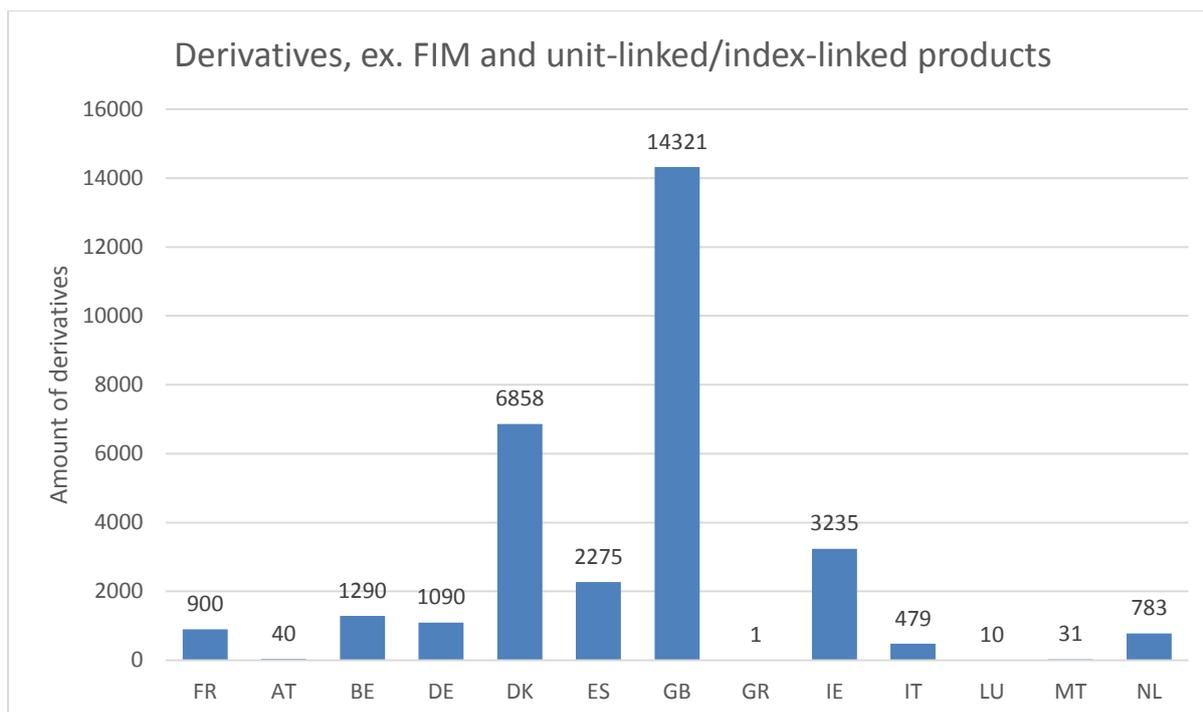
985. Undertakings have reported a list of open derivatives in the annual QRTs. Undertakings are allowed to report one line for several derivative contracts, i.e. on an aggregated net basis, as long as the relevant characteristics are common and it is possible to properly fill in all items requested in the table. The lines reported therefore constitute a lower bound for the amount of open derivative contracts. Only derivatives held directly by the undertakings are reported in this template.

986. In the graph below, the numbers of derivative contracts have been aggregated for each country. The compilation covers all derivatives (close to 70,000).



987. The graph gives a clear picture that the use of derivative contracts varies a lot across Europe. Undertakings in 26 member states use derivatives but the use is very limited in half of the member states. In at least a handful member states, derivative are used to a wide extend.

988. Derivatives held in unit-linked and index-linked products and derivatives held by undertakings that use a full internal model do not have to be considered. They are therefore excluded in the rest of the analysis.



989. The graph above shows the number of derivatives excluding those mentioned in the last paragraph. The number of member states where derivatives are used is halved and the number falls to around 31,000. 96% of the derivatives are held by life and composite undertakings.

990. Close to 8,000 of these derivatives are used for efficient portfolio management. These will not qualify as risk-mitigating derivatives.

991. The most common types of derivative used for efficient portfolio management are forward exchange rate agreements and interest rate swaps (>40%). These types of derivatives are also the most commonly used derivatives for hedging purposes according to the QRTs (>55%).

992. It has not been possible to use the information on the derivative counterparty from the annual QRTs to decide whether derivatives with different purposes are entered into with different counterparties. But there does not seem any obvious reason for undertakings to choose counterparties depending on the purpose of the derivative. The counterparty risk at default would not be different for the two derivatives.

993. Based on these considerations, there does not seem to be a justification to classify derivatives as type 1 and type 2 respectively, purely based on the purpose of the derivative.

994. It also does not seem intuitive if exposures with the same inherent risk that are entered into with the same counterparty are treated in different parts of the module.

995. Accounting for contractual netting agreements would also require that all of the exposures are defined as type 1 exposures.

996. The CEIOPS advice clarifies the background for the division of exposures into the two classes. The difference between type 1 and type 2 exposures are related to whether the exposures are diversified and whether the counterparty is likely to be rated. The treatment of derivatives as type 1 exposures irrespective of purpose would not contradict this assumption.

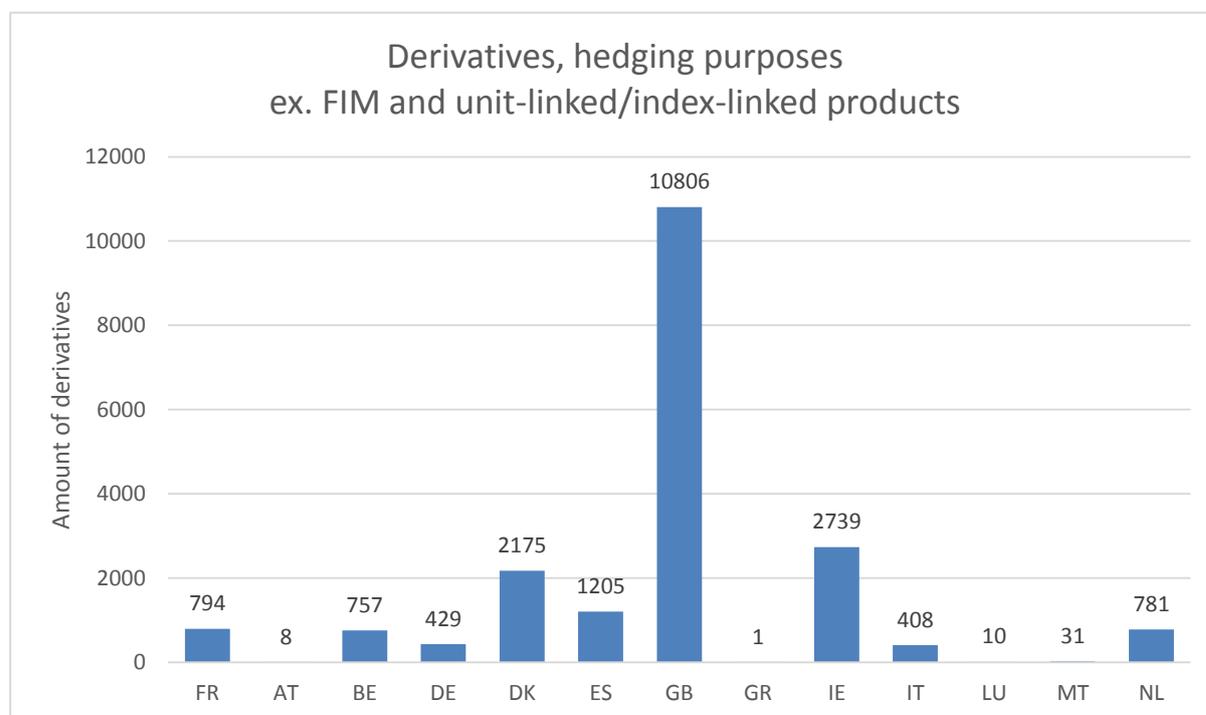
997. EIOPA would suggest that all derivatives are defined as type 1 exposures and the LGD is calculated according to Article 192(3) for all derivatives. This would also clarify how derivatives that are not risk-mitigating should be treated.

998. The present formulation of the LGD calculation in Article 192(3) of the Delegated Regulation takes the risk-mitigating effect on the market risk into account. EIOPA suggests clarifying that the risk-mitigation effect should be zero if the derivative is not risk-mitigating.

Risk-mitigating derivatives

999. Undertakings report the purpose of each open derivative in the annual QRTs. Based on this information undertakings have entered into around 20,000 derivatives used for hedging purposes. This amounts to 64 % of all derivatives. In this context, hedging purposes is defined as derivatives used for macro or micro hedges.

1000. The following graph shows the number of derivatives used for hedging purposes per country.



1001. In the following, the focus will be on interest rate swaps. The reason for this is that the nature of guaranteed products is that the undertaking is obliged to pay a fixed cash flow in the future. A simple way to mitigate the

risk connected to this obligation is to hedge it with interest rate swaps that match the obligations. It can therefore be expected that some undertakings use interest rate swaps for hedging interest rate risk. This derivative would typically be a long position or, more specifically, a payment of a floating rate in exchange for a fixed rate.

1002. Additionally, one would assume that the reporting shows a use of short derivatives classified as hedging. When an undertaking needs to adjust the hedge of the interest rate risk, it can be cheaper to enter into a derivative in the opposite direction instead of partially or fully terminating the long position.

1003. From the QRTs, it can be seen that there are 6,130 interest rate swaps used for macro or micro hedges. This corresponds to 37 % of the derivatives used for hedging. Undertakings should report interest rate swaps in relation to the cash flows. However, for one third of the interest rate swaps undertakings have used the simpler categorization, where one indicates whether the position is long or short. In this analysis, this information is enough and all of the derivatives (with a classification) are included in the following.

Interest rate swaps	Amount of derivatives
Long	1,137
Short	907
Floating-to-fixed	1,730
Fixed-to-floating	1,327
Fixed-to-fixed	308
Floating-to-floating	133

1004. The figures show that there is an extensive use of long, short, floating-to-fixed and fixed-to-floating interest rate swaps.

1005. Even though undertakings have reported that all of these interest rate swaps are used for hedging purposes, it is not entirely clear whether each of them would be classified as a risk-mitigating derivative. The short interest rate swaps would not be risk-mitigating if assessed on a stand-alone basis. But if the risk-mitigating technique was to be understood as a hedging strategy, it would depend on the defined hedging strategy whether the short interest rate swap could be classified as a risk-mitigating derivative or not.

1006. Data also shows that undertakings that use derivatives actively often have both long and short positions.

1007. It is assumed that undertakings that enter both long and short derivatives use a limited number of counterparties. Therefore, in many cases, the undertaking will have both long and short positions towards the same counterparty. Since both the LGD calculation and the calculation of the risk-mitigating effect have to be performed for each derivative according to Article

192 and 196, the LGD will in many cases be floored to zero for the short position and the capital requirement will not reflect the reduced counterparty risk from the two combined positions

1008. EIOPA's advice is to clearly define a risk-mitigating derivative. This is closely related to the risk-mitigation technique and the definition of a risk-mitigating derivative could follow from a definition of the risk-mitigation technique.

1009. To capture the economic counterparty default risk even for relatively simple hedging strategies,⁸⁶ it is necessary to define the risk-mitigation technique as a hedging strategy. This would lead to a definition of a risk-mitigating derivative as a derivative that is a part of a well-defined hedging strategy.

1010. EIOPA suggests that a definition of a risk-mitigation technique as a hedging strategy could be combined with an extension of what a written policy on a risk-mitigating technique should cover. Instead of only covering the replacement of risk-mitigation techniques where the arrangements are in force for a period shorter than the next 12 months it could also cover risk-mitigation strategies where not all the contracts would qualify as risk-mitigation technique on an individual basis.

Collateral

1011. Collateral is in practise only posted on the net position when undertakings have a contractual netting agreement with a counterparty. This reflects that a potential default from the counterparty will be settled on an aggregated level.

1012. If a contractual netting agreement is in place with a counterparty, the transactions with the counterparty will be assessed on a net basis in the case of a default.

1013. To reflect this, the capital requirement for the counterparty default risk module should be calculated based on single name exposures for each single name exposure where there is a contractual netting agreement in place.

1014. This could be implemented by adding a sentence in both Article 192(3) and Article 196 of the Delegated Regulation stating that if a contractual netting agreement is in place (meeting some well-defined requirements) LGD and the risk-mitigating effect should be calculated on the single name exposure and not for each derivative.

1015. At the moment, it is not possible to report on the undertakings' use of contractual netting agreements. However, the banking regulation recognises

⁸⁶ Assume that the interest rate risk is hedged with long interest rate swaps but instead of closing the position down and entering a new position when adjusting the hedge, the long position remains unchanged but a short interest rate swap is entered into to reduce the hedge with the same economic effect. This way of hedging can be cheaper for the undertaking.

contractual netting agreements and therefore it can be assumed that this is used to some extent by the insurance undertakings.

1016. According to the QRTs, the ratio between the number of long and short derivatives undertakings enter into is almost 50/50. Furthermore, undertakings that have entered many derivatives often both use long and short derivatives.

Grouping of exposures

1017. The use of single name exposures in the standard formula is limited to aggregating LGDs for each derivative for the single name exposure. However, the simplified calculation in Article 110 allows for grouping of single name exposures in the calculation of LGD.

1018. The use of these simplifications is only allowed if undertakings comply with Article 88 of the Delegated Regulation. Calculating the counterparty default risk on derivatives that are e.g. covered by contractual netting agreements requires undertakings to manage the data on derivatives on a more granular level than without the use of contractual netting agreements, because undertakings have to know which derivatives are covered by the contractual netting agreements and which are not.

1019. Furthermore, undertakings that use both long and short positions are often using derivatives to a wider extent than undertakings that only use long positions and it would therefore in many cases not be appropriate to handle this calculation in a simplification.

1020. At the moment, it is not possible to report on the undertakings' use of contractual netting agreements. However, as previously mentioned, the banking regulation recognises contractual netting agreements and therefore it can be assumed that this is used to some extent by the insurance undertakings.

1021. To capture the economic effect of the contractual netting agreements, LGD, the risk-mitigating effect and the risk-adjusted value of collateral have to be calculated for the single name exposure. The posted collateral on the net exposure for the counterparties would not have to be divided artificially anymore, since the risk-adjusted value is calculated on the counterparty-level.

Simplified calculation for the risk-mitigating effect of reinsurance arrangements

1022. The suggestion of a modified formula is in fact more conservative than the former QIS5 formula.

1023. Both the QIS5 and the adjusted formula in particular rely on the assumption that the premium and reserve risks are considered as two separate sub-risks and not as a one integrated risk as in the current standard formula. Moreover, the adjusted proposal additionally relies on an assumption about the correlation between CAT and premium risk, respectively reserve risk, which is not specified as such in the Delegated Regulation.

1024. A similar approximation of the risk-mitigation effect of reinsurance obligations can be developed (see “34. Annex to chapter 14 – Derivation of a simplification for the risk-mitigating effect of reinsurance arrangements”):

$$RM(RE) = \sqrt{\frac{(NL_{CAT}^{hyp} - NL_{CAT}^{without})^2 + (3\sigma_S(P_P^{hyp} - P_P^{without} + recoverables))^2}{+ 2 * 0.25 * 3 \sigma_S(P_P^{hyp} - P_P^{without} + recoverables)(NL_{CAT}^{hyp} - NL_{CAT}^{without})}} \quad (2)$$

where

- σ_S is the standard deviation for non-life premium and reserve risk as defined in Article 117(2) in the Delegated Regulation for the corresponding line of business
- $(NL_{CAT}^{hyp} - NL_{CAT}^{without})$ denotes the counterparty’s share of CAT losses
- $(P_P^{hyp} - P_P^{without})$ is the reinsurance premium of the counterparty in the affected line of business
- *recoverables* are the reinsurance recoverables in relation to the counterparty in the affected line of business

1025. The formula (2) does not disentangle the premium and reserve risk and relies on the current correlation between the CAT and the non-life premium and reserve risk. Hence, the adjusted formula is more in line with the current design of the standard formula. Therefore it is suggested to introduce formula (2) as an optional simplification to derive the risk-mitigating effect of a reinsurance arrangement.

1026. If more than one LOB is affected by the reinsurance cover, the application of the formula becomes more complex. The main difficulty is to appropriately assign the reinsurance cover to the different LOBs. In particular, there is a risk that the total risk-mitigating effect might be underestimated for the LGD calculation if the reinsurance cover is not appropriately assigned to the different LOB.

1027. Accordingly, EIOPA proposes to apply this optional simplification only if the reinsurance arrangement affects one LOB. This is in line with the QIS 5 technical specification where the simplification for reinsurance arrangements was also only applicable if the reinsurance arrangement affected one LOB.

Adjustment of Article 107 and 108 of the Delegated Regulation

1028. It was proposed to amend Article 107 and Article 108 of the Delegated Regulation so that the optional simplifications would not be allowed if the reinsurance recoverables were negative.

1029. The mentioned simplifications do not provide sensible results if the reinsurance recoverables are negative. A small amendment of the corresponding articles ruling out negative reinsurance recoverables is therefore deemed appropriate.

13.4.3. EIOPA's advice

The relative significance of the counterparty default risk module

1030. Based on the gross solvency capital requirement for the counterparty default risk module relative to the BSCR, the relative significance of the counterparty default risk is higher for smaller undertakings. For small and medium-sized undertakings, the relative significance is 21 % and 15 % of BSCR respectively.
1031. Differences are also observed between life and non-life undertakings, where the relative significance of the counterparty default risk seems larger for non-life undertakings.
1032. It is important to note that there is a great variance in the relative significance of the counterparty default risk. This is valid for all sizes of undertakings. For 14 % of all undertakings (accounting for 6 % of the total TP) relative significance is 30 % of BSCR or higher.
1033. Comparing these figures with findings in the QIS4-report as well as other analysis, the module has a higher relative significance than previously observed. As with QIS4, there are considerable differences between jurisdictions.
1034. The relative significance shows that, on average, the risk is significant for all types of undertakings but it cannot be seen as the main risk relative to the BSCR.

Assessment of the complexity of the counterparty default risk module

1035. 14% of all undertakings use one or more of the simplifications for the counterparty default risk module. The QRTs do not provide detailed information on which of the six simplifications each undertaking is using.
1036. The QRTs also show that undertakings use the simplifications for the counterparty default risk module irrespective of size. However, only 7 % of the small undertakings use simplifications whereas medium-sized and large undertakings use these simplifications to the same extent. This finding may be due to several factors: Perhaps the existing simplifications are not simple enough so that it makes sense for the small undertakings to use them. Another explanation could be that not all simplifications are reported. It is worth noting that 85% of the small undertakings are non-life undertakings.
1037. For small undertakings the relative significance of the capital requirement on the counterparty default risk is highest. But on average, the risk from the counterparty default risk module is not the major risk and it should in many cases be possible for the small undertakings to meet the requirements of Article 88 of the Delegated Regulation and use the simplified calculations.
1038. The use of simplifications differs significantly between jurisdictions.

1039. Based on information from the NSAs, each of the six simplifications are being used by undertakings in at least 10 different Member States and each of the six simplifications are being used by at least 45 undertakings. Some simplifications are used by substantially more undertakings.

1040. The information from the NSAs also shows that the simplifications for the counterparty default risk module are among the most used simplifications.

1041. Since the simplifications are used to such a wide extent, this could indicate that new simplifications would be used as well. Furthermore, the findings underline the complexity of the module.

Treatment of derivatives in the counterparty default risk module

1042. EIOPA advises that all derivatives are defined as type 1 exposures and that the loss-given-default is calculated according to Article 192(3) of the Delegated Regulation irrespective of whether the derivative is risk-mitigating or not.

1043. This will allow fully reflecting the economic effect of contractual netting agreements in the calculation of the counterparty default risk.

Definition of a financial risk-mitigation technique

1044. It is clear from the annual QRTs that undertakings use both long and short positions when they hedge their risks. However, it is unclear in the Delegated Regulation whether the term financial risk-mitigation technique is restricted to individual instruments or if it also covers well-defined hedging strategies.

1045. To capture the economic effect of these hedging strategies, EIOPA advises to define a financial risk-mitigating technique as a hedging strategy where the individual derivative contracts do not have to comply with all of the requirements for a risk-mitigating technique as long as the entire hedging strategy does. The essential part is that the derivatives do not have to comply with Article 210 (Effective Transfer of Risk) of the Delegated Regulation individually.

1046. In the above definition, an individual derivative that complies with all the requirements for risk-mitigation techniques is still defined as a risk-mitigation technique.

1047. EIOPA suggests that the risk-mitigation technique should be well-defined when the risk-mitigation technique is a hedging strategy. The existing requirement on a written policy on the replacement of a risk-mitigation technique in Article 209(3)(a) of the Delegated Regulation could be extended to include the definition of the risk-mitigation technique, when the technique is constituted by derivatives where not all of the derivatives would meet the requirements for a risk-mitigation technique.

1048. EIOPA advises that the definition of a risk-mitigating derivative follows the definition of a risk-mitigation technique meaning that a derivative is risk-mitigating if it is a part of a well-defined risk-mitigating technique.

Calculation of the risk-mitigating effect of derivatives

1049. The following advice builds on the advices regarding the treatment of derivatives in the counterparty default risk module and the definition of risk-mitigating techniques.

1050. EIOPA advises that the calculation of the risk-mitigating effect in Article 196 of the Delegated Regulation recognises contractual netting agreements provided the contractual arrangement complies with Article 214 of the Delegated Regulation.

1051. This would mean that the risk-mitigating effect should be calculated on the basis of all of the derivatives that an undertaking has entered with the counterparty for which the contractual netting agreement had been concluded.

1052. Derivatives, which are a part of a well-defined risk-mitigating technique, would each have either a positive or a negative impact on the risk-mitigating effect and therefore the resulting risk-mitigating effect can hypothetically be negative on counterparty-level. EIOPA advises that the risk-mitigating effect on counterparty-level is floored to zero.

1053. To clarify Article 196 of the Delegated Regulation, it could be mentioned in the Article that the risk-mitigating effect is zero for derivatives that do not meet the requirements for risk-mitigation techniques.

Calculation of the loss-given-default on derivatives

1054. The following advice builds on the advices regarding the definition of risk-mitigation techniques and the calculation of the risk-mitigating effect of derivatives.

1055. Article 192(1) of the Delegated Regulation should be amended so that the economic effect from contractual netting agreements is recognised.

1056. Article 192(3) of the Delegated Regulation should be amended so that the economic effect from contractual netting agreements is recognised. Hence, in case a contractual netting agreement is in place, the calculation of the loss-given-default should be performed on the counterparty-level and not for each derivative. Therefore, the value of the derivatives, the risk-mitigating effect of the derivatives and the collateral in relation to the derivative should all be considered on a counterparty-level.

Clarification of the calculation of the hypothetical SCR

1057. There seems to be a lot of uncertainty on how to calculate the hypothetical SCR in both Article 196 of the Delegated Regulation and in the simplified calculation in Article 111 of the Delegated Regulation. EIOPA therefore advises that it is clearly stated in the respective Articles whether the hypothetical SCR is calculated after the normal requirements for calculating SCR or if any other requirements apply, e.g. other correlation factors.

Simplified calculation of Article 192(2) of the Delegated Regulation

1058. EIOPA proposes an additional optional simplification for the computation of the LGD for reinsurance arrangements in Article 192(2) of the Delegated Regulation. In this case the undertaking can directly compute the LGD as

$$LGD = \max\{90\%(Recoverables + 50\% RM_{RE}) - F Collateral, 0\}.$$

1059. The simplification is prudent and reduces the burden to assess the 60 % condition in Article 192(2) of the Delegated Regulation.

Simplified calculation for type 1 exposures in Article 200 of the Delegated Regulation

1060. EIOPA proposes an optional simplification for Article 200 of the Delegated Regulation:

Type 1 exposures

1061. Where Article 88 of the Delegated Regulation is complied with, insurance or reinsurance undertakings may use the following simplified calculations for the purposes of Article 200 of the Delegated Regulation:

- a. Where the standard deviation of the loss distribution of type 1 exposures is lower than or equal to 20 % of the total losses-given-default on all type 1 exposures, the capital requirement for counterparty default risk on type 1 exposures shall be equal to the following:

$$SCR_{def,1} = 5 \cdot \sigma$$

where σ denotes the standard deviation of the loss distribution of type 1 exposures.

- b. Where the standard deviation of the loss distribution of type 1 exposures is higher than 20 % of the total losses-given-default on all type 1 exposures, the capital requirement for counterparty default risk on type 1 exposures shall be equal to the total losses-given-default on all type 1 exposures.

1062. The simplification reduces the volatility in $SCR_{def,1}$ for undertakings where the standard deviation of the loss distribution of type 1 exposures is around 7 % and the $SCR_{def,1}$ would consequently shift from 3S to 5S or vice versa.

1063. The proposal is prudent and avoids the shortcomings of the step change from the risk management point of view.

Clarification of Article 201 of the Delegated Regulation

1064. The word “different” should be deleted from Article 201(2)(a) of the Delegated Regulation to reflect that the sum in V_{inter} should cover all possible combinations (j,k) of probabilities, including $j=k$.

1065. Article 201(2)(a) of the Delegated Regulation would then read:

The sum covers all possible combinations (j,k) of probabilities of default on single name exposures in accordance with Article 199

Simplified calculation for the risk-mitigating effect of reinsurance arrangements

1066. EIOPA proposes an additional optional simplification for the computation of the risk-mitigating effect of reinsurance arrangements. The simplification applies only in the case where the reinsurance arrangement affects only one line of business. In this case the risk-mitigating effect can be computed as

$$RM(RE) = \sqrt{\frac{(NL_{CAT}^{hyp} - NL_{CAT}^{without})^2 + (3\sigma_S(P_P^{hyp} - P_P^{without} + recoverables))^2}{+ 2 * 0.25 * 3 \sigma_S(P_P^{hyp} - P_P^{without} + recoverables)(NL_{CAT}^{hyp} - NL_{CAT}^{without})}}$$

where

- σ_S is the standard deviation for non-life premium and reserve risk as defined in Article 117(2) of the Delegated Regulation for the corresponding line of business
- $(NL_{CAT}^{hyp} - NL_{CAT}^{without})$ denotes the counterparty’s share of CAT losses
- $(P_P^{hyp} - P_P^{without})$ is the reinsurance premium of the counterparty in the affected line of business
- *recoverables* are the reinsurance recoverables in relation to the counterparty in the affected line of business.

Adjustment of Article 107 and 108 of the Delegated Regulation

1067. EIOPA advises to adjust Article 107 and Article 108 of the Delegated Regulation such that the optional simplifications could only be applied if the reinsurance recoverables are non-negative.

Clarification of Article 110 of the Delegated Regulation

1068. The description of the simplified calculation for the calculation of loss-given-default for grouping of single name exposures is very brief. To avoid any misunderstanding, it would be useful to clarify that when the loss-given-default is calculated on a group of single name exposures, this also means that the risk-mitigating effect and risk-adjusted value of collateral is calculated based on this group of single name exposures as well.

14. Treatment of exposures to CCPs and changes resulting from EMIR

14.1. Call for advice

EIOPA is asked to:

- *Provide information on the amounts of exposures to qualifying central counterparties and of exposures to derivatives.*
- *Develop an approach for qualifying central counterparties in the framework of the counterparty default risk module with a parameterisation that ensures consistency with the treatment of such exposures in the banking regulation.*
- *Suggest how the Solvency II framework could be updated in its approach to cleared derivatives to take account of the reduced counterparty risk.*

14.2. Legal basis

Solvency II Directive

1069. Article 104(1) of the Solvency II Directive sets out that there shall be a counterparty default risk module in the standard formula. Article 105(6) describes the scope of this module.

Delegated Regulation

1070. Article 192 of the Delegated Regulation sets out the calculation of the loss-given-default. The determination of the probability of default is described in Article 199. The calculation of the capital requirement for counterparty default risk on type 1 exposures is set out in Article 200 and 201.

Guidelines and Technical Standards

1071. EIOPA published Guidelines on the treatment of market and counterparty risk exposures in the standard formula.

14.3. Feedback statement on the main comments received to the discussion paper

Exposures to CCPs

- a. Summary of the comments received

1072. Stakeholders were not aware of insurers which are clearing members and did not expect them to become ones.

1073. Some stakeholders mentioned that more and more repo transaction are centrally cleared

- b. Assessment

1074. Please see the analysis section.

Treatment of CCP exposures

a. Summary of the comments received

1075. A number of stakeholders described the mechanisms to reduce the risk of a CCP defaulting (e.g. reserve fund) and argued for a substantially lower capital requirement to reflect the different risk compared with bilateral transactions.

1076. Some stakeholders pointed out that the requirement to have a legal opinion set out in the current Article 305 (2)I (and also the legal review proposed by the Commission in its November 2016 draft) would create significant costs and burdens, in particular for small and medium sized insurers. As a solution it was suggested to establish a contractual standard for central counterparties and clearing members, that justifies a reduced solvency capital requirement.

1077. A number of stakeholders emphasised the importance of ensuring that future changes in the banking regulation are reflected in the Solvency II rules.

b. Assessment

1078. EIOPA acknowledges the beneficial effects of central clearing and the safety mechanisms that were introduced to reduce the risk for CCPs. For the consequences for the calibration please see the analysis section.

1079. It would be difficult to justify why the requirements for a reduced capital requirements on an indirectly cleared transaction should be weaker for insurers than for banks. There would also be the question how consistency could be achieved.

1080. EIOPA is aware of the discussion on future changes and will try to anticipate them to the extent possible.

Reflection of changes introduced by EMIR

a. Summary of the comments received

1081. Stakeholder expressed the view that there is currently no interaction between EMIR and the Solvency II Delegated Regulations with respect to the treatment of derivatives and associated capital charges for counterparty default risk.

1082. Some stakeholders argued that the adjusted value of collateral is too low based on a comparison with collateral haircuts set out in the EMIR Regulatory Technical Standard for bilateral margining.

1083. One stakeholder claimed that the calculation of the counterparty default risk is too conservative based on the argument that the calculation implies that the default of the counterparty and the shock on the underlying of the derivative always occur together.

1084. It was suggested that the introduction of EMIR increases the recovery rate.

1085. Some stakeholders pointed out that there are some difficulties in the calculation when there are several derivatives with the same counterparty.

b. Assessment

1086. For an analysis of the interaction between the EMIR provisions and the calculations in the counterparty default risk please see the analysis section.

1087. A comparison between the adjusted value of collateral and the haircut-adjusted values in accordance with EMIR is not very meaningful as they aim to capture different risks (see analysis section).

1088. The calculation does not imply that the default of the counterparty and the shock on the underlying of the derivative always occur together as the correlation between the counterparty default risk module and the market risk module is lower than one.

1089. The bilateral margining rules in EMIR reduce the counterparty default risk. One can discuss how this could be reflected in the calculation. But based on the analysis so far it is less clear why EMIR results in higher recovery rates (see analysis section).

1090. For the treatment of several derivatives with the same counterparty in the counterparty default risk module please see heading "Treatment of derivatives in the counterparty default risk module" in section 13.4.2.

14.4. Advice

14.4.1. Previous advice

1091. CEIOPS provided advice on the counterparty default risk module.^{87,88}

14.4.2. Analysis

1092. EMIR introduced the obligation for financial counterparties including insurers to clear through authorised Central Counterparty Clearing (CCPs) OTC derivatives which are standardised and liquid, in accordance with the assessment by ESMA. This makes the treatment of exposures to CCPs in the standard formula more relevant.

1093. For OTC derivative contracts not cleared by a CCP, financial counterparties have to exchange collateral on a timely basis. In particular the frequent exchange of variation margin is required for all financial counterparties. In the following sections the implications of these changes in

⁸⁷ CEIOPS (2009): CEIOPS' Advice for Level 2 Implementing Measures on Solvency II: SCR standard formula - Counterparty default risk module. CEIOPS-DOC-23/09.

⁸⁸ CEIOPS (2010): QIS5 Calibration Paper. CEIOPS-SEC-40-10.

terms of capital requirements are explored. Other possible changes in the treatment of derivatives are discussed in the previous chapter 14.

Exposures to CCPS

Scope

1094. Based on the information available to EIOPA no European insurer is currently a clearing member of a Central Counterparty (CCP).

1095. Exposures to CCPs arise only when insurers enter into centrally cleared derivatives using the services of a clearing member (indirect clearing).

1096. EIOPA is considering whether the case of a standard formula insurer acting as a clearing member has to be covered as well in the advice. If this was the case the approach for deriving the calibration would be the same as outlined below.

1097. EIOPA is also considering whether exposures that result from repo transactions should be covered. The treatment would again be the same as outlined below.

Requirements on the calibration and implications

1098. The proposed treatment should reflect the risks arising from CCP exposures adequately.

1099. Moreover, the call for advice requires that the treatment of CCP exposures in the standard formula is "consistent" with the banking regulation.

1100. According to the CRR derivative transactions are subject to capital requirements for counterparty credit risk, CVA risk and market risk.

1101. For counterparty credit risk the treatment of indirectly cleared exposures to CCPs is set out in Article 305 CRR with two different cases where the risk charges are lower than for bilateral transaction.

1102. It seems appropriate to differentiate the treatment of indirectly cleared derivatives in the standard formula based on the same cases: There is no obvious reason to deviate from the criteria for safer arrangements in the banking sector. Introducing different criteria would also make achieving consistency much more difficult.

1103. There are different possible interpretations what consistency means:

1. The ratio for the capital requirements of bilateral and indirectly cleared transaction is similar under the standard formula and the banking regulation.
2. The absolute level of the risk charges for indirectly cleared derivatives is comparable in the insurance and banking regulation.

1104. Based on the analysis so far the first approach seems preferable: A stand-alone comparison of the capital requirements for a specific transaction

in the banking and insurance regulation may not be very meaningful as the overall design of the regulatory capital requirements is very different.

1105. Another objective is simplicity. Where possible the treatment of indirectly cleared derivatives should be "fitted" into the existing structure of the counterparty default risk module.

1106. Finally, an aspect worth considering is providing incentives for central clearing.

Benchmark for calculation of ratios between capital requirements

1107. EIOPA assumes the normal case to be that the indirectly cleared transactions meets the criteria in Article 305(2) CRR (i.e. the most favourable treatment in terms of capital requirements applies). The main target should therefore be to ensure consistency for this situation. EIOPA assumes further than the normal counterparty in a bilateral transaction would be a bank with an external rating which is assigned to credit quality step 2 (normally corresponding to "A").

Relevant provisions in the CRR

1108. In the following the relevant provisions in the CRR are described. In November 2016 the European Commission proposed amendments to the CRR. Of particular relevance in this context are the suggested changes to implement the standardised approach for counterparty credit risk (SA-CCR). Where relevant the proposed changes are covered as well.

CVA risk

1109. The provisions for CVA risk can be found in Articles 381ff. CRR. Transactions with a qualifying CCP via a clearing member are exempted (Article 382 CRR). For bilateral transactions the formula for calculating the risk charge with the standardised method can be found in Article 384 CRR. For the purpose of this paragraph the total counterparty credit risk exposure is calculated with the same methods as for the determination of the own funds requirements for counterparty credit risk.

Counterparty default risk

Bilateral derivative transaction

1110. The exposure value is calculated in accordance with the provisions in Article 273ff. While non-internal model banks can currently use different methods in future only the SA-CRR would be allowed.

1111. The weight for this exposure value in the case of a transaction with an institution is set out in Articles 120(1) or 121(1) CRR respectively.

1112. The resulting contribution to the overall capital requirement can be calculated with the formula 8 % times risk weight times exposure value.

Indirect clearing as a client of a clearing member with a qualifying CCP

1113. If the provisions in Article 305 (2) or (3) CRR are met then the calculation can be performed in accordance with Article 306 CRR using risk weights of 2 % or 4 % respectively. Otherwise the rules for bilateral transactions (see above) apply.
1114. If Article 305 CRR is applicable the calculation of the exposure value is the same as for bilateral transactions.
1115. This means that the capital requirement for counterparty credit risk if the provisions in Article 305(2) are met would be 8 % times 2 % times exposure value.

Derivation of a consistent calibration in the counterparty default module

1116. The market risk of a derivative (i.e. the change in market value resulting from changes in the value of the underlying or other value relevant parameters) is covered in the respective modules of the standard formula. There is no need to make adjustments to the current rules. Therefore in the following consistency is only considered in terms of counterparty and CVA risk in the CRR.
1117. Indirectly cleared derivatives transactions are exempted from the CVA risk charge. Moreover, the counterparty credit risk charge is substantially lower than for bilateral transactions. As a result the risk charge for the indirectly cleared transaction would be less than 4 % of the risk charge for the same bilateral transaction with an "A"-rated bank.
1118. The exact relationship between the risk charges for indirectly cleared and bilateral transactions for banks would depend on the individual parameters of the transaction. One could calculate the exact values for different cases and try to determine a representative value. But as using the 4 % mentioned above already produces a very low Solvency II risk charge this does not seem necessary as not much is to be gained in terms of additional accuracy.
1119. According to the current Delegated Regulation indirectly cleared derivatives are covered in the type 1 counterparty default risk calculation. There is no reason to change this.
1120. In order to integrate the exposure in the type 1 calculation the probability of default (PD) and the recovery rate (RR) which is currently 10 % for bilateral derivative transactions that qualify as a risk mitigation technique has to be determined.
1121. It seems preferable to perform the calculations on a stand-alone basis, in other words the comparison is performed assuming that the indirectly cleared respectively bilateral transaction is the only type 1 exposure. This avoids the necessity to make assumptions about the type 1 exposure portfolio. Moreover, unless the derivative exposure represents a very meaningful part of the type 1 exposure portfolio the effects of diversification should be similar.

1122. Different combinations of PD and RR can be chosen to produce a stand-alone type 1 risk charge for the indirectly centrally cleared transaction equal to 4 % of the corresponding value for a bilateral transaction with an A-rated bank.
1123. Assuming the same RR of 10 % as for bilateral transactions the necessary PD is only 1/25th of the PD for AAA-rated exposures. With a RR of 50 % the fraction is 12.95%.
1124. From a pure consistency perspective it is not clear which combination should be preferred.
1125. With the relative consistency approach the stand-alone type 1 risk charge for an indirectly cleared derivative would be 0.27 % of the loss-given default (LGD). The effective contribution to the overall SCR would be considerably lower due to diversification within the counterparty default risk module and across the risk modules as well as the possible loss absorbing effects of technical provisions and deferred taxes. Currently, the corresponding value for an AAA-rated counterparty would be 1.34%.
1126. For an indirectly cleared transaction that meets only the requirements in Article 305(3) CRR the risk charge for the indirectly cleared transaction would be less than 8 % of the risk charge for the same bilateral transaction with an "A"-rated bank. Using this 8 % the possible PDs and RRs to produce a consistent calibration can be derived analogously. In order to reduce the additional complexity for the type 1 risk charge calculation one could consider setting the same probability of default for indirectly cleared transactions that meet the requirements in Article 305(2) and 305(3) CRR while the recovery rates are different.
1127. EIOPA will consider whether in addition to compliance with the conditions set out in Article 305 CRR additional requirements similar to relevant CRD provisions should be met to qualify for the treatment described above (e.g. in case certain risk management requirements should not be covered in the Solvency II framework).
1128. According to Article 306(2) CRR for assets posted as collateral to a clearing member that are bankruptcy remote in the event that the CCP, the clearing member or one or more of the other clients of the clearing member becomes insolvent an institution may attribute an exposure value of zero to the counterparty credit risk exposures for those assets. The same should apply under the standard formula where insurer post collateral and the conditions above are met.

Alternative approach to calibration

1129. There are only a few CCPs. Moreover, there have been considerable efforts in the past years to increase their robustness. This makes it difficult to produce a calibration based on historical evidence in line with the requirements of Article 101(3) of the Solvency II Directive.
1130. On this basis one alternative could be to use parameters that create incentives for central clearing but are closer to the existing ones for other

exposures. One could for example assume for qualifying transactions the same probability of default as for AAA-counterparties and a recovery rate of 50 % (the same as for reinsurers). This would produce a stand-alone risk charge corresponding to 0.75% of the LGD (the respective figures for AAA-, AA- and A-rated counterparties with the "default" RR of 90 % would be 1.34 %, 3.00% and 6.71%).

1131. For indirectly cleared transactions which only meet the requirements of Article 305(3) CRR a recovery rate of 50 % and the probability of default for AA-counterparties could be used.

1132. This approach may appear not to be strictly in line with the requirement to produce a consistent calibration with the banking sector. But it acknowledges the limitations in terms of evidence and produces a low capital requirement which can be seen as a kind of "consistency" with the banking regulation. It also avoids the introduction of another "probability bucket".

1133. While the relative differences compared to the treatment of bilateral transaction mentioned above may seem large, again the effects of diversification and possibly loss absorbency have to be considered. Moreover, central clearing has from the perspective of the insurer the potential disadvantage that non-cash collateral cannot be used as variation margin. On this basis one might actually want to choose a combination that produces a lower calibration than with the above mentioned parameters.

Possible implications for the calculation of the Loss-Given Default

The effect of EMIR on the counterparty default risk in an OTC derivative transaction

1134. EMIR has introduced for non-centrally cleared transactions the obligation for counterparties to exchange initial margin for larger transactions as well as variation margin on a very frequent basis for all transactions. Initial margin has to be segregated.

1135. In the following the focus is on the effects that the requirement to exchange variation margin on a frequent basis have as the Delegated Regulation allows capturing the effect of already collected margin. As variation margin has also to be posted on a frequent basis for indirectly centrally cleared transactions, the results are transferable.

Basic model

1136. The following assumptions are made:

- The insurer enters into an OTC derivative contract (as an example a put option on a listed stock is used) on January 1st. The value of the derivative at time t is denoted D_t
- The counterparty defaults at some point in time during the following 12 months
- The insurer does not take out a new contract after the default of the derivative counterparty

- The counterparty does post assets as initial margin at the outset of the transactions. The level of initial margin required does not change over the year with the movement of the stock price
- The collateral is collected in cash (i.e. for the time being changes in the value of the collateral can be ignored). The value of the collateral is denoted C.
- The value of the stock drops by the type 1 risk charge (39 %) over the following 12 months.
- The risk-mitigating effect of the derivative (RM) corresponds to the change in value of the derivative resulting from this drop (i.e. for the sake of simplicity no diversification effects are assumed).

Case 0: No exchange of variation margin

1137. The counterparty defaults at the point in time t. The insurer has a claim based on the then value of the derivative and can seize the assets that were posted as initial margin. Compared with the situation where the counterparty does not default the insurer has lost $D_t - (\min(D_t; C) + 0.1 \cdot \max(0; D_t - C))$. In the case of an instantaneous shock at t=0 this becomes:

$$D_0 + RM - (\min(D_0 + RM; C) + 0.1 \max(0; D_0 + RM - C)) = 0.9 \max(0; D_0 + RM - C)$$

1138. This resembles closely the formula in Article 192(3) of the Delegated Regulation. In case a part of the 39 % decline in the stock price occurs after the default of the counterparty the loss is higher as the claim on the counterparty is lower.

Case 1: Exchange of variation margin and immediate shock

1139. The equity stock occurs instantaneously on January 1 and the counterparty defaults at the same time before further collateral can be exchanged. The loss is then the same as in the previous case without the exchange of variation margin.

Case 2: Exchange of variation margin and gradual decline in the price

1140. The 39 % decline occurs linearly over the year. Whether the default of the counterparty results in a loss depends on the time when the counterparty defaults. If the counterparty defaulted at the end of the year, then it has already posted variation margin to reflect the increased value of the derivative. If the default occurs in the middle of the year the loss is half the full year loss.

1141. One can of course construct many other cases based on different intra-year stock behaviours but the general principle should be clear based on the simple case 2.

1142. In summary, the simple example illustrates that due to the collection of variation margin the insurer can protect the gains on the derivative until the default of the counterparty. But as it is assumed that no new contract is concluded the insurer loses the protection for the remainder of the year.

1143. So far it was assumed that there are no changes in the value of the collected collateral. The Delegated Regulation sets out an adjustment for this risk that covers two cases: First, the insurer may decide to take the collected collateral on its book after the counterparty defaulted. The resulting risks have to be reflected. Second, the value of the collateral could decline before the counterparty defaults. Under EMIR the second risk is mitigated as the counterparty has to compensate lower collateral values. This is of course again not relevant if one assumes an instantaneous shock.

Possible reflection in the standard formula calculation

1144. The collection of variation margin and the compensation on losses of already collected margin does reduce the counterparty risk as shown in the previous discussion. Moreover, the proposed standardised approach for counterparty credit risk in the banking regulation allows the recognition of variation margin.

1145. At the same time the mechanisms mentioned above have only an effect in case of a non-instantaneous shock. Reflecting them would make it necessary to deviate from this basic assumption of the standard formula. Moreover adequate shocks for periods shorter than 12 months would be needed. Therefore it is not obvious that a change is justified.

1146. One aspect to consider though is that there is no discretion involved. The exchange of variation margin and the compensation for losses on already posted collateral are legal requirements.

1147. If one wanted to reflect the effect of EMIR a possible formula for the LGD would be

$$\max(90\%(Derivative + xRM_{fin}) - F'(yValue - zAdjustment_{market\ risk}); 0)$$

where x, y and z are between zero and one (i.e. one possible outcome could be that the adjustment for market risk does not have to be calculated). A value of $x=0.5; y=1; z=0.5$ could for example be interpreted to mean that the default will occur on average after six months, the insurer can collect variation margin for half the protection reflected in the SCR calculation and receives compensation for half the loss in the value of the collateral from its counterparty.

1148. EIOPA will consider whether it is necessary to consider also the second order effect that the collateral collected as variation margin may decline in value.

1149. In case such an adjustment was deemed appropriate it would also apply for indirectly cleared transactions with a CCP.

1150. So far it was assumed that the insurer does not enter into a new contract after the counterparty defaults and that the insurer is subject to the risk of a loss in the value of the collected collateral. Relaxing this assumption could only be justified if there was sufficient certainty that the insurer is able to enter very quickly into a new contract and that the collected collateral is sold or posted as collateral for the new contract.

1151. Based on the analysis EIOPA has performed so far it seems doubtful that this sufficient certainty could be achieved. Therefore the possibility of a replacement should not be considered.

Further possible effects of EMIR

Possible effect on the factor 'F'

1152. The factor 'F' allows taking into account the economic effect of the collateral arrangement in relation to the derivative in case of a credit event related to the counterparty. It depends on whether in case of insolvency of the counterparty, the determination of the insurance or reinsurance undertaking's proportional share of the counterparty's insolvency estate in excess of the collateral takes into account the received collateral or not.

1153. Unless EMIR alters the loss-given-default which is assumed to be 90 % it is not clear why the provisions regarding the factor 'F' should be changed.

Effect on the loss-given default

1154. The current assumed value for the recovery rate on a bilateral derivative transaction is 10 %. This reflects the recovery rate after the use of any existing collateral to satisfy claims. Based on the analysis so far there seem to be no reasons for changes. EMIR may reduce the exposure at default. But it is not clear why it should increase the recovery rate. Actually, EMIR could result in lower recovery values for investment banks as collected collateral has to be segregated.

14.4.3. EIOPA's advice

Exposures to CCPs

Option 1

1155. For the purpose of determining the capital requirement for counterparty default risk, where the derivative transaction of an insurer meets the requirements set out in Article 305(2) CRR, the probability of default and recovery rate shall be set so that the stand-alone risk charge is equal to 4 % of the stand-alone risk charge for an otherwise identical bilateral transaction with a counterparty with credit quality step 2.

1156. Where the conditions in Article 305(3) are met the probability of default and recovery rate shall be set so that the stand-alone risk charge is equal to 8 % of the stand-alone risk charge for an otherwise identical bilateral transaction with a counterparty which is assigned a credit quality step 2.

Option 2

1157. Where the derivative transaction of an insurer meets the requirements set out in Article 305(2) CRR, the probability of default for AAA-rated exposures and a recovery rate of 50 % should be used.

1158. Where the conditions in Article 305(3) are met the probability of default for AA-rated exposures and a recovery rate of 50 % should be used.

1159. In both options where the insurer posts assets as collateral to a clearing member that are bankruptcy remote in the event that the CCP, the clearing member or one or more of the other clients of the clearing member becomes insolvent, the insurer may not consider these assets in the calculation of the counterparty default risk module.

1160. EIOPA will for both options consider whether similar provisions are necessary in case an insurer were to become a clearing member or for repo transaction.

Possible implications for the calculation of the Loss-Given Default

Option 1

1161. No change

Option 2

1162. The formula for the LGD in Article 192(3) is altered to

$$\max(90\%(Derivative + xRM_{fin}) - F'(yValue - zAdjustment_{market risk}); 0)$$

where x, y and z are between zero and one (i.e. one possible outcome could be that the adjustment for market risk does not have to be calculated)

15. Simplification of the look-through approach

15.1. Call for advice

1163. EIOPA is asked to review the simplification provided for the look-through approach (Article 84(3) of the Delegated Regulation).

1164. In particular, EIOPA is asked to provide information on investments by insurers through collective investment undertakings and other investments packaged as funds and on the amount of those investments which are hedging unit linked and index-linked products, including information on cases where the simplified methodology (currently limited to 20% of the assets) does not cover the whole portfolio.

1165. Furthermore EIOPA is asked to suggest refinements to this simplification to cover all investments for which a simplified methodology would allow proportionate and risk-based calculations of the solvency capital requirement. Such refinements should in particular take account of the objective to reduce the reliance on external ratings.

15.2. Legal basis

Solvency II Directive

1166. The Solvency II Directive requires that the Solvency Capital Requirement shall be calculated so as to ensure that all quantifiable risks to which an insurance or reinsurance undertaking is exposed are taken into account, but does not contain any specific provision regarding the application of the look-through approach. The Look-through approach is provisioned in Article 84(1) of the Delegated Regulation.

Delegated Regulation

1167. Article 84(1) of the Delegated Regulation states that “the Solvency Capital Requirement shall be calculated on the basis of each of the underlying assets of collective investment undertakings and other investments packaged as funds (look-through approach)”.

1168. At the same time article 84(3) states that “*Where the look-through approach cannot be applied to collective investment undertakings or investments packaged as funds, the Solvency Capital Requirement may be calculated on the basis of the target underlying asset allocation of the collective investment undertaking or fund, provided such a target allocation is available to the undertaking at the level of granularity necessary for calculating all relevant sub-modules and scenarios of the standard formula, and the underlying assets are managed strictly according to this target allocation. For the purposes of that calculation, data groupings may be used, provided they are applied in a prudent manner, and that they do not apply to more than 20 % of the total value of the assets of the insurance or reinsurance undertaking.*”

1169. Furthermore Article 168 requires that when a look-through approach is not possible and undertakings do not make use of the provisions in Article

84(3), they apply the stress factor of “type 2” equity risk. In particular article 168 (3) reads as follows: *Type 2 equities undertakings Article 168 Type 2 equities shall comprise equities listed in stock exchanges in countries which are not members of the EEA or the OECD, equities which are not listed, commodities and other alternative investments. They shall also comprise all assets other than those covered in the interest rate risk sub-module, the property risk submodule or the spread risk sub-module, including the assets and indirect exposures referred to in Article 84(1) and (2) where a look-through approach is not possible and the insurance or reinsurance undertaking does not make use of the provisions in Article 84(3).*

Guidelines

1170. EIOPA Guidelines on the look-through approach aim at increasing consistency and convergence of professional practice in the application of the look-through approach for all types and sizes of solo undertakings using the standard formula.

1171. As regards the simplified look through of Article 84(3) of the Delegated Regulation, they provide specific guidance on how to apply the “grouping” approach in a prudent way. Specifically Guideline 4 requires that where assets covered in the spread and interest rate risk sub-modules are grouped according to duration bands, undertakings should ensure that the durations assigned to the bands are demonstrably prudent. Furthermore it requires that where groupings across different credit quality steps are used, undertakings should ensure that the credit quality steps assigned to the groups are demonstrably prudent.

1172. Guideline 5 provides for additional guidance for the application of the “grouping” approach to single name exposures when calculating the capital requirement for market risk concentration.

15.3. Feedback statement on the main comments received to the discussion paper

Appropriateness of the 20% threshold established by Article 84(3) of the Delegated Regulation

a. Summary of the comments received

1173. The simplified approach of Article 84(3) of the Delegated Regulation was considered to be an appropriate provision for avoiding prohibitive costs in the application of the Solvency II rules and in respecting the proportionality principle.

1174. As regards the appropriateness of the current level of the threshold of total assets (20%) up to which the simplified approach might be applied, many stakeholders indicated that when the asset grouping method is performed in a prudent way, leading to higher capital requirements, such method should be allowed to be used for larger parts of asset portfolio (more than 20% of total assets). In this context it was reported that consideration should be given to extending the applicability where it can be demonstrated that the simplification would not have a material impact on SCR.

1175. Some comments indeed suggested that investment assets backing unit-linked and index linked products should be excluded from the look-through approach provided that the market risk of those assets is negligible

1176. Other stakeholders suggested that the 20% threshold established by Article 84(3) of the Delegated Regulation should be reflective of risk or materiality. In particular they asked for a risk-based threshold that takes account of the contribution of the assets to the SCR calculation, in order to enable greater scope to apply a simplified look-through approach to unit and index-linked businesses.

1177. Also a more general comment about the applicability of Article 84(3) of the Delegated Regulation was expressed: stakeholders argued that the condition of having a target asset allocation, on the sole basis of which investments are performed, is often difficult to fulfil in practice.

Issue with the application of the simplified approach for investments which are backing unit-linked and index-linked products

a. Summary of the comments received

1178. Many stakeholders reiterated that the simplified approach of Article 84(3) of the Delegated Regulation should be allowed for all unit- or index-linked products without any threshold. They argued that, as far as the risk is borne by the policy holders, the investment related to unit-linked products could be entirely allowed for a simplified approach like a data grouping approach.

1179. Furthermore they raised doubts about the appropriateness of the 20% threshold in individual cases, especially for insurance undertakings with a strong focus on unit-linked products.

1180. It was also indicated that the threshold may be less appropriate in certain circumstances, such as a fund that is passively managed, or a unit-linked fund with low trading volumes and that where there is a lack of data for the application of the look-through, there is also likely a lack of data for alternative information (for example, information about the management of the underlying assets according to a target allocation);

1181. Furthermore many stakeholders indicated that the current strict wording of Article 84 of the Delegated Regulation makes the application of the look-through approach excessively burdensome and in many cases insurers are only left with the alternative of the type 2 equity sub-module which is not appropriate.

1182. It was also asked for additional guidance on the application of the look-through approach in different cases.

Specific proposals to further simplify the look-through approach for investments which are backing unit-linked and index-linked products

a. Summary of the comments received

1183. Some stakeholders suggested an even simpler approach, similar to the standard factors used for equity risk, because the target allocation of a fund does not always contain sufficient information for the calculation of the SCR, e.g. it is not always possible to construct a cash flow profile for the interest rate risk.
1184. Some other stakeholders advocated for an alignment of the threshold of Article 84(3) of the Delegated Regulation with the reporting requirements: they suggested that the same 30 % threshold for reporting requirements (detailed list of assets in QRT) is also applied as a maximum for investments in investment funds subject to the simplified approach of Article 84(3) of the Delegated Regulation.
1185. It was also reiterated that a look-through approach on assets backing unit linked and index linked contracts should be completely excluded.
1186. Some stakeholders proposed to amend Article 84(3) of the Delegated Regulation as follows:
1187. "Where no such target allocation is available, an aggregated actual allocation of the collective investment undertaking or fund can be used as data-grouping, provided it is unlikely to expect that the allocation will change substantially in the near future and provided, that the data grouping of the actual allocation is reviewed on a regular basis (at least yearly). Such a data-grouping may be based on the last published asset allocation and may for example aggregate equity positions or fixed-income securities in an appropriate manner."
1188. It was also proposed that, since the impact of unit-linked business on the SCR is negligible, the 20% threshold should not apply to unit-/index-linked products or at least be substantially increased, for instance by allowing data groupings to be applied in an "appropriate" manner instead of a "prudent" manner as Article 84(3) requires.
1189. It was also suggested to: 1) introduce a simplified SCR calculation based on factors related to risk measure of a given investment fund (e.g. for UCITS SRRI included in the Key Investor Information Document); 2) decrease the frequency of application of the look-through approach, e.g. annually.

Specific exposures for which the cost of the application of the look-through approach would be excessively burdensome

a. Summary of the comments received

1190. Main comments received in this section were:
- in the case of bond funds collecting all the relevant information to apply the look-through approach would be unnecessarily burdensome;

- in case of “external” investment funds (managed by non-related undertakings), the information required for even a high-level estimation of SCRs is very difficult to collect;
- for equity and private equity funds, because of frequent turnover of the holdings of such investment vehicles, a look-through is burdensome. The risk of a particular equity- or private equity fund should be estimated with respect to the investment mandate;
- for unit-linked business, the application of the look-through approach, even with the given simplifications, is excessively burdensome, as the impact of unit-linked business on the SCR is negligible;
- in the case of fixed income funds, it is often difficult to apply the look-through approach as key information such as rating and duration of underlying bonds is missing. This in practice leads to the application of a “type” 2 equity charge, which is significantly overstating the risk of fixed income funds;
- if the change in asset allocation within the fund is immaterial in the context of determining the SCR (e.g. asset classification, rating, duration), then it may be appropriate to exclude these holdings when assessing compliance with the 20% limit;
- for large funds with negligible total asset value it is difficult to collect all necessary information to apply the look-through;
- for money market funds in which captives are investing, the look-through approach could be avoided.

b. Assessment

1191. EIOPA is aware of the costs and challenges associated with the application of the look-through approach, especially in view of the effort to collect all granular information at single exposure level. The same level of granularity is asked also when the “grouping approach” of Article 84(3) is applied.

1192. For this reason EIOPA considers that some refinements are necessary to extend the scope of application of the simplified approach of to Article 84(3) and to make it less costly and more widely applicable, but is not in favour of promoting “exemptions” for specific cases or a less frequent application of the requirement of Article 84(1). The look-through approach is one of the fundamental principles of Solvency II, also from a risk management perspective.

15.4. Advice

15.4.1. Previous advice

1193. Even though CEIOPS did not advise for a specific framework for the application of a “simplified” look-through approach, in *CEIOPS’ Advice regarding the Calibration of Market Risk Module*, it was stated that *the same*

stress as for the "equity, other" category should be applied to the structured product/investment for which the look-through is not possible.

1194. Hence CEIOPS was aware that the "full" look-through approach was not always possible and that the costs and challenges regarding data availability for its application would have made necessary the adoption of simplifications.

15.4.2. Analysis

1195. Based on the comments received, EIOPA has performed some quantitative analysis (reported below) to verify the appropriateness of the 20% threshold of Article 84(3), in order to investigate on the possibility to extend the "scope" of application of the simplified approach of Article 84(3) to larger parts of assets portfolio when it can be prudentially justifiable.

1196. Specific analyses has been performed with regard to assets covering Unit Linked/Index linked products.

Data analysis

1197. In order to review the simplification provided for the look-through approach (Article 84(3) of the Delegated Regulation), EIOPA is asked to provide information on:

- investments by insurers through collective investment undertakings and other investments packaged as funds, and;
- the amount of those investments which are hedging unit linked and index-linked products, including information on cases where the simplified methodology does not cover the whole portfolio.

1198. EIOPA has performed some analysis on specific data from annual reporting templates (as of 31/12/2016). From S.02.01.01 (Balance sheet) – column C001– - EIOPA has analysed the following aggregated data:

Investments (other than assets held for index-linked and unit-linked contracts) – R0070
Collective Investments Undertakings – R0180
Assets held for index-linked and unit-linked contracts – R0220
Total assets – R0500

1199. In S.02.01.01 investments in "Collective Investments Undertakings (CIU)" and "Assets held for index-linked and unit-linked contracts" are separated items.

1200. Below is displayed the aggregated market information (split by country) about the investments in CIUs and about investments covering unit-index linked products, both expressed in percentage of total assets.

	CIUs/Total Assets	Assets for Unit-Index Linked products/Total Assets	Assets for Unit-Index Linked products +CIUs/Total Assets
AT	10.4%	13.1%	23.5%
BE	4.2%	9.4%	13.6%
BG	4.9%	3.0%	7.9%
CY	12.4%	32.0%	44.4%
CZ	4.7%	15.1%	19.8%
DE	8.7%	4.8%	13.5%
DK	13.5%	25.9%	39.5%
EE	4.0%	34.7%	38.7%
ES	3.7%	5.2%	8.8%
FI	12.6%	44.4%	57.1%
FR	9.9%	7.5%	17.4%
GR / EL	5.6%	13.3%	18.9%
HR	6.3%	3.3%	9.7%
HU	4.7%	43.0%	47.7%
IE	1.0%	26.6%	27.7%
IT	5.6%	14.9%	20.5%
LI	0.6%	27.0%	27.6%
LT	6.4%	36.7%	43.0%
LU	3.3%	28.7%	32.0%
LV	8.7%	8.3%	17.0%
MT	4.4%	2.7%	7.1%
NL	3.5%	19.7%	23.2%
NO	20.0%	13.5%	33.5%
PL	9.5%	23.8%	33.3%
PT	4.0%	22.7%	26.7%
RO	1.7%	17.9%	19.6%
SE	11.3%	15.4%	26.7%
SI	4.5%	14.4%	18.8%
SK	3.7%	18.2%	21.9%
UK	4.1%	21.8%	25.8%
EEA	6.9%	14.7%	21.5%

Data reported have been subject to some cleaning. In addition some outliers have been removed. They should be anyway considered as preliminary and only usable for indicative conclusions because some other cleaning/processing are still on-going.

1201. The second column shows that in some countries assets for unit-index linked products represent more than the 20% of total assets, even though at EU level that percentage is largely below 20%.

1202. The third column displays the cumulative percentage of assets for which the look-through approach might be applied. At EU level the 20% threshold of Article 84(3) seems to be appropriate from a global perspective, while it might be low for specific cases, especially for companies highly engaged in unit-index linked products.

1203. In order to get information about Investments in “Collective Investments Undertakings” which are hedging index-linked and unit-linked contracts, EIOPA has combined the information included in S.06.02.01 (List of assets) with the information in S.06.03.01 (Collective investment undertakings - look-through approach).

1204. On an asset by asset basis, data have shown that a big portion of investments in CIUs (almost 80%) are covering unit linked and index-linked products. As the scope of the template S.06.03.01 is confined to assets for which the look-through was applied, this quantitative indication should be treated with caution as there is no indication about which of the relevant investments in CIUs were subject to “equity risk type 2”.

Simplifications envisaged

1205. EIOPA considers appropriate to propose some amendments to the simplified approach of Article 84(3) to allow the usage of “grouping” of exposures also when the target asset allocation is not available at the level of granularity necessary for all relevant sub-modules and scenarios of the standard formula, provided that “grouping” is applied in a prudent manner, so permitting to determine a conservative SCR and a prudent evaluation of the risk.

1206. EIOPA is of the opinion that when it is impractical to get some necessary data at single exposure level (for instance information about the external rating for some of the underlying exposures in case of a bond fund), undertakings should be in a position to apply an average CQS, if it can be demonstrated that this is prudent. The prudent CQS might be derived from the mandate of the investment fund, which might indicate the general target quality of the underlying exposures. This approach might also avoid a wider use of the simplified approach of Article 168(3) of the Delegated Regulation which is not risk-sensitive.

1207. EIOPA believes that this approach might also mitigate the over-reliance on external ratings mentioned in the Call for Advice, as undertakings would not be forced to rely regularly on the detailed information about external ratings for all exposures.

1208. Furthermore EIOPA welcomes the idea that when the target asset allocation is proven to be insufficient to calculate the SCR, the simplified look through can be applied on the basis of the last reported asset allocation, provided that assets are (and will be) actually managed according to that allocation.

1209. As regards the quantitative threshold, the quantitative assessment reported above has shown that the 20% of Article 84(3) are still appropriate.

1210. EIOPA is rather supportive of introducing a “carve out” for assets covering Unit Linked/Index Linked products from the application of the 20% threshold, but only for insurance products for which the significant part of the market risk is transferred to policyholders.

1211. EIOPA believes that assets which are hedging unit/index linked products for which the undertaking has not sold any significant "guarantee" or policyholder option should be still subject to the look-through approach, but should not be considered when determining whether the threshold is met or not. These insurance products might have an immaterial impact on the SCR calculations and hence the simplified approach, if applied in a prudent manner, is considered appropriate with no limitations.
1212. When assets hedge unit linked/index linked products for which the undertaking has sold "guarantees" or policyholder options there are no elements to carve them out from the application of the 20% threshold, since these assets do significantly contribute to the SCR calculation. For these assets the current 20% threshold would be still be relevant.
1213. This proposal would certainly extend the "scope" for the application of the simplified approach of Article 84(3) to a larger part of the asset portfolio.
1214. Finally EIOPA considers also appropriate to impose an additional qualitative condition for the application of a simplified look through i.e. the (qualitative or quantitative) assessment of the error introduced in the calculation of the SCR when the "full" look-through is not applied (applicable for both the simplified approach of Article 84(3) and the residual "equity risk type 2" of Article 168 (3) of the Delegated Regulation).
1215. The application of a simplified look through and in particular the application of the "equity risk type 2" might be insufficient to reflect the underlying risk in some specific cases (e.g. for exposures for which the application of the look-through would determine a stress factor higher than the 49%).
1216. In order to avoid wrong incentives for non-applying the look-through approach when the SCR is likely to be above 49%, EIOPA proposes the introduction of a new provision in the legal framework, in order to be in line with the general requirements on proportionality and simplifications of the standard formula in Article 88 of the Delegated Regulation.

15.4.3. EIOPA's advice

1217. It is proposed to "carve-out" from the 20% limit assets for unit/index linked products that:

- either do not significantly contribute to the SCR (i.e. insurance products without significant guarantees or policyholder options);
- or where the change in the value of the underlying assets do not significantly affect the available own funds (due to future profits).

1218. Where the look-through approach cannot be applied, it is proposed that the SCR may be calculated also on the basis of the last reported asset allocation of the collective investment undertaking or fund, provided that the underlying assets are (and will be) managed strictly according to that reported asset allocation.

1219. Under the scope of Article 84(3) of the Delegated Regulation, it is proposed to allow the usage of "groupings" of exposures also when the target asset allocation is not available at the level of granularity necessary for all relevant sub-modules and scenarios of the standard formula, provided that "grouping" is applied in a prudent manner (permitting to determine a conservative SCR). For instance, in case it is impractical to get detailed information about the external rating for some of the underlying exposures of an investment fund, it should be possible to apply the "grouping" approach of Article 84(3) of the Delegated Regulation by assigning an average CQS to those exposures, provided that the CQS is prudent.

1220. It is proposed to impose an additional qualitative condition for the application of a simplified look-through i.e. the (qualitative or quantitative) assessment of the error introduced in the calculation of the SCR when the "full" look-through is not applied (applicable for both the simplified approach of Article 84(3) of the Delegated Regulation and the residual "equity risk type 2" of Article 168(3) of the Delegated Regulation).

15.4.4. Proposal for New Articles

1221. Proposal for amending Article 84(3) of the Delegated Regulation:

3. *Where the look-through approach cannot be applied to collective investment undertakings or investments packaged as funds, the Solvency Capital Requirement may be calculated on the basis of the target underlying asset allocation **or the last reported asset allocation** of the collective investment undertaking or fund, provided such a target allocation is available to the undertaking ~~at the level of granularity necessary for calculating all relevant sub-modules and scenarios of the standard formula,~~ and the underlying assets are managed strictly according to this target allocation **or to the last reported asset allocation**.*

*For the purposes of that calculation, data groupings may be used, provided they ~~are applied in a prudent manner~~ **permit to calculate all relevant sub-modules and scenarios of the standard formula in a prudent manner**, and that they do not apply to more than **20 %** of the total value of the assets of the insurance or reinsurance undertaking."*

*3b. **Notwithstanding Article 84(3), where the look-through approach cannot be applied to investments in collective investment undertakings or investments packaged as funds which back unit- and index linked obligations (for which the market risk is borne by policyholders), the Solvency Capital Requirement may be calculated on the basis of the target underlying asset allocation or the last reported asset allocation of the collective investment undertaking or fund, provided such a target allocation is available to the undertaking and the underlying assets are managed strictly according to this target allocation or to the last reported asset allocation.***

*For the purposes of that calculation, data groupings may be used, provided they **permit to calculate all relevant sub-modules and scenarios of the standard formula in a prudent manner.***

1222. Proposal for a new article:

In accordance with Article 88, insurance and reinsurance undertakings which make use of the simplified approaches provided for in Articles 84(3) and 168(3) of the Delegated Regulation, shall determine whether the simplified calculation is proportionate to the nature, scale and complexity of the risks by carrying out an assessment which shall include all of the following:

(a) an assessment of the nature, scale and complexity of the risks of the undertaking falling within the relevant module or sub-module;

(b) an evaluation in qualitative or quantitative terms, as appropriate, of the error introduced in the results of the simplified calculation due to any deviation between the following:

- (i) the assumptions underlying the simplified calculation in relation to the risk;*
- (ii) the results of the assessment referred to in point (a).*

A simplified calculation shall not be considered to be proportionate to the nature, scale and complexity of the risks where the error referred to in point (b) of the previous paragraph leads to a misstatement of the Solvency Capital Requirement that could influence the decision-making or the judgement of the user of the information relating to the Solvency Capital Requirement, unless the simplified calculation leads to a Solvency Capital Requirement which exceeds the Solvency Capital Requirement that results from the standard calculation.

16. Look-through approach at group level

16.1. Call for advice

1223. The European Commission call for advice requests EIOPA to review the simplification provided for the look-through approach and to assess under which conditions it may be appropriate to extend the look-through approach to investments in related undertakings.

1224. During the consultation of the draft first set of advice (EIOPA-CP-17-004), EIOPA received a comment on the application of the look-through approach at group level and a request for extending the approach.

1225. EIOPA has also been made aware of different interpretation of how look-through should be applied at group level, in particular for related collective investment undertakings and other similar type of related undertaking.

16.2. Legal basis

Solvency II Directive

1226. Article 212 on “definitions” and in particular paragraph (1)(b).

1227. Article 221 on the “inclusion of proportional share”.

1228. Article 230 on “method 1 (default method): accounting consolidation-based method”.

Delegated Regulation

1229. Article 84 on the “look-through approach”.

1230. Article 335 on “method 1: determination of consolidated data”

1231. Article 36 on “method 1: calculation of the consolidated group solvency capital requirement”

Guidelines

1232. Guidelines on group solvency: in particular Guideline 19 on the “determination of the consolidated data for the group solvency calculation” and the explanatory text 2.52 of the final report⁸⁹.

16.3. Advice

16.3.1. Previous advice

1233. CEIOPS-DOC-52/09: “Assessment of Group Solvency”⁹⁰.

⁸⁹ https://eiopa.europa.eu/Publications/Guidelines/Final_Report_Group_GLS.pdf

16.3.2. Analysis

1234. Currently at solo level, Article 84 of the Delegated Regulation provides the cases where, in the calculation of the Solvency Capital Requirement using the standard formula, look-through should be applied and when it should not. Article 84(4) of the Delegated Regulation provides derogation from the application of the 'look through approach' in Article 84(2) of the Delegated Regulation, meaning that indirect exposures other than CIUs, when classified as 'related undertakings under Article 212' of the Solvency II Directive, should be exempted from the 'look through approach'.
1235. Paragraph 1 provides that look-through shall always be applied at solo level for Collective Investment Undertakings ("CIUs") and other investments packaged as funds. A first discussion point is how CIUs are treated at group level.
1236. Two cases should be distinguished: the case of a CIU that is a related undertaking and the case of a CIU that is not a related undertaking (the CIU is simply an investment).
1237. The look through would apply in the case where the participating undertaking or any subsidiary in the scope of the line by line consolidation simply invests **in a CIU that is not a related undertaking** (for instance holds less than 20%), since Article 336(a) of the Delegated Regulation is applied.
1238. The look through is also applied at group level - indirectly - via the inclusion of the SCR of each related but not controlled insurance and reinsurance undertakings in the scope of the group (Articles 335(1)(d) and Article 336(b) of the Delegated Regulation).
1239. The explanatory text 2.52 of the Group Solvency Guidelines explains the treatment of **CIUs considered as related undertakings** at group level: the holdings in the related CIUs should be treated under Article 335(1)(f) of the Delegated Regulation, i.e. valued in accordance with Article 13 of the Delegated Regulation, and the SCR calculated under Article 336(d) of the Delegated Regulation, i.e. applying a capital charge on the asset value. That means there is no look-through at group level for a related CIUs, whatever percentage of shares the participating undertaking is holding in the related undertaking.
1240. However, some local markets still have a different approach and consider that look-through should apply at group level. The rationale relies on the "mutatis mutandis" principle (what applies at solo level should apply mutatis mutandis at group level) as well as the possibility for not considering CIUs as "related undertakings" but as simple financial investments (which are then subject to look-through).

90 <https://eiopa.europa.eu/CEIOPS-Archive/Documents/Advices/CEIOPS-L2-Final-Advice-Group-solvency-assessment.pdf>

1241. EIOPA has also analysed the treatment at group level for indirect exposures to market risk other than CIUs and investments packaged as fund. This is in particular relevant given EIOPA's advice on extending the look-through approach at solo level for investment related undertakings.

1242. Again one should make a distinction between related and non-related undertakings.

1243. For **related undertakings** that correspond to "Indirect exposures to market risks other than CIUs and investments packaged as funds":

- If they are considered as ancillary services undertakings, the treatment to apply is the one under Article 335(1)(a), (c) or (f) of the Delegated Regulation.
 - In the first two cases (the undertaking is considered a subsidiary) consolidation on a line by line basis would be applied and therefore look through would be applied;
 - whereas in the last case (f) look-through would not be applied.
- If they are not considered as ancillary services undertakings, the only treatment that would be applicable is that under Article 335(1)(f) of the Delegated Regulation, which means that no look-through would be applied.

1244. For **non-related undertakings**, the funds are considered investments by (re)insurance undertakings. In that case, look-through is applied, since Article 336(a) or (b) of the Delegated Regulation is applied.

Conclusion

1245. The question raised is mainly relevant for related undertakings.

1246. At the moment, look-through is applied at group level in different cases than it is at solo level for related undertakings. This could be justified by:

- the specific treatment of related undertakings at group level compared to solo level: Articles 335 and 336 of the Delegated Regulation prescribe specific rules for the treatment of related undertakings for the purpose of the group solvency calculation;
- group supervisory judgment has to be applied: in order for CIUs to be considered related undertakings, the group is expected to provide arguments which are assessed by the group supervisor;
- the complexity of the calculation at group level, which requires more data and which is a more lengthy process;
- the fact that line-by-line consolidation is maybe not appropriate for all type of non-insurance related undertakings.

1247. On the other hand, the treatment at solo level is more risk-sensitive to the underlying assets in related CIUs/funds than at group level for related

undertakings. If one of the subsidiaries of a group has already collected the information necessary for applying look-through at solo level, there is no obvious constraint why the group could not use the same information for the group SCR calculation.

1248. The current approach has led to diverging approaches at European level, due to different assessments of the related characteristics of CIUs, which calls for a clarification of the Delegated Regulation that would favour enhanced convergence between national markets.

1249. Two options have been identified if one would want to have more risk-sensitive calculations for related CIUs, investment related undertakings or other related undertakings with indirect exposures to market risk and packaged as fund and more convergence between national markets:

a) Keeping the current version of the Delegated Regulation and providing more guidance to supervisors as to when they should consider these undertakings as related.

b) Advising the European Commission to make a change in Article 336 of the Delegated Regulation so that these related undertakings are treated at group level in the same way that they are treated at solo level.⁹¹ This would mean that where there is look-through at solo level, there should be look-through at group level and where there is no look-through at solo level because of the simplification in Article 84(3) of the Delegated Regulation, then there is also no look-through at group level⁹².

1250. EIOPA welcomes comments and feedback of stakeholders on this question. In particular, where the SCR of an undertaking is calculating according to Article 336(d) of the Delegated Regulation, no diversification benefits are taken into account in the group SCR calculation. Should option b) be favoured, views on what would be the rationale for calculating the SCR of such related undertakings under Article 336(a) of the Delegated Regulation or under similar provisions than with Article 336(d) of the Delegated Regulation, i.e. without diversification benefits would be useful.

⁹¹ Further analysis is necessary to decide whether the related CIUs would be treated under Article 336(a) or (d), i.e. allowing or not diversification benefits.

⁹² In that case the current treatment would continue to be applied

16.3.3. EIOPA's advice

1251. EIOPA has analysed how the look-through approach is applied at group level for related CIUs, related undertakings that correspond to "Indirect exposures to market risks other than CIUs and investments packaged as funds" and related investment undertakings.

1252. The current approach has led to diverging approaches at European level, due to different assessments of the related characteristics of CIUs, which calls for a clarification of the Delegated Regulation that would favour enhanced convergence between national markets.

1253. Two options have been identified if one would want to have more risk-sensitive calculations for related CIUs, investment related undertakings or other related undertakings with indirect exposures to market risk and packaged as fund and more convergence between national markets:

a) Keeping the current version of the Delegated Regulation and providing more guidance to supervisors as to when they should consider these undertakings as related.

b) Advising the European Commission to make a change in Article 336 of the Delegated Regulation so that these related undertakings are treated at group level in the same way that they are treated at solo level.⁹³ This would mean that where there is look-through at solo level, there should be look-through at group level and where there is no look-through at solo level because of the simplification in Article 84(3) of the Delegated Regulation, then there is also no look-through at group level⁹⁴.

1254. EIOPA welcomes comments and feedback of stakeholders on this question. In particular, where the SCR of an undertaking is calculating according to Article 336(d) of the Delegated Regulation, no diversification benefits are taken into account in the group SCR calculation. Should option b) be favoured, views on what would be the rationale for calculating the SCR of such related undertakings under Article 336(a) of the Delegated Regulation or under similar provisions than with Article 336(d) of the Delegated Regulation, i.e. without diversification benefits would be welcome.

1255. After having received and analysed the feedback of stakeholders, EIOPA may advise a change to the Delegated Regulation to the European Commission.

⁹³ Further analysis is necessary to decide whether the related CIUs would be treated under Article 336(a) or (d), i.e. allowing or not diversification benefits.

⁹⁴ In that case the current treatment would continue to be applied

17. Loss-absorbing capacity of deferred taxes

17.1. Call for advice

1256. The European Commission has asked EIOPA to report on the different methods currently applied to calculate the loss-absorbing capacity of deferred taxes (LAC DT), and on the extent to which the divergent practices lead to differences in capital requirements. The European Commission states that *"The calculation for reduction in capital requirements due to a deferred tax adjustment is complex, and requires a high level of supervisory judgement, resulting in possibly divergent practices in Member States."*
1257. In order to answer this request for information, EIOPA has published a consultation paper (EIOPA-CP-17-004) and has sent factual information to the European Commission.
1258. EIOPA has provided evidence that National Supervisory Authorities (NSAs) have similar approaches with respect to more than 75 % of almost 100 billion euros in LAC DT across the EEA, which is the part of LAC DT where likely utilisation is being demonstrated by a net deferred tax liability (DTL) on the balance sheet. While recognising that positive position, with respect to the remaining part of LAC DT where likely utilisation is being demonstrated by future profits, NSAs do have different approaches. Where carry-back is applicable in the tax regime NSAs also allow for its use to demonstrate likely utilisation of LAC DT, increasing the 75 % of LAC DT where supervisors have similar approaches.
1259. Regression analyses in the first consultation paper suggested that almost 40 % of the variation in LAC DT across the EEA may be explained by differences in the balance sheet of undertakings, differences in the tax regime and the size of undertakings. The fact that an undertaking is in one or another jurisdiction may explain an approximately additional 35 % of the variation in LAC DT; this difference may be due to differences in supervisory practices, but also due to differences in the tax regime and the risk characteristics of undertakings in the different jurisdictions that were not captured by the variables on these aspects in the regression analyses.
1260. EIOPA refers readers to its first response to the Call for Advice for additional background on LAC DT, its impact on the SCR of European (re)insurance undertakings, sources of differences in LAC DT and differences in supervisory practices.
1261. EIOPA recognises the positive position that NSAs have similar approaches with respect to more than 75% of LAC DT across the EEA. Of the remaining proportion where there are differences, EIOPA would consider differences in LAC DT justified if they stemmed from differences in fiscal regimes, risk profiles or the length and duration of assets and liabilities. EIOPA treats the fiscal regimes as given; undertakings in jurisdictions with tax regimes with higher tax rates or more favourable carry-forward and carry-back possibilities will, all else equal, have a higher LAC DT.

1262. EIOPA has observed a wide range of judgement involved in the part of LAC DT that relies on projecting the future profits estimated after the bSCR* shock loss⁹⁵. Subjectivity in itself is not a problem as valuations for the Solvency II balance sheet and SCR calculations require expert judgement. However, typically expert judgement for the balance sheet valuations and SCR calculations result in a relatively small range of possible outcomes for similar assets and liabilities and risks. With respect to the part of LAC DT that is demonstrated by future profits, supervisors have observed a wide range of assumptions and outcomes for similar undertakings.

1263. For this reason and according to Articles 8 and 16 of EIOPA Regulation (Regulation (EU) 1094/2010 of 24 November 2010) EIOPA strives to achieve convergence in the calculation of LAC DT under the standard formula and in particular for the projection of post stress taxable profits used to demonstrate the likely utilisation of increases in deferred taxes, and, going forward, will consider suitable good practices to ensure such convergence.

1264. In the following chapter on LAC DT, EIOPA does not distinguish the elements that could be part of its advice to the European Commission on possible changes to the Delegated Regulation from the elements that could be better addressed via supervisory convergence tools, such as Guidelines, Opinion or Supervisory Handbook. For this reason, this chapter does not contain a blue box advice at the end. After further discussion, including considering stakeholders' comments, EIOPA will take a reasoned decision.

1265. EIOPA considers several key principles to foster supervisory convergence and to address three concerns:

- **Uncertainty** about future profits for utilization of notional deferred tax assets (DTA);
- **Complexity** involved in projections of these future profits;
- **Uneven playing field** because of wide range of judgement involved in the likely utilisation of notional DTA:
 - undertakings with similar solvency ratios which are exposed to similar risks may have significantly different LAC DT and SCR just because of unjustifiable differences in the assumptions made regarding the post-shock world;
 - differences in the application of the Solvency 2 regime (e.g. application of transitional measures) may also give rise to differences in LAC DT between otherwise similar undertakings;
 - differences in tax regimes do justify differences in LAC DT; this chapter is not about off-setting differences in tax regimes.

1266. Proportionality should play an important role in the implementation of these principles. Different levels of complexity could be appropriately treated via the standard formula, a simplified calculation of the standard formula, or

⁹⁵ The bSCR* shock loss is the SCR minus LAC DT or, put differently, the basic SCR (bSCR) plus operational risk and the Loss-Absorbing Capacity of Technical Provisions (LAC TP)

an internal model. EIOPA would like to receive comments from stakeholders on how the key principles could be used in the different levels of complexity.

17.2. Feedback statement on the comments received during consultations EIOPA-CP-16-008 and EIOPA-CP-17-004

1267. Please refer to the final report on the consultation paper EIOPA-CP-17-004 on EIOPA's first advice to the European Commission on specific items in the Solvency II Delegated Regulation.

17.3. Legal basis

Solvency II Directive

1268. Article 103 of the Solvency II Directive on the structure of the standard formula states the following:

The Solvency Capital Requirement calculated on the basis of the standard formula shall be the sum of the following items:

- (a) the Basic Solvency Capital Requirement, as laid down in Article 104;*
- (b) the capital requirement for operational risk, as laid down in Article 107;*
- (c) **the adjustment for the loss-absorbing capacity of technical provisions and deferred taxes**, as laid down in Article 108.*

1269. Article 108 of the Solvency II Directive on the adjustment for the loss-absorbing capacity of technical provisions and deferred taxes states the following:

The adjustment referred to in Article 103(c) for the loss-absorbing capacity of technical provisions and deferred taxes shall reflect potential compensation of unexpected losses through a simultaneous decrease in technical provisions or deferred taxes or a combination of the two.

That adjustment shall take account of the risk mitigating effect provided by future discretionary benefits of insurance contracts, to the extent insurance and reinsurance undertakings can establish that a reduction in such benefits may be used to cover unexpected losses when they arise. The risk mitigating effect provided by future discretionary benefits shall be no higher than the sum of technical provisions and deferred taxes relating to those future discretionary benefits.

For the purpose of the second paragraph, the value of future discretionary benefits under adverse circumstances shall be compared to the value of such benefits under the underlying assumptions of the best-estimate calculation.

Delegated Regulation

1270. Articles 205 and 207 in section 9 on the adjustment for the loss-absorbing capacity of technical provisions and deferred taxes in chapter V on the Solvency capital requirement standard formula of the Delegated Regulation contains the regulation on LAC DT. Article 205 contains general provisions and no requirements for LAC DT. Article 207 sets out the regulation regarding the calculation of LAC DT:

1. *The adjustment for the loss-absorbing capacity of deferred taxes shall be equal to the change in the value of deferred taxes of insurance and reinsurance undertakings that would result from an instantaneous loss of an amount that is equal to the sum of the following:*

(a) the Basic Solvency Capital Requirement referred to in Article 103(a) of Directive 2009/138/EC;

(b) the adjustment for the loss-absorbing capacity of technical provisions referred to in Article 206 of this Regulation;

(c) the capital requirement for operational risk referred to in Article 103(b) of Directive 2009/138/EC.

2. *For the purposes of paragraph 1, deferred taxes shall be valued in accordance with Article 15. Where the loss referred to in paragraph 1 would result in the increase in deferred tax assets, insurance and reinsurance undertakings shall not utilise this increase for the purposes of the adjustment unless they are able to demonstrate that future profits will be available in accordance with Article 15(3), taking into account the magnitude of the loss referred to in paragraph 1 and its impact on the undertaking's current and future financial situation.*

3. *For the purposes of paragraph 1, a decrease in deferred tax liabilities or an increase in deferred tax assets shall result in a negative adjustment for the loss-absorbing capacity of deferred taxes.*

4. *Where the calculation of the adjustment in accordance with paragraph 1 results in a positive change of deferred taxes, the adjustment shall be nil.*

5. *Where it is necessary to allocate the loss referred to in paragraph 1 to its causes in order to calculate the adjustment for the loss-absorbing capacity of deferred taxes, insurance and reinsurance undertakings shall allocate the loss to the risks that are captured by the Basic Solvency Capital Requirement and the capital requirement for operational risk. The allocation shall be consistent with the contribution of the modules and sub-modules of the standard formula to the Basic Solvency Capital Requirement. Where an insurance or reinsurance undertaking uses a partial internal model where the adjustment to the loss-absorbing capacity of technical provisions and deferred taxes are not within the scope of the model, the allocation shall be consistent with the contribution of the modules and sub-modules of the standard formula which are outside of the scope of the model to the Basic Solvency Capital Requirement.*

1271. Article 15 of the Delegated Regulation, which is referred to in Article 207 on LAC DT sets out the regulation for the valuation of deferred taxes on the Solvency II balance sheet:

1. *Insurance and reinsurance undertakings shall recognise and value deferred taxes in relation to all assets and liabilities, including technical provisions, that are recognised for solvency or tax purposes in accordance with Article 9.*

2. *Notwithstanding paragraph 1, insurance and reinsurance undertakings shall value deferred taxes, other than deferred tax assets arising from the carry-forward of unused tax credits and the carry-forward of unused tax losses, on the basis of the difference between the values ascribed to assets and liabilities recognised and valued in accordance with Article 75 of Directive 2009/138/EC and in the case of technical provisions in accordance with Articles 76 to 85 of*

that Directive and the values ascribed to assets and liabilities as recognised and valued for tax purposes.

3. Insurance and reinsurance undertaking shall only ascribe a positive value to deferred tax assets where it is probable that future taxable profit will be available against which the deferred tax asset can be utilised, taking into account any legal or regulatory requirements on the time limits relating to the carry-forward of unused tax losses or the carry-forward of unused tax credits.

1272. Article 9 of the Delegated Regulation sets out the general requirements for the valuation of all assets and liabilities other than technical provisions:

1. Insurance and reinsurance undertakings shall recognise assets and liabilities in conformity with the international accounting standards adopted by the Commission in accordance with Regulation (EC) No 1606/2002.

2. Insurance and reinsurance undertakings shall value assets and liabilities in accordance with international accounting standards adopted by the Commission pursuant to Regulation (EC) No 1606/2002 provided that those standards include valuation methods that are consistent with the valuation approach set out in Article 75 of Directive 2009/138/EC. Where those standards allow for the use of more than one valuation method, insurance and reinsurance undertakings shall only use valuation methods that are consistent with Article 75 of Directive 2009/138/EC.

3. Where the valuation methods included in international accounting standards adopted by the Commission in accordance with Regulation (EC) No 1606/2002 are not consistent either temporarily or permanently with the valuation approach set out in Article 75 of Directive 2009/138/EC, insurance and reinsurance undertakings shall use other valuation methods that are deemed to be consistent with Article 75 of Directive 2009/138/EC.

4. By way of derogation from paragraphs 1 and 2, and in particular by respecting the principle of proportionality laid down in paragraphs 3 and 4 of Article 29 of Directive 2009/138/EC, insurance and reinsurance undertakings may recognise and value an asset or a liability based on the valuation method it uses for preparing its annual or consolidated financial statements provided that: (a) the valuation method is consistent with Article 75 of Directive 2009/138/EC; (b) the valuation method is proportionate with respect to the nature, scale and complexity of the risks inherent in the business of the undertaking; (c) the undertaking does not value that asset or liability using international accounting standards adopted by the Commission in accordance with Regulation (EC) No 1606/2002 in its financial statements; (d) valuing assets and liabilities using international accounting standards would impose costs on the undertaking that would be disproportionate with respect to the total administrative expenses.

5. Insurance and reinsurance undertakings shall value individual assets separately.

6. Insurance and reinsurance undertakings shall value individual liabilities separately

1273. Article 9(2) of the Delegated Regulation implies that Solvency II valuation principles follow the international accounting standards adopted by the European Commission to the extent that they comply with the Solvency II valuation principles, i.e. transfer value, in Article 75 of the Solvency II

Directive. The adopted accounting standard for deferred taxes is IAS12, to be used to the extent that it complies with the Solvency II valuation principles.

1274. Article 76(a)(iii) lists net deferred tax assets as tier 3 basic own fund items.

1275. Furthermore, recital 68 of the Delegated Regulation states that the calculation of the adjustment for the loss-absorbing capacity of technical provisions and deferred taxes should ensure that there is no double counting of the risk mitigating effect provided by future discretionary benefits or deferred taxes.

1276. In the Delegated Regulation all regulation regarding the, scenario-based, calculations of the SCR also applies to LAC DT. Regulation regarding the Basic SCR does not apply to LAC DT as LAC DT is not an element of the Basic Solvency Capital Requirements. Article 83(1)(b) of the Delegated Regulation states that deferred taxes remain unchanged when calculating the Basic SCR.

1277. For the purpose of this advice, EIOPA has left the regulation regarding the calculation of LAC DT for the purpose of the group SCR out of scope.

Guidelines

1278. A separate set of guidelines regarding the loss-absorbing capacity of technical provisions and deferred taxes has been published by EIOPA. Guidelines 6 to 14 in sections II and III relate to the calculation and recognition for the LAC DT adjustment.

1279. Next to these guidelines on LAC DT, the guidelines 9 to 11 regarding deferred taxes in the guidelines on the valuation and recognition of assets and liabilities other than technical provisions are also relevant.

17.4. Advice

17.4.1. Previous advice

1280. CEIOPS-DOC-46/09 on the "loss-absorbing capacity of technical provisions and deferred taxes"⁹⁶.

1281. EIOPA-BOS-17/280 on the "first set of advice to the European Commission on specific items in the Solvency II Delegated Regulation"⁹⁷.

⁹⁶ <https://eiopa.europa.eu/CEIOPS-Archive/Documents/Advices/CEIOPS-L2-Final-Advice%20SCR-Loss-absorbing-capacity-of-TP.pdf>

⁹⁷ https://eiopa.europa.eu/Publications/Reports/EIOPA-BoS-17-280_Final_report_on_First_set_of_Advice_on_SII_DR_Review.pdf

17.4.2. Analysis

Definitions

1282. LAC DT is the phenomenon that undertakings are able to compensate part of a shock loss to their tax authority for which the impact of the loss on own funds is therefore lower than the original gross loss itself. The idea is that the economic Solvency II loss also results in fiscal losses and that these fiscal losses result in tax reductions if fiscal profits are available to utilise/offset these fiscal losses.

1283. LAC DT is, according to Article 207 of the Delegated Regulation, equal to the change in the value of deferred taxes after the shock loss. With DTA^*/DTL^* being the deferred taxes after the shock loss, LAC DT is:

$$LAC DT = DTA^* - DTL^* - (DTA - DTL) + carry-back^{98}$$

1284. Article 207 of the Delegated Regulation provides that deferred taxes shall be valued in accordance with Article 15 and that especially the increase in DTA after the shock loss may be used only if undertakings demonstrate that it is likely that future profits will be available against which to utilise the losses, taking into account the magnitude of the loss and in accordance with the Solvency II valuation principles. The Solvency II valuation principles for deferred taxes are laid down in Article 15 of the Delegated Regulation and state that DTA are only ascribed a positive value if it is probable that future taxable profits are available for its utilization.

1285. The change in the value of deferred taxes is, as a maximum, equal to the tax rate times the shock loss as defined in Article 207(1) of the Delegated Regulation. The Guidelines on LAC DT refer to this change in the value of deferred taxes as notional deferred taxes, nDT and states that to the extent that its recognition depends on an assessment of future taxable profits this must be supported by credible evidence that future profits exist. This can be considered as a simplified approach of the calculation of LAC DT, but would result in the same outcome.

$$LAC DT = nDT \text{ (credible evidence of probable future profits) } + carry-back$$

1286. Undertakings justify likely utilisation of DTA and DTA^* in several ways:

- by demonstrating DTL that reverses at the same time (and under the same tax Authority);
- by demonstrating future fiscal profits that realise at the same time (and under the same tax Authority).

1287. If insufficient DTL or future fiscal profits are available at a certain point in time for the utilization of the DTA at that same point in time, carry-back and

⁹⁸ Carry-back is the phenomenon in Ireland, United Kingdom and the Netherlands that a loss can be used (carried back) to offset taxes paid on profits in the previous year. In this way, a fiscal loss is directly being compensated by a direct claim on the tax authority; carry-back thus does not result in a DTA, but in a tax receivable.

carry-forward possibilities in the tax regime may allow the use of DTL and future fiscal profits from other points in time for the utilization of the DTA.

1288. DTA/DTL and LAC DT contribute to Solvency figures differently: net DTA recognized in the Solvency II balance sheet increases own funds while LAC DT may reduce the SCR.

Differences in deferred taxes on the balance sheet result in differences in LAC DT

1289. While this chapter only pertains to LAC DT, it is useful to note that data analyses in the first set of advice provided evidence that undertakings with a – higher – net DTL on their Solvency II balance sheet typically have a higher LAC DT than undertakings with a – higher – net DTA. This is a consequence of the fact that the likely utilization of the post shock DTA* by net DTL on the balance sheet is more certain and less complex to demonstrate than the demonstration of probable future profits from new business beyond the future profits within the contract boundary, which are already reflected in the DTA on the Solvency II balance sheet.

1290. An undertaking with net DTL has less eligible own funds than the same undertaking with either less net DTL or net DTA. On the other hand, the undertaking with the higher net DTL has more net DTL available to demonstrate likely utilization of the post-shock DTA* and will typically have a higher LAC DT and thus a lower SCR. Moreover, LAC DT is not capped, as is the case for balance sheet net DTAs.

1291. Differences in the net DTA/DTL on the Solvency II balance sheet across Europe occur for different reasons:

- differences in tax regimes;
- economic position of the undertakings⁹⁹;
- implications of differences because different LTG and transitional measures, or none at all, are applied in valuating technical provisions on the Solvency II balance sheet;
- differences in terms and conditions of insurance policies sold (e.g. the amount of profits to be shared with policyholders in life insurance contracts).

1292. Differences in tax regimes are the main source of differences in the net DTA/DTL on the Solvency II balance sheet (beyond their specific economic position of course). If the fiscal valuation principles were the same as the Solvency II valuation principles no deferred taxes for temporary differences would arise on the Solvency II balance sheet; the only DT that might arise would be DTA representing carry-forward of fiscal losses, to the extent permitted in the relevant tax regime.

⁹⁹ These are differences in the balance sheet not due to the other factors detailed in the bullet points but that come from investment choices, other assets, debt ...

1293. The more the valuation principles for the fiscal balance sheet differ from the Solvency II valuation principles, the larger the temporary differences and the larger the DTA and DTL on the Solvency II balance sheet.

Content of the chapter

1294. This chapter consists of key principles regarding the projection of likely future profits:

- role of compliance with the MCR and SCR after bSCR* shock loss;
- future profits stemming from new business;
- future profits from returns on assets;
- future Management Actions (FMA);
- role of the system of Governance;
- supervisory reporting and disclosure.

1295. The principles depict the underlying prudential considerations and are accompanied by a “possible implementation” of the principle, meaning a possible way how the key principles could work in practice to achieve convergence. The possible ways of implementation are not meant to be definitive or exhaustive. In contrast, they are rather for illustration and to stimulate comments from the broader stakeholder community for further development.

Compliance with the minimum capital requirement (MCR) and SCR after the bSCR* shock loss

I. Key principle 1: Role of compliance with the MCR and SCR after shock loss

1296. The extent of compliance with the MCR and SCR after the bSCR* shock has an effect on the likelihood of an undertaking being able to utilise nDT. For example, if an undertaking no longer complied with its MCR after the shock, its supervisor would withdraw its authorisation. Without such authorisation an undertaking would no longer be able to write new business as a source of future profits in the LAC DT calculation.

1297. EIOPA does not expect undertakings using the standard formula to explicitly determine the compliance with their MCR and SCR after the bSCR* shock loss. However, EIOPA does expect that all undertakings reflect the extent of compliance with their MCR and SCR in their assumptions used for their projections of future profits.

1298. If the shock loss would be close to, or an actual breach of the SCR, assumptions regarding likely future profits should reflect this. For example, if the undertaking breached its SCR after shock loss, it is probable that such a disclosure would increase lapses and undermine new business underwriting, even if these risk are not the main contributors of the shock loss.

1299. Similarly, if the undertaking would be close to an MCR breach, more evidence would be needed to demonstrate that future profits would be probable.

Possible implementation of key principle 1

1300. One possible implementation of this principle could be to use a formulaic approach. For instance:

- a) undertakings would disregard future profits from new business if it would not meet its MCR after the bSCR* shock loss;
- b) if their own funds in a post-bSCR* shock situation would be lower than this bSCR*, but higher than its MCR undertakings would take proportionate account of the likely future profits from new business, for instance by applying a linear formula such as the one outlined below;
- c) undertakings with own funds equal or above the bSCR* after the bSCR* shock loss could take full account of likely future profits, taking account of the advised restrictions on new business (see paragraph 1305 and below):

Annual Profits from future new business in LAC DT

$$= \begin{cases} 0 & OF - bSCR^* < MCR \\ \frac{OF - bSCR^* - MCR}{bSCR^* - MCR} \times NewBus & MCR \leq OF - bSCR^* \leq bSCR^* \\ NewBus & OF - bSCR^* > bSCR^* \end{cases}$$

Where:

- *NewBus* equals the profits from new business
- *OF* equals the eligible own funds on the Solvency II balance sheet
- *bSCR** equals $bSCR + SCR_OpRisk - LAC\ TP^{100}$.
- *MCR* equals the minimum capital requirement

1301. Instead of recalculating the MCR and SCR after the shock loss, these values could be approximated by the pre-shock MCR and the bSCR*. The eligible own funds after the shock loss could be approximated by the pre-shock eligible own funds minus the bSCR* shock loss.

1302. Assumptions used for the projections of profits from new business should still take account of the decreased financial position of the undertaking after the shock loss as described in this chapter.

Examples

1303. Consider:

- an undertaking with 250 eligible own funds: $OF = 250$
- $bSCR^* = 100$
- $MCR = 40$

The undertaking would have 150 eligible own funds after the shock loss (250 – 100). That is higher than the bSCR* of 100 that is being used as an approximation of the SCR after the shock loss. In this case, no restriction to the profits from new business would be applied.

¹⁰⁰ Note that the own funds after the shock loss are approximated by $OF - bSCR^* = OF^*$

1304. If the same undertaking only had 150 eligible own funds on its Solvency II balance sheet pre stress, its eligible own funds after the shock loss would equal 50. This is still above its MCR of 40, but below its bSCR* of 100. In that case the annual profits from new business are being limited such that they cannot exceed $(150-100-40)/(100-40)=16.7\%$ of the future profits.¹⁰¹

Future profits stemming from new business

1305. Demonstration of likely utilisation of increases in deferred taxes by virtue of future profits from new business is one of the areas where similar undertakings have provided a wide range of assumptions resulting in a range of LAC DT and SCR outcomes that cannot be explained by differences in solvency position and risk-profiles.

1306. Undertakings often rely on projections for their business plans to demonstrate likely future profits from new business in their LAC DT calculations. The future profits projected to justify LAC DT should consider the impact of post-shock scenario. For example, a mass lapse undermines the capacity of undertakings to finance their overheads or other expenses, hence reducing profits or even generating losses during a future period.

1307. Business plans and their projections used to justify LAC DT vary between 'pessimistic' and 'optimistic' for undertakings with similar risk-profile and risk-appetite. These differences in LAC DT and SCR for similar undertakings appear unjustified.

II. Key principle 2: Future profits stemming from new business – projection assumptions

1308. Future profits stemming from new business should be calculated using assumptions which are consistent with those used to determine own funds in compliance with the Solvency II Delegated Regulation. Given the higher uncertainty after the shock loss, the assumptions of these projections should be set in a manner that is more prudent than for the calculation of technical provisions.

1309. When considering profits from new business it is important to distinguish between two time horizons. The first time horizon relates to the number of years' worth of new business after the shock loss that is recognised by the projection. The second time horizon relates to the projection horizon within which profits for that given new business will emerge.

Possible implementation of key principle 2

1310. New business sold in year 2 of the projection will result in a direct economic profit in year 2 equal to the Economic New Business Value (ENBV); ENBV is the day-one profit or loss of contracts sold when these are valued

¹⁰¹ These future profits are to be determined in line with the rest of this advice.

according to the Solvency II valuation principles for technical provisions¹⁰². If this economic profit in ENBV is taxable, it will generate fiscal profits and losses in the future. These fiscal profits are available for the utilization of the DTA* after the shock loss. Of course, under the condition that the timing of these fiscal profits and DTA*, given the applicable carry-back and carry-forward possibilities, allow for this utilization.

1311. There are different ways to calculate economic profits (based on market-consistent valuation principles). Assumptions are needed (e.g. on inflation, risk-free discount curve, expenses, demography ...) and these assumptions should be compliant with the Solvency II framework. These assumptions should also be consistent with assumptions made in the calculation of technical provisions.¹⁰³

1312. EIOPA would welcome feedback from stakeholders on their experience in calculating the ENBV, in particular on the key parameters that could be dealt with via common principles. EIOPA would also welcome feedback from stakeholders regarding accounting practices, notably how the time horizon is defined for both fiscal and economic profits.

1313. In the remainder of this section EIOPA discusses the horizon over which new business is sold and disregards the question when the taxable economic profits in the ENBV become fiscal profits for the purpose of this section. New business corresponds to all premiums outside of the contract boundaries of the technical provisions in the balance sheet (it can stem from renewals or extensions of existing contracts beyond the current contract boundaries and from completely new contracts).

III. Key principle 3: Future profits stemming from new business – projection horizon of future profits stemming from new business

1314. Given the shock loss and the fact that these future profits are calculated for new business in a hypothetical post-shock situation, there is higher uncertainty compared to the technical provisions calculation and compared to a "normal" scenario (i.e. a pre-shock best estimate scenario). Undertakings should reflect this higher uncertainty into their calculations in a way that is compliant with guideline 9 of EIOPA Guidelines on *recognition and valuation of assets and liabilities other than technical provisions*.

1315. Undertakings should ensure that their forecast of likely new business reflects the impact of the shock loss on the amount of likely new business: the shock loss may lead to a decrease in the amount of likely new business compared to that that would be projected in the pre shock environment of the business plan; the shock loss is expected to decrease the future profits stemming from new business in comparison with realised profits stemming

¹⁰² EVNB may have similarities to the market consistent value of new business developed in the MCEV framework. Important differences exist because the EVNB is to be calculated with assumptions stemming from Solvency II framework, which differ to assumptions in MCEV framework (e.g. the risk-free interest rate curve).

¹⁰³ Please note that "consistency" is not to be interpreted as that "the same" assumptions should be used.

from new business written in past recent years. Furthermore, the impact of the shocks on other assumptions of the projection should be considered as well (e.g. lapse shock may mean the undertaking has lower capacity after the shock to finance overheads and management expenses than beforehand).

Possible implementation of key principle 3 (a)

1316. One way to reflect the consequences of the shock loss, would be to cap the total future profits stemming from new business after the shock loss at the total profits stemming from new business realised in the recent past. One could expect the total future profits stemming from new business not to be greater than 50 percent of the total profits stemming from new business realized in recent years and 50 percent of the total future profits stemming from new business assumed in the business plan. If this is not the case, the undertaking would need to prepare detailed justifications of why this is likely to be the case.

1317. The possible limit in the above paragraph would act as a threshold in the projection of future profits, above which further justifications would be expected. In certain situations, lower levels of projected profits could be expected.

1318. In parallel with this consultation, EIOPA has requested information to (re)insurance undertakings about their projections of future profits. This information will be used to assess this possible implementation and to consider the above threshold of 50 percent.

Possible implementation of key principle 3 (b)

1319. Another possible implementation of the principle of uncertainty in projected future profits arising from new business can be reflected by limiting the horizon of projection of future profits from new business: for instance, applying a reduction factor to the profits from new business after the first 3 years (a similar practice is described in the "CRO Forum Industry Paper on DTA in SCR"). Another example could be to allow 5 fiscal years of projected future profits from new business in full, and nothing thereafter, as a different way to address the uncertainty involved.

1320. This possible implementation is compatible with the previous one (*Possible implementation of key principle 3 (a)*): i.e. the shock loss may lead to a decrease of the future profits stemming from new business compared to those future profits stemming from new business as projected in the pre-shock environment of the business plan. It may also be combined with key principle 4: the amount of new business may also be reduced (see below).

IV. Key principle 4: Future profits stemming from new business – projection horizon of new business sales

1321. Where used to determining likely utilisation of LAC DT, the horizon over which new business sales can be projected should reflect uncertainty.

Possible implementation of key principle 4 (a)

1322. The horizon over which new business sales can be projected could be limited to the length of the projection horizon used in the business plan.

1323. The pros of such an approach are that:

- LAC DT projections are reconcilable with other projections done by the undertaking.
- Business plans are a tool used by undertakings to manage the whole of their business and play a crucial role in the strategy of undertakings. As such, it is a document approved by the AMSB.

1324. Cons are that:

- This restriction may still leave room for an uneven playing field as similar risky and solvent undertakings may have a different LAC DT and SCR caused by different projection horizons used in their business plans.
- Under this restriction, undertakings may lengthen the projection horizon of their business plans in order to allow more future profits from new business to be recognised in their calculation of likely utilisation of LAC DT.

Possible implementation of key principle 4 (b)

1325. In order to reduce the cons identified above and for more convergence in the calculations of likely utilisation of post-shock net DTA, another implementation option is that the horizon over which new business sales can be projected could be limited to the length of the projection horizon used in the business plan, with a maximum of 5 years.

Future profits from returns on assets

1326. Another source of future profits comes from assets in excess of the technical provisions on the Solvency II balance sheet. The assumed returns on these assets are raising differences between similar undertakings. A convergent set of return assumptions can help reduce unjustified differences in LAC DT and SCR for similar undertakings.

V. Key principle 5: Future profits stemming from return on assets

1327. The return assumptions used should take into account the shock loss for market risk and its impact on the economic environment. The extent and timing of the recovery of the financial markets is highly uncertain and future crashes are also possible; (re)insurance undertakings are expected to reflect this uncertainty in their calculations by setting prudent assumptions.

1328. Guideline 9 on the valuation of deferred tax assets in the "*Guidelines on recognition and valuation of assets and liabilities other than technical provisions*" requires that projections of taxable profits are "*broadly consistent*" with the assumptions underlying the projections for the valuation of technical provisions and assets on the Solvency II balance sheet.

1329. The payment of dividends (and hence the decrease in the own funds) should be adequately taken into account, considering both the practice applied during last years and the planning according to the capital and

dividend policies currently in place. The projections of assets in excess of technical provisions should also be consistent with both the asset management policy and practice; see below section on future management action.

1330. When considering returns on assets, the development of the technical provisions should also be taken into account. Assumptions on return on assets also apply to returns on the assets stemming from the new business that is assumed to be sold. Also here, account should be taken of the development of the technical provisions stemming from this new business.

Possible implementation of key principle 5

1331. One way of taking account of the aforementioned uncertainty is to set, for the purpose of the standard formula calculation, returns on assets in future profit projections equal to the forward rates derived from the relevant post-shock risk-free interest rate term structure derived from the interest rates risk sub-module within the market risk module.

1332. Risk-free returns on assets would address supervisory concerns regarding the uncertainty of these future profits after the shock loss. Proscribing returns above the relevant risk-free rates makes LAC DT more certain than assuming returns above the risk-free rate, with the associated risk of returns below that rate, or even negative returns.

1333. Setting returns on assets equal to the relevant risk-free rate would ensure that the calculation is fully consistent with Guideline 9 referred to above, which increases the certainty of future profits from return on assets after the shock loss in the LAC DT standard formula calculation. It implies no so-called pull-to-par and additional returns from recovery of equity markets. In this case, pull-to-par is defined as a recovery of credit spreads to their pre-shock levels.

1334. EIOPA is interested in receiving comments on whether using the post-shock interest rates may incentivize undertakings to hedge interest rates and expose themselves to the risk of upward interest rate shock in order to be able to demonstrate higher likely future profits in the LAC DT calculations. The dependence of LAC DT on being exposed to either an interest increase or decrease also implies that the SCR of an undertaking may suddenly increase or decrease just because it, slightly, adjusts its interest rate hedging.

1335. Other methods may also be used to take account of uncertainty, e.g. projecting various scenarios with regards to future returns on assets. Such greater complexity could (as noted in paragraph 1266 above) imply a greater supervisory scrutiny, such as offered by an internal, or partial internal, model.

VI. Key principle 6: Future profits stemming from return on assets in excess of technical provisions – projection horizon

1336. As for other sources of likely future profits, the returns on assets are uncertain. Even when liabilities run-off, there may be remaining assets in the Solvency II balance sheet that keep generating profits. Compared to the

projection of future profits from new business, the question of the projection horizon for these assets is more difficult to determine: there is no liability that helps determining when the projection should stop. The question of which are these assets also raises difficulties since it depends on the investment strategy and on the maturity of the portfolio among other things. Moreover, additional considerations and requirements about these future profits may apply in some jurisdictions, for example concerning assets management due to terms and conditions of contracts.

1337. The horizon used for the projection of future profits stemming from assets in excess of the technical provisions should be set up in a prudent manner. In particular, (re)insurance undertakings should not project these profits where they cannot objectivise the future own funds of the Solvency II balance-sheet and all elements that will have an impact on future own funds.

Possible implementation of key principle 6

1338. The horizon used for the projection of future profits stemming from assets in excess of the technical provisions could be limited to the time horizon over which new business sales have been considered, with a maximum of, for example, 5 years.

1339. Indeed, the projections done for the purpose of the business plan and over which business sales are considered allow (re)insurance undertakings to project with greater certainty the Solvency II own funds, or at least to assess the impact of existing new business on these future own funds.

1340. Another possible implementation would be to allow the projection horizon to be that of weighted time horizon of technical provisions. As explained above, (re)insurance undertakings would however need to project their Solvency II own funds to that horizon of projection. Such greater complexity could (as noted in paragraph 1266 above) imply a greater supervisory scrutiny, such as offered by an internal, or partial internal, model.

1341. EIOPA will use the information being collected from (re)insurance undertakings to consider the above mentioned horizon.

Future management actions

1342. When demonstrating probable future profits, some undertakings have assumed a range of future management actions, including:

- Recapitalization;
- De-risking;
- Ceasing sales of unprofitable business lines;
- Changes of sales channels;
- Changes to commission structure;
- Transfer of portfolios.

VII. Key principle 7: Future Management Actions (FMA)

1343. The use of future management actions can be an additional source of uncertainty in the calculation of likely utilisation of DTA. Allowing for future management actions without limitations and safeguards bears the risk that

the eligible own funds after the bSCR* shock loss and both the *MCR* and *SCR* after the shock loss are changed in such a way that LAC DT is unjustifiably maximized.

1344. Future management actions become less probable the more they depend on externalities. For example, de-risking is at the full discretion of the undertaking (although policyholders' reaction is not), while the success of recapitalization after a shock loss depends on the willingness of others. The latter is therefore less certain and less probable.

1345. Article 23 of the Delegated Regulation provides requirements on future management actions that relate to the valuation of technical provisions. These requirements should also apply to future management actions integrated into the calculation of LAC DT. In particular an assessment of the results of the future management actions against experience should be included in the FMA plan. The future management actions in the calculation of LAC DT should be part of the existing FMA plan and meet all requirements set out in Article 23 of the Delegated Regulation.

Possible implementation of key principle 7

1346. One FMA which undertakings may consider applying is the use of recapitalization to increase its eligible own funds after the shock loss. Higher eligible own funds after the shock loss will be beneficial for both the projection of likely new business and likely returns on assets and liabilities.

1347. Recapitalization depends on the willingness of third parties to provide additional capital; recapitalization may therefore be less certain for a solo undertaking, which must raise capital from outside the group, than for a member of a group, which might be able to rely on group members to recapitalise them. When considering the likelihood of recapitalization from within a group, undertakings should consider the possibility that the risks of group members are correlated so that they may also have suffered a severe loss in the post stress scenario. Any recapitalization projections should be consistent with the undertaking's risk appetite (e.g. the targeted solvency ratio) and its policy on dividend distributions. These considerations are expected to be carefully assessed and reflected in the future management action plan before they can be reflected in the calculation of likely utilisation of LAC DT.

1348. The transfer of an unprofitable portfolio has sometimes been considered as another FMA under LAC DT calculation. This FMA is likely not to be appropriate since it depends on the willingness of other parties to buy such unprofitable portfolio. Moreover, the valuation on the Solvency II balance sheet already reflects the transfer price of such unprofitable portfolio and no gain from a sale is to be expected.

1349. De-risking measures are not considered relevant to the calculation of likely utilisation of LAC DT. For example, lowering the capital requirements after the shock loss (i.e. *MCR** and *SCR**) would make the proposed restriction on new business less restrictive as the own funds after the shock loss might end up above *MCR** or *SCR**. Allowing de-risking in this setting would thus increase the projected future profits and that contradicts the

common understanding that lower risks because of de-risking imply lower returns.

1350. Another future management action may be to stop selling loss-generating new businesses. This would increase the overall profits from new business. Whilst this measure might meet the requirements of future management actions, reducing the volume of insurance portfolios means lowering the capacity to finance overhead expenses, and hence might lead to projected losses for some future years.

1351. In general, the management actions that are relevant in a pre-stress situation, such as changing a sales channel to increase profitability or changes to commission structure are difficult to accept for the sole purpose of LAC DT calculation: why would the undertaking wait the shock-loss to perform such profitable management actions? The FMA should be compared with the experience as per Article 23(2) of the Delegated Regulation.

Role of system of Governance in LAC DT calculation

1352. As explained above, the LAC DT calculation requires demonstration of likely utilisation which introduces uncertainty and complexity where this depends on a projection of the post-shock situation.

1353. The projections and calculations done to identify likely future taxable profits have similarity with those that are made for the calculation of technical provisions. Solvency II however places fewer governance requirements on this calculation than on the calculation of technical provisions, which increases the risk of unrealistic or inappropriate assumptions being used, inappropriate validation of the results, an inappropriate audit trail being kept, appropriate key functions not being involved and, the AMSB not taking ultimate responsibility for the projections.

VIII. Key principle 8: Role of system of governance

AMSB and Key functions

1354. As part of the ORSA exercise the calculation of LAC DT should be approved by the AMSB. Since the projection of future profits are linked to the business planning of the undertaking and its whole strategy, AMSB approval should play a role in the demonstration of the credibility of the assumptions and calculations.

1355. Key functions (and in particular the Actuarial Function given the required consistency with TP calculation) should play a role in the validation of the assumptions and calculations.

Capital management

1356. Regarding capital management and consistently with Article 297(1) of the Delegated Regulation, undertakings are expected to define their targets both in respect of the solvency ratio (own funds compared to capital requirements) and in respect of the quality of own funds (e.g. maximum percentage of own funds relying on items of the lowest quality, among them, the net deferred tax assets). For the sake of completion and according to the

principle of substance over form, the reliance of own funds on items of lowest quality should consider to which extent the capital needs are covered with net deferred tax assets, both those included as assets in the balance sheet and those accounted to offset losses under a stressed scenario.

1357. It is relevant to bear in mind that the justification of the deferred tax assets (pre-stress) and notional deferred tax assets (post-stress) may rely on future profits. In such case, it is likely that the assessment of future profits will be materially sensitive to the assumptions applied in the projections. Therefore it seems appropriate to carry out sensitivity analysis in order to assess which changes in the aforementioned assumptions may endanger the capacity of the undertaking to keep the quality of its own funds below the limits targeted in order to avoid an overreliance of the capital needs on deferred tax assets and notional deferred tax assets.

ORSA

1358. Article 45 of the Solvency II Directive provides that, as part of its risk-management system, every undertaking shall conduct its own risk and solvency assessment.

1359. In particular, paragraph (1)(b) provides that this assessment shall include an assessment of the compliance, on a continuous basis, with the capital requirements.

1360. Given the materiality of LAC DT and its specificities, the projections performed for the calculation of likely utilisation of LAC DT and the whole of the calculation should be explicitly part of the ORSA. Furthermore, the ORSA should develop a sensitivity analysis to changes in the main assumptions used to estimate or justify both deferred tax assets in the pre-stress situation and LAC DT generated post-shock, including changes in future profits.

1361. In particular, the ORSA report should include a specific section on the calculation of LAC DT and an assessment of its assumption.

Possible implementation of key principle 8

1362. The system of governance on the LAC DT calculation is reinforced, in particular by requiring an approval of the methods used and outcome by AMSB and by involving key functions, in particular the Actuarial Function. In practice this is achieved by including the LAC DT in the scope of the ORSA in particular in the part on compliance with the SCR (Article 45(1)(b) of the Solvency II Directive).

1363. The capital management policy should consider which part of the own funds correspond to both deferred tax assets in the pre-stress situation and LAC DT generated post-shock. The capital management policy should also target appropriate limits to the part of the solvency position that is based on the two aforementioned elements.

1364. The ORSA should include the assumptions and calculations done for the purpose of LAC DT:

- The sources used to justify LAC DT and their effect (e.g. amount justified with DTL pre-stress, amount justified with DTL post-stress, amount justified with future profits).
- A sensitivity analysis to changes in the main assumptions used to estimate or justify both deferred tax assets in the pre-stress and post-stress situation, including changes in future profits.
- Comparisons of the projections against experience where relevant should be performed.
- Where profits from new business after the shock loss are equal of greater than 50 percent of the average profits from new business over the past 3 years, or where they are greater than 50 percent of the assumed profits from new business in the business plan, undertakings should provide specific explanations on the future management actions undertaken to justify such future profits in the ORSA supervisory report.
- the ORSA supervisory report includes a specific section on the calculation of LAC DT and an assessment of its assumptions.

Supervisory Reporting and Public disclosure regarding LAC DT calculation

IX. Key principle 9: Supervisory reporting and disclosure

1365. Consistently with the Solvency II framework, it is appropriate to enhance the information for supervisors and public disclosure of the LAC DT calculation and justification of its likely utilisation.

1366. LAC DT is a material factor in determining and understanding the solvency position of most undertakings and should be publically disclosed in a manner consistent with other material components of the solvency position.

1367. Furthermore, without an adequate public disclosure investors and customers will lack essential data for a well-informed decision. In particular it will be unlikely to have a comparable overview of market participants and to what extent the level playing field is preserved.

Possible implementation of key principle 9

1368. Ensuring enhanced information provision could be achieved by strengthening both the supervisory reporting and the public disclosure of the deferred tax assets in the pre-stress balance sheet and the LAC DT calculation. For instance undertakings could be asked to include in the RSR, if not covered by the ORSA Report, and in the SFCR, under section of Risk profile and/or Capital management, at least the following information:

- The part of the own funds generated by deferred tax assets, both in the pre-stress and post-shock situations.
- The calculation of the notional deferred tax assets.
- The limits targeted in the capital management to the part of the solvency position that is based on the two aforementioned elements.
- The sources used to justify likely utilisation of LAC DT, with a justification of the effect of each source (e.g. amount justified with DTL pre-stress, amount justified with DTL post-stress, amount justified with future profits).

- Where future profits are used to demonstrate likely utilisation of either deferred tax assets in the pre-stress situation or LAC DT generated post-shock,
 - the numbers of years over which new business sales are projected,
 - the time horizon over which profits emerging from that new business are projected,
 - the profits assumed for new business and its comparison with the average profit during the last three years,
 - the rate of return used for future investments supporting technical provisions and the rate of return of other assets,
 - the number of years over which returns of assets in excess of the technical provisions have been projected to demonstrate likely utilisation.
- A summary of the sensitivity analysis carried out regarding the assumptions used to demonstrate likely utilisation of both deferred tax assets in the pre-stress situation and LAC DT. The sensitivity analysis will assess the impact of changes in the assumptions on the solvency position of the undertaking,
- Any other information on both pre-stress deferred tax assets and LAC DT that could influence the decision-making or judgement of third parties.

Possible simplified calculation of LAC DT

1369. Considering the materiality and complexity of the calculation of LAC DT, a simplified calculation of the standard formula could help reducing the complexity and align the assumption settings where appropriate and where proportionate, as per Article 88 of the Delegated Regulation.

1370. The following formulaic approach could be envisaged for a simplified calculation:

$$LAC\ DT = Carry-back + max(net\ DTL, 0) \\ + ApplicableTaxRate \times PF \times CF \times TaxableEconomicProfits - max(net\ DTA, 0)$$

1371. *PF* is a "post-shock factor" to reflect the uncertainty involved in the amount of economic taxable profits after the shock loss. The data collected will be used to set this factor.

1372. *CF* is an adjustment factor for the carry-forward possibilities. In some jurisdictions only a certain percentage of future profits are available for the utilization of DTA. If only 75 percent of the future profits are available for the utilization of DTA, i.e. an undertaking would pay at least taxes on 25 percent of its future profits, *CF* would equal 75 percent. *CF* could also be further adjusted to reflect that carry-forward possibilities vary from several years to infinity.

1373. If the proposed simplified calculation would result in a negative LAC DT, then LAC DT should be set to zero.

1374. If the calculation would result in a number larger than the tax rate times the bSCR* shock loss, LAC DT would be set equal to the tax rate times the

bSCR*. The latter can occur when an undertaking has a relatively large amount of carry-back and net DTL.

1375. The amount of likely annual taxable economic future profits consists of two parts; that arising in relation to profits from new business sold and that arising from returns on assets in excess of the technical provisions.

1376. The likely profits from new business sold would be set at the average economic profits (ENBV) from new business over the past 3 years multiplied by this post-shock factor PF to take account of the uncertainty due to the shock loss. Feedback is welcome on whether such a figure is easily available to (re)insurance undertakings. If not, alternative proposals such as using the average profitability ratio¹⁰⁴ of the past years applied on the volume of new business could be envisaged. This amount of profits could be adjusted according to the formulaic approach of paragraph 1300 (possible implementation of key principle 1) to reflect the compliance with the MCR and SCR in the amount of new business. These taxable economic profits would then be projected over the horizon the business plan with a maximum of five years.

1377. The returns on assets in excess of the technical provisions equal the forward rates derived from the post-shock relevant risk-free interest rate term structure (as in possible implementation of key principle 5). The profits from these asset returns run over the horizon used for the business plan with a maximum of five years (as in possible implementation of key principle 6).

1378. Undertakings that wish to use such a simplified calculation would have to demonstrate that the taxable economic profits become fiscal profits at the right times for the utilization of the post-shock DTA*.

17.4.3. Conclusion on key principles

1379. EIOPA has provided evidence that National Supervisory Authorities have similar approaches with respect to more than 75 % of almost 100 billion euros in LAC DT across the EEA, which is the part of LAC DT where likely utilisation is being demonstrated by a net deferred tax liability (DTL) on the balance sheet. With respect to the remaining part of LAC DT where likely utilisation is being demonstrated by future profits, NSAs do have different approaches. Where carry-back is applicable in the tax regime NSAs also allow for its use to demonstrate likely utilisation of LAC DT, increasing the 75 % of LAC DT where supervisors have similar approaches.

1380. EIOPA recognises the positive position that NSAs have similar approaches with respect to more than 75% of LAC DT across the EEA. Of the remaining proportion where there are differences, EIOPA would consider differences in LAC DT justified if they stemmed from differences in fiscal regimes, risk profiles or the length and duration of assets and liabilities.

¹⁰⁴ Based on fiscal profits: e.g. combined ratio for non-life activities; profitability on return, mortality, lapse risks for life activities.

EIOPA treats the fiscal regimes as given; undertakings in jurisdictions with tax regimes with higher tax rates or more favourable carry-forward and carry-back possibilities will, all else equal, have a higher LAC DT.

1381. EIOPA has observed a wide range of judgement involved in the part of LAC DT that relies on projecting the future profits estimated after the bSCR* shock loss¹⁰⁵. Subjectivity in itself is not a problem as valuations for the Solvency II balance sheet and SCR calculations require expert judgement. However, typically expert judgement for the balance sheet valuations and SCR calculations result in a relatively small range of possible outcomes for similar assets and liabilities and risks. With respect to the part of LAC DT that is demonstrated by future profits, supervisors have observed a wide range of assumptions and outcomes for similar undertakings.

1382. For this reason and according to Articles 8 and 16 of EIOPA Regulation (Regulation (EU) 1094/2010 of 24 November 2010) EIOPA strives to achieve convergence in the calculation of LAC DT under the standard formula and in particular for the projection of post stress taxable profits used to demonstrate the likely utilisation of increases in deferred taxes, and, going forward, will consider suitable good practices to ensure such convergence.

1383. In this chapter on LAC DT, EIOPA did not distinguish the elements that could be part of its advice to the European Commission on possible changes to the Delegated Regulation from the elements that could be better addressed via supervisory convergence tools, such as Guidelines, Opinion or Supervisory Handbook. For this reason, this chapter does not contain a blue box advice. After further discussion, including considering stakeholders' comments, EIOPA will take a reasoned decision.

1384. EIOPA considers several key principles to foster supervisory convergence and to address three concerns:

- **Uncertainty** about future profits for utilization of notional deferred tax assets (DTA)
- **Complexity** involved in projections of these future profits
- **Uneven playing field** because of wide range of judgement involved in the likely utilisation of notional DTA

1385. These key principles are about:

- Role of compliance with the MCR and SCR after shock loss
- Future profits stemming from new business – projection assumptions
- Future profits stemming from new business – projection horizon of future profits stemming from new business
- Future profits stemming from new business – projection horizon of new business sales
- Future profits stemming from return on assets

¹⁰⁵ The bSCR* shock loss is the SCR minus LAC DT or, put differently, the basic SCR (bSCR) plus operational risk and the Loss-Absorbing Capacity of Technical Provisions (LAC TP)

- Future profits stemming from return on assets in excess of technical provisions – projection horizon
- Future Management Actions
- Role of system of governance
- Supervisory reporting and disclosure

1386. Proportionality should play an important role in the implementation of these principles. Different levels of complexity could be appropriately treated via the standard formula, a simplified calculation of the standard formula, or an internal model. EIOPA would like to receive comments from stakeholders on how the key principles could be used in the different levels of complexity.

18. Risk margin

18.1. Call for advice

1387. According to Article 77(5) of the Solvency II Directive, the risk margin shall be calculated by determining the cost of providing an amount of eligible own funds equal to the SCR necessary to support the insurance and reinsurance obligations over the lifetime thereof. The risk margin is such as to ensure that the value of the technical provisions is equivalent to the amount that (re)insurance undertakings would be expected to require in order to take over and meet the (re)insurance obligations.

1388. As part of the SCR review EIOPA is asked to:

- Provide information on the relative size of the risk margin in insurers' balance sheet.
- Assess if the methods and assumptions applied in the calculation of the risk margin continue to be appropriate, in view of a changed market environment. In particular, EIOPA is asked to review the Cost-of-Capital rate (CoC rate).

18.2. Legal basis

Solvency II Directive

1389. Recital 56: *The assumptions made about the reference undertaking assumed to take over and meet the underlying insurance and reinsurance obligations should be harmonised throughout the Community. In particular, the assumptions made about the reference undertaking that determine whether or not, and if so to what extent, diversification effects should be taken into account in the calculation of the risk margin should be analysed as part of the impact assessment of implementing measures and should then be harmonised at Community level.*

1390. Article 77 – Calculation of technical provisions

(1) The value of technical provisions shall be equal to the sum of a best estimate and a risk margin as set out in paragraphs 2 and 3.

[...]

(3) The risk margin shall be such as to ensure that the value of the technical provisions is equivalent to the amount that insurance and reinsurance undertakings would be expected to require in order to take over and meet the insurance and reinsurance obligations.

[...]

(5) Where insurance and reinsurance undertakings value the best estimate and the risk margin separately, the risk margin shall be calculated by determining the cost of providing an amount of eligible own funds equal to the Solvency Capital Requirement necessary to support the insurance and reinsurance obligations over the lifetime thereof.

The rate used in the determination of the cost of providing that amount of eligible own funds (Cost-of-Capital rate) shall be the same for all insurance and reinsurance undertakings and shall be reviewed periodically.

The Cost-of-Capital rate used shall be equal to the additional rate, above the relevant risk-free interest rate, that an insurance or reinsurance undertaking would incur holding an amount of eligible own funds, as set out in Section 3, equal to the Solvency Capital Requirement necessary to support insurance and reinsurance obligations over the lifetime of those obligations.

1391. Article 86 – Delegated Regulation and Regulatory and Implementing technical standards

1. The Commission shall adopt delegated acts in accordance with Article 301a laying down the following:

...

(d) the methods and assumptions to be used in the calculation of the risk margin including the determination of the amount of eligible own funds necessary to support the insurance and reinsurance obligations and the calibration of the cost-of-capital rate, as referred to in Article 77(5);

Delegated Regulation

1392. The calculation of the risk margin is described in Subsection 4 of the Delegated Regulation, Articles 37 to 39. In particular, Article 39 provides the following:

The Cost-of-Capital rate referred to in Article 77(5) of Directive 2009/138/EC shall be assumed to be equal to 6 %.

18.3. Feedback statement on the main comments received to the discussion paper

Level of the cost of capital

Stakeholders proposal	Assessment
<p>The CoC rate should be fixed at the level that corresponds to current market conditions.</p>	<p>The proposal does not ensure that the risk margin is sufficient where liabilities run off over a longer time period that includes market conditions different from current conditions.</p> <p>A CoC rate that reflects current credit spreads, for instance, would have procyclical effects. Technical provisions would increase when credit spreads are widening forcing insurers to derisk their asset portfolios thereby contributing to further spread</p>

	<p>widening.</p> <p>A CoC rate that reflects current interest rates is discussed separately below.</p>
<p>The CoC rate should be fixed and based on market prices for underwriting reinsurance (2-3 %) or on MCEV approaches (4.5 %).</p>	<p>Market prices for underwriting reinsurance risks corresponding to those in the risk margin are typically not directly observable, and the approach under MCEV does not seem to be in line with the transfer value approach of Solvency II. A methodology followed for the initial calibration of the CoC rate – using a weighted average cost of capital model, (assessing the expected cost of equity with a shareholder return model) and proceeding with adjustments to reflect the long term objectives seems more appropriate.</p>
<p>The CoC rate should be fixed and based on the long-term average of EUR/USD investment grade spread levels of 2-3 % since it corresponds to the level of the VaR at 99.5 %.</p>	<p>The CoC rate should reflect the cost for raising sufficient own funds for the reference undertaking. The current CoC rate reflects the average composition of equity and debt at the time of original calibration across European insurance undertakings. Since then the debt-funding has not significantly increased.</p> <p>The debt CoC for insurance undertakings may be different from the debt CoC of other undertakings.</p> <p>The universe of investment grade instruments will contain senior debt which does not count as regulatory capital under SII. It therefore may not be appropriate to reflect yields on senior debt instruments when deriving the CoC.</p>
<p>The CoC rate should be fixed to avoid unintended pro-cyclicality and for reasons of simplicity. EIOPA should</p>	<p>The Solvency II Directive provides that the CoC rate should be reviewed periodically.</p>

periodically review the CoC rate and keep it constant between these reviews.	CEIOPS advice on the risk margin suggested a method for such revision. It is EIOPA's objective to document the proposed approach.
The CoC rate should not be fixed but change gradually depending on a long-term average, as for the UFR.	As part of the refresh of the cost of capital methodology the appropriate role for averages and length of time period will be considered to avoid undue volatility and procyclical effects.

Sensitivity of the cost of capital to interest rates

Stakeholders proposal	Assessment
<p>The CoC rate should be allowed to vary per currency. Some stakeholders propose that it could be the sum of a fixed credit risk component and a floating interest rate risk element:</p> $\text{CoC} = [X\% * \text{risk free rate}] + [Y\% \text{ fixed addition}]$ <p>Stakeholders argue that this proposal would reduce the volatility of the risk margin.</p>	<p>The Solvency II Directive provides that the CoC rate shall be the same for all insurance undertakings. A differentiation of the CoC rate by currency may not be in line with the Directive.</p> <p>There is no clear economic justification of the proposal. Its main objective seems to be to reduce the volatility of the risk margin.</p> <p>The proposed approach may reduce the volatility of the risk margin for long-term business, but may increase it for short-term business, unless the rate was to vary by term.</p> <p>See also the assessment below this table.</p>
<p>Some stakeholders propose to adjust the formula as set out above, where the CoC rate is allowed to vary according to a weighted average of risk-free interest rates for different currencies.</p>	<p>The proposal aims to lower the volatility of the risk margin, but will not achieve that in case interest rates of different currencies move in different directions.</p>

1393. The empirical and academic evidence to support a theoretical link between the risk-free rate and the equity risk premium is mixed. The economics and finance profession has investigated the use of macroeconomic variables to forecast the cost of capital, including risk-free interest rates, but has yet to reach a consensus.^{106 107}
1394. Over the very long term prior to 2000, there was a mostly positive relationship between the returns demanded by equity investors and those demanded by investors in government bonds.¹⁰⁸ Using data from the 1960s onwards, Damodaran (2012) also found a positive relationship between the equity risk premium and the risk-free rate (see Chart below).¹⁰⁹ That might suggest that the risk premium does tend to decline as risk free interest rates fall, and vice versa.
1395. However, in the early part of this century, the relationship between equity returns and risk-free bond yields appeared to turn negative. Various explanations have been put forward, including investors being less concerned about inflation and more concerned about low economic growth, and post-crisis there has been an increased demand for risk-free assets.¹¹⁰ The change in this relationship has also been reflected in the relationship with the equity risk premium. Damodaran's (2016) most recent estimates of the relationship between the equity risk premium and the risk-free rate has found only no statistically significant relationship.¹¹¹

¹⁰⁶ Neely, Rapach and Tu (2012) Forecasting the Equity Risk Premium: the Role of Technical Indicators

¹⁰⁷ Duarte and Rosa (2015) The Equity Risk Premium: A Review of Models

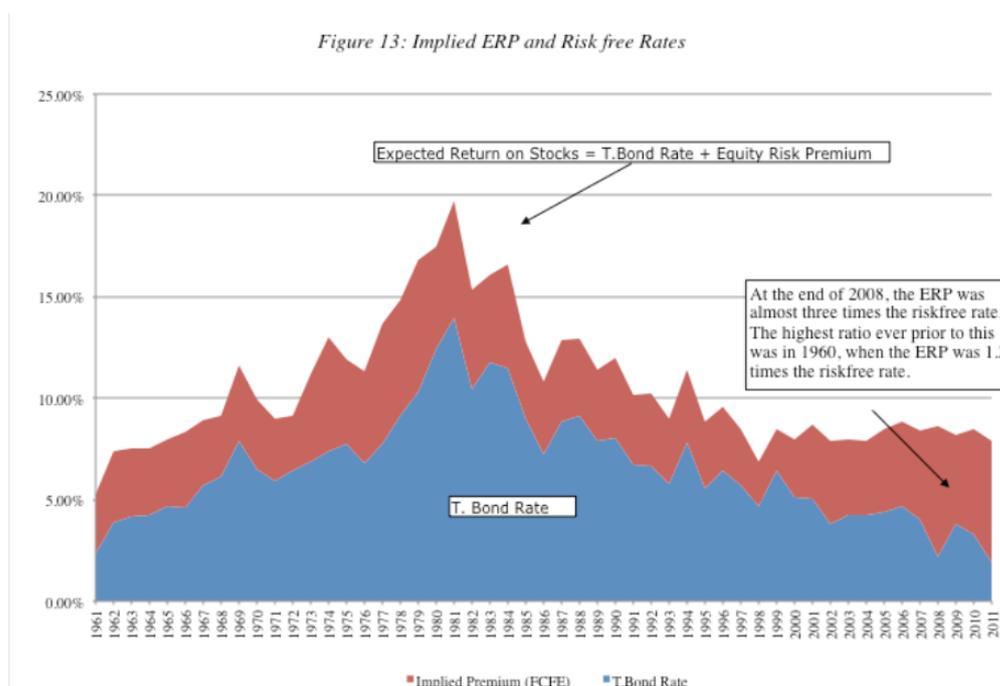
¹⁰⁸ Campbell, Sunderam and Viceira (2016) Inflation Bets or Deflation Hedges? The Changing Risks of Nominal Bonds. Roberts-Sklar (2016) 250 years of the bond-equity correlation, Bank of England Bitesize

¹⁰⁹ Damodaran (2012) Equity Risk Premium (ERP): Determinants, Estimation and Implications – The 2012 Edition. See also Cappiello and Guene (2005) Measuring Market and Inflation Risk Premia in France and in Germany, ECB Working Paper, for evidence of the effects of inflation on equities and long-term government bonds.

¹¹⁰ Roberts-Sklar (2016) 250 years of the bond-equity correlation

¹¹¹ Damodaran (2016) Equity Risk Premium (ERP): Determinants, Estimation and Implications – The 2016 Edition. The coefficient in the regression of the equity risk premium on long-term interest rates remains positive, but is not statistically significant.

The relationship between the equity risk premium and yields on long-term risk free bonds



Source: Damodaran (2012)

Calculation of the risk margin

Stakeholders proposal	Assessment
The reference undertaking should be allowed to use the VA and MA.	Changes to the scope of application of the long-term guarantee measures should be assessed in the ongoing review of the long-term guarantee measures and measures on equity risk. Measures that require supervisory approval on a case-by-case basis should not be assumed to be granted for all undertakings.
Allowing for more diversification in the reference undertaking: between the life and non-life business for composite insurance undertakings and between the other business that the reference undertaking could have on its own.	The current calculation already allows for diversification across lines of business. The assumption is however that the life and non-life business are taken over separately by two different undertakings and the reference undertaking is empty before receiving the business of the original

	<p>undertaking. This approach appears still to be more realistic than assuming that the portfolio is transferred to a composite undertaking. That is in particular the case for composite undertakings subject to grandfathering in accordance with Article 73(5) of the Solvency II Directive.</p>
<p>Allowing for hedgeability of longevity risk.</p>	<p>The current assumptions for the reference undertaking allow taking account of the risk-mitigation technique that are in place in the original undertaking.</p> <p>That assumption still appears to be appropriate. It is not clear why the reference undertaking should apply more (or less) risk-mitigation than the original undertaking. If the approach would be changed and the assumption on additional risk mitigation would be included in the transfer scenario, then the cost of hedging would need to be reflected in the risk margin.</p>
<p>In order to simplify the RM calculation, use a percentage of the best estimate or of the SCR or a different CoC rate per line of business.</p>	<p>The simplifications of using a percentage of the best estimate or of the SCR provide a bad approximation for lines of business where the duration of liabilities differs across undertakings. There are simplifications available that take into account the duration information and are equally easy to calculate.</p> <p>The distinction per line of business may allow adjusting the CoC rate for long term business, but it would be more complex to calculate and the RM may less benefit from diversification effects.</p>
<p>Use a time scaling factor to reduce SCR projected.</p>	<p>The materiality of the risk diversification over time is not clear nor how this effect can be quantified reliably. The diversification effect appears to be business-specific, existing mainly where risks may result</p>

	in policyholders leaving the portfolio (e.g. for lapse risk or mortality risk).
Include market risk in the reference undertaking.	It would be more realistic to assume that the reference undertaking is exposed to market risk. It would however increase the complexity of the risk margin calculation.
Cap the risk margin at 100 % of the SCR.	There is no conceptual reason that would justify capping the risk margin. For liabilities with long durations a risk margin that exceeds the SCR can be appropriate.
Allow the risk margin to change in the scenario-based calculations of the SCR standard formula.	It would be more realistic to assume that the risk margin can change in the stress scenarios. It would however increase the complexity of the risk margin calculation, in particular because the risk margin itself depends on the future SCR of the insurance portfolio.
The calculation of the group risk margin should allow for intra group transactions.	The group risk margin is calculated as the sum of the risk margin for the participating undertaking and the proportional shares of related undertakings. Consequently the risk margin allows for intra-group transactions reflected in the risk margin of those solo undertakings.

1396. The focus of EIOPA's work is currently to provide an advice on revising the CoC rate as a fixed amount. The starting point for the development of the methodology is the earlier advice from CEIOPS on the RM.

18.4. Advice

18.4.1. Previous advice

1397. CEIOPS provided advice on the risk margin for the level 2 implementing measures for Solvency II “Technical Provisions – Article 86(d) – Calculation of the Risk Margin” (CEIOPS-DOC-36/09)¹¹² On the derivation of the CoC rate the advice included in particular the following:

The Cost-of-Capital rate has to be a long-term average rate, reflecting both periods of stability and periods of stress. Otherwise, the rate would vary from year to year, and would be higher in times of economic uncertainty.

A rate of at least 6 per cent is assessed to be an adequate placeholder for the Cost-of-Capital rate in the current context of the Solvency II regulation. In order to reach this conclusion it may be argued along the following lines:

- *Shareholder return models provide the initial input.*
- *Some objective criteria may cause upward and downward adjustments of the initial input.*
- *A final calibration of the Cost-of-Capital rate, in order to obtain risk margins consistent with observable prices in the marketplace, may be necessary.*

Shareholder return models

A rate of at least 6 per cent is assessed to be an adequate placeholder for the Cost-of-Capital rate in the current context of the Solvency II regulation

As the most commonly used models in the market seem to be the Capital Asset Pricing Model (CAPM) and versions of the Fama-French multi Factor Model (FFmF), CEIOPS’ analysis has been confined to the results given for these models... CEIOPS finds it ... appropriate to base the assessment of the Cost-of-Capital rate on CRO Forum’s results for the CAPM and the FF2F method for European insurance undertakings.

Table 2. Equity Risk Premiums as assessed in the CRO Forum’s report.⁴⁴

	CAPM		FF2F	
	European market	Global market	European market	Global market
Life	10.0 pct	5.1 pct	11.8 pct	9.4 pct
Non-life	7.4 pct	4.2 pct	12.5 pct	9.6 pct

¹¹² See <https://eiopa.europa.eu/CEIOPS-Archive/Documents/Advices/CEIOPS-L2-Final-Advice-on-TP-Risk-Margin.pdf>

Taking into account only the results from the shareholder return models a cost-of-capital rate of 7.5% - 10% seems to be adequate.

Objective adjustments

In order to account for the fact that a key source of return that exists for going concerns (the so called franchise value related to expected profit from new business) may not be demanded by capital providers in a transfer context, a downward adjustment is needed. No reliable quantitative results are available concerning the size of this adjustment.

Additional costs may stem from:

- *Frictional costs of carrying capital. These are ... costs related to managers' incentives, information asymmetries, and so on. Again, these costs are very difficult, if not impossible, to quantify.*
- *Initial costs of raising capital. These are fees for underwriting, listing and regulation, which in most jurisdictions are not negligible.*
- *Corporate income taxes on the risk margin in some tax jurisdictions. This is the case if the risk margin is considered as taxable profit at inception and not as taxable income only over the time of its release from the risk margin.*

It is unlikely that the downward adjustment outweighs the upward adjustments by a large margin. A reasonable range for the cost-of-capital rate taking into account these necessary adjustments could be 6% to 8%.

18.4.2. Analysis

Size of the risk margin

1398. Based on the reporting of insurance and reinsurance undertakings to their national supervisory authorities EIOPA has analysed the size of the risk margin at the end of the first, second and third quarter of 2016.¹¹³ The size of the risk margin was compared to the best estimate, the own funds and the SCR. The comparison was performed for all undertakings and separately for life insurance undertakings, non-life insurance undertakings and undertakings pursuing both life and non-life activities.

1399. At European level the risk margins amounted to EUR 161 billion at the end of 2016. The following table sets out the relative size of the risk margin for the end of the first three quarters of 2016 at European level:

¹¹³ Additional reference dates may be included in the analysis after the consultation.

	Q1 2016	Q2 2016	Q3 2016
Ratio of risk margin and best estimate	2%	2%	2%
Ratio of risk margin and amount of own funds	12%	12%	13%
Ratio of risk margin and SCR	26%	26%	26%

1400. For the calculation of the risk margin, it is necessary to calculate future SCR for each point in time over the lifetime of (re)insurance obligations. The longer the obligations, the longer the projection of the SCR. That is why, for long-term business such as annuities, the risk margin is generally higher than for short-term business and more sensitive to changes in long-end maturities of the risk-free interest rate term structure.

1401. More detailed results can be found in "35. Annex to chapter 18 – Relative size of the risk margin".

General approach to the review of the CoC rate

1402. The initial calibration of the CoC rate was carried out by CEIOPS in 2009, resulting in a recommendation to fix the CoC rate within the range of 6%-8%. On the basis of CEIOPS' recommendation the Commission included a CoC rate of 6% in the Delegated Regulation.

1403. In order to assess the CEIOPS method and possible alternative methods EIOPA developed a list of criteria to assess and compare the methods. The criteria are set out in the following table.

Criteria	Prerequisite for methodology
Reflects economic reality	Solvency II is a market consistent regime, and so all elements of the regime should reflect the economic reality. Note that this does not mean the model would need to rely <i>only</i> on current market data or observations.
Captures all relevant costs (e.g. dividends and share buy-backs)	Methods that only use dividends can be criticised for not including other forms of compensation, e.g. buy-backs. Buy-backs are more important in US than Europe, but are still a part of compensation.
Underlying assumptions are realistic and reliable	The methods are based on assumptions, for example on current and future shareholder remuneration or on how the country of the undertaking influences the equity risk premium of the undertaking. These assumptions should be realistic and reliable in order to ensure an appropriate derivation of the equity risk premium.
'Through the cycle calibration'	As per the original CEIOPS advice, the method should result in a long-term average result, at least with regard to changes in credit risk. Otherwise, the rate would vary from year to year, and would be higher in times of economic uncertainty. This may have procyclical effects with regard to the investment behaviour of insurance and reinsurance undertakings.
Results should not be too volatile	A volatile CoC rate would cause the own funds of insurance and reinsurance undertakings to be also volatile. Where this volatility does not reflect fundamental economic changes it should be avoided. ¹¹⁴
Transparent	The methodology should be clearly specified so that stakeholders can understand how the COC rate is derived. Transparency enables firms to model and predict potential future results of the methodology.
Replicable in the future	The methodology should be capable of being replicated by EIOPA on a regular basis, without being onerous. This will in particular ensure that the CoC rates derived by EIOPA are consistent over time.
Simplicity	Where it does not introduce material error the methodology should be simple. This will contribute to the transparency and replicability of the methodology.

¹¹⁴ The risk margin being calculated as a percentage of the sum of discounted future SCR may change according to economic conditions even if the CoC is stable

1404. The requirement of a calibration 'through the cycle' was already applied in the initial calibration of the CoC rate. EIOPA explicitly recommended that the CoC rate should be a long-term average rate, reflecting both periods of stability and periods of stress.

1405. The CEIOPS method and the other methods analysed have the following theoretical setting in common:

Basic formula for the Cost of Capital

$$\text{CoC} = (\text{Cost of equity}) * (\text{Weight of equity}) + (\text{Cost of debt}) * (\text{Weight of debt})$$

Cost of equity

1406. The cost of equity is a commonly investigated element in the field of economics. The estimation of the cost of equity is usually based on the capital asset pricing model (CAPM). That model is based on the assumption that the only risk priced by rational investors is systematic risk, because this risk cannot be eliminated by diversification. Accordingly, the expected return of a security is equal to the rate on a risk-free security (r_f) plus a risk premium multiplied by the asset's systematic risk (beta - β):

$$\text{Cost of equity} = r_f + \beta * ERP$$

1407. The *Equity Risk Premium (ERP)* is the difference between the return on the market and the risk-free rate. It represents the extra return that investors demand above a risk-free rate to invest in an equity class.

1408. The factor beta is the measure of the non-diversifiable risk from owning a particular stock, and it is derived from a regression analysis of how a change in the market index affects the returns on the individual stock. It is given by:

$$\beta = \frac{\text{Cov}(r_m, r)}{\text{Var}(r_m)}$$

where r_m is the return of the market and r is the return of the individual stock. The beta is meant to reflect that a given sector company stocks may constantly perform differently to that wider market. A beta of 1 indicates that the stock price moves with the market.

Cost of Debt

1409. The cost of debt reflects the default risk that lenders perceive from an investment.

1410. CEIOPS analysis showed, based on the QIS4 results, that debt funding cannot constitute more than 6 – 8% of the capital base, and thus assigned 0% to the weight of debt by way of simplification. The situation has not significantly changed since QIS4. The weight of debt is therefore still assumed to be nil.

1411. Consequently, the amount to determine is the following:

$$CoC - r_f = \text{Cost of Equity} - r_f = \beta * ERP$$

1412. The Cost of Capital is therefore driven by the cost of equity, i.e. by the ERP and the beta from the insurance sector.

1413. Further adjustments to the product of ERP and beta may be necessary in order to allow for economic aspects not taken into account in that calculation.

1414. The following analysis is structured in three parts that correspond to three steps of the CoC calculation:

- Equity risk premium
- Beta factor
- Further adjustments

Equity risk premium

Initial derivation of the equity risk premium

1415. CEIOPS advice was based on a derivation of the equity risk premium from historical returns. The premium was derived from the return of US stocks over 30-day T-bill rates for the period from July 1926 to December 2006. The resulting equity risk premium was 7.81%.¹¹⁵

Models to calculate the equity risk premium

1416. Estimating ERPs on the basis of historical returns was the commonly used approach at the time of CEIOPS' advice. Since then further methods have been developed to estimate the ERP. The development of these new methods does not mean that academics have dismissed the use of historical returns. Apart from that also variants of estimating ERPs on the basis of historical returns have emerged.

1417. Five types of approach to estimating the equity risk premium were considered¹¹⁶

- Historic return models
- Dividend discount models
- Cross section approaches, explaining differences in the ERP between firms
- Time-series approaches, based on economic and financial variables
- Surveys of firms.

¹¹⁵ CEIOPS advice was based on calculations performed by the Chief Risk Officer Forum, see "Market Value of Liabilities for Insurance Firms", page 56 (<https://www.thecroforum.org/wp-content/uploads/2012/10/croforummvlpaperjuly2008.pdf>)

¹¹⁶ Duarte and Rosa (2015) The Equity Risk Premium: A review of models, FRBNY staff report 714

1418. The basic idea behind each of the approaches is to measure the compensation investors expect and use this to infer a discount rate, which is comprised of the equity risk premium and the risk free interest rate. In general, approaches use past equity returns as a measure of expected compensation, or measures of expected future cash flows.

1419. In what follows we focus on two of these five approaches – *historic return models* and *dividend discount models*. This is because EIOPA is interested in the ERP across the sector, ruling out a *cross section approach*. *Time-series approaches* are an area of live academic debate, where a consensus has yet to emerge. *Surveys of firms* would rely on collecting data from firms. Although surveys may prove a useful validation exercise, we do not see a survey as being able to be used as a sufficiently robust calibration tool.

Historical return model

1420. CEIOPS advice was based on a time series of US stocks since 1926. Since the CoC rate will be primarily applied in the European insurance market a calibration on European stocks appears preferable. The disadvantage of that approach is that for European stock markets the history of consistent data is shorter than for the US stock market. The use of a shorter time series would result in an estimate of the ERP that is less stable. On the other hand, 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.

1421. The analysis that CEIOPS advice was based on also includes a long-term estimate of the ERP on European data for the period from January 1975 to December 2006 of 9.24%.¹¹⁷ This time series can be extended with data from January 2007 to December 2016. The data used for that extension were returns of the Eurostoxx 600 over the 1-year euro risk-free interest rates of Solvency II. After the extension the average ERP of the time series is 8.09%.

1422. For comparison also the result of extending the time series of US stocks since 1926 was calculated. The extension is based on S&P 500 stock returns and 1-year US dollar risk-free interest rates. The outcome is an ERP of 7.54%. The comparison is relevant because the beta factor derived for the S&P 500 Index is in the same range as the ones derived for the European indices (see next section on the beta factors).

1423. In order to validate the aforementioned results an approach of A. Damodaran was followed to derive the European ERP.¹¹⁸ The calculation consists of four different steps: determining the market premium of the S&P 500, assessing the country risk using Moody's ratings, converting the country

¹¹⁷ See Chief Risk Officer Forum (2008) "Market Value of Liabilities for Insurance Firms", page 56 (<https://www.thecroforum.org/wp-content/uploads/2012/10/croforummvlpaperjuly2008.pdf>).

¹¹⁸ See Aswath Damodaran (2016) "The Cost of Capital: The Swiss Army Knife of Finance", (<http://people.stern.nyu.edu/adamodar/pdfiles/papers/costofcapital.pdf>). The equity risk premium used for the S&P 500 is based on data from 1966 to 2015 and derived in relation to US T-Bills, see table 1 on page 11.

risk measure into an additional country risk premium for equity and estimating the ERP for the country. This give the following results for the EU countries:

Country	Total ERP (%)	Country risk premium (%)	GDP (M\$)
Austria	6	0	376 950
Belgium	6,9	0,9	455 086
Bulgaria	8,84	2,84	50 199
Croatia	9,72	3,72	48 732
Czech Republic	7,05	1,05	185 156
Denmark	6	0	301 308
Estonia	7,05	1,05	22 459
Finland	6	0	232 351
France	6,74	0,74	2 418 836
Germany	6	0	3 363 447
Hungary	9,72	3,72	121 715
Ireland	8,38	2,38	283 703
Italy	8,84	2,84	1 821 497
Latvia	7,79	1,79	27 003
Lithuania	7,79	1,79	41 400
Luxembourg	6	0	56 800
Malta	7,79	1,79	9 746
Netherlands	6	0	750 284
Poland	7,26	1,26	477 066
Portugal	9,72	3,72	199 113
Romania	9,28	3,28	177 954
Slovakia	7,26	1,26	87 264
Slovenia	9,28	3,28	42 775
Spain	8,84	2,84	1 192 901
Sweden	6	0	495 694
UK	6,59	0,59	2 861 091
Average	7,02	-	-

1424. The weighted average of the country ERPs with GDP weights¹¹⁹ is 7.02%.

Dividend discount model

1425. The equity risk premium represents the additional compensation required by investors to hold risky assets. For the purposes of determining an estimate of the CoC that the reference entity would require we are concerned with investors' required future returns. Historical ERP can be determined by examining the difference between returns on equity investments and risk-

¹¹⁹ World Bank 2015

free returns over a particular time period. On the assumption that the past is a good guide to the future, and that over a suitably long time period unexpected returns average zero, then historical ERP can be used as an estimate of the expected future ERP. Forward-looking methods (primarily dividend discount models) on the other hand use data based on current economic conditions (for example equity prices and compensation to shareholders) and assumptions on future economic development (eg growth) to infer the ERP.

1426. The Damodaran method is one example of a dividend discount model. It is an extension of the simpler 'Gordon Growth model' in which the ERP is determined using current dividend yields and risk-free rates and an assumption that future dividends will grow at a constant rate in perpetuity.

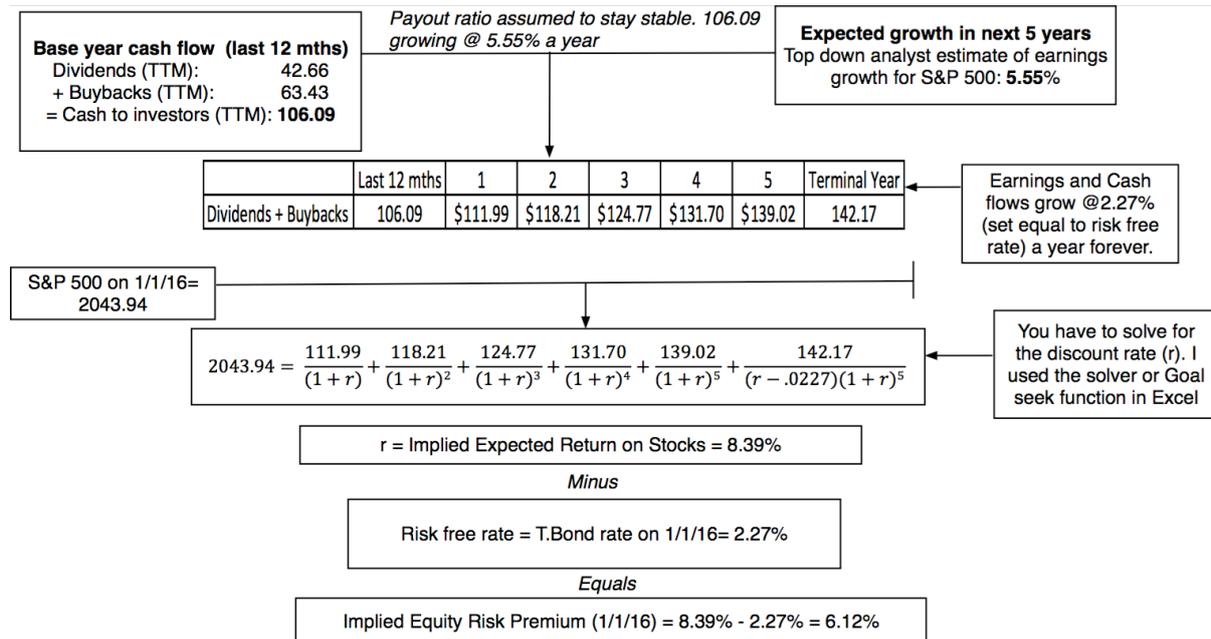
1427. The Damodaran method enhances this method in two ways:

- First, it makes a forward projection of compensation, by applying a constant dividend growth assumption for 5 years and a long-run assumption for the remaining years.
- Second it is assumed that shareholders are remunerated not only by dividends but also share buy-backs.

1428. The Damodaran method projects future compensation, and derives the ERP from the discount rate that gives these future cash flows a present value equal to the current share price. The computation of the ERP using the Damodaran method is set out in the figure below. For further information on the Damodaran method see 'Damodaran, The Cost of Capital: The Swiss Army Knife of Finance, 2016 ('The Damodaran paper').¹²⁰

¹²⁰ <http://people.stern.nyu.edu/adamodar/pdfiles/papers/costofcapital.pdf>

How Damodaran determines the implied ERP for S&P 500 – January 2016 (extracted from ‘The Damodaran paper’)



1429. The key assumptions and features of the model are as follows:

- **Data:** We have used Eurostoxx 600 data on the basis that this data is readily available, and is representative of listed European firms.
- **Dividend growth for the first five years of the projection:** An assumption of 5.5% has been used in line with Professor Damodaran’s assumption, which is based on consensus estimates. The average dividend growth rate of the Eurostoxx 600 over the last five years was c5% (and c0% over the last 10 years).
- **Growth after the first five years:** The assumption that compensation grows at the risk free rate after the first 5 years of the projection is another feature of the Damodaran model. This is on the basis that the growth rate assumed for the first five years will not continue indefinitely and long-term growth will be equal to the growth of the wider economy¹²¹.
- **Risk-free rate:** We have used the 10-year rate for the Euro Area (OECD data) of 0.93% as per the Damodaran methodology¹²².
- **Proportion of total compensation due to share buy-backs:** We have included share buy-backs, which represented c30% of shareholders’ total

¹²¹ See pages 64-65 of <http://people.stern.nyu.edu/adamodar/pdfiles/papers/ERP2012.pdf>

¹²² It is also widely used by practitioners, e.g. CFA Institute (2009) Equity

remuneration over the last 10 years.¹²³ This represents an uplift factor of 143% to dividends to arrive at total compensation ($1/(1-0.3)$). This uplift factor has been applied to actual dividends used to determine projected future compensation.

1430. The results are shown in the chart below. Both point-in-time and smoothed results have been shown. See below for further details.

Damodaran ERP estimates based on Eurostoxx 600



1431. The results show that the ERP derived using the Damodaran method is in the same range for most of the points in time. However, during the financial crisis the ERP strongly increased. This may be due to a faster adjustment in share prices, due to weaker economic growth, than in companies' dividend policy. In practice firms are often reluctant to reduce dividends and share prices subsequently recovered post crisis. The chart also shows results on a smoothed basis by averaging the point-in-time results over a 10-year period. The smoothed estimate is about 6%.

1432. The results show the following sensitivities to the changes in the input parameters:

- An increase in the compensation growth assumption in the first 5 years of 100bps (from 5.5% to 6.5%) results in a c20bps increase in the derived ERP.

¹²³ See ECB (2007) Monthly Bulletin, Share Buybacks in the Euro Area and Pictet (2015) Share Buybacks: A powerful driver that looks set to gain even more momentum.

- Assuming that compensation growth in the first 5 years of the projection is equal to the risk-free rate (i.e. lower than 5.5%) would reduce the derived ERP by 120bps.
- Increasing the period for which we assume 5.5% growth in total compensation from five years to ten years – a departure from the Damodaran method - increases the derived ERP by c80bps¹²⁴.
- Using the 10yr rate from the EIOPA curve as the risk free rate increases the derived ERP by c10 basis points. Using the 1yr rate from the EIOPA curve as the risk free rate increases the derived ERP by c30 basis points.
- A 5 percentage point increase in the uplift factor applied to dividends to allow for share buybacks (e.g. from 143% to 148%) results in an increase in the derived ERP of c25bps.
- A reduction in the risk free rate of 50bps results in an increase in the derived ERP of c20bps. Note that in the Damodaran model the same rate is used to project future compensation and as the risk free rate deducted from the implied expected equity return to determine the ERP. This results in an offsetting effect; in isolation, decreases to the rate used in projecting compensation reduce the ERP whereas decreases to the rate used to deduct from the expected equity return increase the ERP.

1433. There are several different dividend discount models that tend to provide different results. Research by Norges Bank Investment Management gives an indication of the variation in dividend discount estimates of ERP (see table below).¹²⁵ For Europe the ERPs estimated by the models analysed range from 2.3% to 8.7%. Bloomberg provides an estimate of the ERP for the Eurostoxx 600 that is currently about 10%.

¹²⁴ This, in effect, assumes that the largest 600 companies in Europe grow at 5.5% annually for the next 10 years.

¹²⁵ Norges Bank Investment Management (2016): "The equity Premium – Discussion Note", (<https://www.nbim.no/contentassets/2b92009ffa9440f98eec8f32a0996ca2/discussion-note-1-16---equity-risk-premium.pdf>)

Implied ERPs from dividend discount models

	Gordon	Fed	Expected Fed	Shiller	SOP Const	SOP Mean-Rev	SOP Low growth	Multi-stage DDM (GDP, 15 year)	Multi-stage DDM (EPS, 15 year)	Multi-stage DDM (GDP, 5 year)	Ave all models
Australia	5.4	4.7	4.4	4.9	9.9	7.9	4.2	5.1	5.1	4.7	5.6
Austria	2.0	7.4	8.3	11.6	7.9	9.4	2.1	6.5	6.3	7.3	6.9
Belgium	3.1	5.8	5.7	5.5	8.7	8.4	4.5	6.0	5.9	5.8	5.9
Canada	3.3	4.5	6.1	5.6	11.2	8.6	3.8	8.6	8.4	7.2	6.8
Denmark	1.7	3.1	4.0	1.9	14.4	13.1	1.7	5.4	5.4	4.6	5.5
France	3.3	5.3	7.2	7.0	9.5	9.6	4.6	8.3	8.3	7.7	7.1
Germany	3.0	5.5	6.8	5.5	10.1	9.6	3.1	7.5	7.5	7.1	6.6
Hong Kong	3.3	9.4	7.2	6.9	6.9	5.2	4.1	8.6	8.1	7.8	6.8
Italy	3.5	2.8	5.7	9.3	9.1	10.4	3.5	11.9	11.9	8.4	7.6
Japan	2.1	5.7	5.9	3.2	6.1	4.0	2.0	7.6	7.5	6.7	5.1
Netherlands	2.3	5.3	6.7	6.0	6.0	8.6	3.7	7.9	7.8	7.3	6.2
Norway	4.5	7.8	6.9	9.7	19.4	16.8	4.8	6.5	6.1	6.6	8.9
Singapore	4.6	7.3	7.3	7.9	11.2	7.7	4.0	8.5	7.3	7.8	7.4
Spain	5.2	7.2	8.0	10.2	15.0	14.0	6.6	10.6	10.4	9.2	9.6
Sweden	4.1	6.6	7.2	6.2	20.2	17.9	5.5	7.9	7.9	7.5	9.1
Switzerland	3.3	6.2	6.4	5.2	13.8	11.2	4.7	7.3	7.4	6.8	7.2
UK	4.4	6.6	6.7	8.8	8.0	6.2	5.5	7.1	7.0	6.9	6.7
US	2.3	4.8	5.7	4.3	8.1	7.1	2.9	6.9	6.8	6.3	5.5
America	2.9	5.9	5.8	4.1	7.1	5.0	2.7	7.0	6.9	6.3	5.4
Asia	3.6	5.9	6.7	7.1	10.6	9.5	4.7	7.2	7.0	6.5	6.9
Europe	2.3	4.8	5.7	4.3	8.2	7.1	3.0	7.7	7.7	7.2	5.8
World	2.7	5.2	6.0	5.0	8.7	7.4	3.4	7.2	7.1	6.5	5.9

Source: Factset, IMF, OECD, Bloomberg, USDA Macroeconomic data; Norges Bank Investment Management

1434. The table below summarizes the pros and cons to develop a new methodology for estimating the ERP based either on dividend discount models or on historical return methods

Historical return models	
Pros	Cons
Less volatile than dividend discount models	Could misstate the ERP as the past data that it is derived from includes periods of particularly high returns and very low returns (crashes) that were not anticipated by investors at the time.
Provides an estimate through the cycle	Outcome of the models depended on the time period chosen.
Arguably consistent with beta calculation which is based on historical returns.	
These methods seem more objective and reliable as they rely on observed data rather than on strong assumptions	
Ensures methodological consistency with the initial calibration of the CoC rate where also a historical return model was used.	
Dividend discount models	
Pros	Cons
Aims to take into account differences between past and future levels of the ERP.	Dividend discount models rely on strong assumptions about the future economic development, like dividend growth or the rate of future share buy-back. Our ability to correctly project these figures, in particular in the mid and long term, is poor. The model results are dependent on these assumptions.
Takes account of new academic work	Using a dividend discount model for estimating the ERP would arguably be inconsistent with the methodology to derive the beta which relies on historical returns.
Based on current economic conditions.	Change of method compared to the initial calibration. Compared to the initial calibration the ERP may change because of the change of method. That change would not reflect a change in the economic situation but a regulatory decision. It would produce artificial volatility in the insurer's technical provisions and own funds.

1435. In view of the advantages and disadvantages of both models it is suggested to use historic return models to derive the Equity Risk Premium. In particular, these models ensure methodological consistency with the initial calibration of the CoC rate, stronger stability of the CoC rate over time and depend less on assumptions.

Beta factor

1436. CEIOPS advice was based on a derivation of the beta factor that compared the performance of US stocks with European insurance stocks over a period of nine years. The calculation provided separate beta factors of 1.28 for life insurance and 0.94 for non-life insurance.¹²⁶

1437. For the revision of the beta factor the returns of European insurance undertakings are compared with the returns of the European stock market because the beta factors will be applied to an ERP for the European stock market. Furthermore it is not useful to derive separate beta factors for life and non-life undertakings because the Solvency II Directive stipulates that the same CoC rate is applied for all undertakings. It is therefore more appropriate to directly derive a beta for an average undertaking.

1438. The derivation of the revised beta factors is based on the following specifications:

- a. The beta factor is derived on the basis of a weighted average of the betas for the 66 listed EEA insurance and reinsurance companies and groups.¹²⁷ Please refer to "36. Annex to chapter 18 – EEA (re)insurance undertakings used to derive beta factor" for the list of companies used.
- b. The beta is regressed against the Eurostoxx 600¹²⁸ as it is the most representative index of the European market. For comparison also betas with regard to the most relevant local index for each firm¹²⁹ and for the European market returns index of K. French¹³⁰ were calculated.
- c. The data cover the period 2006 to 2016.
- d. Correlations are derived from weekly periods as it allow for a larger set of data and therefore provides more stable results. For the European market returns index of K. French monthly periods were used because weekly data were not available.

¹²⁶ Chief Risk Officer Forum (2008) "Market Value of Liabilities for Insurance Firms", page 58 (<https://www.thecroforum.org/wp-content/uploads/2012/10/croforummvlpaperjuly2008.pdf>)

¹²⁷ The weights are based on market capitalisation.

¹²⁸ Source: Bloomberg

¹²⁹ Source: Bloomberg

¹³⁰ Source: <http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/>

- e. Levered beta is used as was it done in the derivation for the initial beta factor (i.e. the capital structure of insurance companies, reflecting equity and debt, was taken into account).¹³¹
- f. Betas are averaged over a period of 10 years to ensure the stability of the outcome.
- g. Data from companies is aggregated using a weighted average in order to reflect different company sizes and to arrive at an estimate that is sufficient to transfer half of the insurance liabilities in the market. It was not considered appropriate to take the simple average of company betas, which results in a beta in the range 0.9-1, and would provide a lower level of protection.

1439. The following table sets out the result of the beta calculations for all classes of firm (life and non-life):

Index	Beta
Eurostoxx 600	1.25
Local indices	1.19
K. French European market returns index	1.12

1440. In view of these results a beta factor of 1.20 is suggested to be used in the calculation of the CAPM.

Further adjustments

1441. In the initial derivation of the CoC rate CEIOPS applied further adjustments to allow for economic aspects not reflected in the CAPM estimation of the CoC. EIOPA mentioned in particular the franchise value related to expected profit from new business, frictional costs of carrying capital, the initial costs of raising capital and corporate income taxes on the risk margin in some tax jurisdictions. EIOPA did not quantify the impact of the different aspects separately. Instead, on the basis of expert judgement one adjustment for the combination of all aspects was made. The relative size of the adjustment was -20%.

1442. As for the initial estimation of the CoC rate it seems hardly possible to quantify the impact of the aspects that the further adjustment reflects. As there are no indication that their impact has changed since the initial calibration it is advisable to keep the relative adjustment that CEIOPS applied and reduce the result of the CAPM calculation by 20% to determine the CoC rate.

¹³¹ A. Damodaran derives an unlevered beta of 0.9, see http://people.stern.nyu.edu/adamodar/New_Home_Page/data.html. See 'Levered and Unlevered Betas by Industry' under 'current data' and 'archived data' links

CoC rate

1443. Combining the three steps produces a CoC rate of 6.7% to 7.8% where the ERP is derived from a historical return model.

	ERP	Beta factor	Further adjustment	CoC rate
Historical return model based on European stocks	8.09%	1.20	0.80	7.8%
Historical return model based on US stocks and country factors	7.02%	1.20	0.80	6.7%

18.4.3. EIOPA's advice

1444. EIOPA reviewed the CoC rate by following the same approach that CEIOPS applied in its technical advice on the risk margin of 2009, in particular:

- The Cost of Capital is equal to the cost of equity.
- The cost of equity is calculated with the capital asset pricing model (CAPM), which includes:
 - An Equity Risk Premium, which represents the extra return that investors demand above a risk-free rate to invest in an equity class.
 - A Beta factor, which reflects the insurance sector stocks performance compared to that of the wider market.
- The outcome is adjusted to allow for economic aspects not reflected in the CAPM estimation of the CoC.

1445. With regard to the estimation of the Equity Risk Premium historical return models and dividend discount models were analysed. In view of the advantages and disadvantages of both models EIOPA suggests to use historic return models to derive the Equity Risk Premium. In particular, these models ensure methodological consistency with the initial calibration of the CoC rate, stronger stability of the CoC rate over time and depend less on assumptions.

1446. In view of the results of the CoC calculations in the range from 6% to 8% EIOPA recommends that the currently applicable CoC rate of 6% should not be changed.

19. Comparison of own funds in insurance and banking sectors

19.1. Call for advice

1447. The European Commission states that *“Certain own funds items are shared by the insurance and banking frameworks (e.g. certain debt instruments). However, feedback received through the Call for Evidence highlighted that certain features (e.g. contractual clauses) do not receive the same treatment in both frameworks.*

EIOPA is asked to:

- *For those eligible items which are comparable between the banking framework and Delegated Regulation (EU) 2015/35, assess differences in their classification.*
- *For each of these differences, assess if they are justified by differences in the business model of the two sectors, by diverging elements in the determination of own funds requirements, or on other grounds.”*

19.2. Legal basis

1448. In this section EIOPA sets out the relevant Solvency II regulation that relates to own funds together with the relevant banking rules in Commission Delegated Regulations (CDR) Capital Requirements Regulation (CRR) (Regulation (EU) 575/2013)¹³² and Commission Delegated Regulation (EU) 241/2014¹³³ for Own Funds requirements for institutions (CDR).

19.2.1. Solvency II Directive

Article 75 (1)

Member States shall ensure that, unless otherwise stated, insurance and reinsurance undertakings value assets and liabilities as follows:

- (a) assets shall be valued at the amount for which they could be exchanged between knowledgeable willing parties in an arm’s length transaction;*
- (b) liabilities shall be valued at the amount for which they could be transferred, or settled, between knowledgeable willing parties in an arm’s length transaction.*

When valuing liabilities under point (b), no adjustment to take account of the own credit standing of the insurance or reinsurance undertaking shall be made.

¹³² Regulation (EU) No 575/2013 of the European Parliament and of the Council of 26 June 2013 on prudential requirements for credit institutions and investment firms and amending Regulation (EU) No 648/2012. OJ L 176.

¹³³ Commission Delegated Regulation (EU) No 241/2014 of 7 January 2014 supplementing Regulation (EU) No 575/2013 of the European Parliament and of the Council with regard to regulatory technical standards for Own Funds requirements for institutions. OJ L 74.

Article 138 (3) and (4)

(3) The supervisory authority shall require the insurance or reinsurance undertaking concerned to take the necessary measures to achieve, within six months from the observation of non-compliance with the Solvency Capital Requirement, the re-establishment of the level of eligible own funds covering the Solvency Capital Requirement or the reduction of its risk profile to ensure compliance with the Solvency Capital Requirement.

The supervisory authority may, if appropriate, extend that period by three months.

(4) In the event of exceptional adverse situations affecting insurance and reinsurance undertakings representing a significant share of the market or of the affected lines of business, as declared by EIOPA, and where appropriate after consulting the ESRB, the supervisory authority may extend, for affected undertakings, the period set out in the second subparagraph of paragraph 3 by a maximum period of seven years, taking into account all relevant factors including the average duration of the technical provisions.

[...]

[...]

The insurance or reinsurance undertaking concerned shall, every three months, submit a progress report to its supervisory authority setting out the measures taken and the progress made to re-establish the level of eligible own funds covering the Solvency Capital Requirement or to reduce the risk profile to ensure compliance with the Solvency Capital Requirement.

The extension referred to in the first subparagraph shall be withdrawn where that progress report shows that there was no significant progress in achieving the re-establishment of the level of eligible own funds covering the Solvency Capital Requirement or the reduction of the risk profile to ensure compliance with the Solvency Capital Requirement between the date of the observation of non-compliance of the Solvency Capital Requirement and the date of the submission of the progress report

19.2.2. Solvency II Delegated Regulation

Article 9

1. Insurance and reinsurance undertakings shall recognise assets and liabilities in conformity with the international accounting standards adopted by the Commission in accordance with Regulation (EC) No 1606/2002.

2. Insurance and reinsurance undertakings shall value assets and liabilities in accordance with international accounting standards adopted by the Commission pursuant to Regulation (EC) No 1606/2002 provided that those standards include valuation methods that are consistent with the valuation approach set out in Article 75 of Directive 2009/138/EC. Where those standards allow for the use of more than one valuation method, insurance and reinsurance undertakings shall only use valuation methods that are consistent with Article 75 of Directive 2009/138/EC.

3. Where the valuation methods included in international accounting standards adopted by the Commission in accordance with Regulation (EC) No 1606/2002 are not consistent either temporarily or permanently with the valuation approach set out in Article 75 of Directive 2009/138/EC, insurance and reinsurance undertakings shall use other valuation methods that are deemed to be consistent with Article 75 of Directive 2009/138/EC.

4. By way of derogation from paragraphs 1 and 2, and in particular by respecting the principle of proportionality laid down in paragraphs 3 and 4 of Article 29 of Directive 2009/138/EC, insurance and reinsurance undertakings may recognise and value an asset or a liability based on the valuation method it uses for preparing its annual or consolidated financial statements provided that:

(a) the valuation method is consistent with Article 75 of Directive 2009/138/EC;

(b) the valuation method is proportionate with respect to the nature, scale and complexity of the risks inherent in the business of the undertaking;

(c) the undertaking does not value that asset or liability using international accounting standards adopted by the Commission in accordance with Regulation (EC) No 1606/2002 in its financial statements;

(d) valuing assets and liabilities using international accounting standards would impose costs on the undertaking that would be disproportionate with respect to the total administrative expenses.

5. Insurance and reinsurance undertakings shall value individual assets separately.

6. Insurance and reinsurance undertakings shall value individual liabilities separately.

Article 69

The following basic own-fund items shall be deemed to substantially possess the characteristics set out in Article 93 (1)(a) and (b) of Directive 2009/138/EC, taking into consideration the features set out in Article 93 (2) of that Directive, and shall be classified as Tier 1, where those items display all of the features set out in Article 71: (a) the part of excess of assets over liabilities, valued in accordance with Article 75 and Section 2 of Chapter VI of Directive 2009/138/EC, comprising the following items: (i) paid-in ordinary share capital and the related share premium account; (ii) paid-in initial funds, members' contributions or the equivalent basic own-fund item for mutual and mutual-type undertakings; (iii) paid-in subordinated mutual member accounts; (iv) surplus

funds that are not considered as insurance and reinsurance liabilities in accordance with Article 91 (2) of Directive 2009/138/EC; (v) paid-in preference shares and the related share premium account; (vi) a reconciliation reserve; (b) paid-in subordinated liabilities valued in accordance with Article 75 of Directive 2009/138/EC.

Article 71

1.(e)(iii) a principal loss absorbency mechanism that achieves an equivalent outcome to the principal loss absorbency mechanisms set out in points (i) or (ii) [..]

1 (f)(ii) in the case of items referred to in points (a)(iii) and (v) and point (b) of Article 69, the item is undated; the first contractual opportunity to repay or redeem the basic own-fund item does not occur before 5 years from the date of issuance;

5. For the purposes of paragraph (1)(e)(i), the nominal or principal amount of the basic own-fund item shall be written down in such a way that all of the following are reduced: (a) the claim of the holder of that item in the event of winding-up proceedings; (b) the amount required to be paid on repayment or redemption of that item; (c) the distributions paid on that item. [..]

8. The trigger event referred to in paragraph (1)(e) shall be significant non-compliance with the Solvency Capital Requirement. For the purposes of this paragraph, non-compliance with the Solvency Capital Requirement shall be considered significant where any of the following conditions is met: (a) the amount of own-fund items eligible to cover the Solvency Capital Requirement is equal to or less than the 75 % of the Solvency Capital Requirement; (b) the amount of own-fund items eligible to cover the Minimum Capital Requirement is equal to or less than Minimum Capital Requirement; (c) compliance with the Solvency Capital Requirement is not re-established within a period of three months of the date when non-compliance with the Solvency Capital Requirement was first observed. Insurance and reinsurance undertakings may specify, in the provisions governing the instrument, one or more trigger events in addition to the events referred to in points (a) to (c).

Article 76

The following basic own-fund items shall be deemed to possess the characteristics set out in Article 93 (1)(b) of Directive 2009/138/EC, taking into consideration the features set out in Article 93 (2) of that Directive, and shall be classified as Tier 3 where the following items display all of the features set out in Article 77:

[..]

(a)(iii) an amount equal to the value of net deferred tax assets.

19.2.3. Guidelines

1449. Introduction to EIOPA Guidelines on classification of own funds.

1.33 In order that any principal loss absorbency mechanism can achieve its purpose at the point of the trigger, the terms of the contractual arrangement should be clearly defined and legally certain, and capable of being applied without delay.

19.2.4. Relevant CDR requirements

Article 29 (3)

Submission of application by the institution to carry out redemptions, reductions and repurchases for the purposes of Article 77 and Article 78 of Regulation (EU) No 575/2013 and appropriate bases of limitation of redemption for the purposes of paragraph 3 of Article 78 of Regulation (EU) No 575/2013

.[.].

3. In the case of a repurchase of Common Equity Tier 1 instruments, Additional Tier 1 instruments or Tier 2 instruments for market making purposes, competent authorities may give their permission in accordance with the criteria set out in Article 78 of Regulation (EU) No 575/2013 in advance to actions listed in Article 77 of that Regulation for a certain predetermined amount.

19.2.5. Relevant CRR requirements

Article 54

Write down or conversion of Additional Tier 1 instruments

.[.].

(3) The amount of Additional Tier 1 instruments recognised in Additional Tier 1 items is limited to the minimum amount of Common Equity Tier 1 items that would be generated if the principal amount of the Additional Tier 1 instruments were fully written down or converted into Common Equity Tier 1 instruments.

Article 77

Conditions for reducing own funds

An institution shall require the prior permission of the competent authority to do either or both of the following:

.[.].

(b) effect the call, redemption, repayment or repurchase of Additional Tier 1 instruments or Tier 2 instruments as applicable, prior to the date of their contractual maturity.

Article 78

1. *The competent authority shall grant permission for an institution to reduce, repurchase, call or redeem Common Equity Tier 1, Additional Tier 1 or Tier 2 instruments where either of the following conditions is met:*

(a) earlier than or at the same time as the action referred to in Article 77, the institution replaces the instruments referred to in Article 77 with own funds instruments of equal or higher quality at terms that are sustainable for the income capacity of the institution;

(b) the institution has demonstrated to the satisfaction of the competent authority that the own funds of the institution would, following the action in question, exceed the requirements laid down in Article 92 (1) of this Regulation and the combined buffer requirement as defined in point (6) of Article 128 of Directive 2013/36/EU by a margin that the competent authority may consider necessary on the basis of Article 104 (3) of Directive 2013/36/EU.

2. *When assessing under point (a) of paragraph 1 the sustainability of the replacement instruments for the income capacity of the institution, competent authorities shall consider the extent to which those replacement capital instruments would be more costly for the institution than those they would replace.*

3. *Where an institution takes an action referred to in point (a) of Article 77 and the refusal of redemption of Common Equity Tier 1 instruments referred to in Article 27 is prohibited by applicable national law, the competent authority may waive the conditions laid down in paragraph 1 of this article provided that the competent authority requires the institution to limit the redemption of such instruments on an appropriate basis.*

4. *The competent authorities may permit institutions to redeem Additional Tier 1 or Tier 2 instruments before five years of the date of issue only where the conditions laid down in paragraph 1 and point (a) or (b) of this paragraph are met:*

(a) there is a change in the regulatory classification of those instruments that would be likely to result in their exclusion from own funds or reclassification as a lower quality form of own funds, and both the following conditions are met:

(i) the competent authority considers such a change to be sufficiently certain;

(ii) the institution demonstrates to the satisfaction of the competent authorities that the regulatory reclassification of those instruments was not reasonably foreseeable at the time of their issuance;

(b) there is a change in the applicable tax treatment of those instruments which the institution demonstrates to the satisfaction of the competent authorities is material and was not reasonably foreseeable at the time of their issuance.

19.2.6. Relevant EBA Questions and answers

1450. EBA Q&A 2013-290

Question:

Can you please confirm if Article 78 (4) is meant to apply only to the redemption of T2 securities within 5 years of issuance (as specified in the terms and conditions of the instrument), or if it also prohibits the use of liability management exercises to repurchase (and cancellation) T2 notes at market levels within 5 years of the issuance.

Answer:

Article 63(j) of Regulation (EU) No 575/2013 (CRR) permits that Tier 2 instruments may be reduced/repaid, repurchased, called or redeemed early only where prior supervisory permission has been granted in accordance with Articles 77 and 78 and not before five years after the date of issuance. Article 78 (4) of the CRR conditionally permits redemption of AT1 and Tier 2 instruments before five years from date of issuance where a significant/material tax or regulatory change is deemed by the competent authorities to have occurred. The CRR provides no other basis on which fully eligible Tier 2 instruments may be called, redeemed, repurchased or repaid/reduced before five years after the date of issuance or raising.

Instruments grandfathered under Article 484 of the CRR can be called, redeemed, repurchased or repaid/reduced before five years after the date of issuance.

Fully eligible instruments may be exchanged against fully eligible instruments of a higher quality, in exceptional circumstances, and subject to the approval of the competent authority in accordance with Article 77.

19.3. The main differences identified by the discussion paper

1451. Most of the responses received to EIOPA's discussion paper (EIOPA-CP-16-008) related to differences between Additional Tier 1 (AT1) in the banking regime and items listed in Article 69 (a)(iii), (v) and (b) of the Solvency II Delegated Regulation (rT1), as regards the features they are required to have, and the impact that triggering a principal loss absorption mechanism (PLAM) has on total capital or own funds under the banking regime and Solvency II. In particular respondents drew attention to two topics related to perceived differences between AT1 and rT1:

- Operation of the PLAM; and
- Tax effect of rT1 which writes down on trigger.

1452. Respondents also drew attention to one difference that applied more broadly to all basic own funds items of whatever tier - the treatment of repayment or redemption in the first five years.

19.4. Operation of the PLAM

19.4.1. In Solvency II, the way the mandatory triggers are calculated means that write down does not normally restore compliance

1453. Several respondents pointed out that triggering an rT1 instrument does not normally restore compliance with the SCR, and therefore questioned the value of the principal loss absorbency mechanism.

1454. Neither triggering AT1 nor rT1 results in an increase in the quantity of regulatory capital. In both cases the mechanism results in an increase in the highest quality of capital (Common Equity Tier 1(CET1) and unrestricted Tier 1 respectively) but does not change the total amount. The prudential purpose of the PLAM under both the banking regime and Solvency II is it improves the quality of own funds at the trigger point. The trigger specified for banks is calculated by reference to the amount of this highest quality of capital that a bank has. So, the increase in the amount of CET1 after the trigger event can cure the CET1 breach.

1455. In contrast the trigger specified in Solvency II is calculated with reference to total capital. This being the case, a write down or conversion of rT1 cannot restore compliance (except in the rare situation where both the 20% rT1 limit and the 50% Tier 2 limit are impacting the total amount of eligible capital). This is a technical fact, which results from differences in the way that the insurance and banking regimes articulate the mandatory trigger event.

1456. The primary objective of triggering a capital instrument is not to cure breaches of regulatory capital, nor does the fact that rT1 does not cure a breach imply a deficiency in the requirements of Article 71 of the Delegated Regulation. The value to the financial stability of the undertaking of the PLAM in the case of both AT1 and rT1 is that it provides more of the highest quality of own funds under stress, whilst not changing total own funds available. This mechanism, to improve the quality of own funds, is the main feature that differentiates rT1 instruments from Tier 2 ones.

19.4.2. Whether to align with the banking regime by changing the trigger mechanism to reference an unrestricted tier 1 coverage ratio

1457. EIOPA considered the possibility of aligning with the banking regime, so that the PLAM cured the solvency breach. To do this would require a change to the trigger, from one articulated in terms of SCR coverage to one articulated in terms of the own-fund items listed in Article 69 (a)(i), (ii), (iv) and (v) of the Delegated Regulation (uT1) as a proportion of the SCR.

1458. Whilst this would be consistent with the banking regime, and would provide a rationale for a partial write down amount, it would introduce complexity because the SCR breach triggers would still apply to rT1 as regards prohibition on distributions (i.e. coupon payments) and repayments and redemptions (e.g. upon a call date) so undertakings would need to

monitor both ratios. EIOPA also did not identify any prudential benefit to policyholders that would be delivered by making this change.

1459. Therefore, bearing in mind the absence of any prudential benefit, EIOPA currently considers that there is a stronger case not to align with the banking regime on this point based on fundamental differences in the structure of the respective Regulations. Nevertheless, EIOPA will continue to analyse this issue before finalising its advice to the Commission.

1460. Whilst not pre-empting this continuing analysis, the rest of this CP is predicated on the assumption that the Solvency II triggers for the PLAM will not be redrafted to align with the banking regime.

19.4.3. Amendments to Article 71 of the Delegated Regulation separate from alignment with the banking regime

1461. EIOPA has observed different practices and implementation within Member States regarding the operation of the PLAM based on the current requirement in the Solvency II Delegated Regulation, in particular the requirement in Article 71 (1)(e) that the “nominal or principal amount of the basis own-fund item is written-down”. In view of this, although it was not part of the request for advice from the European Commission, EIOPA intends to recommend that even if it is decided not to align the PLAM with the banking regime, changes should be made to the Delegated Regulation to further specify the operation of the PLAM.

1462. In particular, EIOPA believes that it would be beneficial to redraft Article 71(1)(e) of the Delegated Regulation to clarify how and when partial write down is permitted, and the minimum write down required in such cases.

When and how partial write down should be permissible

1463. As stated above, only in rare cases can partial write down of rT1 instruments upon the occurrence of a mandatory trigger event result in SCR compliance being restored. In situations other than these, different approaches have been taken by Member States regarding the implementation of Article 71 (1)(e)(i), (5) and (8) of the Delegated Regulation and the extent to which a partial write down is permissible if a mandatory trigger is breached.

1464. EIOPA believes that it is reasonable to allow partial write down when that is sufficient to restore compliance with the SCR.

1465. EIOPA also believes that partial write down should be possible in those cases where own funds have fallen a limited amount below the SCR. However EIOPA believes that any rT1 instrument should be written down fully at least

at the point at which SCR coverage falls to 75% or the MCR is breached.¹³⁴ Furthermore, if partial write down is permitted between SCR breach and 75% SCR coverage, then EIOPA believes it is desirable to avoid a cliff edge effect at the point of 75% SCR coverage.

1466. This being the case, EIOPA recommends that partial write down should be permissible where the mandatory trigger of 3 months SCR breach has been reached, but only so long as the 75% SCR breach and MCR breach triggers have not also been triggered.

1467. EIOPA further recommends that, as a minimum, rT1 is written down on a straight line basis in such a way that at 75% SCR breach the instrument is written down in full.

Considering the need for further write down – recalculation of the SCR

1468. Furthermore, there can be uncertainty relating to how an rT1 instrument should absorb losses if it triggers the 3 month SCR breach and then continues to make losses, but does not reach the 75% SCR trigger¹³⁵. In such a situation, in order for the rT1 to “absorb losses at least once there is non-compliance with the SCR” periodical consideration of the need for further write down is necessary.

1469. Article 138 (3) of the Solvency II Directive requires an undertaking to re-establish compliance with the SCR within 6 months, with the possibility of a 3 months extension being granted by the supervisory authority. So, if an undertaking breached its SCR and gradually drifted downwards, without breaching 75% of SCR then there may be a number of months of increasing losses that do not result in write down if no recalculation is made.¹³⁶

1470. However, if EIOPA has declared an exceptional adverse situation in accordance with Article 138 (4) of the Solvency II Directive then that recovery period can be extended for up to seven years, and the undertaking has to report its solvency position at least quarterly. So, without periodic recalculation of the write down an undertaking could in theory breach SCR for three months by a very small amount, calculate a small write down and then face a slow loss over years – during which it is likely it would be reporting its SCR coverage to its supervisors monthly or quarterly – without another trigger being reached.

¹³⁴ EIOPA sees no reason why undertakings, if they chose, could not issue rT1 instruments which triggered before the mandatory triggers, which always wrote down in full on first trigger or which wrote down at a rate such that it was fully written down before coverage fell to 75% SCR.

¹³⁵ The exception to this is the situation of an undertaking which had more than 20% rT1 (so that some rT1 were being relegated to Tier 2, and also Tier 2 own funds > SCR). In that specific situation, because of the effects of changes in recognition, it is possible for a partial write down to cure the breach.

¹³⁶ That is, at the end of months 4 to 8, with SCR coverage re-established at the end of month 9.

1471. EIOPA expects that any undertaking in breach of its SCR may well be calculating its solvency position at least monthly for its own governance purposes, and may be reporting this to their supervisory authority. However, EIOPA believes that it would be disproportionate to require undertakings to consider the need for further write down, to reflect any further deterioration in solvency coverage, on a monthly basis. On balance EIOPA considers that its policyholder protection objectives will be achieved so long as undertakings are required to undertake any further write down, at least every three months. The subsequent three month periods should refer back to the date that the trigger event in Article 71(8)(c) of the Delegated Regulation occurred and not when the partial write-down actually took place (if different). This would mean a recalculation, as needed, 6 months and then 9 months etc. following the date that the SCR breach was first observed.

1472. EIOPA believes that it is appropriate to address the question in the context of exceptional adverse circumstances separately from that of normal market conditions. EIOPA is still considering the appropriate treatment in the context of exceptional market conditions and will address this in its final advice.

1473. EIOPA recommends that, absent an exceptional adverse situation having been declared in accordance with Article 138 (4) of the Solvency II Directive, undertakings should recalculate their SCR coverage and perform further write down if necessary, every three months until compliance with the SCR is restored.

How should write down subsequent to the initial write down be calculated?

1474. Separate from the question of the frequency of write down following an initial trigger, is the question of how any such subsequent write downs should be calculated. EIOPA identified two means by which further write down could be calculated:

- Option a: When the extent of the breach is recalculated at the 6 month breach point, if the undertaking is still in SCR breach then the instrument writes down in full.
- Option b: When the extent of the breach is recalculated, any further deterioration of the solvency ratio results in a further write down (e.g. if the SCR cover was 90% at the original trigger date, and on recalculation remains at 90% no further write down; if it drops to 80% a further write down reflecting the 10% deterioration of the solvency position is needed).

1475. The first option could be seen as justifiable since the default approach is that SCR compliance should have been restored within 6 months, and has the advantage of being a simple approach that avoids the potential for multiple recalculations.

1476. However, on balance, EIOPA believes that option (b) is more proportionate and intuitive and best reflects the aim of the PLAM which is to mitigate losses. This further write down would be limited to the extent of the

deterioration of the SCR position, but should be calculated on the basis of the principal or nominal amount at original issuance.

1477. EIOPA recommends that undertakings should be required to apply a further write down upon any further worsening of the SCR coverage ratio after each subsequent 3 month period¹³⁷.

Conversion

1478. EIOPA is also considering whether changes to the delegated regulation are needed to specify the application of Article 71(1)(e)(ii) of the Delegated Regulation and in particular whether partial conversion of rT1 instruments should be permissible. EIOPA is aware that there are some examples in the market of debt instruments with partial conversion features. However, EIOPA understands that no rT1 instruments with partial conversion features have yet been issued by insurance or reinsurance undertakings and therefore does not have direct experience with which to assess this issue. EIOPA also understands that there have not been AT1 issuances with partial conversion features.

1479. EIOPA believes that there could be some challenges to draft terms and conditions with sufficient legal certainty to allow rT1 instruments with partial conversion terms to be issued. It could therefore be argued that for the purposes of legal certainty and in order to ensure consistent supervisory practices it would be beneficial to specify in the delegated regulation that the conversion of an instrument on breach of a mandatory trigger event would need to be in full.

1480. On the other hand, preventing partial conversion could be seen as inconsistent with the broad equivalence between the write-down and conversion mechanisms, that is implied by Article 71(1)(e) of the Delegated Regulation. Another option could therefore be to apply the proposed provisions above regarding partial write-down mutatis mutandis to conversion.

1481. EIOPA needs to consider these issues further before finalising its advice. **In the meantime, as part of this consultation, EIOPA welcomes stakeholder feedback on whether and how partial conversion could be applied.**

¹³⁷ For clarity: The recalculation of the SCR coverage ratio referred to is the recalculation for the purposes of determining whether a further write-down of the instrument is required and not the recalculation of the SCR coverage ratio performed for another purposes. For example, if a normal reporting point were to occur after a partial write down, but less than 3 months after that partial write down, EIOPA is not recommending an additional write down be considered at that reporting point.

19.4.4. New Article

1482. Amend Article 71 of the Delegated Regulation to:

(1)(e) becomes:

(i) the nominal or principal amount of the basic own-fund item is written down as set down in paragraph 5,5 bis and 5 ter

(ii) the basic own-fund item automatically converts into a basic own-fund item listed in point (a)(i) or (ii) of Article 69 as set out in paragraph 6;

(iii) a principal loss absorbency mechanism that achieves an equivalent outcome to the principal loss absorbency mechanisms set out in points (i) or (ii);

5 bis is added:

(a) When the single trigger event listed in paragraph 8 (c) is met, and write down can re-establish compliance with the SCR then partial write down to restore compliance is sufficient.

(b) In all other cases,

(i) when the trigger event listed in paragraph 8 (c) occurs, the nominal or principal amount of the basic own-fund item as determined at original issuance is written down at least on a linear basis in a manner which ensures that full write down occurs at or before 75% coverage of the SCR is reached.

(ii) when either of the trigger events listed in paragraph 8 (a) or (b) are met, the nominal or principal amount of the basic own-fund item is written down in full.

5 ter is added:

Where partial write down is undertaken in accordance with Article 5 bis (b)(i), unless an exceptional adverse situation has subsequently been declared in accordance with Article 138 (4) of Directive 2009/138/EC, the SCR coverage ratio should be recalculated every three months starting from the trigger event listed in paragraph 8 (c) until the insurance or reinsurance undertaking either:

a) re-establishes compliance with the SCR; or

b) breaches either of the triggers listed in paragraph 8 (a) or (b), and in either case writes down in full.

If this recalculation indicates that the SCR coverage ratio has deteriorated further, then the nominal or principal amount of the basic own-fund item as determined at original issuance should be written down further in accordance with Article 5 bis (i) to reflect that additional deterioration.

19.5. Tax effect of rT1 which writes down on trigger

19.5.1. Summary of the comments received

1483. Respondents from some Member States noted that under their national fiscal regimes the write down of an rT1 instrument in accordance with Article 71(1)(e)(i) of the Delegated Regulation would create a taxable profit. This in turn would result in a tax liability arising and own funds falling.

19.5.2. Analysis of banking regime

1484. This tax effect can also occur in the banking regime and depends on the specific fiscal regime of the member state concerned. In some Member States, the write down of both AT1 and rT1 can create a tax liability if the bank or insurance undertaking is making taxable profits at the point of trigger. In others this is not the case. To date, AT1 instruments have usually triggered at a point where the bank has not been making taxable profits, so that the write down has not normally created a tax liability.

1485. Although not specified by respondents, it appears that their comments are based on an assumption that rT1 may trigger at a higher level than AT1, when an undertaking is still generating taxable profits¹³⁸. EIOPA has no robust statistical analysis to confirm or rebut this assumption, and notes that the situation will be case specific, but treats it as plausible for the purposes of this advice.

1486. CRR Article 54 (3) requires that:

"The amount of Additional Tier 1 instruments recognised in Additional Tier 1 items is limited to the minimum amount of Common Equity Tier 1 items that would be generated if the principal amount of the Additional Tier 1 instruments were fully written down".

Thus the maximum possible tax consequences on write down or conversion should be deducted from the principal amount when considering how much AT1 to recognise in respect of any particular instrument. That being so, the concern of SII basic own funds being lost on trigger as a result of tax becoming due could be fully addressed by aligning the banking and insurance regimes.

19.5.3. Recommendation on whether to align with the banking regime

1487. If the Solvency II regime were to be aligned fully with that of CRR Article 54 this would mean limiting the amount of rT1 recognised as basic own funds to the minimum amount of unrestricted tier 1 capital that would be generated if the principal amount of the instrument were fully written down.

¹³⁸ This might occur, for example, if SCR coverage is falling due to a fall in market value of assets whilst the tax regime of the relevant member state does not recognise that loss until the assets are sold.

1488. EIOPA has not identified a difference in the business models of the two sectors nor diverging elements in the determination of own funds requirements. From a prudential perspective, in order for the basic own funds to reflect the loss absorbing characteristics of the instrument, it can be seen as reasonable for the principal value to be adjusted to reflect the amount of tax that would be expected to be paid on trigger; it is not available to provide policy holder protection since it would be paid to the tax authorities on trigger.

1489. However, EIOPA recognises that whilst the theoretical maximum tax consequences could be calculated, and deducted from the principal to obtain the amount of own funds to be recognised, the likelihood of this tax actually being payable on trigger is expected to be low. Therefore mandatory deduction of the maximum possible tax that could be due on write down would seem to be unduly stringent. EIOPA therefore considered the possibility for regulatory authorities to be able to waive the requirement for a write down at the point of trigger if a tax liability was likely to arise.

1490. When considering this approach, EIOPA was concerned that if the write down of rT1 capital were regularly waived because of the tax effects this would lead both to the degradation of the quality of protection afforded to policyholders by rT1 and potentially to a distortion in the pricing of such instruments in the capital market. EIOPA also considered that the question of the extent to which tax will be payable on write down will be case specific and may not be known until end of the tax period in which the instrument was triggered; potentially only at or after the tax year end, which might be some time after the instrument is triggered.

1491. To mitigate these risks EIOPA believes that any waiver a supervisory authority decides to grant should be on an exceptional basis and subject to strict criteria. EIOPA is also of the opinion that, due to their seriousness, the waiver should not be available if either of the mandatory triggers in Article 71(8)(a) or (b) of the Delegated Regulation are breached.

1492. One approach considered was whether the waiver should be granted on a temporary basis only, to be confirmed or not once the tax position of the undertaking is known. However the practical complexity of applying this approach was judged to outweigh the positive benefits that might arise from dissuading overly optimistic projections at the point of trigger. This also avoids additional uncertainty to holders of rT1 instruments.

1493. As discussed above, EIOPA also considered the case of an undertaking which remains in SCR breach after a further 3 month period. Consistent with the recommendation above that a further write down should apply if there is deterioration in the SCR coverage ratio, it is proposed that the undertaking would need to apply for a further waiver in this case. The subsequent waiver would only address the write down required by the deterioration of the SCR coverage ratio and would not revisit the decision to grant the first waiver.

1494. EIOPA is considering whether it is appropriate to define the timing of the request for a waiver. It is considered to be in the interests of the undertaking to prepare for the waiver following the initial SCR breach and one option

would be to require the undertaking to submit the request for a waiver to the supervisory authority as part of recovery plan required by Article 138(2) of the Solvency II Directive. In this case, it should be possible for the supervisory authority to decide whether to accept the waiver request either at the point of or soon after the 3 month SCR breach trigger. This would, however, require the undertaking to conduct and sign-off projections before it is known whether the 3 month SCR breach trigger point will actually be reached. On the other hand, if the waiver request was submitted after the SCR had been in breach for 3 months (e.g. within 1 or 2 months of the mandatory trigger), there may not be a decision on the waiver before the SCR has been breached for 6 months¹³⁹. EIOPA needs to consider these issues further before finalising its advice. **In the meantime, as part of this consultation, EIOPA welcomes stakeholder feedback on whether it is preferable to define deadlines for the request of the waiver and what these deadlines should be.**

1495. EIOPA recommends not to align with the banking regime and instead to continue to allow for full recognition of the principal amount of rT1 instruments on issuance. Additionally, EIOPA recommends to provide supervisory authorities with the ability to consider whether to give an exceptional waiver from the requirement to write down, on a case specific basis, if:

- the undertaking requests such a waiver and provides projections to the end of its tax year, based on reasonable assumptions, which demonstrate there is a high likelihood that the tax effects of write down could significantly weaken the solvency position of an undertaking; and
- the undertaking's statutory auditors confirm in writing that the assumptions used in that projection are reasonable; and
- neither the 75% SCR mandatory trigger nor MCR have been breached.

¹³⁹ The SCR should normally have been restored within 6 months (see paragraph 16 above).

19.5.4. New Article

1496. Proposed amendments to the Delegated Regulation

Article 70 bis

Tax effects of write down of items listed in Article 69 (a)(iii), (v) and (b)

For own funds items listed in points(a)(iii), (v) and (b) of Article 69 which write down on trigger in accordance with Article 71 (1)(e)(i) or (iii), the supervisory authority may decide in exceptional circumstances to waive the write down requirement where at least the following conditions are met:

- a) the waiver has been requested by the undertaking; and
- b) when requesting the waiver the undertaking has provided the following to the supervisory authority:
 - (i) projections which demonstrate that a write down is very likely to lead to a tax liability that will have a significant adverse effect on SCR coverage; and
 - (ii) a certification by the undertaking's statutory auditors that all of the assumptions used in the projection are realistic.

19.6. Early redemptions, tax calls and regulatory calls

19.6.1. Summary of the comments received

1497. Several respondents commented that the Delegated Regulation differs from the banking regime in that it does not permit undertakings to undertake a tax or regulatory call (i.e. first contractual opportunity to redeem) within the first five years after issuance, unless that call is funded out of the proceeds of a new issuance of the same or higher quality. .

1498. EIOPA agrees with respondents that there is a difference between Solvency II and the banking regime as regards tax and regulatory calls. However, this is just one aspect of some wider differences in the way that the redemption of capital instruments in the first five years is treated under the two regimes.

19.6.2. Analysis of the banking regime

1499. The Solvency II regime allows undertakings to redeem any rT1 or Tier 2 capital instrument in the first five years for any reason, so long as they do so out of the proceeds of a new issuance of the same or higher quality.

1500. Article 78 of the CRR text permits banks to perform tax and regulatory calls¹⁴⁰, subject to supervisory approval, without replacing those instruments

¹⁴⁰ There are conditions regarding the types of tax and regulatory calls, namely that these need to be material and unforeseen changes.

with new capital if a sufficient capital buffer is retained after the redemption. Alternatively, as clarified in EBA Q&A 2013 290, redemptions out of the proceeds of new issuance of higher quality, are permitted in exceptional circumstances.

1501. It is relevant to bear in mind that the Council of the EU is currently considering the Commission's proposal of 23 November 2016 to amend the CRR in certain respects, including permitting redemption out of the proceeds of new issuance of the same quality of capital¹⁴¹. It is possible that this will not be decided before any amendments to the Solvency II regulations are put in place. Thus, there is the possibility that if Solvency II is aligned with CRR, the two regimes may move apart again at a future date.

1502. Article 29 (3) of the Commission Delegated Regulation (CDR) 241/2014 also permits banks, subject to supervisory approval, to undertake limited repurchases without new issuance, up to the lower of 10% of the relevant AT1 or Tier 2 issuance or 3% of total amount of AT1 or Tier 2, as part of market-making activity. Since EIOPA does not expect that market making should ever be performed by insurance entities it has not considered this further.

1503. This being the case, should the Commission choose to align Solvency II with the banking regime it would need to make two changes:

- a. Permitting, subject to supervisory approval, material and unforeseen tax and regulatory calls on rT1 or Tier 2 instruments under Solvency II in the first five years, without requiring that this is out of the proceeds of a new issuance of the same or higher quality if a sufficient capital buffer is retained; and
- b. Remove the wider ability under Solvency II for undertakings to repay or redeem rT1 or Tier 2 instruments in the first five years after issuance with replacement of equal quality capital and instead only allow this in exceptional circumstances with replacement with higher quality capital.

19.6.3. Recommendation on whether to align with the banking regime

1504. Allowing capital to be reduced by permitting tax and regulatory calls without replacement means that the amount of policyholder protection which it can provide is arguably reduced to a certain extent. However, the regulatory safeguards in the banking regime including the requirement that undertakings must have a sufficient capital buffer, should significantly mitigate any resulting prudential risk. This being the case, whilst Solvency II can be seen as currently somewhat more prudent than CRR in this regard,

¹⁴¹ <https://ec.europa.eu/transparency/regdoc/rep/1/2016/EN/COM-2016-850-F1-EN-MAIN.PDF>

this is considered to be a marginal difference and EIOPA sees no prudential concern from aligning the regimes.

1505. CRR is more restrictive than Solvency II as regards redemption in the first five years out of the proceeds of another issuance. Withdrawing the ability for insurance undertakings to repay or redeem rT1 or Tier 2 instruments in the first five years out of the proceeds of an issuance of the same quality, places a restriction on capital management. EIOPA considers that there may be commercial reasons for undertaking such capital management and limiting this does not offer any obvious prudential advantage. EIOPA also notes the Commission proposal to amend CRR to allow for replacement with capital of equal quality. It is therefore not recommend that Solvency II is amended in this respect.

1506. This being the case, EIOPA recommends changes to bring Solvency II closer to alignment with CRR, in particular regarding tax and regulatory calls. In doing so EIOPA notes that this would be in line with the November 2016 draft of CRR II.

19.6.4. Proposed new Articles

Article 71 (2) bis

Notwithstanding paragraph (1)(f)(ii) of this Article, the competent authorities may permit institutions to redeem a Tier 1 instrument before five years of the date of issue when the undertaking's Solvency Capital Requirement is, after the redemption, exceeded by an appropriate margin taking into account the solvency position of the undertaking including the undertaking's medium-term capital management plan and in addition one of the following situations is met:

(a) there is a change in the regulatory classification of that instrument which would be likely to result in its exclusion from own funds or reclassification as a lower tier of own funds, and both of the following conditions are met:

(i) the competent authority considers such a change to be sufficiently certain; and

(ii) the undertaking demonstrates to the satisfaction of the competent authorities that the regulatory reclassification of the instrument was not reasonably foreseeable at the time of their issuance;

(b) there is a change in the applicable tax treatment of that instrument which the undertaking demonstrates to the satisfaction of the competent authorities is material and was not reasonably foreseeable at the time of their issuance.

Article 73 (2) bis

Notwithstanding paragraph (1)(c) of this Article, the competent authorities may permit institutions to redeem a Tier 2 instrument before five years of the date of issue when the undertaking's Solvency Capital Requirement is, after the

redemption, exceeded by an appropriate margin taking into account the solvency position of the undertaking including the undertaking's medium-term capital management plan and in addition one of the following situations is met:

[..]

Article 77 (2) bis

Notwithstanding paragraph (1)(c) of this Article, the competent authorities may permit institutions to redeem a Tier 3 instrument before five years of the date of issue when the undertaking's Solvency Capital Requirement is, after the redemption, exceeded by an appropriate margin taking into account the solvency position of the undertaking including the undertaking's medium-term capital management plan and in addition one of the following situations is met:

[..]

19.7. EIOPA's advice

Operation of the Principal Loss absorbency mechanism

1507. Bearing in mind the absence of any prudential benefit, EIOPA currently considers that there is a stronger case not to align with the banking regime on this point based on fundamental differences in the structure of the respective Regulations. Nevertheless, EIOPA will continue to analyse this issue before finalising its advice to the Commission.

1508. Since, EIOPA has observed different practices and implementation within Member States, EIOPA intends to recommend that even if it is decided not to align the PLAM with the banking regime, changes should be made to the Delegated Regulation to further specify the operation of the PLAM.

When and how partial write-down should be permissible

1509. EIOPA believes that any restricted Tier 1 instrument should be written down fully at least at the point at which SCR coverage falls to 75% or the MCR is breached (therefore partial-write-down not possible in these cases).

1510. EIOPA recommends that partial write down should be permissible where the mandatory trigger of 3 months SCR breach has been reached, but only so long as the 75% SCR breach and MCR breach triggers have not also been triggered.

1511. EIOPA further recommends that, as a minimum, rT1 is written down on a straight line basis in such a way that at 75% SCR breach the instrument is written down in full.

1512. EIOPA recommends that, absent an exceptional adverse situation having been declared in accordance with Article 138(4) of the Solvency II Directive, undertakings should recalculate their SCR coverage and perform further write down if necessary, every three months until compliance with the SCR is

restored

1513. EIOPA recommends that undertakings should be required to apply a further write down upon any further worsening of the SCR coverage ratio after each subsequent 3 month period¹⁴².

1514. EIOPA needs to consider the issue of conversion further before finalising its advice. In the meantime, as part of this consultation, EIOPA welcomes stakeholder feedback on whether and how partial conversion could be applied.

Tax effect of restricted Tier 1 which writes down on trigger

1515. EIOPA recommends not to align with the banking regime and instead to continue to allow for full recognition of the principal amount of rT1 instruments on issuance. Additionally, EIOPA recommends to provide supervisory authorities with the ability to consider whether to give an exceptional waiver from the requirement to write down, on a case specific basis, if:

- the undertaking requests such a waiver and provides projections to the end of its tax year, based on reasonable assumptions, which demonstrate there is a high likelihood that the tax effects of write down could significantly weaken the solvency position of an undertaking; and
- the undertaking's statutory auditors confirm in writing that the assumptions used in that projection are reasonable; and
- neither the 75% SCR mandatory trigger nor MCR have been breached.

1516. EIOPA welcomes stakeholder feedback on whether it is preferable to define deadlines for the request of the waiver and what these deadlines should be.

Early redemptions, tax calls and regulatory calls

1517. EIOPA recommends changes to bring Solvency II closer to alignment with CRR, in particular regarding tax and regulatory calls. In doing so EIOPA notes that this would be in line with the November 2016 draft of CRR II.

¹⁴² For clarity: The recalculation of the SCR coverage ratio referred to is the recalculation for the purposes of determining whether a further write-down of the instrument is required and not the recalculation of the SCR coverage ratio performed for another purposes. For example, if a normal reporting point were to occur after a partial write down, but less than 3 months after that partial write down, EIOPA is not recommending an additional write down be considered at that reporting point.

20. Capital instruments only eligible as tier 1 up to 20% of total tier 1

20.1. Call for advice

The list of own-fund items, deemed to fulfil the tier 1 eligibility criteria, which contains for each own-fund item a precise description of the features which determine its classification (under the empowerments in Articles 97 (1) and 99 (a) of Directive 2009/138/EC).

The list of own funds items deemed to fulfil the tier 1 eligibility criteria contains paid-in subordinated mutual member accounts, paid-in preference shares and the related share premium account, and paid-in subordinated liabilities¹⁴³. These items are subject to a quantitative limit of 20%.

EIOPA is asked to assess whether, if this quantitative limit were removed, the detailed eligibility criteria applicable to these items would need to be modified, in order to ensure that the criteria set out in Article 94 (1) continue to be fulfilled.”

20.2. Legal basis

Solvency II Directive

Recital 16

(16) The main objective of insurance and reinsurance regulation and supervision is the adequate protection of policy holders and beneficiaries. The term beneficiary is intended to cover any natural or legal person who is entitled to a right under an insurance contract. Financial stability and fair and stable markets are other objectives of insurance and reinsurance regulation and supervision which should also be taken into account but should not undermine the main objective.

Article 97:

The Commission shall adopt implementing measures laying down the following:

- (a) a list of own-fund items, including those referred to in Article 96, deemed to fulfil the criteria, set out in Article 94, which contains for each own-fund item a precise description of the features which determined its classification;*
- (b) [..]*

Article 99:

The Commission shall adopt implementing measures laying down:

- (a) the quantitative limits referred to in Article 98 (1) and (2);*
- (b) [...]*

¹⁴³ For the purposes of this paper these items are referred to as “restricted tier 1”, or “rT1”.

Delegated Regulation

Article 82:

1. *As far as compliance with the Solvency Capital Requirement is concerned, the eligible amounts of Tier 2 and Tier 3 items shall be subject to all of the following quantitative limits:*
 - a. *the eligible amount of Tier 1 items shall be at least one half of the Solvency Capital Requirement;*
 - b. *the eligible amount of Tier 3 items shall be less than 15 % of the Solvency Capital Requirement;*
 - c. *the sum of the eligible amounts of Tier 2 and Tier 3 items shall not exceed 50 % of the Solvency Capital Requirement.*
2. *As far as compliance with the Minimum Capital Requirements is concerned, the eligible amounts of Tier 2 items shall be subject to all of the following quantitative limits:*
 - a. *the eligible amount of Tier 1 items shall be at least 80 % of the Minimum Capital Requirement;*
 - b. *the eligible amounts of Tier 2 items shall not exceed 20 % of the Minimum Capital Requirement.*
3. *Within the limit referred to in point (a) of paragraph 1 and point (a) of paragraph 2, the sum of the following basic own-fund items shall make up less than 20 % of the total amount of Tier 1 items:*
 - a. *items referred to in point (a)(iii) of Article 69;*
 - b. *(b) items referred to in point (a)(v) of Article 69; (c) items referred to in point (b) of Article 69; (d) items that are included in Tier 1 basic own funds under the transitional arrangement set out in Article 308b (9) of Directive 2009/138/EC.*

20.3. Feedback statement on the main comments received to the discussion paper

a. Summary of the comments received

1518. No respondents were in favour of removing the 20% limit, given the amendment to the features required of rT1 which would then be necessary to mitigate the resulting fall in the quality of Tier 1 own funds. A third of respondents positively opposed such a change.
1519. Respondents commented that removing the 20% limit would provide a large ex-post subsidy to undertakings which have a lot of legacy instruments which had transitioned into rT1. Indeed, these are currently being recognised as Tier 2 own funds as a result of the 20% limit.
1520. Respondents were unanimous that improving the quality of rT1 capital by raising the mandatory triggers in Article 71(8) of the Delegated Regulation to a point above SCR breach would increase the cost of such instruments. But, several respondents also pointed out that setting a trigger above the point at which there is a mandatory dividend cancellation could lead to undesirable reversals of creditor subordination.

1521. All respondents thought that improving the quality of rT1 capital by making the first contractual opportunity to redeem (or call date) more distant would increase the price of the instruments. However, some respondents also stated that the first call date is irrelevant to the economic substance of rT1, given its perpetual nature and the need for supervisory approval before any redemption.

1522. One respondent commented that if the limit were removed, and the features required for rT1 instruments to be Tier 1 compliant strengthened, then it would be important to introduce transitional arrangements for instruments already issued which comply with the current requirements.

b. Assessment

1523. EIOPA agrees with the view that the 20% limit should be retained and that its removal would provide a large ex-post subsidy to undertakings, which had a lot of legacy instruments which had transitioned into rT1, and which are currently recognised as Tier 2 own funds as a result of the limit. EIOPA is of the view that if the 20% limit were removed, it would be inappropriate to take no action to mitigate the resulting effect of lowering the quality of Tier 1 capital.

1524. EIOPA accepts the argument that raising the mandatory trigger point to a point before mandatory dividend cancellation had occurred risks introducing perverse incentives into the rT1 market. This possibility is not considered further in this CP.

1525. EIOPA sees an inconsistency between the argument that extending the first call date would cause rT1 instruments to be more expensive, with the view that the perpetual nature of Tier 1, plus the need for supervisory permission to redeem, are sufficient to provide permanence. Since supervisory permission to redeem is required for all three tiers of own funds, EIOPA does not believe that this is relevant to assessing whether rT1 items have sufficient quality to be recognised as the highest quality of own funds. Market data clearly shows that investors tend to price instruments to their first call date, treating this as the effective duration of the instrument. That being the case, if a supervisor did not allow the instrument to be redeemed on call, investor expectations would not be fulfilled and it is unlikely that the relevant undertaking would be able to raise further capital for some time. Extending the period to the first call date would therefore change investor expectations, and improve the permanence of rT1 own funds, bringing the expectations of the duration of rT1 instruments closer to that of equity, which is the highest quality form of capital.

1526. The instruments which are recognised as rT1 under the transitional arrangements are identified in Article 308b of the Solvency II Directive. The Directive requirements are not within the scope of the Commission's call for advice. So, if the Commission were to remove the 20% limit for rT1 instruments, it is expected that all instruments subject to the transitional provisions would be recognised as Tier 1 own funds.

20.4. Advice

20.4.1. Previous advice

1527. CEIOPS' Advice for Level 2 Implementing Measures on Solvency II: Own funds - Article 97 and 99 - classification and eligibility gave the following advice to the European Commission in 2009:

3.33. A number of CEIOPS Members are of the view that only ordinary share capital or the equivalent capital of mutual and mutual-type undertakings should be allowed in Tier 1, as far as capital instruments are concerned.

3.34. These Members do not consider other capital instruments to be of sufficient quality for classification in Tier 1. At the same time, these Members acknowledge that there may be merit in providing the possibility of classifying such other instruments in Tier 1 in exceptional circumstances, subject to those instruments meeting the necessary characteristics for eligibility as Tier 1 own funds

3.38. CEIOPS cannot [...] support any regime in which hybrid instruments could represent all or the most significant part of Tier 1. Any inclusion of high quality hybrids should therefore be restricted i.e. they should account for no more than 20% of Tier 1.

20.4.2. Analysis

Analysis: Retention of the 20% limit

1528. Article 93 of the Solvency II Directive sets out the characteristics which are used to classify own funds into tiers. Those characteristics are no different now than they were when CEIOPS gave its previous advice regarding the quality of rT1 instruments.

1529. That being the case, EIOPA is still of the view that it cannot support any regime in which hybrid instruments¹⁴⁴ could represent all or the most significant part of Tier 1. It therefore reconfirms the view that any inclusion of high quality hybrids should be restricted. If the 20% limit is removed undertakings would be able to comply with the requirement for at least 50% of the SCR to be presented by Tier 1 own funds by holding more hybrid capital and equity-like capital than at present. This would weaken the ability of Solvency II to deliver protection to policy holders and beneficiaries at the 1 in 200 level of risk.

1530. EIOPA analysed the data it receives from the 2016 annual reporting of undertakings. It received data pertaining to 2707 undertakings, out of which 204 have recognised rT1 capital. Of those 204, only 30 entities (i.e. 1.1%)

¹⁴⁴ Hybrid instruments are instruments which have a mixture of both debt and equity characteristics. Whilst rT1 instrument will be hybrid instruments it does not follow that all hybrid instruments have the Article 71 features required of rT1 own funds.

had rT1 above the 20% total tier 1 limit (and therefore relegate some rT1 to Tier 2). Of those only eight (0.029%) have more than 30% of total Tier 1 (before relegation). In four extreme cases undertakings have rT1 (before relegation) of over 50% of total Tier 1. This being the case, the limit is not considered to be a material impediment to the industry. If the 20% limit were removed, EIOPA does not believe that recognising higher levels of hybrid debt as Tier 1 capital would be consistent with requirements of Article 93 of the Solvency II Directive.

Analysis: Strengthening of the features required of rT1 instruments

1531. There is no way to strengthen the quality of rT1 which would exactly mitigate the effect on Tier 1 own funds of removing the 20% limit, and thereby deliver the same quality of own funds as before any change. However, the impact can be partly mitigated by:

- a. improving the permanence of rT1 instruments; and
- b. improving the loss absorbency which they provide on trigger; and
- c. strengthening the mandatory trigger points at which they provide loss absorbency.

Permanency

1532. Two options are considered to be logical possibilities to improve permanence:

- a. increase the first call date to 10 years; or
- b. require that rT1 has no call dates so that all Tier 1 own fund items have the same permanence features.

1533. In the first case a consequential change would be needed to amend the start and end dates of the subsequent period where repayment or redemption may only be allowed if the SCR is exceeded by an appropriate margin.

Improved loss absorbency

1534. The loss absorbency of rT1 instruments which write down could be improved by requiring full write down immediately in the event of any of the mandatory triggers occurring.

Stronger mandatory triggers

1535. The extent to which rT1 instruments absorb losses could be strengthened by changing the mandatory triggers to:

- a. SCR breach for two month¹⁴⁵; or
- b. 80% SCR trigger; or
- c. MCR breach.

Analysis: Removal from Article 71 of the Delegated Regulation of those features pertaining to hybrid instruments

1536. One way of preserving the quality of Tier 1 own funds if the 20% limit were removed would be to withdraw the ability for hybrid instruments to be recognised as Tier 1 capital.

1537. However, removing these criteria may have a large impact on mutual undertakings, since they may be limited by their mutual nature in their ability to issue equity-like Tier 1 own fund instruments.

1538. This being the case, EIOPA does not recommend this option.

¹⁴⁵ If the Commission chooses this option, there may be consequential amendments necessary to other EIOPA recommendations such as the frequency with which recalculation of partial write down is recalculated. See Section 1.4 Operation of the PLAM.

20.4.3. EIOPA's advice

Option 1: Retain the 20% limit

1539. Bearing in mind that no respondents to the EIOPA-CP-16/008 discussion paper supported removal of the 20% limit on rT1 together with consequential actions needed to mitigate a resulting fall in the quality of Tier 1 capital, EIOPA advises the Commission to retain the 20% limit in order to protect the prudential quality of Solvency II Tier 1 own funds necessary to deliver the adequate protection of policy holders and beneficiaries.

1540. If the 20% limit would not be kept, EIOPA believes that no changes to the features required of hybrid instruments would fully mitigate the resulting loss in capital quality. However, in proposing that the features required of hybrid tier 1 instruments be strengthened if the limit is removed, EIOPA has sought to strike a balance between the prudential desire to maintain capital quality and practical concerns; if the quality of tier 1 hybrids is raised too high they may not be viable and the practical effect would be the same as if hybrids instruments could not be recognised in tier 1. Therefore certain changes that would strengthen the quality of tier 1 hybrids bringing them close to unrestricted tier 1, such as requiring that they be perpetual with no call date, were considered, but were not judged to be appropriate on the grounds of proportionality.

Option 2: Strengthen the quality of hybrid T1 instruments

1541. If option 1 would not be accepted, then EIOPA recommends that, in order to protect the quality of Tier 1 own funds the regulations are amended to include at least the following changes:

- a) to require that the first call date of rT1 instruments is extended to 10 years after issuance;
- b) to require that redemption is only permitted between 10 and 20 years after the date of issuance where the undertaking's SCR is exceeded by an appropriate margin;
- c) to require full write down on breach of any of the mandatory triggers; and
- d) to change the mandatory triggers to breach of any of the following conditions:
 - the amount of own-funds eligible to cover the SCR is equal or less than 80% of the SCR;
 - the amount of own-funds eligible to cover the MCR is equal or less than the MCR;
 - compliance with the SCR is not re-established within a period of two months of the date when non-compliance was first observed.

20.4.4. Proposal for new articles

Option 2: Strengthen the quality of rT1 instruments

1542. Article 71 (1) of the Delegated Regulation is amended to:

(a) the basic own-fund item meets one of the following criteria:

(i) in the case of items referred to in points (a)(i) and (ii) of Article 69, the item is undated or, where the insurance or reinsurance undertaking has a fixed maturity, is of the same maturity as the undertaking;

*(ii) in the case of items referred to in points (a)(iii) and (v) and point (b) of Article 69, the item is undated; the first contractual opportunity to repay or redeem the basic own-fund item does not occur before **510** years from the date of issuance;*

*(g) the basic own-fund item referred to in points (a)(iii) and (v) and point (b) of Article 69 may only allow for repayment or redemption of that item between **510** and ~~1020~~ years after the date of issuance where the undertaking's Solvency Capital Requirement is exceeded by an appropriate margin taking into account the solvency position of the undertaking including the undertaking's medium-term capital management plan;*

1543. Article 71 (5) is amended to:

*For the purposes of paragraph (1)(e)(i), the nominal or principal amount of the basic own-fund item shall be written down **in full** in such a way that all of the following are reduced: (a) the claim of the holder of that item in the event of winding-up proceedings; (b) the amount required to be paid on repayment or redemption of that item; (c) the distributions paid on that item.*

1544. Article 71 (8) is amended to:

8. The trigger event referred to in paragraph (1)(e) shall be significant non-compliance with the Solvency Capital Requirement.

For the purposes of this paragraph, non-compliance with the Solvency Capital Requirement shall be considered significant where any of the following conditions is met:

*(a) the amount of own-fund items eligible to cover the Solvency Capital Requirement is equal to or less than the **75–80 %** of the Solvency Capital Requirement;*

(b) the amount of own-fund items eligible to cover the Minimum Capital Requirement is equal to or less than Minimum Capital Requirement;

(c) compliance with the Solvency Capital Requirement is not re-established within a period of ~~three~~-two months of the date when non-compliance with the Solvency Capital Requirement was first observed. Insurance and reinsurance undertakings may specify, in the provisions governing the instrument, one or more trigger events in addition to the events referred to in points (a) to (c).

Insurance and reinsurance undertakings may specify, in the provisions governing the instrument, one or more trigger events in addition to the events referred to in points (a) to (c).

21. Draft Impact Assessment

21.1. Procedural issues and consultation of interested parties

1545. In July 2016 and February 2017 the European Commission has requested EIOPA to provide technical advice on the review of specific items in the Delegated Regulation. In particular, the European Commission seeks EIOPA's technical advice regarding the review of the methods, assumptions and standard parameters used when calculating the Solvency Capital Requirement (hereinafter, SCR) with the standard formula.
1546. According to the European Commission's request, EIOPA should justify its advice by identifying, where relevant, a range of technical options and by undertaking evidence-based assessment of the costs and benefits of each. Where administrative burdens and compliance costs on the side of the industry could be significant, EIOPA should where possible quantify these costs.
1547. The analysis of costs and benefits is undertaken according to an Impact Assessment methodology.
1548. The European Commission has requested EIOPA to provide sufficient factual data backing the analyses gathered during its assessment. The request highlights the importance of the presentation of the advice produced by EIOPA making maximum use of the data gathered and enabling all stakeholders to understand the overall impact of the options presented by EIOPA.
1549. The European Commission's request takes into account the input from stakeholders to the Call for evidence on the EU regulatory framework for financial services, launched in September 2015. Comments received on the Solvency II requirements contributed to identify the areas to be reviewed.
1550. Between December 2016 and March 2017, EIOPA published a discussion paper in order to get stakeholders' views on the scope of the review and to collect relevant evidence. Comments received during that first public consultation have been taken into account in the development of the draft technical advice.
1551. EIOPA will provide its technical advice to the Commission following a staggered approach according to the availability of evidence needed to support its proposals, in particular, evidence from annual regular supervisory reporting of (re)insurance undertakings.
1552. A first set of advice that EIOPA intends to submit to the Commission by October 2017 contains items for which the analysis of annual reporting data of undertakings is less relevant. In particular it contains the following: simplified calculations, reducing reliance on external credit ratings, treatment of guarantees and exposures to regional governments and local authorities, risk-mitigation techniques, look-through approach for investment related vehicles and undertaking specific parameters.

1553. This impact assessment refers to a second set of advice that EIOPA intends to submit to the Commission by February 2018. It contains the following items: premium and reserve risks, mortality and longevity risks, catastrophe risks, interest rate risk, market risk concentration, currency risk at group level, unrated bonds and loans, unlisted equity, counterparty default risk, treatment of exposure to CCPs and changes resulting from EMIR, simplification of the look-through approach, look-through approach at group level, loss-absorbing capacity of deferred taxes, risk margin and own funds.

1554. As it was done for the first set of advice, the draft technical advice and its impact assessment will be subject to public consultation. Stakeholders' responses to the public consultation will be duly analysed and serve as a valuable input for the revision of the draft technical advice and its impact assessment. Additionally, the opinion from the Insurance and Reinsurance Stakeholder Group, provided in Article 37 of EIOPA Regulation, will be considered.

21.2. Problem definition

1555. Article 111(3) of the Solvency II Directive provides that 'by 31 December 2020, the Commission shall make an assessment of the appropriateness of the methods, assumptions and standard parameters used when calculating the Solvency Capital Requirement standard formula'. The outcome of this assessment shall be presented to the European Parliament and to the Council, proposing amendments of the Directive or of the implementing measures.

1556. Recital 150 of the Delegated Regulation defined a new timeline for the review of the SCR standard formula, which should be done by the European Commission before December 2018.

1557. In preparation of such review the European Commission requested EIOPA's technical advice in three areas where the current requirements can be improved or need to be amended:

- proportionate and simplified application of the SCR standard formula requirements;
- removal of unintended technical inconsistencies, i.e. recalibration of certain parameters and other technical issues; and
- removal of unjustified constraints to financing, in the context of Capital Market Union.

1558. When analysing the impact from proposed policies, the impact assessment methodology foresees that a baseline scenario is applied as the basis for comparing policy options. This helps to identify the incremental impact of each policy option considered. The aim of the baseline scenario is to explain how the current situation would evolve without additional regulatory intervention.

1559. For the analysis of the potential related costs and benefits of the proposed technical advice, EIOPA has applied as a baseline scenario the effect from the application of the Solvency II Directive requirements, the Delegated Regulation and the relevant implementing measures as they currently stand.

1560. In particular the baseline will include:

- Articles 100 to 111 of the Solvency II Directive;
- Articles 83 to 221 of the Delegated Regulation;
- the following implementing technical standards (ITS):
 - ITS with regard to the supervisory approval procedure to use undertaking-specific parameters (Commission Implementing Regulation (EU) 2015/498 of 24 March 2015);
 - ITS with regard to the lists of regional governments and local authorities, exposures to whom are to be treated as exposures to the central government (Commission Implementing Regulation (EU) 2015/2011 of 11 November 2015);
 - ITS with regard to the adjusted factors to calculate the capital requirement for currency risk for currencies pegged to the euro (Commission Implementing Regulation (EU) 2015/2017 of 11 November 2015);
- the following EIOPA's guidelines:
 - Guidelines on application of outwards reinsurance;
 - Guidelines on basis risk;
 - Guidelines on health catastrophe risk sub-module;
 - Guidelines on look-through approach;
 - Guidelines on the application of life underwriting risk module;
 - Guidelines on the loss-absorbing capacity of technical provisions and deferred taxes;
 - Guidelines on the treatment of market and counterparty risk exposures in the standard formula;
 - Guidelines on undertaking-specific parameters; and
 - Guidelines on group solvency.

21.3. Objective pursued

1561. The specific objectives of the review can be summarised as follows:

- simplify where possible and ensure the proportionate application of the SCR standard formula, in particular for small undertakings;
- ensure the methods, assumptions and parameters to be used in the SCR standard formula remain appropriate and compliant with the Solvency II Directive;
- reduce the risk of overreliance on rating agencies;
- increase consistency across sectorial rules to the extent possible; and
- avoid pro-cyclicality.

1562. In order to reach the mentioned objectives the following set of more detailed operational objectives has been considered:

- provide new simplified calculations for more modules of the SCR standard formula, in addition to the existing simplifications;
- simplify the design of some modules (counterparty default and catastrophe risk modules);
- update the parameters for underwriting risks taking into account the recent experience;
- assess if inconsistencies with banking framework on common topics (guarantees, RGLA, own funds) should be removed;
- adjust the requirements where necessary taking into account recent market development; and
- extend the use of alternative credit assessments.

1563. The mentioned objectives for the review are connected to the general objectives of the Solvency II framework (deepen the integration of the EU insurance market, enhance the protection of policyholders and beneficiaries and promote better regulation) and in particular they are connected to:

- the establishment of risk-sensitive harmonised solvency standards;
- the introduction of proportionate requirements for small undertakings; and
- the promotion of compatibility of prudential supervision of insurance and banking.

1564. The objectives of the review are also consistent with the following objectives of EIOPA, as reflected in the Regulation of the Authority¹⁴⁶:

- ensure a sound, effective and consistent level of regulation and supervision;
- ensure the taking of risks related to (re)insurance activities is appropriately regulated and supervised; and
- consumer protection.

21.4. Recalibration of standard parameters of premium and reserve risks

21.4.1. Policy options

1565. The capital requirement for the non-life premium and reserve risk sub-module is calculated using specific standard parameters defined in the regulation for each line of business. Based on the experience gained since the standards were defined, EIOPA has assessed the appropriateness of the standard parameters for the lines of business: assistance, credit and suretyship, legal expenses, medical expense and workers' compensation.

1566. For this purpose, the same methodology that was initially used to calibrate the standard parameters was used again.

21.4.2. Analysis of impact

1567. In order to analyse the impact of the new standard parameters, EIOPA intends to make use of the annual QRTs to assess the quantitative impact. By using the volume measures reported in S.26.05.01, one can replicate the calculations of the SCR for premium and reserve risks.

1568. The average increase or decrease of the resulting capital requirements will be provided for the final advice, taking into account diversification effects with other lines of businesses.

1569. The recalibration is aimed to improve the risk sensitivity and therefore to provide benefits for policyholders, industry and supervisors likewise, avoiding the underestimation or overestimation of the capital requirement.

¹⁴⁶ See Article 1.6 of EIOPA Regulation

21.5. Volume measure for premium risk

21.5.1. Policy options

1570. The capital requirement for premium and reserve risks is calculated on the basis of a volume measure for premium and reserve risk and of standard deviations. EIOPA has been asked to assess for continuous appropriateness the definition of the volume measure for premium risk.

1571. The current definition takes account of the premiums to be earned for contracts where the initial recognition date falls in the following 12 months but excluding the premiums to be earned during the 12 months after the initial recognition date. Excluding these premiums means that there is a gap in the premiums taken into account in the volume measure.

1572. During the development of the advice on volume measure for premium risk, EIOPA has considered different options for amending the standard formula.

- Option 1: no change.
- Option 2: filling the gap and taking account of the premiums to be earned for contracts where the initial recognition date falls in the following 12 months but excluding the premiums to be earned during the following 12 months. Since it would lead to more premiums than today, the effect would be mitigated by the introduction of an adjustment factor.

21.5.2. Analysis of impact

Option 1: no change

1573. On the side of benefits, following observations can be made:

- Policyholders – none.
- Industry – this approach is arguably less volatile for 1-year contracts and therefore the anticipation of capital requirements is easier to manage.
- Supervisors – none.

1574. On the side of costs, following observations can be made:

- Policyholders – there is a difference between policyholders that subscribe multi-year contracts and those that subscribe 1-year contracts: there is a jump in the capital requirements. However most of the contracts are 1-year contracts.
- Industry – the current approach with the gap has led to misunderstanding and some (wrongly) believed this was a mistake.
- Supervisors – none.

Option 2: filling in the gap

1575. On the side of benefits, following observations can be made:

- Policyholders – policyholders that subscribe multi-year contracts are treated on a similar basis as those that subscribe 1-year contracts.
- Industry – this approach is easier to understand technically speaking: permanent costs are reflected throughout the life of the contract and not only 12 months after the initial recognition date.
- Supervisors – this approach is easier to understand technically speaking and therefore easier to supervise.

1576. On the side of costs, following observations can be made:

- Policyholders – this approach arguably provides for a more volatile volume measure for 1-year contract, which may be compensated by the industry by raising premiums.
- Industry – this approach seems to provide for a more volatile volume measure for 1-year contract which may be more difficult to manage.
- Supervisors – none.

21.5.3. Comparison of options

1577. EIOPA did not yet take a decision on the preferred option and would welcome stakeholders feedback on the benefits and cost of these two options, taking in particular into account:

- Difference between 1-year and multi-year contracts;
- The stability of the volume measure and its reflection of the risk exposure, taking into account Article 17 of the Delegated Regulation.

21.6. Recalibration of mortality and longevity risks

21.6.1. Policy options

1578. The capital requirements for longevity and mortality risks are calculated by (re)insurers by stressing the mortality rates of the best estimate.

1579. EIOPA has assessed the granularity with which the stresses are defined and has considered different options for amending the standard formula.

- Option 1: no change, i.e. define one stress for all ages.
- Option 2: define stresses per age group.

21.6.2. Analysis of impact

Option 1: no change, i.e. one stress for all ages

1580. On the side of benefits, following observations can be made:

- Policyholders – the approach is easily implementable by the industry, which ultimately reduces the cost for policyholders. Risks are mutualized between younger ages and older ages, which reduces cost for portfolio of younger ages.
- Industry – the approach is easily implementable, whichever granularity with which best estimate are calculated. It reflects the fact that (re)insurers have diversified portfolio with diversified risks.
- Supervisors – the approach is easy to supervise.

1581. On the side of costs, following observations can be made:

- Policyholders – the stress is overestimated for ages above 60 years old, which could increase costs for this population.
- Industry – the stress is underestimated for ages below 60 years, which could adversely affect the (re)insurer.
- Supervisors – the stress is underestimated for ages below 60 years, therefore supervisors need to assess the average age of the insurer portfolio.

Option 2: define stresses per age group

1582. On the side of benefits, following observations can be made:

- Policyholders – the stress would better match the risk, hence older population would pay less and younger population would be protected by an appropriate capital requirement.
- Industry – this could relief capital held by industry on portfolios of older population.
- Supervisors – capital requirements are more appropriate for specific age distribution of insurers.

1583. On the side of costs, following observations can be made:

- Policyholders – the approach is more burdensome to implement which could increase costs for policyholders, at least on a temporary basis.
- Industry – the best estimate is calculated with a high granularity: not only per age group but also per gender, per different socio-economic factors... the granularity of the best estimate is tailor-made for each insurer. A stress per age group would not correspond to this granularity and implementation could be difficult.

- Supervisors – it is more difficult to supervise.

21.6.3. Comparison of options

1584. EIOPA recommends **option 1 (one stress for all ages)** having taken into account one of the key objectives of this review to simplify the standard formula.

21.7. Health catastrophe risks

1585. With the aim of simplifying the health catastrophe risk sub-module, EIOPA has considered different policy options to simplify each of its components:

- a. capital requirement of the mass accident risk sub-module;
- b. capital requirement of the accident concentration risk sub-module; and
- c. capital requirement of the pandemic risk sub-module.

21.7.1. Mass accident risk simplification

21.7.1.1. Policy options

1586. For the calculation of the capital requirements of the mass accident risk sub-module and the accident concentration risk sub-module 5 types of events need to be considered:

- a. death caused by an accident;
- b. permanent disability caused by an accident;
- c. disability that lasts 10 years caused by an accident;
- d. disability that lasts 12 months caused by an accident; and
- e. medical treatment caused by an accident.

1587. With the aim of simplifying this module, and in particular the problems associated with the “disability that lasts 10 years”, the following options have been considered:

- Option 1 – no change;
- Option 2 – delete the “disability that lasts 10 years” scenario, not modifying the rest of scenarios
- Option 3 - delete the “disability that lasts 10 years” scenario, modifying the rest of scenarios.

21.7.1.2. Analysis of impacts

Option 1 – no change

1588. On the side of benefits, it is possible to detect the following effects:

- Policyholders – none.
- Industry – consistency with previous calculations.
- Supervisors - consistency with previous calculations.

1589. On the side of costs, it is possible to detect the following effects:

- Policyholders – wrong risk sensitivity which could lead to lower protection.
- Industry – difficulty to apply the current module.
- Supervisors – difficulty to apply the current module.

Option 2 – delete the “disability that lasts 10 years” scenario, not modifying the rest of scenarios

1590. On the side of benefits, it is possible to detect the following effects:

- Policyholders – None.
- Industry – Relative consistency with previous calculations, simplicity.
- Supervisors - Relative consistency with previous calculations, simplicity.

1591. On the side of costs, it is possible to detect the following effects:

- Policyholders – Some risk exposures would not be covered which could lead to lower protection.
- Industry – None.
- Supervisors – Wrong risk assessment.

Option 3 – delete the “disability that lasts 10 years” scenario, modifying the rest of scenarios

1592. On the side of benefits, it is possible to detect the following effects:

- Policyholders – Appropriate protection.
- Industry – Simplification.
- Supervisors - Simplifications.

1593. On the side of costs, it is possible to detect the following effects:

- Policyholders – None.

- Industry – Change in the module design.
- Supervisors – Change in the module design.

21.7.1.3. Comparison of options

1594. From the options detailed, only the latter two (delete the “disability that lasts 10 years” scenario) would lead to significant simplification.

1595. However, only one of those two options would lead to an appropriate risk assessment, this is Option 3. Consequently, **option 3 (delete the “disability that lasts 10 years” scenario, modifying the rest of scenarios)** is the preferred option.

1596. In this respect, only 2 hypotheses have an incidence on the cost of the disability scenarios:

- the difference between retirement age and the mean age of insureds;
- the mean annual cost of total disability.

The following table summarizes the impact of the new proposal on the mass-accident risk sub-module and on the concentration risk sub-module, in various configurations. A positive impact means that the new proposal is more conservative ($[CAT\ WS - CTF] / CTF$), resulting in a higher capital requirement.

1597. It appears clearly that the new calibration is broadly in line with previous one, though more simple (4 scenarios instead of 5) and with no longer use of the unrealistic 10 year disability scenario.

1598. It also appears that generally speaking, the new proposal is a bit more conservative than previous one only when permanent disability is expensive (young insureds, high annual disability costs).

Mean age (Retirement = 62 years)	Mean annual disability cost	Impact (with death = 100k€)	Impact (with death = 150 k€)
35	7 000	2.8 %	2.2 %
35	10 000	3.4 %	2.7 %
35	12 000	3.7 %	3.0 %
40	7 000	-1.2 %	-1.0 %
40	10 000	-1.5 %	-1.2 %
40	12 000	-1.6 %	-1.3 %
45	7 000	-5.5 %	-4.2 %
45	10 000	-6.8 %	-5.4 %
45	12 000	-7.4 %	-6.0 %

Table 21.1: Impact of new calibration compared to CTF calibration

1599. The differences are less important when payments in case of accidental death are bigger, because the weight of disability in the Health CAT is lower. Medical expenses are generally not material and thus do not materially change the impacts.

21.7.2. Accident concentration risk simplification

21.7.2.1. Policy options

1600. For the calculation of the capital requirement of the accident concentration risk sub-module undertakings are required to identify their largest accident risk concentration in each country, which is based on the largest number of persons working in the same building in relation to which the (re)insurance undertaking has a workers' compensation (re)insurance obligation or an group income protection (re)insurance obligation.

1601. With the aim of simplifying this module, and in particular addressing undertakings' main difficulty in analysing whether policyholders are located in the same building or not, the following options have been considered:

- Option 1 – No change;
- Option 2 – Allow undertakings to take the largest policy (i.e. that covers the highest number of people), but assuming then that all policyholders are working in the same building;

- Option 3 - Perform the calculation on an event that hits the headquarters of the undertaking.

21.7.2.2. Analysis of impacts

Option 1 – no change

1602. On the side of benefits, it is possible to detect the following effects:

- Policyholders – assuming that undertakings are able to identify whether policyholders are located in the same building, this option is most risk sensitive, and therefore policyholders’ protection is appropriate.
- Industry – assuming that undertakings are able to identify whether policyholders are located in the same building, this option is most risk sensitive.
- Supervisors – assuming that undertakings are able to identify whether policyholders are located in the same building, this option is most risk sensitive.

1603. On the side of costs, it is possible to detect the following effects:

- Policyholders – none.
- Industry – difficulty to perform the calculations is not reduced.
- Supervisors – none.

Option 2 – Allow undertakings to use the largest policy

1604. On the side of benefits, it is possible to detect the following effects:

- Policyholders – None.
- Industry – Simplicity.
- Supervisors - Relative simplicity.

1605. On the side of costs, it is possible to detect the following effects:

- Policyholders – Potential higher cost since higher costs for undertakings could be passed on to policyholders via higher prices.
- Industry – Potential wrong results and higher capital requirement, if for instance the largest policy is a large group of people (e.g. hundreds of thousands) but the number of people working in the same building is much lower.
- Supervisors – Wrong risk assessment. Unreasonable results, since it cannot be assumed that group insurance policies follow geographical patterns.

Option 3 – Perform the calculation on an event that hits the headquarters of the undertaking

1606. On the side of benefits, it is possible to detect the following effects:

- Policyholders – None.
- Industry – Simplification.
- Supervisors - Simplifications.

1607. On the side of costs, it is possible to detect the following effects:

- Policyholders – Potential high costs or lower protection.
- Industry – Potential wrong results and higher or lower capital requirements since it is less risk-sensitive.
- Supervisors – Potential unrealistic risk assessment.

21.7.2.3. Comparison of options

1608. Against the background of the aforementioned results, EIOPA concluded that no generic simplification should be proposed. Consequently the preferred option is **Option 1 (no change)**.

21.7.3. Pandemic risk simplification

21.7.3.1. Policy options

1609. The calculation of the capital requirement of the pandemic risk sub-module is based on the estimation per country of medical expenses to be covered by (re)insurance undertakings in case of a pandemic.

1610. With the aim of simplifying this module (in particular the estimation of costs, which vary from member state to member state), the following options have been considered:

- Option 1 – keep the current design.
- Option 2 – A simplification to allow for grouping the countries where the exposure is assessed as not proportionate.
- Option 3 - A second possibility could be to provide maximal unit claim costs per scenario and country. This would allow undertakings for which the risk is not proportionate to take these maximal costs.

21.7.3.2. Analysis of impacts

Option 1 – no change

1611. On the side of benefits, it is possible to detect the following effects:

- Policyholders – none.
- Industry – consistency with previous calculations.
- Supervisors - consistency with previous calculations.

1612. On the side of costs, it is possible to detect the following effects:

- Policyholders – none.
- Industry – difficulty to apply the current module.
- Supervisors – difficulty to apply the current module.

Option 2 – grouping the countries where the exposure is assessed as not proportionate

1613. On the side of benefits, it is possible to detect the following effects:

- Policyholders – None.
- Industry – Simplicity.
- Supervisors - Simplicity.

1614. On the side of costs, it is possible to detect the following effects:

- Policyholders – Potential risk underestimation which could lead to lower protection.
- Industry – None.
- Supervisors – Potentials wrong risk assessment.

Option 3 – provide maximal unit claim costs per scenario and country

1615. On the side of benefits, it is possible to detect the following effects:

- Policyholders – Appropriate protection.
- Industry – Simplification.
- Supervisors – Potential right fit with local idiosyncratic features, cost structures and chargeabilities of the national health care system in each Member State.

1616. On the side of costs, it is possible to detect the following effects:

- Policyholders – None.
- Industry – Change in the module design.

- Supervisors – Change in the module design.

21.7.3.3. Comparison of options

1617. From the options detailed, only one of the options would simplify the fact that the benefits payable in all countries and in all scenarios are sometimes difficult to estimate, while accounting idiosyncratic features, cost structures and chargeabilities of the national health care system in each Member State.

1618. Consequently the preferred option is **Option 3 (provide maximal unit claim costs per scenario and country)**.

21.8. Man-made catastrophe risks

1619. The man-made catastrophe risk sub-module consists of all of the following sub-modules: (a) the motor vehicle liability risk sub-module; (b) the marine risk sub-module; (c) the aviation risk sub-module; (d) the fire risk sub-module; (e) the liability risk sub-module; (f) the credit and suretyship risk sub-module.

1620. With the aim of simplifying the man-made catastrophe risk sub-module, EIOPA has considered different policy options to simplify the fire risk sub-module, the marine risk sub-module and the aviation risk sub-module.

21.8.1. Fire risk simplification

21.8.1.1. Policy options

1621. For the calculation of the capital requirement of the fire risk sub-module undertakings are required to identify their largest fire risk concentration, which is based on the set of buildings located within a radius of 200 meters with the largest sum insured covering damage due to fire or explosion, including as a result of terrorist attacks.

1622. EIOPA believes that the existing methodology is the optimal approach and recommends that this remains the default calculation.

1623. However, it is also recognised that there are a number of issues with the current methodology which mean that it is costly or burdensome to implement for all undertakings. Therefore, the following options have been considered:

- Option 1 – No change: Retain existing volume.
- Option 2 – Using the largest exposure measure (i.e. building with the largest sum insured) with an adjustment for conflagration
- Option 3 - Using a factor based approach (same as the simplification of QIS 5: multiplying volumes by risk factors) and not the current scenario-based approach

- Option 4 - Alter the formula to reflect market share, building density and reconstruction costs
- Option 5 - Limit the scope of the identification to the largest concentration of risk within a 200m radius circle to, at a minimum, the top five exposures per risk type (industrial, commercial, residential).

21.8.1.2. Analysis of impacts

Option 1 – no change

1624. On the side of benefits, it is possible to detect the following effects:

- Policyholders – none.
- Industry – consistency with previous calculations.
- Supervisors - consistency with previous calculations.

1625. On the side of costs, it is possible to detect the following effects:

- Policyholders – potential high costs.
- Industry – burdensome and costly particularly for small undertakings. This option is neither a simplification nor an alternative calculation.
- Supervisors – This option is neither a simplification nor an alternative calculation.

Option 2 – Using the largest exposure measure with an adjustment for conflagration

1626. On the side of benefits, it is possible to detect the following effects:

- Policyholders – None.
- Industry – Simplicity.
- Supervisors - Simplicity.

1627. On the side of costs, it is possible to detect the following effects:

- Policyholders – Could lead to lower protection.
- Industry – loss of risk sensitivity.
- Supervisors – Substantial loss of risk sensitivity and practical limitations with the proposal, including the calibration of the conflagration adjustment factors and the potential use of postal codes.

Option 3 – Using the simplification of QIS 5 (factor based approach)

1628. On the side of benefits, it is possible to detect the following effects:

- Policyholders – Appropriate protection.
- Industry – Simplification with minimal costs.

- Supervisors - Simplifications.

1629. On the side of costs, it is possible to detect the following effects:

- Policyholders – None.
- Industry – Loss of risk sensitivity.

1630.

- Supervisors – Loss of risk sensitivity.

Option 4 – Alter the formula to reflect market share, building density and reconstruction costs

1631. On the side of benefits, it is possible to detect the following effects:

- Policyholders – none.
- Industry – Reduced calculation burden as requirement to identify concentration risk is removed.
- Supervisors - Reduced calculation burden as requirement to identify concentration risk is removed.

1632.

1633. On the side of costs, it is possible to detect the following effects:

- Policyholders – potential high costs.
- Industry – Loss of risk sensitivity. Loss of simplicity through increased data requirements
- Supervisors – Increased complexity.

Option 5 – Limit the scope of the identification to the largest concentration of risk within a 200m radius circle to, at a minimum, the top five exposures per risk type (industrial, commercial, residential)

1634. On the side of benefits, it is possible to detect the following effects:

- Policyholders – Adequate risk assessment.
- Industry – Simplicity. Reduced calculation burden to identify largest concentration of risks for undertakings that are manually assessing their exposures. Current level of risk sensitivity will be maintained in majority of cases.
- Supervisors - Simplicity.

1635. On the side of costs, it is possible to detect the following effects:

- Policyholders – None.
- Industry – loss of risk sensitivity in certain cases.

- Supervisors – loss of risk sensitivity in certain cases.

21.8.1.3. Comparison of options

1636. Regarding fire risk, the “no change” option is neither a simplification nor an alternative calculation.

1637. However, the EIOPA agreed with the conclusions from the previous CAT taskforce and believe this remains the optimal approach.

1638. However, it is also recognised that there are a number of issues with the current methodology which mean that it is costly or burdensome to implement for all undertakings.

1639. EIOPA believes it is important for undertakings to understand their exposures and risks. Likewise, improved data recording and management should be incentivised. EIOPA therefore recommends that **option 5**, limit the scope of the identification to the largest concentration of risk within a 200m radius circle around, at a minimum, the top five exposures per risk type (Industrial, commercial, residential) be adopted as a simplification.

21.8.2. Marine risk submodule

21.8.2.1. Policy options

1640. The marine risk sub-module consists of the capital requirements for the risk of a tanker collision and for the risk of a platform explosion. Therefore the catastrophe risk is not considered for undertakings providing cover for other vessels than ‘tankers’ or ‘platforms’ or for other types of events than ‘collision’ or ‘explosion’. In view of that , the following options have been considered:

- Option 1 –no change;
- Option 2 – modify the scenarios, replacing the “tanker” scenario with “vessel”.

21.8.2.2. Analysis of impacts

Option 1 – no change

1641. On the side of benefits, it is possible to detect the following effects:

- Policyholders – none.
- Industry – consistency with previous calculations.
- Supervisors - consistency with previous calculations.

1642. On the side of costs, it is possible to detect the following effects:

- Policyholders – wrong risk sensitivity which could lead to lower protection.

- Industry – not risk sensitive.
- Supervisors – not risk sensitive.

Option 2 – modify the scenarios, replacing the “tanker” scenario with “vessel”

1643. On the side of benefits, it is possible to detect the following effects:

- Policyholders – Better protection.
- Industry – Relative consistency with previous calculations, simplicity.
- Supervisors - Relative consistency with previous calculations, simplicity.

1644. On the side of costs, it is possible to detect the following effects:

- Policyholders – None.
- Industry – higher capital requirements, however this will reflect the risks hence benefits in terms of risk management should outweigh the cost.
- Supervisors – None.

21.8.2.3. Comparison of options

1645. From the options detailed, only the second would lead to an improvement of the module. Therefore the preferred option is **option 2 (modify the scenarios, replacing the “tanker” scenario with “vessel”)**.

21.8.3. Identification of largest man-made catastrophe exposures on gross vs. net of reinsurance basis risk sub-module

21.8.3.1. Policy options

1646. EIOPA has analysed whether the identification of the largest risk exposure within the Marine, Fire and Aviation (“MFA”) submodules should be altered to be carried out on a net of reinsurance basis.

1647. The following options have been considered:

- Option 1 – no change; the identification is carried out gross of reinsurance,
- Option 2 – alter the submodule to net of reinsurance basis

21.8.3.2. Analysis of impacts

Option 1 – no change

1648. On the side of benefits, it is possible to detect the following effects:

- Policyholders – none.
- Industry – consistency with previous calculations.
- Supervisors - consistency with previous calculations.

1649. On the side of costs, it is possible to detect the following effects:

- Policyholders – wrong risk sensitivity which could lead to lower protection.
- Industry – Potential distortion since the biggest loss could arise from a different exposure than the one used to determine the capital requirements.
- Supervisors – Potential distortion since the biggest loss could arise from a different exposure than the one used to determine the capital requirements.

Option 2 – largest exposures net of reinsurance basis

1650. On the side of benefits, it is possible to detect the following effects:

- Policyholders – Better risk assessment.
- Industry – risk-sensitivity of the calculation that takes account of specific reinsurance programme.
- Supervisors – Removal of a potential distortion.

1651. On the side of costs, it is possible to detect the following effects:

- Policyholders – Some risk exposures would not be covered which could lead to lower protection.
- Industry – None.
- Supervisors – None.

21.8.3.3. Comparison of options

1652. EIOPA proposes **Option 2 (largest exposure net of reinsurance)**, to remove the distortion within the SCR calculation in the majority of cases.

21.9. Natural catastrophe risks

21.9.1. NatCat simplification

21.9.1.1. Policy options

1653. The non-life catastrophe risk sub-module is one of the most complex sub-modules in the SCR standard formula, mainly due to the high granularity of the technical specifications and calculations. The non-life catastrophe risk sub-module consists altogether of 13 sub-modules, 5 of which form the natural catastrophe risk sub-module. Three of the natural catastrophe sub-modules are further defined by means of two different scenarios.

1654. With the aim of simplifying this module, the following options have been considered:

- Option 1 – Use of less granular risk zones than the ones currently used, but more granular than the current regions (typically defined on country level).
- Option 2 – Use of risk factor for the region without consideration of risk zones for the (non-allocated part of the) undertaking's exposure.
- Option 3 - Use of risk factor for the region without consideration of risk zones and applying prudency factor for the (non-allocated part of the) undertaking's exposure.
- Option 4 - Allocation of the (non-allocated part of the) undertaking's exposure in the region the average of the industry within the region.
- Option 5 - Allocation of non-allocated part of the undertaking's exposure to the CRESTA zone with the highest risk weight in the region
- Option 6 - Allocation o of the non-allocated part of the undertaking's exposure in the region on country level to the average of the undertaking within the region.

21.9.1.2. Analysis of impacts

Option 1 – Use of less granular risk zones

1655. On the side of benefits, it is possible to detect the following effects:

- Policyholders – adequate risk assessment.
- Industry – would make the standard formula simpler, and retain adequate risk sensitivity.
- Supervisors – adequate risk assessment.

1656. On the side of costs, it is possible to detect the following effects:

- Policyholders – wrong risk sensitivity which could lead to lower protection.
- Industry – It is not sure whether the simplification is actually helpful for a lot of undertakings. It would introduce another zoning mechanism that is no industry standard.
- Supervisors – The simplification would require a dedicated calibration for every single peril/region combination, which would be complicated by the fact that this level of aggregation is not readily available in most models.

Option 2 – Use of risk factor for the region

1657. On the side of benefits, it is possible to detect the following effects:

- Policyholders – None.
- Industry – Simplicity.
- Supervisors - Simplicity.

1658. On the side of costs, it is possible to detect the following effects:

- Policyholders – None.
- Industry – Loss of risk sensitivity.
- Supervisors – Loss of risk sensitivity.

Option 3 – Use of risk factor for the region and applying prudency factor

1659. On the side of benefits, it is possible to detect the following effects:

- Policyholders – None.
- Industry – Simplicity.
- Supervisors - Simplicity.

1660. On the side of costs, it is possible to detect the following effects:

- Policyholders – None.
- Industry – Loss of risk sensitivity.
- Supervisors – Loss of risk sensitivity.

Option 4 – Allocation to industry exposure

1661. On the side of benefits, it is possible to detect the following effects:

- Policyholders – None.
- Industry – less information from the undertakings.

- Supervisors - None.

1662. On the side of costs, it is possible to detect the following effects:

- Policyholders – substantial loss of risk sensitivity which could lead to lower protection.
- Industry – substantial loss of risk sensitivity, need for substantial reporting.
- Supervisors - substantial loss of risk sensitivity.

Option 5 – Allocation of remaining exposure to highest risk weight

1663. On the side of benefits, it is possible to detect the following effects:

- Policyholders – None.
- Industry – less information from the undertakings.
- Supervisors - None.

1664. On the side of costs, it is possible to detect the following effects:

- Policyholders – substantial loss of risk sensitivity which could lead to lower protection.
- Industry – substantial loss of risk sensitivity, need for substantial reporting.
- Supervisors - substantial loss of risk sensitivity.

Option 6 – Allocation of remaining exposure to already allocated exposure

1665. On the side of benefits, it is possible to detect the following effects:

- Policyholders – None.
- Industry – less information from the undertakings.
- Supervisors - None.

1666. On the side of costs, it is possible to detect the following effects:

- Policyholders – potential underestimation of risk which could lead to lower protection.
- Industry –.
- Supervisors - difficult to supervise.

21.9.1.3. Comparison of options

1667. The final assessment of the options is the following:

- a. Ad 1) this option is too complex for calibration and use as an optional simplification.
- b. Ad 2) There is a material loss of risk sensitivity when following this option. There would be a need to introduce a level of additional prudence in this case, which option 2) does not include.
- c. Ad 3) this option can be considered appropriate, with the open question concerning the appropriate calibration of the prudency factor. The same or similar results can be obtained when following option 5 which appears to be a bit more intuitive, especially when only parts of the exposure for a peril/ region are considered in the simplified approach.
- d. Ad 4) there is no advantage of this approach in comparison to option 2). As this approach has the additional drawback of the need to publish industry exposure as part of the regulation, option 2 is the preferred approach in comparison to option 4).
- e. Ad 5) the approach is considered reasonable.
- f. Ad 6) Together with option 5)/ 3) this option is identified as one of the potential simplifications. It would however require to have a minimum percentage threshold for the already allocated part (or in turn max % of unallocated contracts) of the portfolio in order to prevent arbitrage, which raises difficulties. For this approach to reflect the risk that the undertaking is exposed to, the unallocated part of the exposure needs to be similar to the allocated one. There are different kinds of circumstances that can generate such case:
 - Nature peril profile: if the peril is relatively homogeneous within the region(s) where the undertakings conducts business, then deep asymmetries in the risk embedded in allocated and unallocated exposures are not expectable.
 - Operational reasons: for instance, insurance contracts with inception more remotely in the past, under inferior geocoding standards, not (fully) upgraded in successive renewals, may contain less detailed information impairing allocation, while not necessarily corresponding to differentiated (more severe) risk exposures.

1668. Considering the pros and cons outlined above, **option 5 (Allocation of remaining exposure to highest risk weight)** is the preferred option.

21.10. Interest rate risk

21.10.1. Policy options

1669. During the development of the advice on interest rate risk module, EIOPA has identified two main policy options which have been considered and debated:

- Option 1: No change.
- Option 2: Changing the method in the interest rate risk module to particularly better reflect lower and negative interest rates.

21.10.2. Analysis of impacts

Option 1 – No change

1670. On the side of benefits, it is possible to detect the following effects:

- Policyholders – None.
- Industry – Undertakings would need to hold less regulatory capital for their interest rate risk. The lower capital requirement in the low yield could act countercyclical if rates do not decrease further and may partly counterbalance the other problems undertakings suffer from in the low yield environment.
- Supervisors – None.

1671. On the side of costs, it is possible to detect the following effects:

- Policyholders – They are less protected if undertakings underestimate their important risks and do not set sufficient capital aside to cover those risks.
- Industry – The undertakings would need to justify more the potential deviations from their risk profile within the ORSA. The risk of interest rates decreasing is not covered by appropriate capital requirements.
- Supervisors – They are more concerned about the likely underestimation of the interest rate risk in the low yield environment and the fact that the SCR does not sufficiently capture the real risk of the undertakings.

Option 2 – changing the method to reflect low and negative interest rates

1672. On the side of benefits, it is possible to detect the following effects:

- Policyholders – a more risk-sensitive methodology for interest rate risk in the low yield environment promotes good risk management, which benefits policyholders.

- Industry – From a risk-management point of view, the adjusted methodology will provide more risk-sensitive results in the low yield environment and thus better capture the undertakings risk-profile. From a complexity point of view, the methodology remains relatively simple and transparent, such that the modified methodology will not create an extra burden for undertakings with regard to complexity.
- Supervisors – they are more certain that the SCR for the interest rate risk is not underestimated in the low and medium yield environment.

1673. On the side of costs, it is possible to detect the following effects:

- Policyholders – None.
- Industry – The main cost is the probably increasing capital requirement undertakings need to hold for their interest rate risks.
- Supervisors – None. The understanding and particularly the supervision of the interest rate risk module does not become more complex.

21.10.3. Comparison of options

1674. Given the above cost-benefit analysis, **Option 2 (changing the method to reflect low and negative interest rates)** is the preferred option.

1675. EIOPA has identified two different ways to implement option 2, that are referred to as “proposal A” (absolute stresses of 2% and static floor to interest rates) and as “proposal B” (combined approach).

1676. Beside the qualitative impact assessment considerations above, EIOPA will in addition perform a quantitative impact assessment for the interest rate risk module and the two implementations envisaged.

1677. In this regard, a two-step impact assessment approach is followed:

1678. In the first step, EIOPA will use the annual QRT data to make an impact assessment that has some limitations. Indeed, liabilities’ cash-flows are provided, but it is not possible to assess the impact in case the liabilities cash-flows depend on interest rates and assets cash-flows are not provided. On the asset side, approximations can be made using the duration (cf. Article 103 of the Delegated Regulation). The impact will be relevant for these undertakings where the liability cash-flows do not depend on interest rates.

1679. In the second step, EIOPA has launched an information request on these undertakings where liabilities cash-flows depend on interest rates (i.e. profit participation business). It is proposed to limit the impact assessment to undertakings that are representative of such business in

each country, so that the burden is limited. The results will be shared in the final advice to the European Commission in February 2018.

21.11. Market risk concentration

21.11.1. Policy options

1680. The capital requirement for market risk concentration shall be calculated on the basis of single name exposures. Each single name exposure shall be assigned a risk factor depending on the weighted average credit quality step of the exposure.

1681. However, the risk factor for single name exposures to a (re)insurance undertaking for which a credit assessment by a nominated ECAI is not available and where the undertaking meets its Minimum Capital Requirement shall be determined based on its solvency ratio. The risk factor to be applied would range between 12%-73%; the higher the solvency ratio, the lower the risk factor (and the resulting capital requirement for market risk concentration).

1682. This provision is not applicable where exposures to a solo insurance undertaking are part of a larger single name exposure. In this case the risk factor has to be determined in accordance with the general rule for exposures for which a credit assessment by a nominated ECAI is not available; therefore the risk factor would be 73% irrespective of the solvency ratio.

1683. This situation would for example arise if a solo insurance undertaking was part of a group and there were exposures to other members of the group (e.g. other solo insurance undertakings).

1684. This means that the same exposures to a solo insurance undertaking may be assigned different risk factors depending on whether they are part of a larger single name exposure or not.

1685. In order to avoid such a situation, EIOPA has analysed the possible introduction of a different treatment for single name exposures which consist not exclusively of exposures to a single solo insurance or reinsurance undertaking.

1686. In this respect the following policy options have been considered:

- Option 1 – No change: in this option exposures to a solo insurance undertaking which are part of a larger single name exposure are treated as described above.
- Option 2 – Change: The contribution of exposures to a solo insurance undertaking which are part of a larger single name exposure to the risk factor is determined based on the solvency ratio of the solo insurer. EIOPA considered two approaches how this could be implemented (“Reverse mapping” and “Average risk factor”). Both can be calibrated so that the results are (nearly) identical. In consequence the impacts on policyholders,

industry and supervisors do not differ materially. But due to its simplicity the latter approach seems preferable.

21.11.2. Analysis of impacts

Option 1 - No change

1687. On the side of benefits, it is possible to detect the following effects:

- Policyholders – in case the mapping of solvency ratios underestimated the risks, the current rules would avoid an insufficient level of regulatory capital requirements. This would reduce the risk that the insurance undertaking cannot meet its obligations towards the policyholder.
- Industry – in case the mapping of solvency ratios underestimated the risks, the current rules would avoid an insufficient level of regulatory capital requirements. This would reduce the risk of the loss of the “franchise value” in case of a default, the need to raise additional capital under stressed conditions or reputational damage.
- Supervisors – in case the mapping of solvency ratios underestimated the risks, the current rules would avoid an insufficient level of regulatory capital requirements. This would reduce the risk of solvency problems for insurers and the risk of losses for policyholders.

1688. On the side of costs, it is possible to detect the following effects:

- Policyholders – in case the mapping of solvency ratios reflected the risks better than the current treatment, the regulatory capital requirements could overestimate the risks. This could result in higher premiums or in reduced benefits: The regulatory capital could be higher than necessary or the insurer might enter into less efficient transactions (e.g. to avoid “mixed” exposures).
- Industry – in case the mapping of solvency ratios reflected the risks better than the current treatment, the regulatory capital requirements could overestimate the risks. This could result in lower returns on capital: The regulatory capital that the insurer has to hold might be higher than necessary or the profits might be lowered by less efficient transactions.
- Supervisors – in case the mapping of solvency ratios reflected the risks better than the current treatment, the regulatory capital requirements could overestimate the risks. This could result in higher premiums than necessary and less choice for policyholders. Another consequence could be that insurance undertakings are less profitable thus making it more difficult for them to absorb losses.

Option 2 - Change

1689. On the side of benefits, it is possible to detect the following effects:

- Policyholders – in case the mapping of solvency ratios reflected the risks better than the current treatment, an overestimation of the regulatory capital requirements with the costs for policyholders described for option 1 would be avoided.
- Industry – in case the mapping of solvency ratios reflected the risks better than the current treatment, an overestimation of the regulatory capital requirements with the costs for industry described for option 1 would be avoided.
- Supervisors – in case the mapping of solvency ratios reflected the risks better than the current treatment, an overestimation of the regulatory capital requirements with the costs for supervisors described for option 1 would be avoided.

1690. On the side of costs, it is possible to detect the following effects:

- Policyholders – in case the mapping of solvency ratios underestimated the risks, this would result in an insufficient level of regulatory capital with the consequences for policyholders described for option 1.
- Industry – in case the mapping of solvency ratios underestimated the risks, this would result in an insufficient level of regulatory capital with the consequences for industry described for option 1. The mapping does not result in a meaningful increase in the complexity of the calculations.
- Supervisors – in case the mapping of solvency ratios underestimated the risks, this would result in an insufficient level of regulatory capital with the consequences for supervisors described for option 1.

21.11.3. Comparison of options

1691. For the assessment of the options it is crucial whether the mapping based on solvency ratios adequately reflects the risks. If this was the case, option 2 (change) would be more risk-sensitive than the current approach and the expected capital relief would not result in reduced policyholder protection. Another factor to consider is how relevant such “mixed” exposures are. If they were not material then there might be no reason to introduce a specific treatment for them.

1692. EIOPA will come to a final conclusion based on the feedback from stakeholders and the results of the further analysis with respect to the accuracy of the mappings and the materiality of “mixed” exposures.

21.12. Currency risk at group level

21.12.1. Policy options

1693. The capital requirement for currency risk is calculated for each foreign currency based on a stress to the value of foreign currency against local currency. At group level that calculation may penalize holding own funds to cover a related undertaking's Solvency Capital requirement in the currency in which this undertaking's assets and obligations are denominated. A group with exposure to multiple currencies would be increasing its risk if it chose to hold all its capital in the reporting currency; however with the current design of the standard formula, that would imply a lower capital requirement.

1694. During the development of the advice on the currency risk at group level, EIOPA has considered different options for amending the standard formula.

- Option 1: adjust the standard formula to exclude assets that cover MCR locally.
- Option 2: Groups could be given flexibility to select a 'local' currency other than the one used for preparing their consolidated accounts.

21.12.2. Analysis of impact

Option 1: adjust the standard formula to exclude assets that cover MCR locally

1695. On the side of benefits, following observations can be made:

- Policyholders- no benefits compared to the current approach.
- Industry- this approach will result in reduction of group currency risk capital requirement and thus benefit them by providing a capital relief.
- Supervisors-no benefits compared to the current approach.

1696. On the side of costs, following observations can be made:

- Policyholders- no costs compared to the current approach.
- Industry-there will be implementation costs so that the standard formula still captures risks appropriately.
- Supervisors – the formula is more complex.

Option 2: Groups could be given flexibility to select a 'local' currency other than the one used for preparing their consolidated accounts

1697. On the side of benefits, following observations can be made:

- Policyholders- the reduction in capital requirements can be passed back to policyholders. However, this will apply in a limited number of cases.
- Industry- this approach can reduce currency risk capital requirements of some groups materially, where they have significant exposure to a single currency other than the currency used to prepare their consolidated accounts. In addition, it can allow groups to manage their FX exposures more effectively by determining the group currency risk capital requirement based on economic risk.
- Supervisors- no benefits compared to the current approach.

1698. On the side of costs, following observations can be made:

- Policyholders- no costs compared to the current approach.
- Industry- Implementation costs will be small but groups may need to spend resources on justifying their choice of the reference currency for determining the currency risk capital requirement.
- Supervisors- the supervisory assessment of FX exposures and capital requirement may be more complex. In particular, judgement may be required to assess whether choices of currencies by groups are appropriate.

21.12.3. Comparison of options

1699. EIOPA recommends **option 2 (flexibility to select a 'local' currency other than the one used for preparing their consolidated accounts)** and would like to get feedback from stakeholders on the benefits and costs.

21.13. Unrated debt

21.13.1. Policy options

1700. The calculation of the capital requirement for spread risk on bonds and loans is based on risk factors which depend on the credit quality step (CQS) and the modified duration of the bond or loan. The higher the duration and the CQS, the higher the risk factor and the resulting capital requirement.

1701. CQS range from 0 to 6 and are assigned based on the credit assessments by one or more nominated ECAI. Bonds and loans for which a credit assessment by a nominated ECAI is not available receive a treatment between the risk factors applicable to bonds and loans with a CQS 4 and CQS 3.

1702. With the aim to reduce reliance on external credit ratings for regulatory purposes, the Commission asked EIOPA to provide criteria through which investments with a better risk profile can be identified ensuring that bonds and loans benefit from a risk-based treatment,

without limiting this benefit to instruments for which a credit assessment by a nominated ECAI is available. In particular, in its call for advice the Commission asked EIOPA to identify certain unrated debt, which would be allowed to receive the calibration associated with QCS 2. During the development of the advice on unrated debt, EIOPA has identified two main policy issues for which different options have been considered and debated:

- policy issue 1: internal assessment process; and
- policy issue 2: Use of results from approved internal banking or insurance models

Policy issue 1: internal assessment process

1703. To identify the unrated bonds and loans eligible to such treatment, a first step is to require the insurer to perform an internal assessment in accordance with certain requirements to be defined in the regulation.

1704. The outcome of this internal assessment would allow the insurer to apply a treatment equivalent to the treatment applicable to bonds and loans with a credit quality step 2, benefiting from a lower capital requirement compared to the current regulation. The bonds and loans for which a credit assessment by an ECAI is not available and which do not meet the criteria defined by the internal assessment will still receive a treatment between CQS 3 and CQS 4.

1705. For the sake of harmonization and to ensure that the internal assessments would be sufficiently prudent, the process put in place by insurers shall respect certain criteria.

1706. In this respect the following options have been considered:

- Option 1.1 – Implementing criteria based on financial ratios of the borrower.
- Option 1.2 – implementing a criterion based on the spread between the yield of the bonds and loans considered and the average yield of investment grade assets.
- Option 1.3 – Extend risk management requirements for insurer benefiting from the specific treatment
- Option 1.4. – Combination of financial ratios criteria, spread criterion and extended risk management requirements

Policy issue 2: Use of results from approved internal banking or insurance models

1707. There are insurers that invest alongside banks in portfolios of unrated corporate loans. The bank underwrites the loans and performs the associated administrative tasks. The insurer purchases a part of the

portfolio with the same rights as the bank (i.e. no differences in terms of seniority, collateralisation etc.).

1708. If the bank has an approved IRB model for quantifying the credit risk a standard formula insurer could use outputs of the internal model (probability of default ("PD") and potentially loss given default) to determine whether the debt can be treated as rated debt with a certain credit quality step for the purpose of the spread risk sub-module.

1709. Instead of the results of IRB models, results from approved full or partial internal models used by an insurer could be used.

1710. In order to identify unrated debt and loans eligible to the specific treatment, the following options have been considered:

- Option 2.1 – Allow the use of the results from approved internal banking or insurance models
- Option 2.2. – Not allow the use of the results from approved internal models (current approach)

21.13.2. Analysis of impacts

Policy issue 1: internal assessment process

Option 1.1 - Implementing criteria based on financial ratios of the borrower.

1711. On the side of benefits, it is possible to detect the following effects:

- Policyholders – financial ratios provide a good indicator of the credit risk of a company and thus limit the risk subscribed by the insurer and do not compromise its solvency position.
- Industry – financial ratios can be easily computed based on financial statements.
- Supervisors – they can easily verify that the unrated debt and loans to which the insurer applies a treatment equivalent CQS 2 effectively comply with the financial ratios criteria.

1712. On the side of costs, it is possible to detect the following effects:

- Policyholders – inevitably, the methodology developed might produce some "false positives". Thus, the insurer might subscribe to risky asset without having the corresponding amount of eligible own funds.
- Industry – On the other hand, the methodology developed might generate some "false negatives" preventing the insurer from investing in good credit quality debt.

- Supervisors – inevitably, the methodology developed might produce some “false positives”. Thus, the insurer might subscribe too risky asset without having the corresponding amount of eligible own funds.

Option 1.2 implementing a criterion based on the spread between the yield of the bonds and loans considered and the average yield of investment grade assets

1713. On the side of benefits, it is possible to detect the following effects:

- Policyholders – By using the spread criterion to identify unrated debt and loans qualifying to the treatment equivalent to CQS 2, the implementing cost for the industry would be lower hence benefiting potentially policyholders via lower prices.
- Industry – Certainty and less time is spent on performing the assessment: the use of a simplified calculation is the result of a simple “yes or no” question. If the yield of the bond or loan is above the threshold, thus it would not qualify to the treatment equivalent to CQS 2.
- Supervisors – The yield criterion permits to take into account the risk perceived by the investor.

1714. On the side of costs, it is possible to detect the following effects of option 2:

- Policyholders – Incentive for the insurer to “under-price” the loan might provoke an under estimation of the risk associated to the loan. This may compromise the solvency position of the insurer and then potentially hurt the policyholders.
- Industry – the use of the yield criterion may provide incentives to the insurer “under-price” the loan.
- Supervisors – need to perform themselves the calculation of the average yield for investment grade assets.

Option 1.3 Extend risk management requirements for insurer benefiting from the specific treatment

1715. On the side of benefits, it is possible to detect the following effects:

- Policyholders – Improvement in the risk management processes ensure a sound and prudent management of the insurer. Such improvement, by reducing the risk of failure of the insurer will benefit to policyholders.
- Industry – As those criteria are based on existing requirements and process that an insurer investing in unrated debt would need anyway, the implementation costs are limited.
- Supervisors – The insurers have incentives to improve the internal processes for assessing credit risk.

1716. On the side of costs, it is possible to detect the following effects of option 3:

- Policyholders – The extended risk management increases the costs. There is the risk of discrepancies amongst insurers as some might establish “lighter” additional processes.
- Industry – The extended risk management increases the costs. Insurers will a more demanding internal assessment may be at a competitive disadvantage.
- Supervisors – Off-site monitoring of internal processes is difficult to perform. Hence, compliance with risk management requirements needs to be supervised by on-site visits;

Option 1.4. – Combination of financial ratios criteria, spread criterion and extended risk management requirements

As a combination of the first three options it shares to a certain extent the benefits and the costs of the other options. The combination of different criteria makes it easier to determine the optimal trade-off between “false positives” and “false negatives”. At the same time the implementation costs are increased.

Policy issue 2: Use of results from approved internal banking or insurance models

Option 2.1 – Use of the results from approved internal models

1717. On the side of benefits, it is possible to detect the following effects:

- Policyholders – By using internal models to identify unrated debt and loans qualifying to the treatment equivalent to CQS 2, the implementing cost for the industry would be lower hence benefiting potentially policyholders via lower prices.
- Industry – Insurer benefits from the expertise and the knowledge of the bank in credit risk assessment.
- Supervisors – As the internal model has to be approved by the supervisor and has to be regularly reviewed in order to meet high regulatory requirements, there is little additional supervision action to implement.

1718. On the side of costs, it is possible to detect the following effects of option 3:

- Policyholders – In case of problems in the banking sector result from insufficient regulatory capital calculated with internal models they are potentially transmitted to the insurance sector thus increasing interconnectedness. This can undermine the solvency of the insurance sector and ultimately affect policyholders.
- Industry – The results for the same debt item can differ widely across internal models. As a result there is a trend in banking regulation to

reduce reliance on internal models. Furthermore, the bank may use its informational advantage to the detriment of the insurer.

- Supervisors – in MS where bank and insurance supervisors are distinct, insurance supervisor might have difficulties to supervise the internal assessment.

Option 2.2- Not allow the use of the results from approved internal models

1719. On the side of benefits, it is possible to detect the following effects:

- Policyholders – Limit interconnectedness between insurance and bank sectors.
- Industry – Better understanding and control of the assessment process by the insurer.
- Supervisors – maintain ability of the insurance supervisor to control the internal assessment.

1720. On the side of costs, it is possible to detect the following effects:

- Policyholders – Insurers may invest less in unrated debt than optimal from an economic perspective as the “default” treatment of unrated debt overestimates the risk and the internal assessment is perceived as too burdensome.
- Industry – To benefit from the specific treatment, insurers would have to implement an internal assessment process which could lead to increasing costs.
- Supervisors – The capital requirement based on the results of the internal assessment process may reflect the risks better than the “default” treatment of unrated debt. .

21.13.3. Comparison of options

1721. Regarding policy issue 1(internal assessment process), **option 1.4 (Combination of financial ratios criteria, spread criterion and extended risk management requirements)** is preferred. Only by combining the different criteria the credit risk of the unrated debt and unrated loan can be assessed with sufficient accuracy (risk sensitivity). Further work will be performed by EIOPA taking into account the result of public consultation to improve different aspects of the methodology.

1722. Regarding policy issue 2 (use of results from internal models), both options are under consideration.

21.14. Unlisted equity

21.14.1. Policy options

1723. EIOPA is asked to develop criteria for identifying unlisted equities with a risk similar to type 1 equities. For this purpose EIOPA has developed an approach that combines a look-through to the underlying companies with requirements on the investment vehicle.

1724. The aim of the look-through is to ensure that the unlisted companies have a similar risk profile as the companies which were used to calibrate the type 1 equity risk charge.

1725. Regarding the method for look-through, the following policy options have been considered:

- Option 1 – Beta method: For each company a beta is calculated with a function that uses risk relevant properties as inputs. The function is derived based on the observed betas for listed companies. If the portfolio beta is sufficiently low then the type 1 risk charge can be applied.
- Option 2 – Stressed period loss method: For each company a stressed one-year loss is calculated with industry sector and leverage as inputs. If the portfolio loss is similar to the loss observed for a broad portfolio of listed equities then the type 1 risk charge can be applied.

21.14.2. Analysis of impacts

1726. In terms of the costs for their implementation the difference between the two methods are negligible. Therefore the only relevant aspect to consider is their risk-sensitivity.

Option 1 – Beta method

1727. On the side of benefits, it is possible to detect the following effects:

- Policyholders – As more factors can be considered the method is potentially more accurate in reflecting the differences in the risk between companies. It allows reproducing the historical betas for diversified portfolios of listed equities with sufficient accuracy and the calibration does not depend exclusively on a single crisis. This might on balance result in a better reflection of the risks in the regulatory capital requirement.
- Industry – As more factors can be considered the method is potentially more accurate in reflecting the differences in the risk between companies. It allows reproducing the historical betas for diversified portfolios of listed equities with sufficient accuracy and the calibration does not depend exclusively on a single crisis. This might on balance result in a better reflection of the risks in the regulatory capital requirement.

- Supervisors – As more factors can be considered the method is potentially more accurate in reflecting the differences in the risk between companies. It allows reproducing the historical betas for diversified portfolios of listed equities with sufficient accuracy and the calibration does not depend exclusively on a single crisis. This might on balance result in a better reflection of the risks in the regulatory capital requirement.

1728. On the side of costs, it is possible to detect the following effects:

- Policyholders – The risk measure underlying the beta approach differs from the risk measure defined in Solvency II. But preliminary analysis shows that there is a strong relation between beta and the drop in the stock price during the financial crisis of 2007-2008. This might on balance result in a worse reflection of the risks in the regulatory capital requirement
- Industry – The risk measure underlying the beta approach differs from the risk measure defined in Solvency II. But preliminary analysis shows that there is a strong relation between beta and the drop in the stock price during the financial crisis of 2007-2008. This might on balance result in a worse reflection of the risks in the regulatory capital requirement
- Supervisors – The risk measure underlying the beta approach differs from the risk measure defined in Solvency II. But preliminary analysis shows that there is a strong relation between beta and the drop in the stock price during the financial crisis of 2007-2008. This might on balance result in a worse reflection of the risks in the regulatory capital requirement

Option 1.2 – Stressed period loss method

1729. On the side of benefits, it is possible to detect the following effects:

- Policyholders – the risk is measured based on the same metric which is defined in the Solvency II framework. The global financial crisis seems to be the best recent proxy for a 1 in 200 year event. This might on balance result in a better reflection of the risks in the regulatory capital requirement.
- Industry – the risk is measured based on the same metric which is defined in the Solvency II framework. The global financial crisis seems to be the best recent proxy for a 1 in 200 year event. This might on balance result in a better reflection of the risks in the regulatory capital requirement.
- Supervisors – the risk is measured based on the same metric which is defined in the Solvency II framework. The global financial crisis seems to be the best recent proxy for a 1 in 200 year event. This

might on balance result in a better reflection of the risks in the regulatory capital requirement.

1730. On the side of costs, it is possible to detect the following effects:

- Policyholders – As fewer factors are considered than in the other option the method is potentially less accurate in reflecting the differences in the risk between companies. The method is calibrated based on the 2008-2009 period and the next crisis may be different. This might on balance result in a worse reflection of the risks in the regulatory capital requirement.
- Industry – As fewer factors are considered than in the other option the method is potentially less accurate in reflecting the differences in the risk between companies. The method is calibrated based on the 2008-2009 period and the next crisis may be different. This might on balance result in a worse reflection of the risks in the regulatory capital requirement.
- Supervisors – As fewer factors are considered than in the other option the method is potentially less accurate in reflecting the differences in the risk between companies. The method is calibrated based on the 2008-2009 period and the next crisis may be different. This might on balance result in a worse reflection of the risks in the regulatory capital requirement.

21.14.3. Comparison of options

1731. There are no meaningful differences in terms of the costs for applying the methods. Therefore risk-sensitivity should be the main concern.

1732. EIOPA will further develop the methods along the lines set out in the consultation paper and decide on this basis which method to recommend in the final advice.

21.15. Simplification of the counterparty default risk module

21.15.1. Policy options

1733. During the development of the advice on simplifications on the counterparty default risk module, EIOPA has identified three main policy issues for which different options have been considered and debated:

- policy issue 1: risk mitigation techniques
- policy issue 2: contractual netting agreements; and
- policy issue 3: treatment of derivatives.

Policy issue 1: Risk mitigation techniques

1734. Section 10 in the Delegated Regulation concerns risk mitigation techniques. The Articles in this section set out criteria for the recognition of

a technique as risk mitigating. However, it is not clear whether the term “technique” refers to an individual contract or an entire strategy.

1735. With the general wish to clarify the regulation where necessary, EIOPA advises to clearly define what is meant by a risk mitigation technique to avoid different interpretations and practises across Europe.

1736. In this respect the following options have been considered:

- Option 1.1 – Individual contracts: in this option, a risk mitigation technique is defined as an individual contract. The individual contract should meet the criteria in section 10 to qualify as a risk mitigation technique, e.g. it should transfer risk on a stand-alone basis.
- Option 1.2 – Strategy: in this option, a risk mitigation technique is defined as a strategy. The strategy is clearly defined by the undertaking, potentially in a written policy. The strategy can entail both long and short positions, and the criteria for risk mitigation techniques should be met for the strategy as a whole and not for the individual contracts that form the strategy.

Policy issue 2: Contractual netting agreements

1737. Article 192(3) of the Delegated Regulation currently requires undertakings to calculate loss-given-default for each derivative. The calculation requires as input the risk-adjusted value of collateral in relation to the derivative.

1738. If an undertaking has entered a netting agreement with the counterparty, the collateral is not posted on each derivative but on the entire exposure to the counterparty. This makes it difficult to calculate the risk-adjusted value of collateral for an individual derivative.

1739. In this respect the following options have been considered:

- Option 2.1 – No change: in this option it is considered that the issue with netting agreements is not material for the undertakings and the calculation of loss-given-default captures the risk appropriately.
- Option 2.2 – Netting agreements included: under this option Article 192(3) should allow undertakings to calculate the loss-given-default so that it reflects the netting agreement that is entered with the counterparty/single name exposure.

Policy issue 3: Treatment of derivatives

1740. There is no reason for not covering the counterparty risk for all types of derivatives in the counterparty default risk module.

1741. The current wording in Article 189(2)(a) of the Delegated Regulation defines only risk-mitigating derivatives as type 1 exposures. However, the rationale for treating some derivatives as type 1 exposures and others as

type 2 seems not fully justified. Risk-mitigating derivatives and derivatives used for exposure steering may have for example the same counterparty. The difference in the use of the derivatives has no effect on the counterparty default risk and it would be natural to cover the two exposures in the same category.

1742. In this respect the following options have been considered:

- Option 3.1 – All derivatives are treated as type 1 exposures.
- Option 3.2 – No change: Some derivatives are treated as type 2.

21.15.2. Analysis of impacts

Policy issue 1: Risk mitigation techniques

Option 1.1 – Individual contracts

1743. On the side of benefits, it is possible to detect the following effects:

- Policyholders – as only relatively simple methods for mitigating risks are recognised the risk that more complex strategies do not work as anticipated is avoided.
- Industry – as only relative simple methods are recognised the risks and costs associated with more complexity are avoided.
- Supervisors – it is easier to supervise since each individual contract should be categorised as risk-mitigating or not and supervisors do not have to assess potentially complex strategies.

1744. On the side of costs, it is possible to detect the following effects:

- Policyholders – effective strategies to mitigate risks are not used or less used than would be optimal. This can result in higher risks and/or lower benefits.
- Industry – effective strategies to mitigate risks are not used or less used than would be optimal. This can result in higher risks or lower returns for insurers.
- Supervisors – Insurers may use do less risk-mitigation that would be desirable in terms of risks.

Option 1.2 Strategy

1745. On the side of benefits, it is possible to detect the following effects:

- Policyholders – effective strategies to mitigate risks are not penalised by not recognising their effect in the calculation of the capital requirements with the possible result of lower risk and/or higher returns.
- Industry – effective strategies to mitigate risks are not penalised by not recognising their effect in the calculation of the capital

requirements with the possible result of lower risk and/or higher returns.

- Supervisors – effective strategies to mitigate risks are not penalised by not recognising their effect in the calculation of the capital requirements with the possible result of lower risk and/or higher returns.

1746. On the side of costs, it is possible to detect the following effects:

- Policyholders – The effectiveness of complex strategies is more difficult to assess with the potential risk that they do not work as anticipated.
- Industry – The effectiveness of complex strategies is more difficult to assess with the potential risk that they do not work as anticipated.
- Supervisors – The effectiveness of complex strategies is more difficult to assess with the potential risk that they do not work as anticipated. The assessment of more complex strategies is more involved.

Policy issue 2: Contractual netting agreements

Option 2.1 – No change

1747. On the side of benefits, it is possible to detect the following effects:

- Policyholders – There is no need to assess the effectiveness of the netting agreement with the potential for misjudgement.
- Industry – There is no need to assess the effectiveness of the netting agreement with the potential for misjudgement.
- Supervisors – There is no need to assess the effectiveness of the netting agreement for the checking the regulatory capital requirement calculation.

1748. On the side of costs, it is possible to detect the following effects:

- Policyholders – the current method for calculating counterparty default risk on derivatives where netting agreements are in place makes it necessary to allocate the collective collateral in an artificial manner to individual contracts. It does not reflect the economic reality of the transactions and does not create incentives for insurers to enter in netting agreements with counterparties.
- Industry – the current method for calculating counterparty default risk on derivatives where netting agreements are in place makes it necessary to allocate the collective collateral in an artificial manner to individual contracts. It does not reflect the economic reality of the transactions and does not create incentives for insurers to enter in netting agreements with counterparties.

- Supervisors – The supervisor has to check the artificial allocation of collateral to individual contracts. No Incentives to enter into netting agreements are created.

Option 2.2 Netting agreements included

1749. On the side of benefits, it is possible to detect the following effects:

- Policyholders – There is no need to allocate the collateral to individual contracts. The capital requirements reflect the economic reality and there are incentives for the insurer to enter into nettings arrangements.
- Industry – There is no need to allocate the collateral to individual contracts. The capital requirements reflect the economic reality and there are incentives for the insurer to enter into nettings arrangements.
- Supervisors – There is no need to assess the allocation of collateral to individual contracts. The capital requirements reflect the economic reality and there are incentives for the insurer to enter into nettings arrangements.

1750. On the side of costs, it is possible to detect the following effects:

- Policyholders – There is the need to assess the effectiveness of the netting agreement with the potential for misjudgement.
- Industry – There is the need to assess the effectiveness of the netting agreement with the potential for misjudgement.
- Supervisors – An assessment is necessary whether the netting agreement is effective.

Policy issue 3: Treatment of derivatives

Option 3.1 – All derivatives as type 1

1751. On the side of benefits, it is possible to detect the following effects:

- Policyholders – the counterparty default risk of derivatives is better reflected in the regulatory capital requirement.
- Industry – the counterparty default risk of derivatives is better reflected in the regulatory capital requirement.
- Supervisors – the counterparty default risk of derivatives is better reflected in the regulatory capital requirement.

1752. On the side of costs, it is possible to detect the following effects:

- Policyholders – none.
- Industry – none.

- Supervisors – none.

Option 3.2 No change

1753. On the side of benefits, it is possible to detect the following effects:

- Policyholders – none.
- Industry – none.
- Supervisors – none.

1754. On the side of costs, it is possible to detect the following effects:

- Policyholders – No better reflection of the counterparty default risk for derivatives.
- Industry – No better reflection of the counterparty default risk for derivatives.
- Supervisors – No better reflection of the counterparty default risk for derivatives.

21.15.3. Comparison of options

1755. Regarding policy issue 1 (risk mitigation techniques) the preferred option is **option 1.2 (strategy)**. With the definition of the risk mitigation technique as a strategy (not excluding the strategy to consist of one single contract), the Delegated Regulation will better reflect how undertakings actually use e.g. derivatives in matching assets and liabilities. The risks associated with this option outlined above are manageable. This option also takes the regulation a step further to being able to recognize netting on single name exposures in the calculation of the counterparty default risk.

1756. Regarding policy issue 2 (contractual netting agreements) the preferred option is **option 2.2 (netting agreement included)**. Article 192(3) should reflect the effect of netting agreements. It results in higher risk sensitivity as the alternative option prevents undertakings from reflecting the actual counterparty default risk on their derivatives and forces them to allocate the collateral in an artificial manner to individual contracts.

1757. Regarding policy issue 3 (treatment of derivatives) the preferred option is **option 3.1 (all derivatives as type 1)** as it increases risk sensitivity.

21.16. Treatment of exposure to CCPs and changes resulting from EMIR

21.16.1. Policy options

Policy issue 1: Exposures to CCPs

1758. At the moment there is no specific treatment in the standard formula for exposures to central counterparties (CCPs). As they are often not rated they would in many cases be assigned the same probability of default as rated exposures with a CQS of 5.

1759. CCPs pool the credit risk of many counterparties thus reducing the risk of default. The call for advice asks EIOPA to propose a treatment for exposures to CCPs that is consistent with the treatment in the banking sector. At the same time there is limited historical evidence on which the choice of recovery rate and probability of default in line with the confidence level required in Article 101(3) of the Solvency II calibration can be based.

1760. The following options for a different treatment of exposures to CCPs as type 1 exposures in the counterparty default risk module have been considered:

- a. Option 1.1 - The probability of default and the recovery rate for qualifying transactions with a CCP are chosen so that the ratio for the capital requirements of bilateral and CCP transaction is similar under the standard formula and the banking regulation ("Relative consistency approach").
- b. Option 1.2 - For qualifying transactions the same probability of default as for AAA-counterparties and a recovery rate of 50 % (the same as for reinsurers) is used ("Alternative approach").

Policy issue 2: EMIR implications

1761. EMIR has introduced the obligation to exchange variation margin for bilateral derivatives transactions on a very frequent basis. The exchange of variation margin reduces the counterparty credit risk.

1762. Consequently, EIOPA has considered the introduction of a new formula for the loss-given default on a derivative to take into account the impact of variation margin. The following options have been considered:

- a. Option 2.1: No change
- b. Option 2.2: A new formula for the loss-given default to reflect the impact of variation margin

21.16.2. Analysis of impacts

Policy issue 1: Exposures to CCPs

Option 1.1 – Relative consistency approach

1763. On the side of benefits, the following observations can be made:

- Policyholders – This option provides stronger incentives to use central clearing instead of entering into a bilateral transaction than option 1.2 as the resulting regulatory capital charge is lower. With central clearing the risk of losses resulting from a counterparty default is lower.
- Industry – While a comparison between the capital requirements in the banking and insurance sector is not very meaningful this option is closer to ensuring a level playing field between banks and insurers.
- Supervisors- this option provides stronger incentives for central clearing with a reduced risk of counterparty credit losses.

1764. On the side of costs, the following observations can be made:

- Policyholders- The historical evidence on which the calibration can be based is limited. The calibration is lower than for option 1.2 which means that the risk of an insufficient level of capital requirements is higher. Also the calculation is marginally more complex.
- Industry- The risk of an insufficient level of capital requirements is higher than with the other option. Also the calculation is marginally more complex.
- Supervisors- The risk of an insufficient level of capital requirements is higher than with the other option.

Option 1.2 - Alternative approach

218. On the side of benefits, following observations can be made:

- Policyholders - The calibration is higher than for the other option which means that the risk of an insufficient level of capital requirements is lower. Also the calculation is marginally less complex.
- Industry - The calibration is higher than for the other option which means that the risk of an insufficient level of capital requirements is lower. Also the calculation is marginally less complex
- Supervisors- The calibration is higher than for the other option which means that the risk of an insufficient level of capital requirements is lower.

219. On the side of costs, following observations can be made:

- Policyholders- This option provides weaker incentives to use central clearing instead of entering into a bilateral transaction compared to the other option as the resulting regulatory capital charge is higher. With central clearing the risk of losses resulting from a counterparty default is lower
- Industry- While a comparison between the capital requirements in the banking and insurance sector is not very meaningful this option is further away from ensuring a level playing field between banks and insurers than the other option.

- Supervisors- This option provides weaker incentives to use central clearing. With central clearing the risk of losses resulting from a counterparty default is lower

Policy issue 2: EMIR implications

Option 2.1: No change

1765. On the side of benefits, following observations can be made:

- Policyholders – There is no increase in the complexity of the standard formula. No assumptions are necessary to take into account events and actions during the year with the potential of underestimating the risks.
- Industry- There is no increase in the complexity of the standard formula. No assumptions are necessary to take into account events and actions during the year with the potential of underestimating the risks.
- Supervisors- There is no increase in the complexity of the standard formula. No assumptions are necessary to take into account events and actions during the year with the potential of underestimating the risks.

1766. On the side of costs, following observations can be made:

- Policyholders- The credit risk is potentially overestimated with the possible consequence of fewer derivatives for risk mitigation than would be desirable.
- Industry- The credit risk is potentially overestimated with the possible consequence of fewer derivatives for risk mitigation than would be desirable.
- Supervisors- The credit risk is potentially overestimated with the possible consequence of fewer derivatives for risk mitigation than would be desirable.

Option 2.2: A new formula for the loss-given default to reflect the impact of variation margin

1767. On the side of benefits, following observations can be made:

- Policyholders – Reflecting the positive effects of EMIR when calculating the capital requirement makes it more attractive for insurers to enter into derivatives to mitigate risks. This would reduce the risk for policyholders.
- Industry- it becomes less costly to enter into derivatives to mitigate risk thus reducing the risk of losing the franchise value or being forced to raise capital under stressed conditions. There is also a greater alignment between the treatment of variation margin in banking and insurance regulation.
- Supervisors- An increased use of derivatives can make the companies safer.

1768. On the side of costs, following observations can be made:

- Policyholders – the complexity of the standard formula is increased. In addition, assumptions are necessary to take into account events and actions during the year with the potential of underestimating the risks.
- Industry – It becomes more complex to calculate the standard formula and there is a risk that the necessary assumptions result in an underestimation of the risks.
- Supervisors- It becomes more complex to calculate the standard formula and there is a risk that the necessary assumptions result in an underestimation of the risks.

21.16.3. Comparison of options

1769. Regarding policy issue 1 (Exposures to CCPs), possible incentives for central clearing and the level playing field have to be balanced with additional complexity and the limited historical evidence to derive a risk-sensitive calibration. EIOPA will decide on a recommendation after the consultation.

1770. Regarding policy issue 2 (EMIR implications), one has to decide whether the assumption of an instantaneous shock which is a core element of the standard formula should be replaced. This can potentially result in higher risk sensitivity and more consistency with the banking regulation but also increases the complexity and the chosen assumptions might be too optimistic. EIOPA will decide on a recommendation after the consultation.

21.17. Simplification of the look-through approach

21.17.1. Policy options

1771. During the development of the advice on simplification of the look-through approach, EIOPA has identified the following policy issue for which different options have been considered and debated: application of the look-through approach for unit-linked business.

1772. Article 84(3) of the Delegated Regulation provides that data grouping may be used in a prudent manner as long as they do not apply to more than 20% of the total value of the assets. The following options have been considered:

- Option 1: no change, i.e. assets corresponding to unit-linked products should be subject to the 20% limit;
- Option 2: carve-out for assets corresponding to unit-linked products that either do not significantly contribute to the SCR (i.e. insurance products without significant guarantees or policyholder options) or where the change in the value of the underlying assets do not significantly affect the available own funds (due to future profits).

21.17.2. Analysis of impacts

Option 1: no change

1773. On the side of benefits, it is possible to detect the following effects:

- Policyholders – certainty that the capital requirements correspond to the underlying risks, hence assuring full policyholders’ protection.
- Industry – insurers know in details to which risk they are exposed to; also beneficial from a “business conduct” point of view since they know in which products policyholders are investing.
- Supervisors – risk-sensitivity of the calculation is assured.

1774. On the side of costs, it is possible to detect the following:

- Policyholders – none.
- Industry – it is burdensome and costly to gather the information with sufficient details to allow for an SCR calculation.
- Supervisors – none.

Option 2: carve-out for assets corresponding to some UL products

1775. On the side of benefits, it is possible to detect the following effects:

- Policyholders – policyholders’ protection is still assured since these assets do not contribute materially to the SCR. That is because only products without significant guarantees or policyholder options are excluded.
- Industry – simplify the process and the calculation for risks that do not contribute materially to the SCR.
- Supervisors – still assured that the SCR reflect the risks.

1776. On the side of costs, it is possible to detect the following:

- Policyholders – none.
- Industry – insurers have to assess which assets correspond to UL products without significant guarantees or policyholder options. This should be minimal cost.
- Supervisors – none

21.17.3. Comparison of options

1777. In view of the cost-benefit analysis, EIOPA’s preferred option is option 2 (carve-out for assets corresponding to some UL products). In terms of conduct of business, the prudent person principle still applies to these products and a certain degree of look-through is required through the annual reporting.

21.18. Look-through approach at group level

21.18.1. Policy options

1778. During the development of the advice on the look-through approach at group level, EIOPA has identified the following policy issue for which different options have been considered and debated: application of the look-through approach at group level for related CIUs.

1779. In order to harmonise the practices at European level, the following options have been considered:

- Option 1: no change to the current approach in the Delegated Regulation;
- Option 2: applying look-through for related CIUs at group level where it has already been applied at solo level.

21.18.2. Analysis of impacts

Option 1: no change

1780. On the side of benefits, it is possible to detect the following effects:

- Policyholders – no benefits compared to the current situation.
- Industry – the current approach has already been implemented so there is no new implementation cost. The current approach is based on an assessment whether a CIU is related or not: there is more flexibility.
- Supervisors – they can apply supervisory judgment as to the evidence provided by the (re)insurance undertaking to prove that a CIU is related or not.

1781. On the side of costs, it is possible to detect the following:

- Policyholders – no costs compared to the current situation.
- Industry – look-through is applied at solo level to all CIUs, including related CIUs. Not applying it a group level may lead to different outcome in terms of SCR (either higher or lower).
- Supervisors – since supervisory judgment is applied, there are cases where two different group supervisors came to different conclusions.

Option 2: applying look-through for related CIUs at group level where it has already been applied at solo level

1782. On the side of benefits, it is possible to detect the following effects:

- Policyholders – allocation of capital across the group follows an outcome that is consistent at group and solo level, hence no necessary changes in prices.

- Industry – the look-through is already applied at solo level and provides an outcome that is more sensitive to the risk of the underlying assets. There is consistency between and the group and solo calculations, which simplifies the group SCR calculation.
- Supervisors – it enhances harmonisation across the EU.

1783. On the side of costs, it is possible to detect the following:

- Policyholders – this possible change would imply changes to the current group SCR calculation process, which may increase costs for groups and ultimately prices for policyholders. However, since look-through is already applied at solo level, costs should not be material.
- Industry – changes to the group SCR calculation process, which means further data to process.
- Supervisors – less supervisory judgment is applied to make the group solvency calculation appropriate to the risk profile of a given group.

21.18.3. Comparison of options

1784. Before taking a decision on its preferred option, EIOPA would like to get feedback from stakeholders on the benefits and costs.

21.19. Loss-absorbing capacity of deferred taxes

21.19.1. Policy options

1785. Current regulations regarding LAC DT do not prevent similar undertakings in similar risk positions from recognising different LAC DT as a result of different assumptions in their projection of post stress taxable profits. For this reason and according to articles 8 and 16 of EIOPA Regulation (Regulation (EU) 1094/2010 of 24 November 2010) in its draft advice EIOPA puts forward several policy options to reduce the differences in these projections for similar undertakings.

21.19.2. Analysis of impact

1786. In order to analyse the impact of these policy options, EIOPA has launched an information request to (re)insurance undertakings via National Supervisory Authorities. It will also allow EIOPA to calibrate its proposal: length of horizon of projection, return on assets, economic profits of new business after the shock, future management actions...

1787. In its final advice, EIOPA will provide statistics on the impact of its policy options to the SCR coverage ratio of undertakings.

21.20. Risk margin

21.20.1. Policy options

1788. The value of technical provisions shall be equal to the sum of a best estimate and a risk margin. The risk margin shall be calculated by determining the cost of providing an amount of eligible own funds equal to the SCR necessary to support the insurance and reinsurance obligations over the lifetime thereof. The rate used in the determination of the cost of providing that amount of eligible own funds (Cost-of-Capital rate) shall be the same for all insurance and reinsurance undertakings and shall be reviewed periodically.

1789. During the development of the advice on the risk margin and on the cost-of-capital, EIOPA has identified the following policy issue for which different options have been considered and debated: calculation methods for the equity risk premium (ERP). ERP is a key element in the calculation of the Cost-of-Capital rate and represents the extra return that investors demand above a risk-free rate to invest in an equity class.

1790. In order to harmonise the practices at European level, the following options have been considered:

- Option 1: historical return model;
- Option 2: dividend discount model.

21.20.2. Analysis of impacts

Option 1: historical return model

1791. On the side of benefits, it is possible to detect the following effects:

- Policyholders – if the period considered is sufficiently long, the model provides for an ERP that is through the cycle and that reflects periods of stability and crisis. Policyholders' protection is therefore ensured.
- Industry – it provides regulatory stability since this method was used by CEIOPS.
- Supervisors – ensures that in case of (re)insurance liabilities transfer undertakings are able to pay the transfer value in different economic situations.

1792. On the side of costs, it is possible to detect the following:

- Policyholders – the ERP could be misstated as the past data that it is derived from includes periods of particularly high returns and very low returns (crashes) that were not anticipated by investors at the time: it could generate an either too low or too high cost of capital rate, hence affecting policyholders' protection.

- Industry – the outcome depends on the time period chosen. If future updates consider different time period this would introduce regulatory volatility in terms of final outcome of cost of capital rate.
- Supervisors – none.

Option 2: dividend discount model

1793. On the side of benefits, it is possible to detect the following effects:

- Policyholders – none.
- Industry – the model aims at taking into account differences between past and future levels of ERP, hence (re)insurance liabilities are valued based on current economic conditions.
- Supervisors – the model takes account of new academic work.

1794. On the side of costs, it is possible to detect the following:

- Policyholders – the model relies on strong assumptions about future economic development. If the future economic development envisaged does not realise, the cost-of-capital and the technical provisions could be underestimated hence policyholders' protection reduced.
- Industry – this model is not consistent with the way other elements of the cost-of-capital are derived, hence it is more difficult to assess the underlying assumptions, which could adversely affect risk management. This would be change compared to CEIOPS method and would create regulatory volatility.
- Supervisors – the model is sensitive to assumptions hence supervisors would need to assess whether the assumptions match sufficiently the specific risk-profile of supervised (re)insurance undertakings.

21.20.3. Comparison of options

1795. The preferred option is **option 1 (historical return model)**. This model provides for a more stable ERP over time, it is appropriate in different economic environments and it depends less on assumptions. The historical return model provides for a better policyholders' protection.

21.21. Capital instruments only eligible as tier 1 up to 20% of total tier 1

21.21.1. Policy options

1796. Solvency II permits undertakings to recognise subordinated debt instruments, that they have issued as own funds (i.e. available capital), provided those instruments have certain features (e.g. minimum durations) intended to ensure that they are available to absorb losses by the insurer. These instruments may be classified in Tier 1, Tier 2 and Tier 3 own funds depending on which features they exhibit and are then eligible

as own funds up to certain limits. Tier 1 subordinated debt instruments are the highest quality and therefore need to satisfy the “strictest” criteria. These items are eligible up to a limit of 20% total tier 1 and accordingly are known as “restricted tier 1” instruments (rT1).

1797. During the development of the advice on own funds, EIOPA has identified the following policy issues for which different options have been considered and debated:

- Policy issue 1: removing the 20% limit for rT1 instruments
- Policy issue 2: Possibility of a tax exemption in some circumstances.
- Policy issue 3: Possibility of changes in the mandatory trigger

Policy issue 1: Removing the 20% limit for rT1 instruments

1798. During the development of the advice on which features required of rT1 instruments would need to be changed, EIOPA has analysed the impact of the following two options:

- Option 1: removing the 20% limit.
- Option 2: keeping the 20 % limit.

Policy issue 2: Possibility of a tax exemption in some circumstances

1799. Under some national fiscal regimes writing down an rT1 can create an exceptional profit which is taxable. So, if the rT1 triggers when an insurance undertaking is still making taxable profits, the write down could increase the quality of own funds but at the same time lower the quantity, by causing a tax liability. In this respect, the following two options have been considered:

- Option 2.1: allowing for tax exemption from the requirement to write down; in exceptional circumstances the supervisor could have the ability to consider whether to give an exceptional waiver from the requirement to write down, on a case specific basis, if certain conditions are met.
- Option 2.2: not allowing for tax exemption from the requirement to write down.

Policy issue 3: Possibility of changes in the mandatory trigger

1800. The Commission has asked EIOPA which features required of rT1 instruments should be strengthened to maintain the quality of Tier 1, should the 20% limit be removed. One of the elements analysed is to make the mandatory trigger of write down stronger.

1801. During the development of the advice on strengthening the features required of rT1 instruments, EIOPA has considered the change of the mandatory trigger of 75% of SCR.

1802. To assess to which level the trigger should be increased EIOPA has performed a quantitative analysis.

21.21.2. Analysis of impacts

Policy issue 1: Removing the 20% limit for rT1 instruments

Option 1.1: removing the 20% limit

1803. On the side of benefits, it is possible to detect the following effects:

- Policyholders – none.
- Industry – the cost of financing may be reduced for few undertakings since more hybrid instruments would be eligible to cover the SCR. EIOPA analysed the data it receives from the 2016 annual reporting of undertakings. It received data pertaining to 2707 undertakings, out of which 204 have recognised rT1 capital. Of those 204, only 30 entities (i.e. 1.1%) had rT1 above the 20% total tier 1 limit (and therefore relegate some rT1 to Tier 2). Of those only eight (0.029%) have more than 30% of total Tier 1 (before relegation). In four extreme cases undertakings have rT1 (before relegation) of over 50% of total Tier 1. This being the case, the limit is not considered to be a material impediment to the industry.
- Supervisors – none.

1804. On the side of costs, it is possible to detect the following effects:

- Policyholders – less policyholders' protection: If the 20% limit is removed undertakings would be able to comply with the requirement for at least 50% of the SCR to be presented by Tier 1 own funds by holding more hybrid capital and equity-like capital than at present. This would weaken the ability of Solvency II to deliver protection to policy holders and beneficiaries at the 1 in 200 level of risk.
- Industry – the loss-absorbency capacity may be reduced at the 1 in 200 level of risk, which could make the cost of financing through equity higher.
- Supervisors – the supervision of Tier 1 own funds is made more difficult; the assessment whether the characteristics and features of Article 93 of the Solvency II Directive may need to be deepened.

Option 1.2: keeping the 20% limit

1805. On the side of benefits, it is possible to detect the following effects:

- Policyholders – better policyholders' protection since Tier 1 own funds items would meet the requirements of Article 93 of the Solvency II Directive.
- Industry – better loss-absorbency capacity at the 1 in 200 level of risk.
- Supervisors – the 20% limit is easy to supervise; it is easier to assess the quality of Tier 1 own funds; it ensures better policyholders' protection.

1806. On the side of costs, it is possible to detect the following effects:

- Policyholders – none.
- Industry – for the vast majority of the industry, there is no cost in keeping the 20% limit: EIOPA analysed the data it receives from the 2016 annual reporting of undertakings. It received data pertaining to 2707 undertakings, out of which 204 have recognised rT1 capital. Of those 204, only 30 entities (i.e. 1.1%) had rT1 above the 20% total tier 1 limit (and therefore relegate some rT1 to Tier 2). Of those only eight (0.029%) have more than 30% of total Tier 1 (before relegation). In four extreme cases undertakings have rT1 (before relegation) of over 50% of total Tier 1. This being the case, the limit is not considered to be a material impediment to the industry.
- Supervisors – none.

Policy issue 2: Possibility of a tax exemption in some circumstances

Option 2.1: allowing for tax exemption from the requirement to write down

1807. On the side of benefits, it is possible to detect the following effects:

- Policyholders – in exceptional circumstances the write down could adversely affect the solvency position of the undertaking and reduce its capacity to meet its insurance obligations to the detriment of policyholders. The tax waiver avoids that situation.
- Industry – in exceptional circumstances the write down could adversely affect the solvency position of the undertaking and reduce its capacity to meet its insurance obligations. The tax waiver avoids that situation.
- Supervisors – the tax waiver is a decision of the supervisor who has the flexibility to assess the solvency situation of the undertaking.

1808. On the side of costs, it is possible to detect the following effects:

- Policyholders – since it is based on an assessment of the likelihood that the tax effects, the waiver could be granted in cases where writing down would not affect the solvency position of the undertaking. If the write down were still provided, the quality of own funds would be less which could affect the capacity of the undertaking to meet its insurance obligations.
- Industry – since it is based on an assessment of the likelihood that the tax effects, the waiver could be granted in cases where writing down would not affect the solvency position of the undertaking. If the write down were still provided, the quality of own funds would be less which could affect the capacity of the undertaking to meet its insurance obligations.
- Supervisors – since it is based on an assessment of the likelihood that the tax effects, the waiver could be granted in cases where writing down would not affect the solvency position of the undertaking. If the write

down were still provided, the quality of own funds would be less which could affect the capacity of the undertaking to meet its insurance obligations.

Option 2.2: not allowing for tax exemption from the requirement to write down

1809. On the side of benefits, it is possible to detect the following effects:

- Policyholders – the write down increase the quality of own funds, which increase the likelihood of the undertaking meeting its insurance obligations.
- Industry – the write down increase the quality of own funds, which increase the likelihood of the undertaking meeting its insurance obligations.
- Supervisors – the write down increase the quality of own funds, which increase the likelihood of the undertaking meeting its insurance obligations.

1810. On the side of costs, it is possible to detect the following effects:

- Policyholders – in exceptional circumstances the write down could adversely affect the solvency position of the undertaking and reduce its capacity to meet its insurance obligations to the detriment of policyholders.
- Industry – in exceptional circumstances the write down could adversely affect the solvency position of the undertaking and reduce its capacity to meet its insurance obligations.
- Supervisors – in exceptional circumstances the write down could adversely affect the solvency position of the undertaking and reduce its capacity to meet its insurance obligations to the detriment of policyholders.

Policy issue 3: Possibility of changes in the mandatory trigger

1811. The trigger would need to be increased in such a way that it strengthens the features of rT1. However, if it is increased to a too high level, the trigger could be reached not because of a real decrease in own funds, but because of the volatility of the Solvency II balance-sheet and of the SCR that is due to market consistent valuation.

1812. A too high trigger capturing the volatility of the Solvency II balance-sheet would be to the detriment of the industry: this would cause difficulties in risk management. For policyholders, the benefit would be that the quality of own funds would be reinforced. The cost would be a risk that industry does not finance itself through these instruments but with more costly instruments, which could ultimately increase prices for policyholders.

1813. EIOPA has looked at evolution of solvency ratios over time and built some indicators: standard deviations, averages and number of undertakings that breach their SCR and recovered “quickly”.

1814. Time series of solvency ratios from Q1 2016 to Q4 2016 from undertakings that provided numbers for these 5 quarters (1770 undertakings) were analysed.

1815. The analysis has been restricted to undertakings, solvency ratios of which were below 120% or 150%. This is because

- using the data from the quarterly reporting, undertakings with higher solvency ratio appear to have higher volatility in their solvency ratio;
- undertakings with high solvency ratio are less expected to breach their SCR.

1816. EIOPA has looked at standard deviations as a measure to quantify the amount of variation in the SCR ratio. A low standard deviation indicates that data points tend to be close to the mean, while a high standard deviation indicates that data points are spread out.

1817. In Q1, there are 451 undertakings that have a SCR ratio lower than 150%. The average SCR ratio is 133%. We calculated the standard deviation of the SCR ratio over 4 quarters for each undertaking and took the average over the whole sample. The average standard deviation is 12%. That means that approximately two third of the undertakings have a SCR ratio that varies between 121% and 145%.

1818. In Q1, there are 144 undertakings that have a SCR ratio lower than 120%. The average SCR ratio is 114%. The average standard deviation is 13%. That means that approximately two third of the undertakings have a SCR ratio that varies between 101% and 127%.

1819. 11. Looking at the difference in the SCR ratio from Q1 to Q2, from Q2 to Q3 and from Q3 to Q4 for all undertakings that have a SCR ratio below 150%. There is average difference of 14% from one quarter to another.

21.21.3. Comparison of options

Policy issue 1: Removing the 20% limit for rT1 instruments

1820. The preferred option is **Option 2 (keeping the 20% limit)**. This protects the prudential quality of Solvency II Tier 1 own funds necessary to deliver the adequate protection of policy holders and beneficiaries. If the 20% limit would not be kept, EIOPA believes that no changes to the features required of hybrid instruments would fully mitigate the resulting loss in capital quality.

Policy issue 2: Possibility of a tax exemption in some circumstances

1821. The preferred option is **option 2.1 (allowing for tax exemption from the requirement to write down)**. Option 2.2 would be more consistent with the banking framework, but since the tax exemption is considered by the supervisor under exceptional circumstances and allowed on a discretionary basis, option 2.1 ensures maximum level of policyholders' protection.

Policy issue 3: Possibility of changes in the mandatory trigger

1822. The average movement of SCR ratio from one quarter to another is 14%, for those undertakings that have a SCR ratio below 150% in Q1. Looking at the standard deviation, the results are similar whether one looks at a sample of undertakings with SCR ratio below 150% or below 120%. That would tend to indicate that we can observe the same level of volatility.

1823. It appears that raising the trigger point higher than 85% would not be reasonable, in the sense that it would capture the volatility of the SCR ratio rather than situations where write-down is necessary. That would be the case at least on average.

1824. The preferred option is to increase the trigger from 75% to 80% to take a margin of prudence as regards the volatility observed.

22. Annex to chapter 1 – USP calibration

1825. The USP sigma factors are calculated as described in Annex XVII of the delegated regulation without taking into account the credibility factor described in paragraph G of Annex XVII.

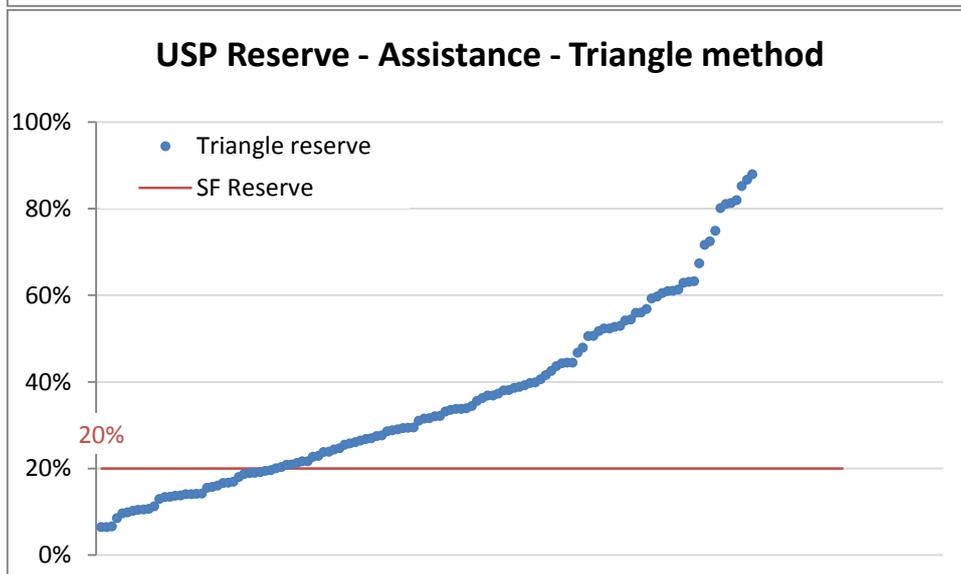
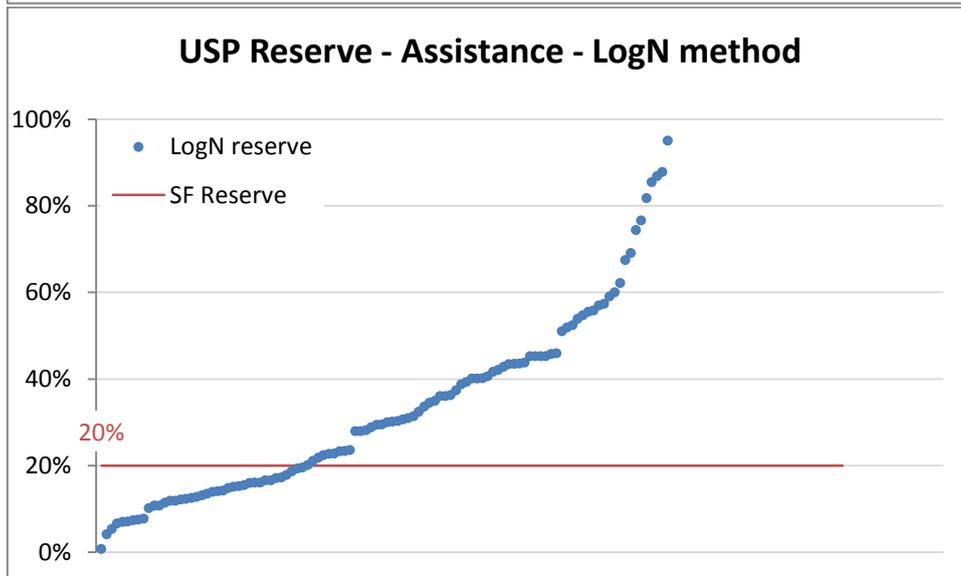
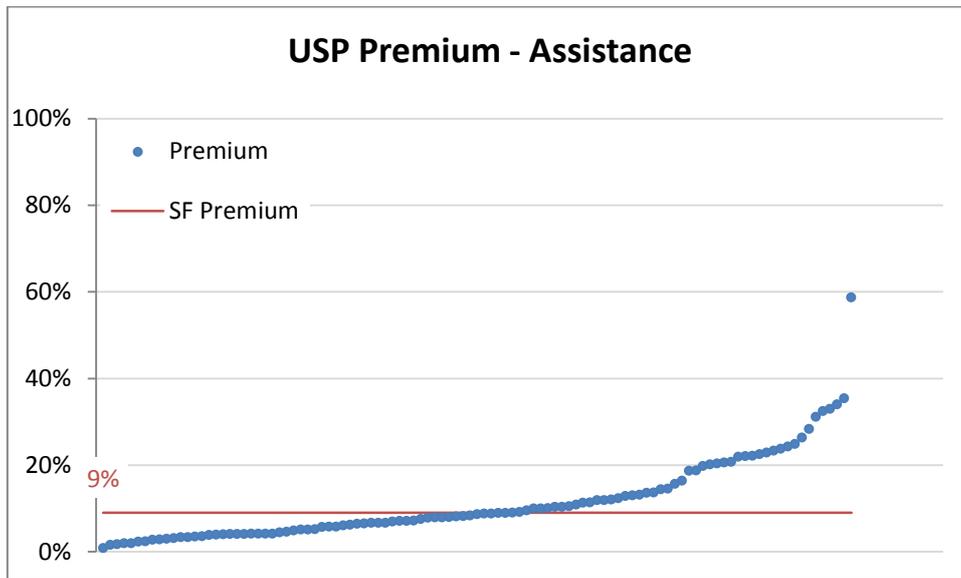
1826. LogN method refers to the reserve risk method 1 of the paragraph C of Annex XVII. Triangle method refers to the reserve risk method 2 of the paragraph D of Annex XVII. These are calculated using paid triangles.

1827. For the sake of clarity, figures above 100% are ignored. The number of excluded figures varies from a graph to another.

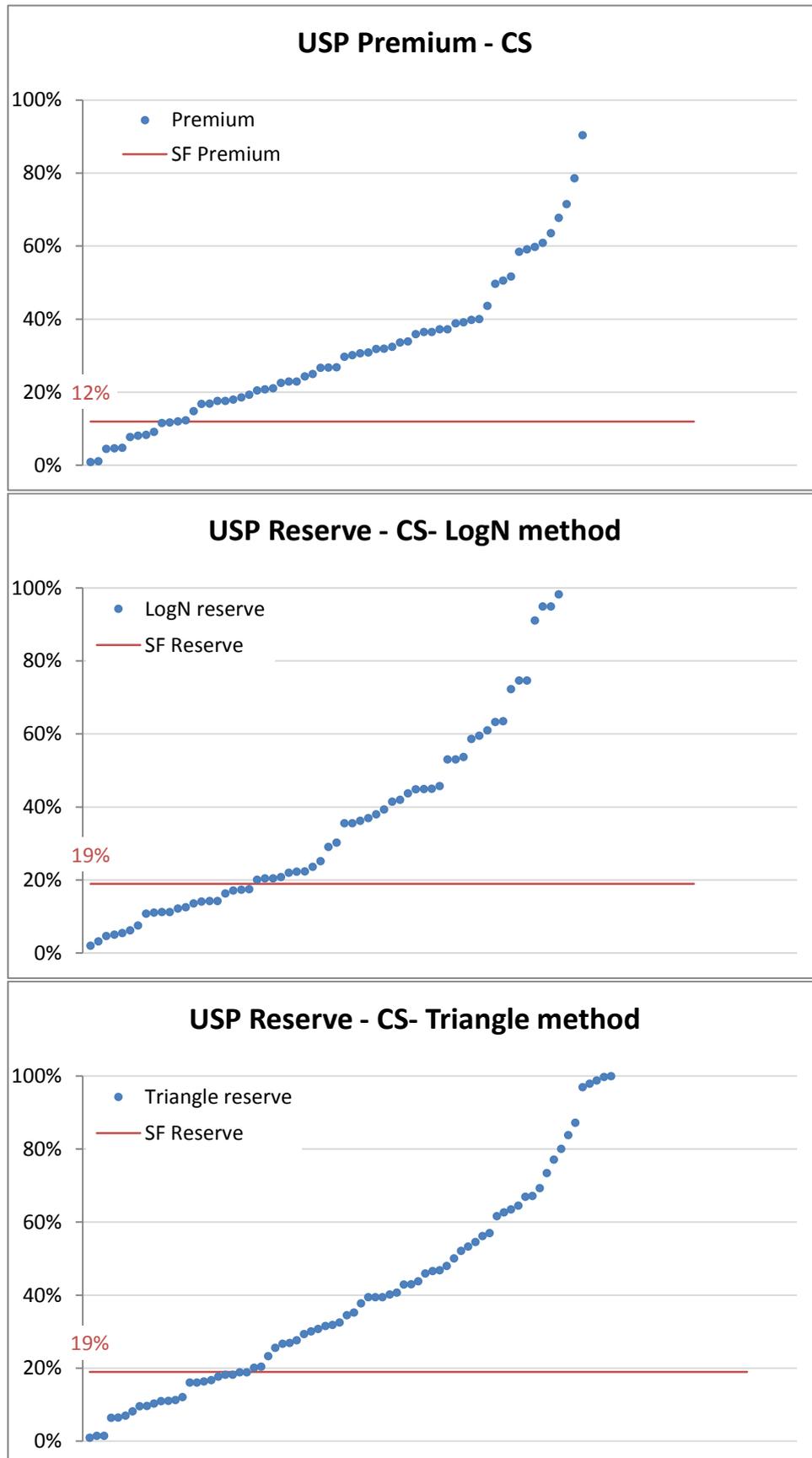
1828. The following table discloses the amount of USP for a given line of business that is below standard formula's calibration.

	Amount of USP below the standard formula calibration		
	<i>Premium</i>	<i>Reserve LogN</i>	<i>Reserve Triangle</i>
AS	51%	36%	28%
CS	19%	35%	31%
HME	41%	11%	9%
HWC	46%	22%	45%
LE	59%	46%	52%

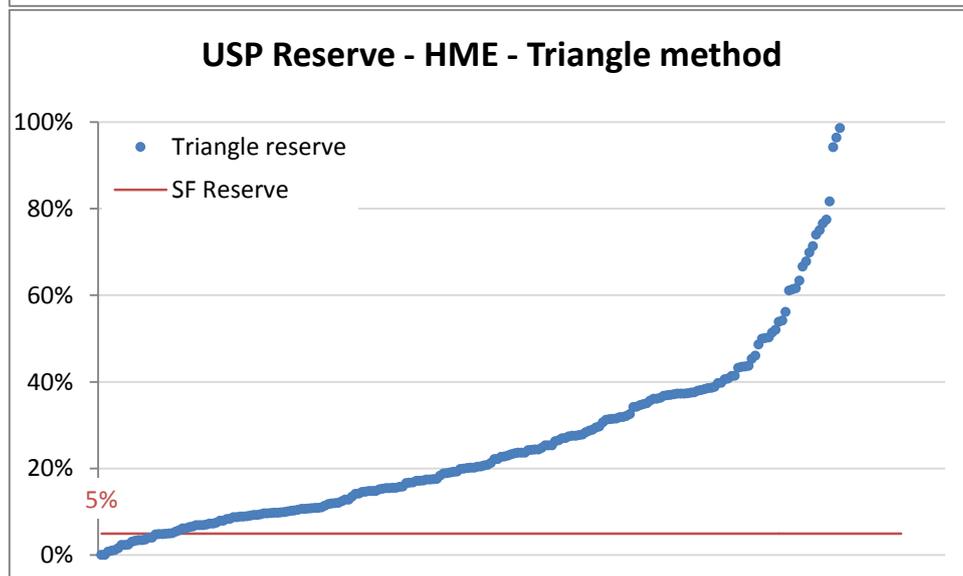
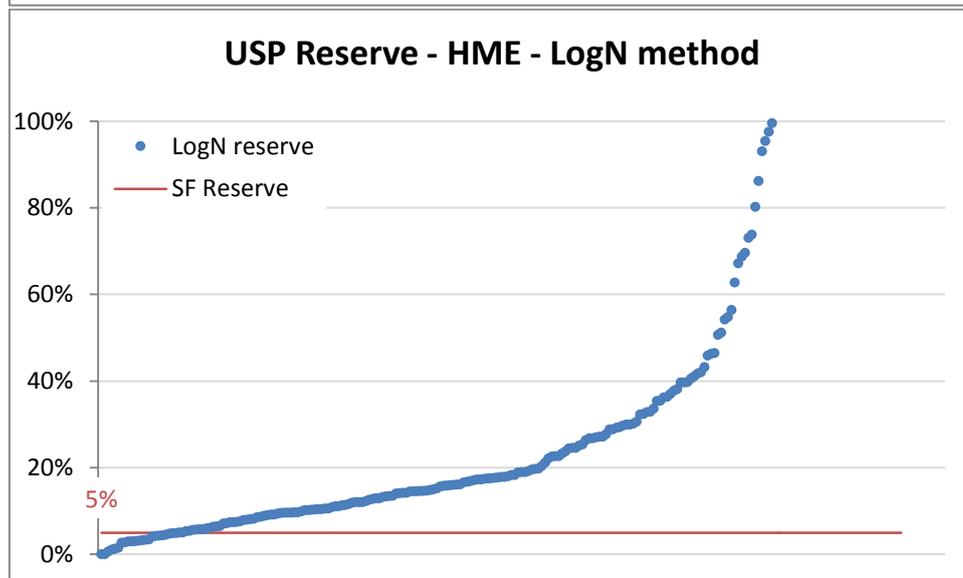
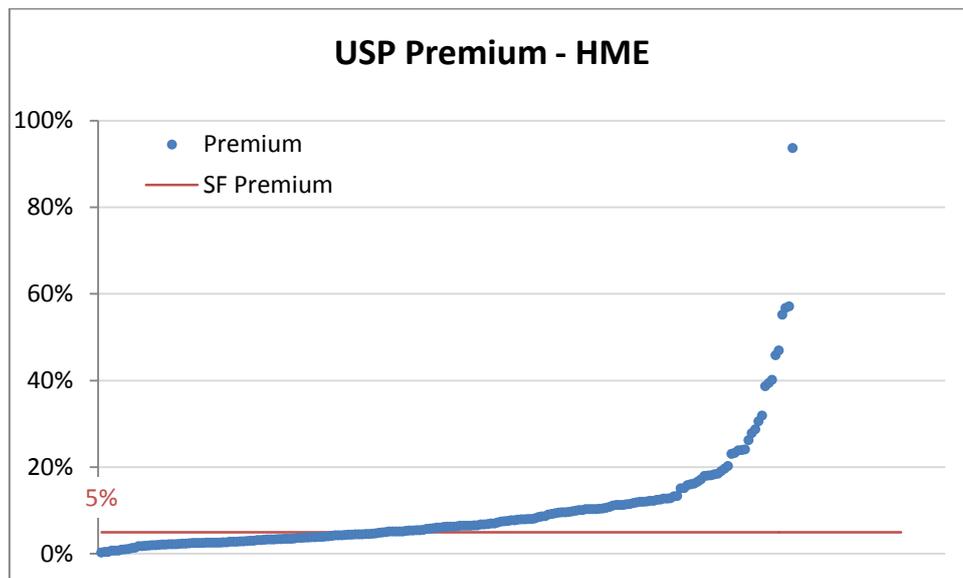
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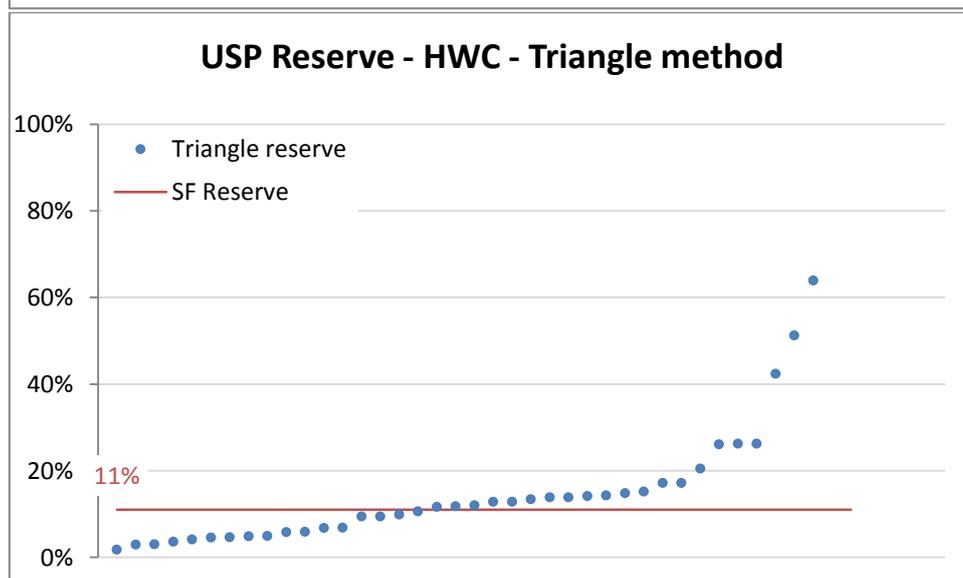
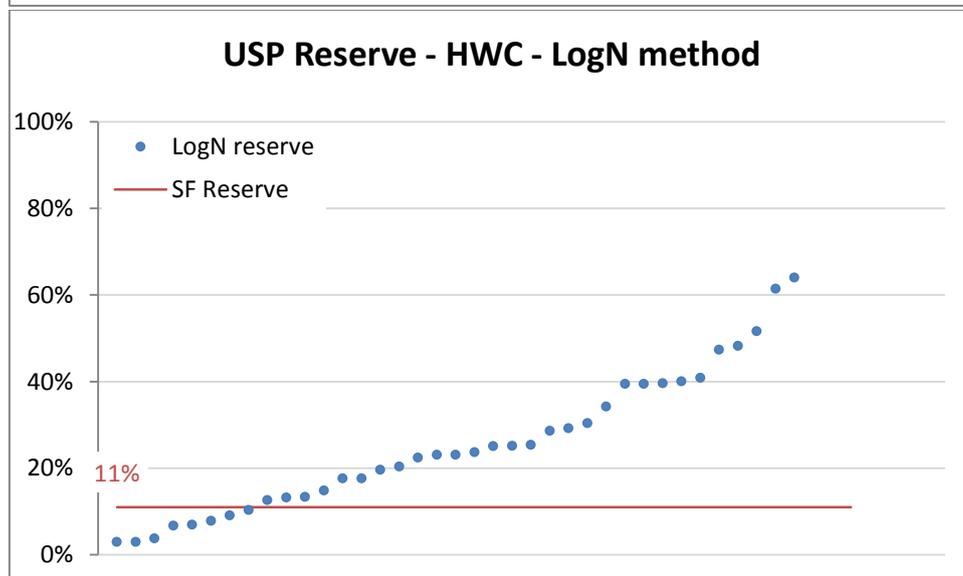
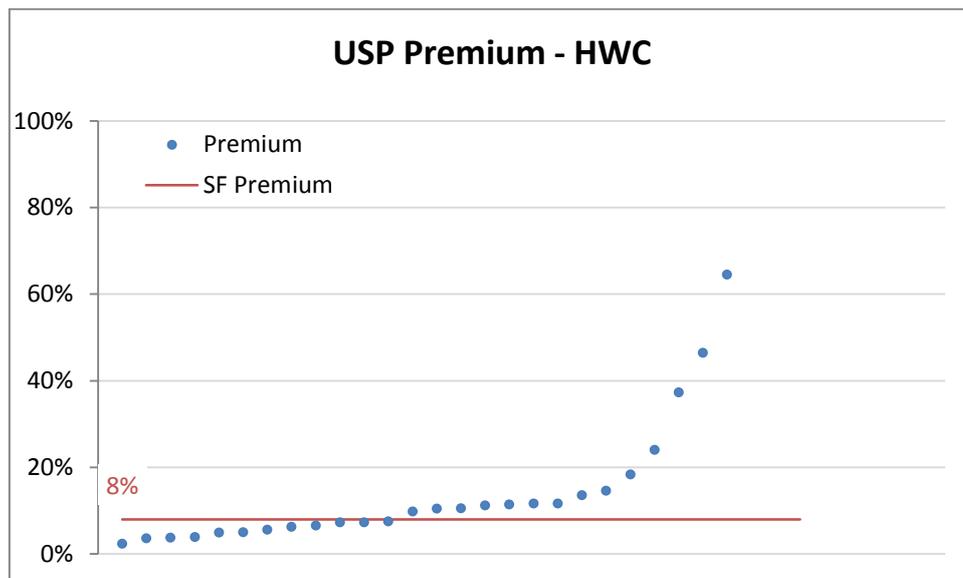
Credit and Suretyship



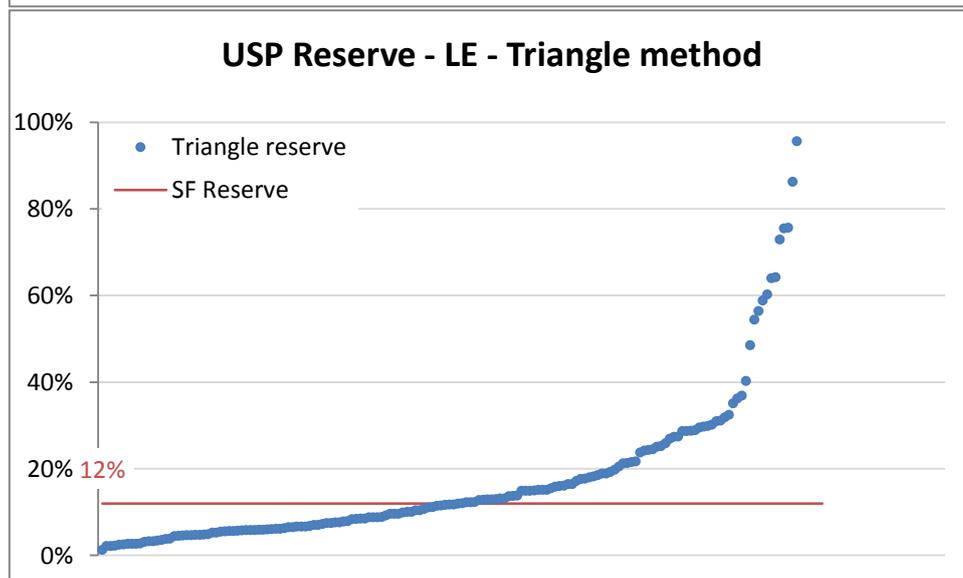
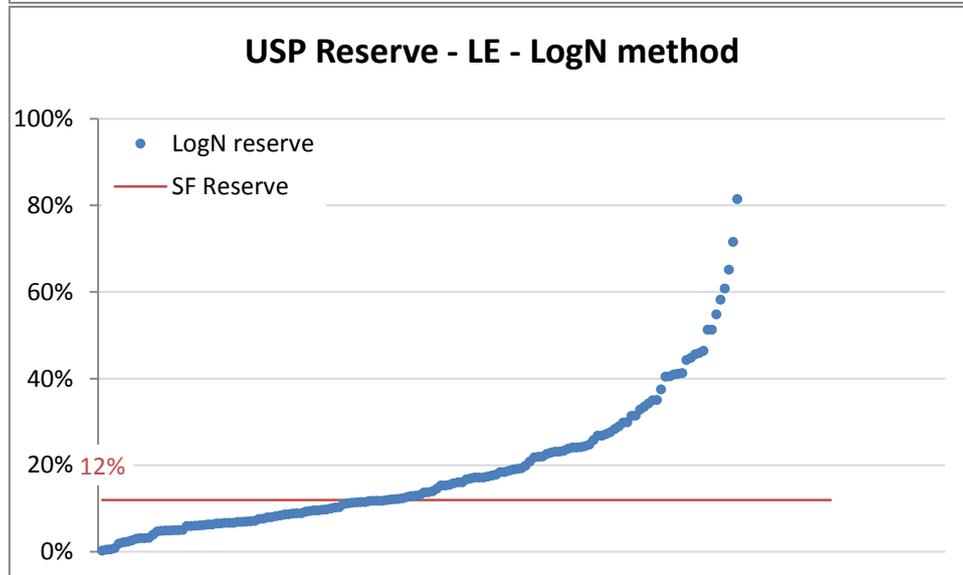
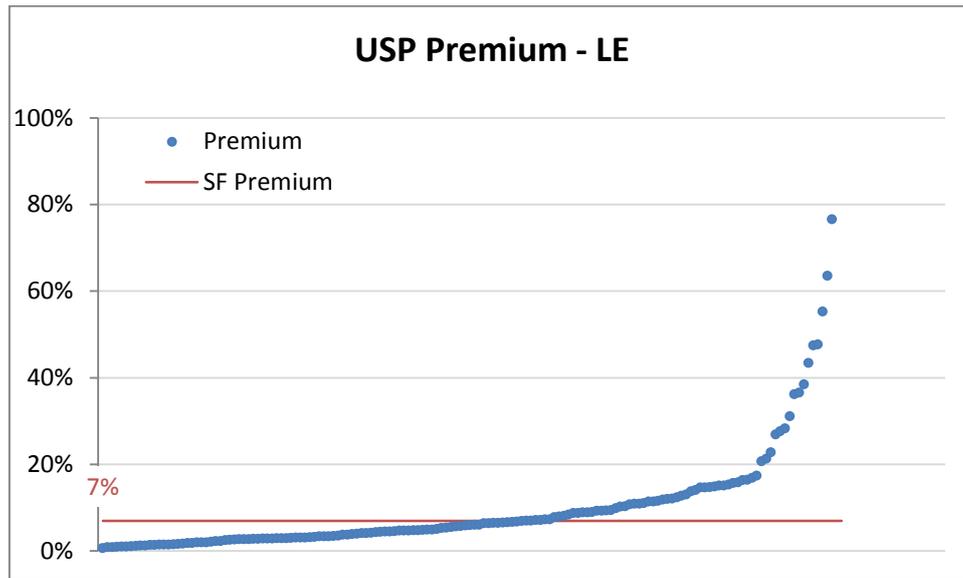
Health Medical Expense



Health Worker's Compensation



Legal Expenses



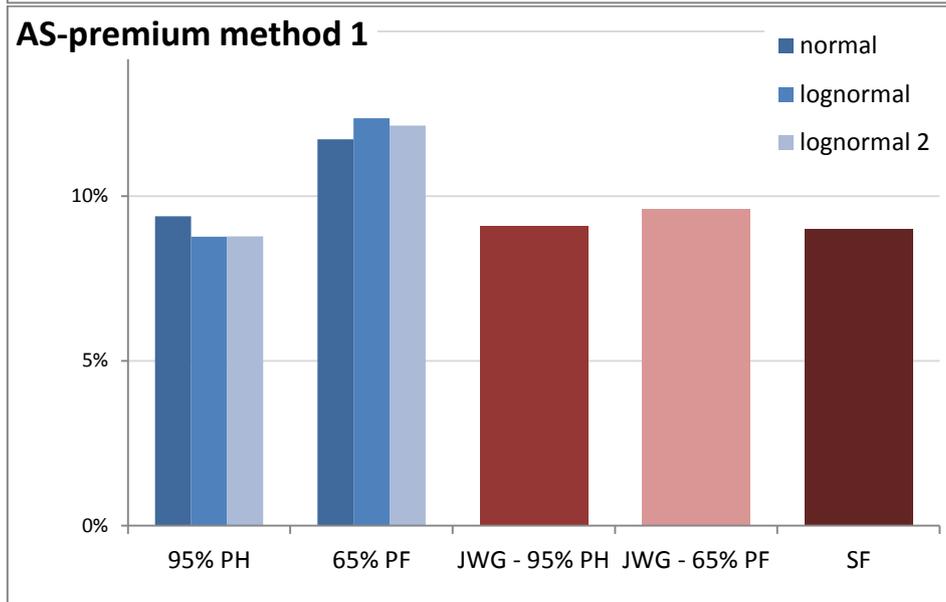
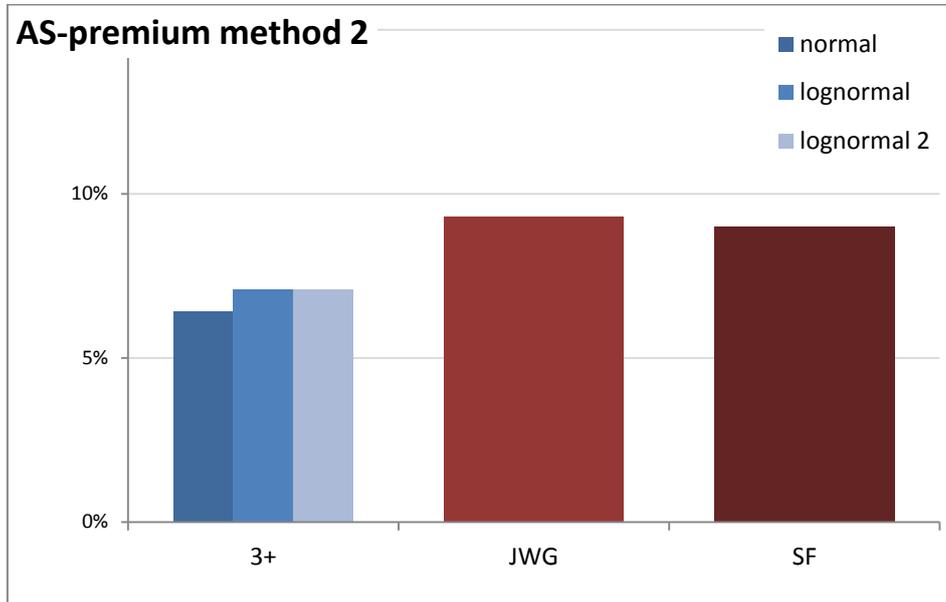
23. Annex to chapter 1 – Results of the calibration for premium risks

1829. In the following are disclosed the outcomes of the recalibration work performed. Both method 1 and method 2 results are displayed and for all different model (normal, lognormal and lognormal 2). Final 2011 calibration was performed thanks to the normal method 2.

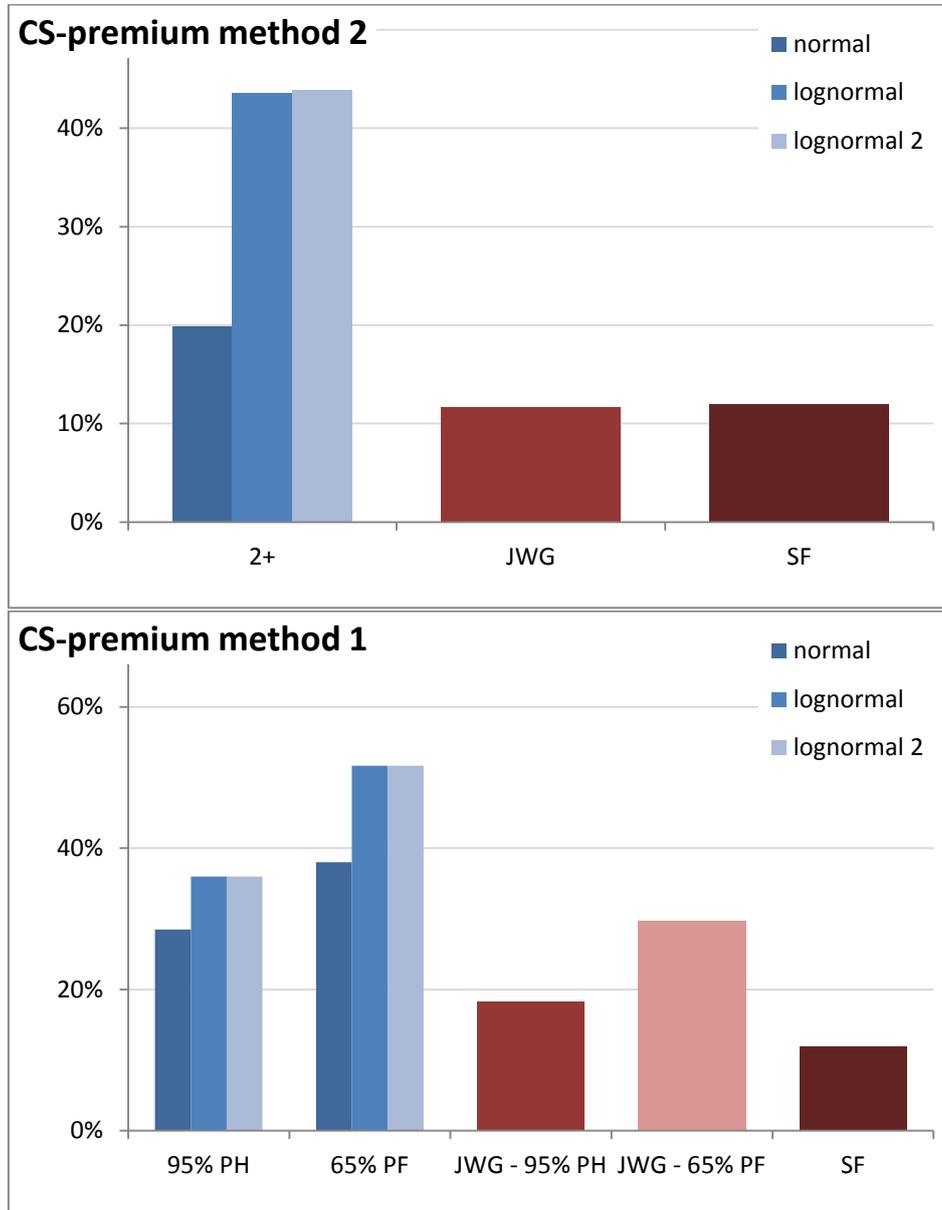
1830. In the method 1 graphs, 95% PH correspond to the policyholder approach and 65% PF to the company approach. In the method 2, 3+ corresponds to the non-inclusion of countries with strictly less than three submissions (AS, LE and HME), and 2+ to the non-inclusion of countries with strictly less than two submissions (HWC and CS).

			Recalibration 2017			JWG			
			Method 2	Method 1		Method 2	Method 1		SF
			3+/2+	95% PH	65% PF	normal	95% PH	65% PF	
Premium	AS	normal	6,4%	9,4%	11,7%	9,3%	9,1%	9,6%	9%
		lognormal	7%	9%	12%				
		lognormal 2	7%	9%	12%				
	CS	normal	19,9%	28,5%	38,0%	11,7%	18,3%	29,7%	12%
		lognormal	44%	36%	52%				
		lognormal 2	44%	36%	52%				
	HME	normal	6,0%	7,0%	9,9%	5,0%	7,0%	9,2%	5%
		lognormal	6%	18%	41%				
		lognormal 2	5%	18%	41%				
	HWC	normal	9,6%	10,8%	10,8%	8,0%	11,8%	14,9%	8%
		lognormal	11%	14%	19%				
		lognormal 2	11%	14%	19%				
	LE	normal	8,3%	7,1%	8,6%	6,5%	7,9%	12,4%	7%
		lognormal	16%	9%	11%				
		lognormal 2	16%	9%	11%				

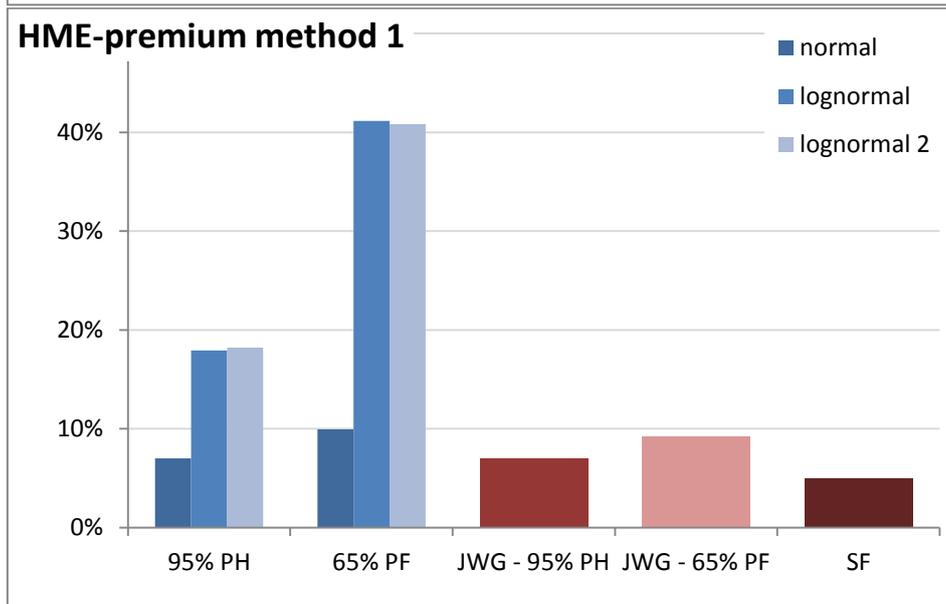
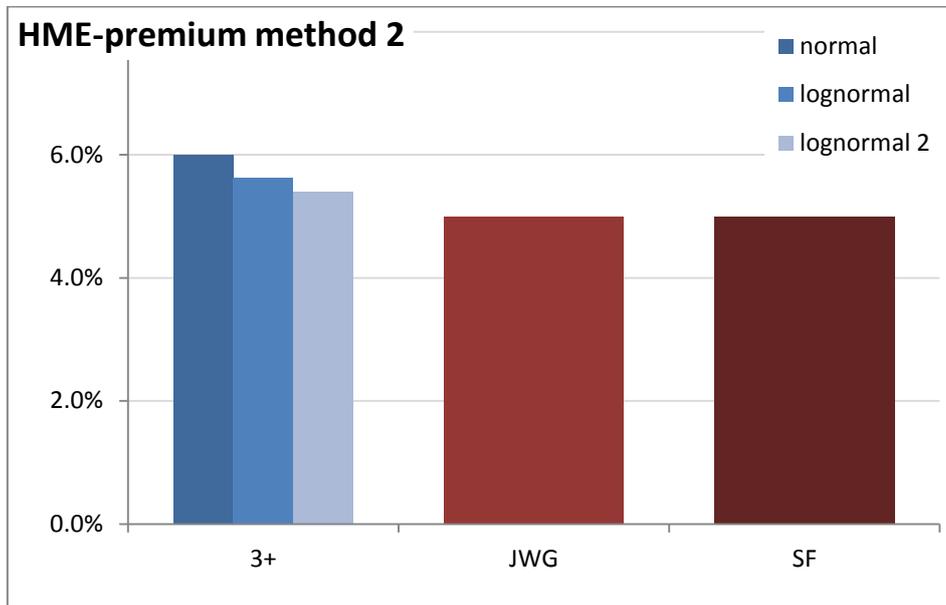
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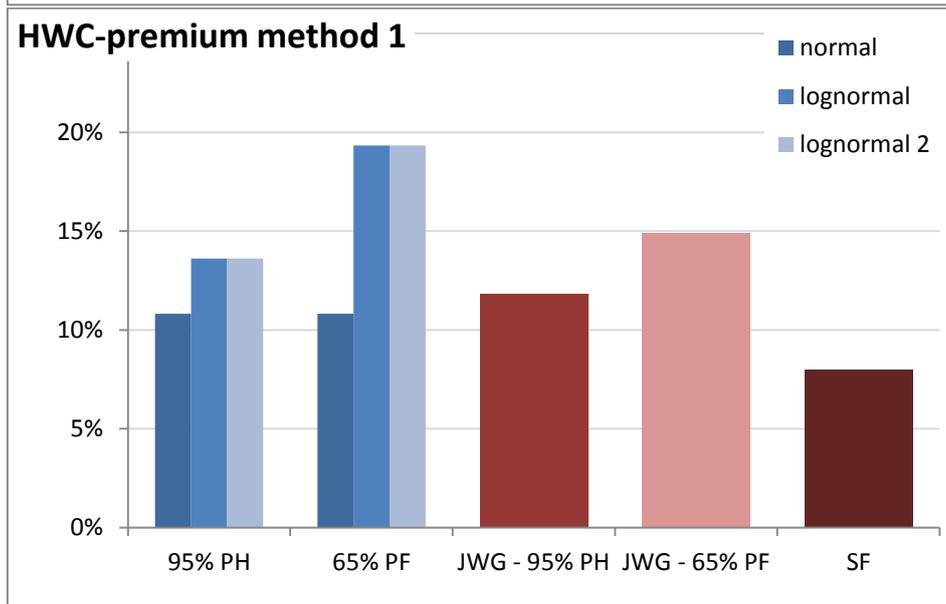
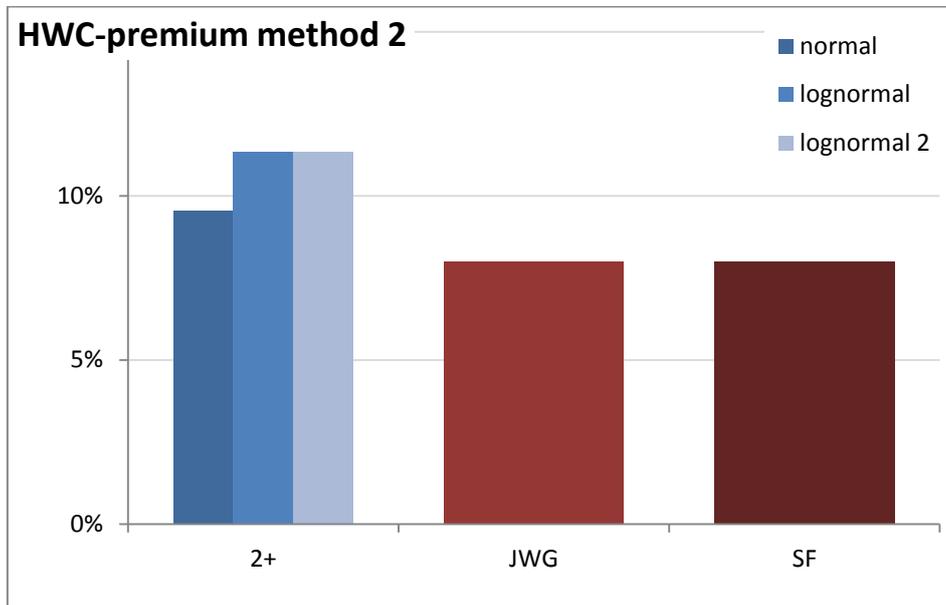
Credit and suretyship



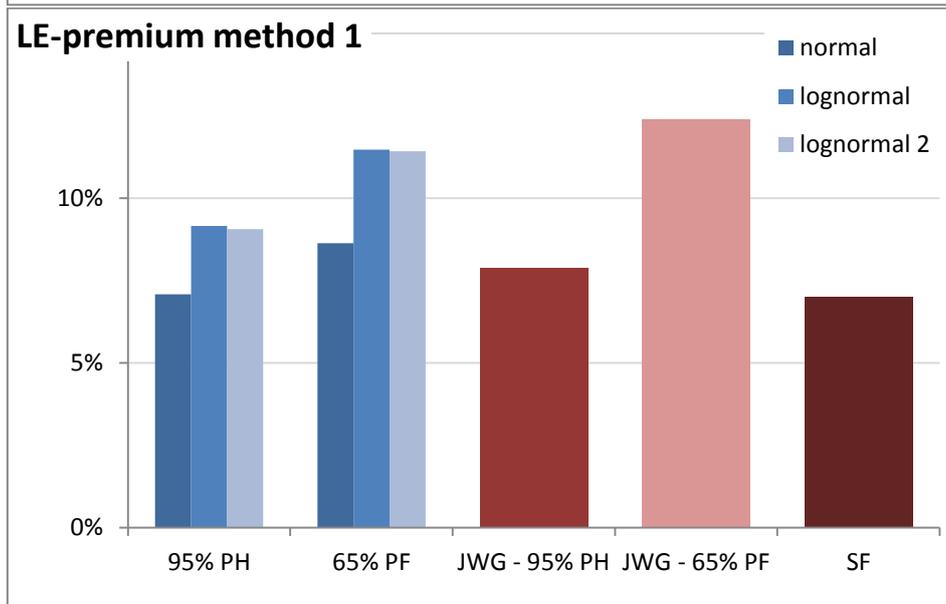
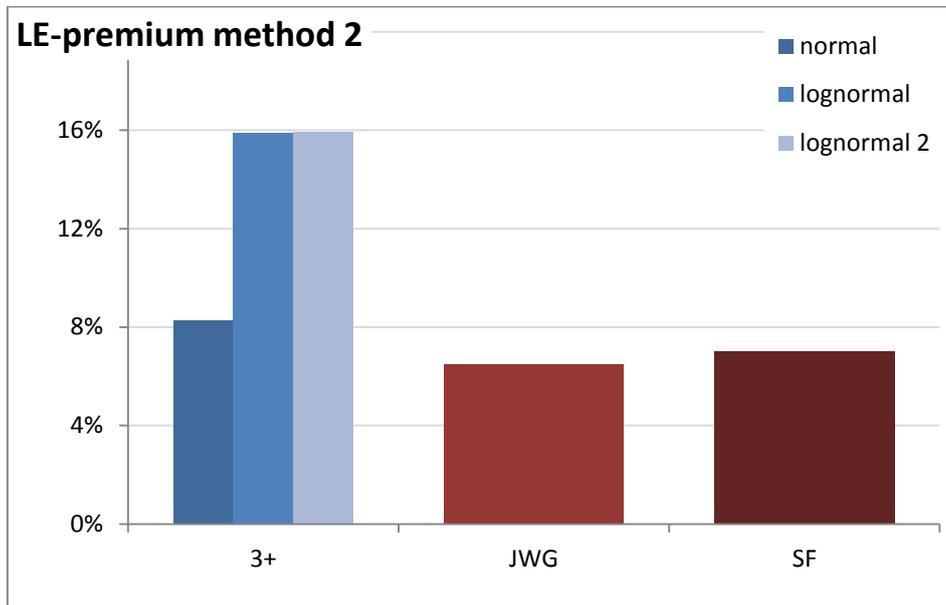
Health Medical Expense



Health Worker's Compensation



Legal Expenses



24. Annex to chapter 1 – Results of the calibration for reserve risks

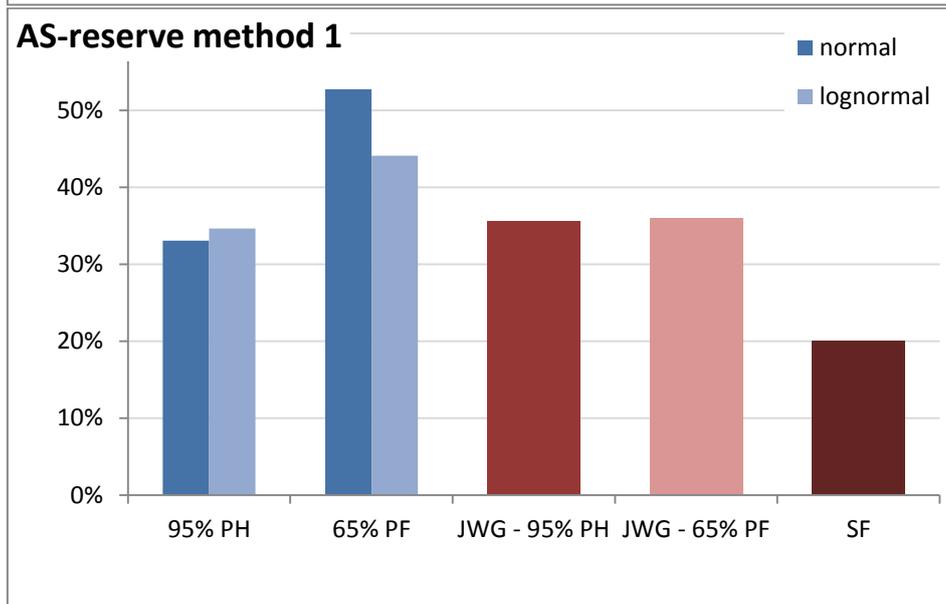
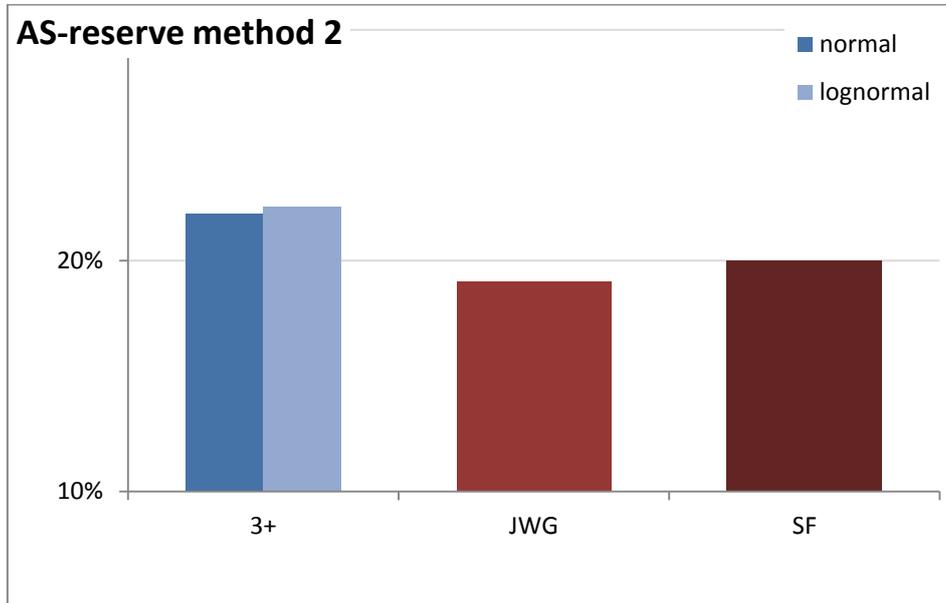
1831. In the following are disclosed the outcomes of the recalibration work performed. Both method 1 and method 2 results are displayed and for all different model (normal and lognormal). Final 2011 calibration was performed thanks to the normal method 2.

1832. In the method 1 graphs, 95% PH correspond to the policyholder approach and 65% PF to the company approach. In the method 2, 3+ corresponds to the non-inclusion of countries with strictly less than three submissions (AS, LE and HME), and 2+ to the non-inclusion of countries with strictly less than two submissions (HWC and CS).

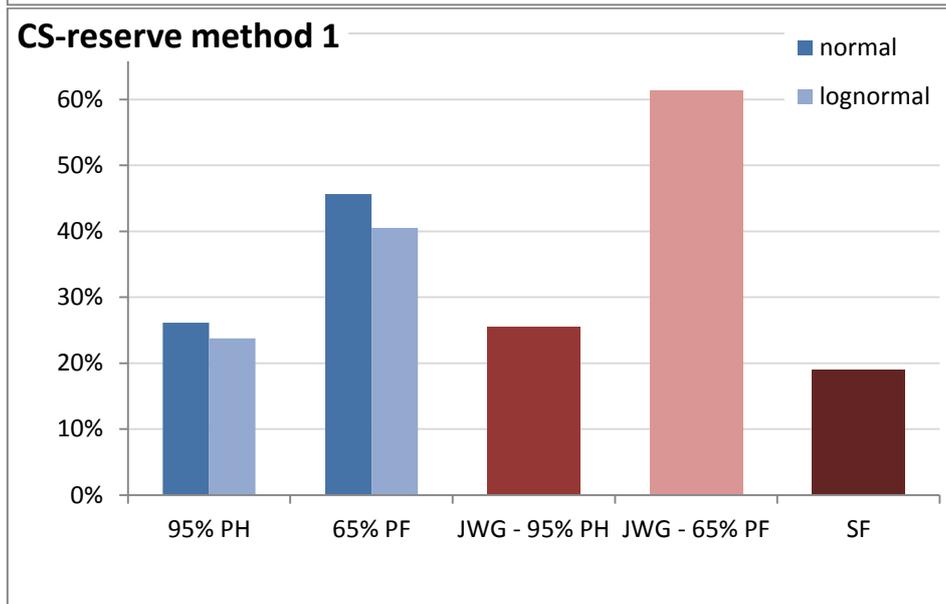
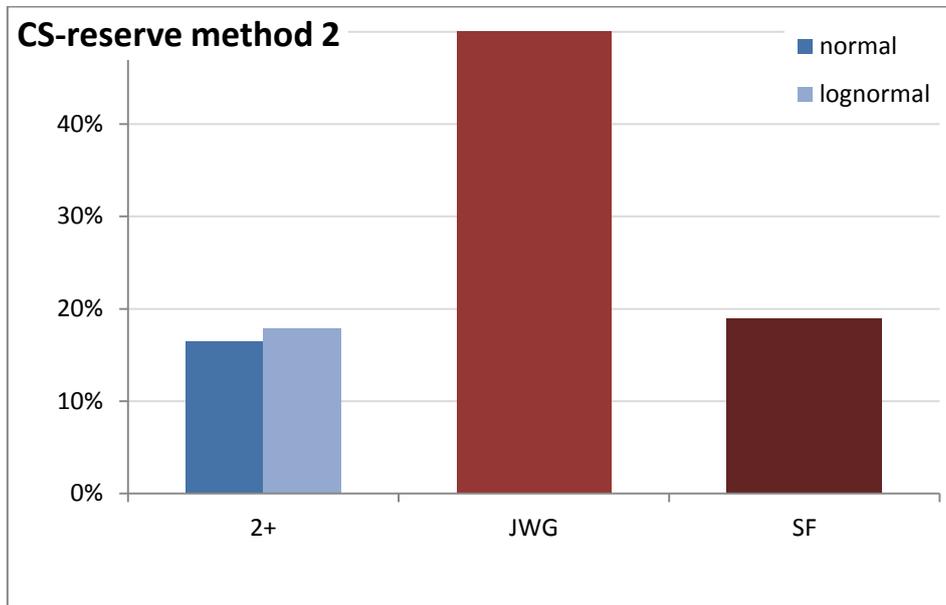
1833. As reserve risks were calibrated on data gross of reinsurance, figures from the JWG report are disclosed gross of reinsurance (see section 1.2.4). Standard formula figures for reserve are net of reinsurance.

			Recalibration 2017			JWG				
			Method 2	Method 1		Method 2 (gross)	Method 1 (gross)		Gross to net factor	SF (net)
			3+	95% PH	65% PF	gross	95% PH	65% PF	gross to net	net
Reserve	AS	normal	22,0%	33,1%	52,7%	19,1%	35,6%	36,0%	100%	20%
		lognormal	22%	35%	44%					
	CS	normal	16,4%	26,1%	45,7%	52,6%	25,4%	61,3%	100%	19%
		lognormal	18%	24%	40%					
	HME	normal	11,3%	15,3%	27,4%	9,2%	15,8%	17,8%	58%	5%
		lognormal	13%	27%	30%					
	HWC	normal	12,0%	12,9%	17,1%	12,7%	15,3%	30,9%	90%	11%
		lognormal	9%	13%	24%					
	LE	normal	5,5%	9,7%	37,0%	12,3%	16,0%	19,9%	100%	12%
		lognormal	12%	10%	20%					

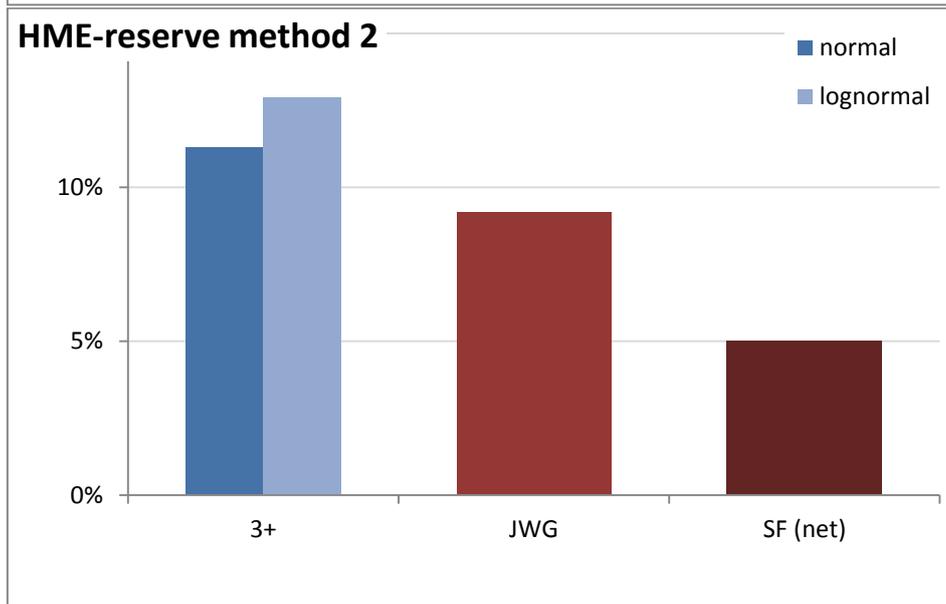
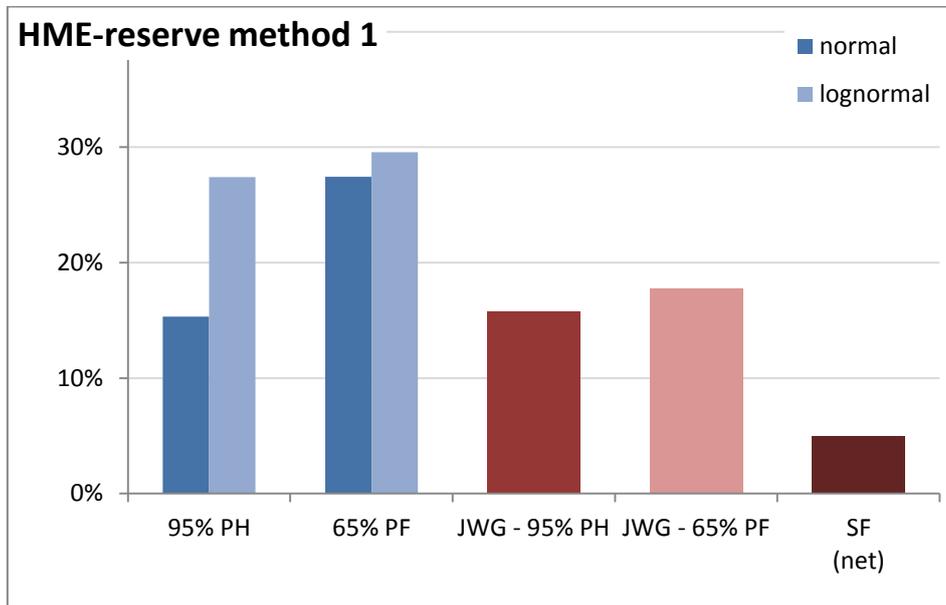
Assistance



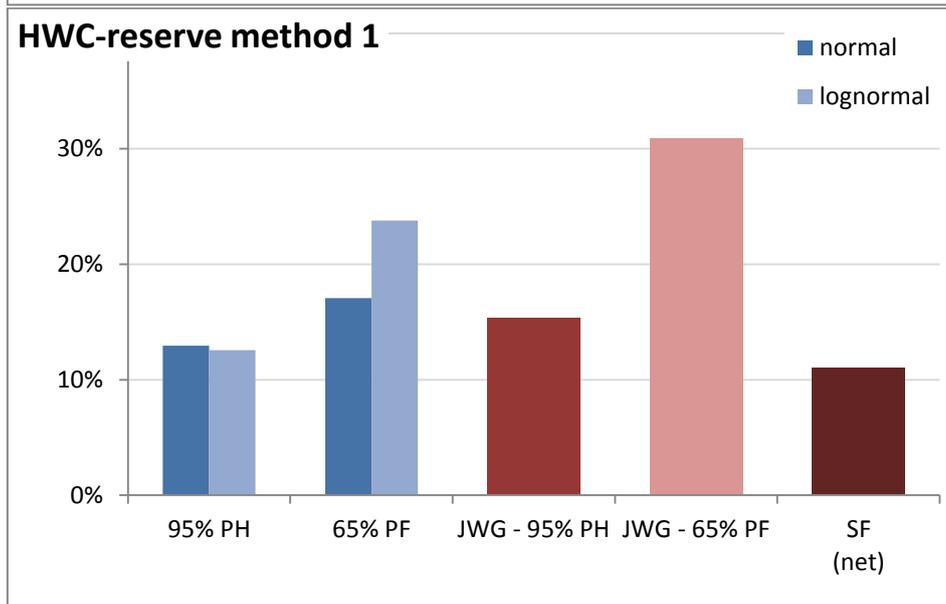
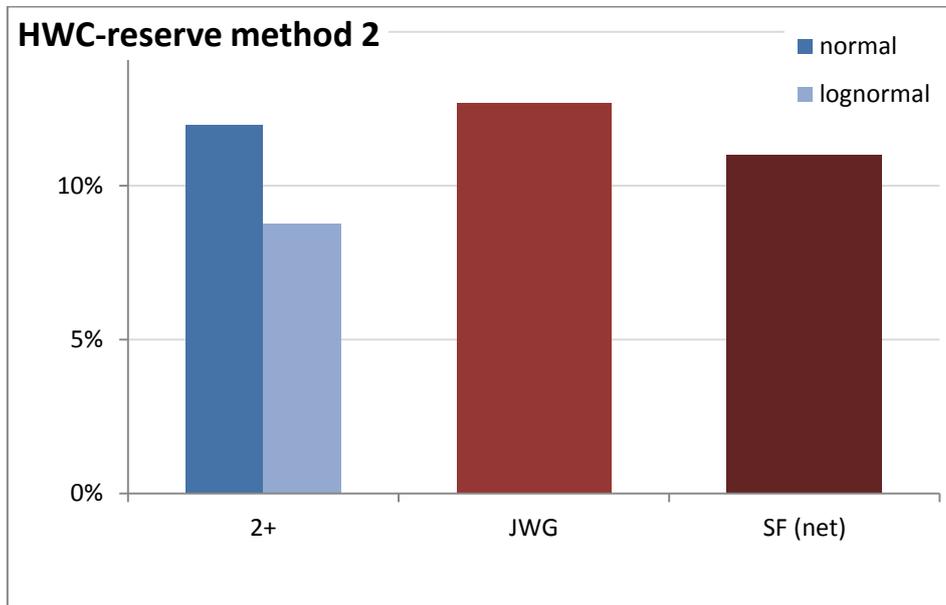
Credit and suretyship



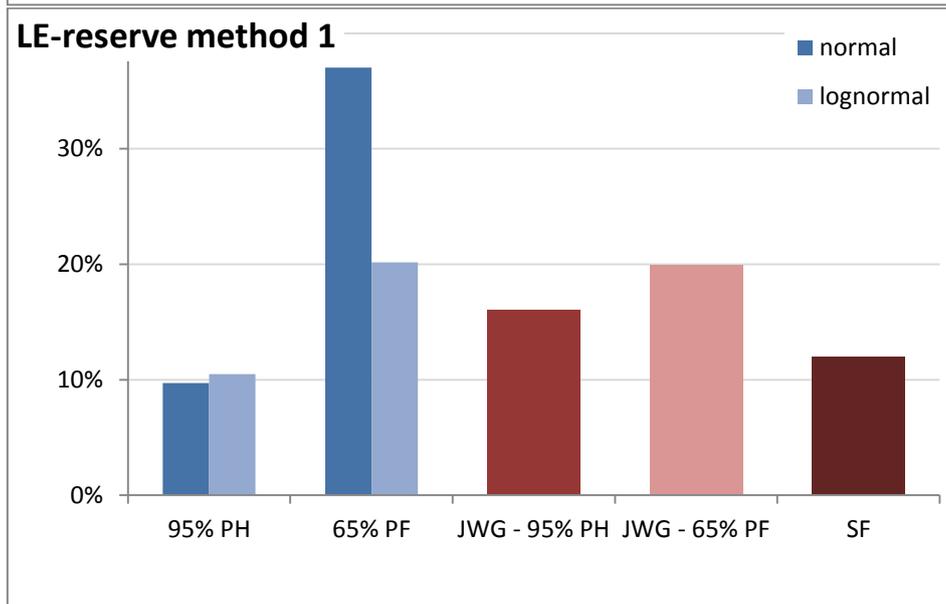
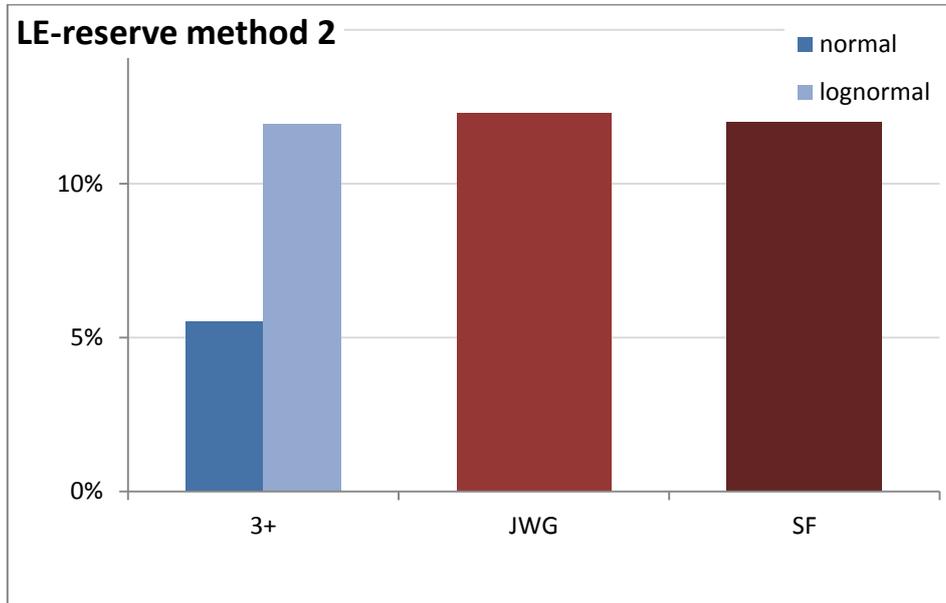
Health Medical Expense



Health Worker's Compensation



Legal Expenses



25. Annex to chapter 1 – Weights used in the method 2

1834. Below are displayed the weights used to aggregate the country sigma in the method 2. They are based on the 2016 end of year reporting.

1835. For the ease of the reading, the weights that are lower than 0.05% are in light grey.

Premium

	Premium				
	AS	CS	HME	HWC	LE
AT	0,2%	0,9%	0,0%	0,0%	19,3%
BE	10,5%	1,0%	0,6%	30,0%	5,1%
BU	0,2%	0,1%	0,0%	0,2%	0,0%
CY	0,0%	0,0%	0,1%	0,0%	0,0%
CZ	0,3%	0,1%	0,1%	0,0%	0,0%
DE	8,0%	18,8%	1,6%	0,1%	43,4%
DK	17,1%	0,0%	0,5%	0,7%	0,1%
EE	0,0%	0,0%	0,0%	0,0%	0,0%
EL	0,9%	0,1%	0,2%	0,0%	0,4%
ES	13,4%	14,8%	7,5%	0,9%	2,6%
FI	0,0%	0,6%	0,6%	20,6%	0,9%
FR	27,2%	12,3%	31,7%	11,6%	16,3%
HR	0,1%	0,6%	0,0%	0,0%	0,0%
HU	0,2%	0,2%	0,0%	0,1%	0,1%
IE	0,3%	15,6%	1,4%	1,5%	0,0%
IT	6,4%	3,3%	1,4%	0,0%	2,6%
LI	0,0%	0,0%	0,1%	0,0%	0,0%
LT	0,0%	0,1%	0,0%	0,0%	0,0%
LU	0,2%	4,2%	0,3%	1,2%	0,5%
LV	0,2%	0,1%	0,0%	0,0%	0,0%
MT	0,2%	0,0%	0,0%	0,0%	0,1%
NL	2,5%	0,5%	47,8%	0,1%	4,8%
NO	3,8%	0,1%	0,2%	9,9%	0,7%
PL	2,6%	3,1%	0,1%	0,0%	0,6%
PT	2,0%	0,4%	0,7%	21,7%	0,3%
RO	0,3%	0,4%	0,0%	0,0%	0,0%
SE	1,3%	1,9%	0,4%	1,0%	0,1%
SI	0,4%	2,1%	0,5%	0,0%	0,0%
SK	0,3%	0,0%	0,0%	0,0%	0,0%
UK	1,4%	18,3%	3,7%	0,4%	1,9%

Reserve

	Reserve				
	AS	CS	HME	HWC	LE
AT	0,0%	0,4%	0,0%	0,0%	8,1%
BE	9,0%	0,9%	1,4%	17,2%	10,9%
BU	0,4%	0,1%	0,0%	0,0%	0,0%
CY	0,0%	0,0%	0,1%	0,0%	0,0%
CZ	0,4%	0,2%	0,0%	0,0%	0,0%
DE	4,3%	25,0%	1,0%	0,0%	57,9%
DK	20,9%	0,1%	0,4%	1,7%	0,2%
EE	0,0%	0,0%	0,0%	0,0%	0,0%
EL	0,0%	0,2%	0,5%	0,1%	0,2%
ES	10,9%	12,1%	6,1%	0,3%	1,3%
FI	0,0%	0,2%	1,4%	14,4%	1,1%
FR	29,3%	21,0%	18,7%	9,8%	10,8%
HR	0,1%	0,1%	0,0%	0,0%	0,0%
HU	0,1%	0,0%	0,0%	0,1%	0,0%
IE	0,1%	16,3%	1,2%	2,5%	0,1%
IT	8,5%	8,1%	2,1%	0,0%	3,6%
LI	0,0%	0,1%	0,2%	0,0%	0,0%
LT	0,0%	0,1%	0,0%	0,0%	0,0%
LU	0,1%	3,8%	0,4%	1,7%	0,5%
LV	0,1%	0,2%	0,0%	0,0%	0,0%
MT	0,4%	0,0%	0,0%	0,0%	0,0%
NL	1,1%	0,4%	62,8%	0,2%	3,0%
NO	7,1%	0,2%	0,5%	31,5%	0,6%
PL	2,0%	1,5%	0,1%	0,0%	0,1%
PT	1,6%	0,5%	0,5%	4,2%	0,1%
RO	0,8%	0,3%	0,0%	0,0%	0,0%
SE	0,9%	1,4%	0,6%	15,7%	0,1%
SI	0,6%	0,3%	0,1%	0,0%	0,0%
SK	0,2%	0,0%	0,0%	0,0%	0,0%
UK	1,0%	6,6%	1,8%	0,5%	1,4%

26. Annex to chapter 5 – Identification of largest man-made catastrophe exposures

Potential implication of recommendation

The following issue which arises when identification of the largest risk exposure is carried out “net of reinsurance where that reinsurance cover alters the relative ranking of the exposure within the undertaking’s portfolio, based on the size of the exposure.”

Reporting

Undertakings are required to report their risk exposures arising from the MFA submodule scenarios both gross and net of risk mitigation. Altering the scenario-based calculations in the MFA submodules as proposed by the CAT WS i.e. so they are assessed “net of reinsurance where that reinsurance cover alters the relative ranking of the exposure within the undertaking’s portfolio, based on the size of the exposure” effectively creates an additional categorisation of exposure which we define to be ‘adjusted gross’ exposure. This gives rise to multiple possibilities of what the reported gross and net exposures could be.

Experts agreed that the net reported amount should be calculated as the net exposure from the adjusted gross scenario. This is implicit in the CAT WS’s recommendation.

However, the gross amount to be defined as either:

1. The “true” gross amount i.e. the maximum risk exposure assessed without consideration of any reinsurance.
2. The gross amount from the ‘adjusted gross’ scenario.

The CAT WS believes that option 1 would provide a better representation of an undertaking’s counterparty risk but would effectively require undertakings to complete multiple scenarios to provide their reporting up to the level of the overall SCR figure (QRT S.25.01).

Option 2 is more straightforward but arguably provides a less good representation of the true gross amount before all reinsurance.

EXAMPLE FOR ILLUSTRATION: Fire risk

Insurer has facultative covers for 2 specific exposures and a XL per risk treaty cover with retention of 30M EUR. Risk concentration 1 illustrates the identification of top 5 maximum concentration on a gross basis while Risk Concentration 2 illustrates the identification of top 5 maximum concentration net of certain Reinsurance as per this proposal.

Risk concentration 1 (identification using gross exposure)

Exposure	Gross	Facultative Reinsurance	Net of Facultative Reinsurance	Risk XL Reinsurance	Net
A	200	(200)	0	0	0
B	50	(10)	40	(10)	30
C	40	-	40	(10)	30
D	30	-	30	-	30
E	20	-	20	-	20
Total	350	(210)	130	(20)	110

Risk concentration 2 (identification using net of facultative exposure)

Exposure	Gross	Facultative Reinsurance	Net of Facultative Reinsurance	Risk XL Reinsurance	Net
B	50	(10)	40	(10)	30
C	40	-	40	(10)	30
D	30	-	30	-	30
E	20	-	20	-	20
F	10	-	10	-	10
Total	150	(10)	140	(20)	120

In this example, the CAT WS's proposal to change the identification of the maximum risk exposure results in concentration 2 being the applicable scenario for the SCR calculation. Therefore, the net figure should clearly be reported as 120.

For option 1, the gross figure would be 350 and the risk mitigating effect (before any diversification effects with other risks) would be 230. This is calculated as a combination of the two risk concentration scenarios ie gross from concentration 1 and net from concentration 2 (350 – 120).

For option 2, the gross figure would be 150, the net figure 120 and the risk mitigating effect would be 30. This risk mitigating effect of 30 is consistent with the scenario relevant for the SCR; in the example only the best estimate reinsurance recoverable related to the facultative reinsurance of exposure A is considered in the counterparty risk module.

Counterparty default risk submodule

The CAT WS would like to highlight that the risk mitigating effect of the reinsurance is an input into the counterparty default risk submodule and the decision on which gross is most applicable will also impact on this submodule.

27. Annex to chapter 5 – Fire risk simplification

Risk sensitivity

The calculation has been designed to result in a sufficient level of risk sensitivity:

- o The assessment of the five largest exposures, for each risk type, increases granularity and is intended to capture the scenario where clusters of commercial or residential portfolios result in a greater concentration of exposure than higher value, but more isolated, industrial exposures.
- o The underpin is designed to provide a minimum level of capital for portfolios of homogenous residential properties where the largest risks are less likely to provide the proxy for concentration.

The CAT WS discussed other changes that could be made to the proposal to further increase the level of risk sensitivity.

- o Require for the five 200m radius circles being assessed per risk type to be mutually exclusive. This would be intended to improve the assessment of concentration in portfolios where multiple contracts are written to the same address. For example, where an undertaking has multiple exposures to the same industrial site.
- o Require undertakings to assess every 200m radius circle containing the largest risks rather than having it as a central point.

The CAT WS members recognised the improved risk sensitivity that these alterations would bring. However, it was agreed that a balance needed to be struck between simplicity and risk sensitivity. It was also noted that undertakings needed to provide a qualitative assessment of the simplification through their ORSA process. It was therefore proposed not to incorporate these changes into the proposal.

Calibration of the underpin factor

The underpin is intended to provide a minimum capital requirement for undertakings who have a portfolio of residential, largely homogenous exposures. In this case, the identification of the largest exposure may be difficult (i.e. if there are lots of policies with the same level of sum insured). The largest residential properties by sum insured may also not give a good reflection of any clustering and therefore not a good proxy for the true concentration of risk.

The underpin is designed to capture the impact on a residential portfolio from a large-scale conflagration event. The CAT WS has based the calculation on the Enschede event in the Netherlands in 2000 (see appendix) which they assessed to be a good proxy for such a future event.

The final calibration of the underpin has been developed with regard to the following considerations:

- Using the portfolio-specific average sum insured provides a better reflection of the risk profile of the insurer and enables the value to vary across different countries.
- As the underpin is expected to be applicable mostly in cases where the portfolio is relatively homogenous, the average sum insured provides a good proxy for the portfolio exposures.

- The factor of 500 represents the number of properties affected during the conflagration event and is derived from loss information from the Enschede event, supplemented by expert judgement.
- The undertaking's market share provides the proportion of properties which the undertaking could be expected to provide cover for.

A minimum market share of 5% was prescribed to reflect the possibility of regional concentrations within portfolios which would not be adequately captured by using undertaking's national market share

28. Annex to chapter 6 – Natural Catastrophe risk simplification: mathematical formulation and quantitative results

1 Mathematical Formulation for options 3, 5, and 6

The starting point for the discussion below is the formula for the loss in a region r , given by

$$L_r = Q_r \sqrt{\left(\sum_{(i,j)} \text{Corr}_{ij} WSI_i WSI_j \right)},$$

with the weighted sum insured WSI given by the product of weight W for the (Cresta)zone i and sum insured in this zone (W and SI always refer to the zones in region r hereafter, the sum goes over all zones of the region)

$$WSI_i = W_i SI_i.$$

Depending on the peril, the sums insured include weights for the different lines of business. For simplicity this is not considered here.

We further define the quantity \tilde{SI}^r for any exposure in the region r not allocated to zones i . Therefore the proportion of exposure that is not allocated is given by

$$\gamma_r = \frac{\tilde{SI}^r}{\tilde{SI}^r + \sum_i SI_i}, 0 \leq \gamma_r \leq 1.$$

1.1 Use of risk factor for the region and applying prudency factor (Option 3)

For this option, the loss in the region r is given by

$$L_r = Q_r \left[\sqrt{\left(\sum_{(i,j)} \text{Corr}_{ij} WSI_i WSI_j \right)} + p_r \tilde{SI}^r \right],$$

where $p_r \geq 1$ is the prudency factor ($p_r = 1$ is the limiting case of no prudency, option 2). It would not be appropriate to assume diversification effects between $\sqrt{\left(\sum_{(i,j)} \text{Corr}_{ij} WSI_i WSI_j \right)}$ and $p_r \tilde{SI}^r$, as this is already considered in the calibration of Q_r .

For the case, where the undertaking uses the simplification for the overall exposure in region r , this simplifies to

$$L_r = p_r Q_r \tilde{SI}^r.$$

1.2 Allocation to zone with highest risk weight (Option 5)

In this case, the formula for the loss in the region r remains unchanged

$$L_r = Q_r \sqrt{\left(\sum_{(i,j)} \text{Corr}_{ij} WSI_i WSI_j \right)}$$

However, the sum insured for the zone \hat{i} with highest risk weight is replaced by

$$SI_{\hat{i}} \rightarrow SI_{\hat{i}} + \tilde{S}I^r.$$

For the case that this simplification is done for the overall portfolio of region r , this simplifies to

$$L_r = W_{\hat{i}} Q_r \tilde{S}I^r.$$

Therefore, using this simplification for the overall portfolio, the result is equivalent to Option 2 with the special choice of prudency factor $p_r = W_{\hat{i}}$.

The formulas for variation a) (not using the highest risk weight, but some other) are equal, the only difference is the choice of \hat{i} .

This applies to variation b) (using the highest risk weight within the subset of zones where the exposure could be) as well. In this case, there might be more than one zone \hat{i} , where SI consists of the sum of allocated and not (fully) allocated parts.

1.3 Allocation to undertaking's average (Option 6)

This option can be written as

$$L_r = Q_r \sqrt{\left(\sum_{(i,j)} \text{Corr}_{ij} \frac{WSI_i}{1-\gamma_r} \frac{WSI_j}{1-\gamma_r} \right)} = Q_r /_{1-\gamma_r} \sqrt{\left(\sum_{(i,j)} \text{Corr}_{ij} WSI_i WSI_j \right)}.$$

Therefore, it is simply the scaled figure for the allocated exposure. Mathematically the solution fails when no exposure has been allocated to risk zones before applying the simplification (i.e. $\gamma_r \rightarrow 1$, or $\sum_i S I_i \rightarrow 0$). To avoid the risk of cherry-picking, there is agreement that in practice γ_r should be relatively large.

There is no intuitive way to implement the concept of prudency into this approach. The easiest solution – from a technical point of view – is the replacement of the factor $1/(1-\gamma_r) = (1-\gamma_r)^{-1}$ with another function that diverges faster for $\gamma_r \rightarrow 1$, e.g. with $(1-\gamma_r)^{-\alpha}$, $\alpha \geq 1$.

2 Quantitative results and prudency for options 3, 5 and 6

In the following we list quantitative criteria for the choice of options and prudency factors. To demonstrate the results of the different options we consider two different undertakings, one being the “average industry” (AI) undertaking, the other one being the “regionally concentrated” (RC) undertaking. AI and RC are meant to span the limiting cases, and especially RC is likely exaggerated.¹⁴⁷

¹⁴⁷ Probably the impact of anti-selecting risks within a risk zone is more relevant for an undertaking (but not covered by the standard formula) than the anti-selection of risk zones.

The sum insured of AI are approximately¹⁴⁸ the one used to normalize the aggregation matrix $Corr_{ij}$ of the standard formula, so that without applying simplifications, the result is proportional to the country factor ($L_r^{AI} \approx Q_r \sum_i SI_i^{AI} = Q_r SI^{AI}$) and the sum insured summed over all risk zones $SI^{AI} = \sum_i SI_i^{AI}$. We define RC as an undertaking where 40% of the exposure is additionally concentrated in the two risk zones k, l with highest risk weights, and 60% are distributed as for AI, or

$$SI_i^{RC} = 60\%SI_i^{AI} | i \notin (k, l),$$

$$SI_i^{RC} = 60\%SI_i^{AI} + 20\%SI^{AI} | i \in (k, l).$$

The example is constructed such that $\sum_i SI_i^{AI} = SI^{AI} = \sum_i SI_i^{RC} = SI^{RC}$.

Let us further consider the three cases that 10%, 40%, 100% of the exposure is not allocated ($\gamma_r = 0,1; 0,4; 1$). As we are considering an extreme case RC applies the simplification for the exposure on the highest risk zones first, with equal weight for the two zones. Here we show result for the following four perils/region combinations only, that are representative for the regions where the corresponding peril is material (we briefly comment why we consider the peril/region as representative). The result is always normalized to $Q_r SI$. The table is based on the scenario with 100% loss (as there is no reinsurance considered this will give the same results as using SCR).

The colour coding is based on the following criteria:

- Green: Estimate of simplification largely in line with result without simplification (80%-150%)
- Yellow: Material overestimation (>150%)
- Red: Material underestimation (<80%)

Clearly these criteria are subject to expert judgement, and other thresholds can be selected. It should be pointed out, that the colour coding cannot take into account if the peril/region is material for the undertaking for its overall SCR.

The reasons for choosing specific peril/regions are – first – that all perils (except subsidence) should be covered. It is of specific importance that one considers both perils with low correlations between risk zones (Hail, EQ) and large correlations (Storm)¹⁴⁹. Second we focus on the material perils for specific countries. Last, we cover both larger and smaller regions (with the exception of “One-Risk-Zone” regions, where the simplifications are not applicable).

EQ Italy: major peril for Italy larger region in the sample

Flood Poland major peril for Poland larger region in the sample

Storm Denmark major peril for Denmark smaller region in the sample

Hail Austria major peril for Austria smaller region in the sample

¹⁴⁸ The identity $L_r^{AI} = Q_r \sum_i SI_i^{AI} = Q_r SI^{AI}$ does not hold exactly, as our AI undertaking is approximated by equal distribution of SI^{AI} to all the risk zones, which is not the actual contribution used to normalize the standard formula. For the purpose here the difference is not relevant.

¹⁴⁹ For flood, the materiality of correlations depend on the regions.

2.1 Results and discussion of the examples

2.1.1 Earthquake Italy

	No simplification	Option 3 ¹⁵⁰ $p_r = 1$	Option 3 $p_r = 3$	Option 3 $p_r = \max_i W_i$	Option 5	Option 5 90% quantile factor	Option 6	Option 6 with loading ($\alpha = 2$)
AI, 10%	100%	101%	122%	205%	162%	124%	100%	111%
AI, 40%	100%	102%	187%	521%	478%	303%	100%	167%
AI, 100%	100%	106%	317%	1152%	1152%	719%	./.	./.
RC, 10%	100%	80%	86%	111%	103%	84%	86%	95%
RC, 40%	100%	29%	54%	150%	138%	97%	29%	48%
RC, 100%	100%	30%	91%	332%	332%	207%	./.	./.

2.1.2 Flood Poland

	No simplification	Option 3 $p_r = 1$	Option 3 $p_r = 3$	Option 3 $p_r = \max_i W_i$	Option 5	Option 5 90% quantile factor	Option 6	Option 6 with loading ($\alpha = 2$)
AI, 10%	100%	99%	117%	203%	176%	130%	100%	111%
AI, 40%	100%	96%	168%	514%	487%	255%	100%	167%
AI, 100%	100%	90%	271%	1135%	1135%	532%	./.	./.
RC, 10%	100%	80%	85%	109%	104%	85%	87%	96%
RC, 40%	100%	26%	45%	139%	131%	69%	27%	45%
RC, 100%	100%	24%	73%	307%	307%	144%	./.	./.

¹⁵⁰ This limiting case of Option 3 is identical to Option 2.

2.1.3 Storm Denmark

	No simplification	Option 3 $p_r = 1$	Option 3 $p_r = 3$	Option 3 $p_r = \max_i W_i$	Option 5	Option 5 90% quantile factor	Option 6	Option 6 with loading ($\alpha = 2$)
AI, 10%	100%	99%	116%	107%	106%	102%	100%	111%
AI, 40%	100%	94%	163%	129%	126%	113%	100%	167%
AI, 100%	100%	86%	259%	172%	172%	155%	./.	./.
RC, 10%	100%	95%	112%	103%	102%	99%	98%	109%
RC, 40%	100%	82%	142%	112%	110%	98%	87%	145%
RC, 100%	100%	75%	225%	150%	150%	135%	./.	./.

2.1.4 Hail Austria

	No simplification	Option 3 $p_r = 1$	Option 3 $p_r = 3$	Option 3 $p_r = \max_i W_i$	Option 5	Option 5 90% quantile factor	Option 6	Option 6 with loading ($\alpha = 2$)
AI, 10%	100%	101%	123%	349%	307%	166%	100%	111%
AI, 40%	100%	104%	192%	1098%	1064%	511%	100%	167%
AI, 100%	100%	110%	330%	2595%	2595%	1244%	./.	./.
RC, 10%	100%	78%	81%	115%	109%	79%	85%	94%
RC, 40%	100%	15%	28%	162%	157%	76%	15%	25%
RC, 100%	100%	16%	49%	383%	383%	184%	./.	./.

2.2 Discussion

Based on the results above, the following conclusions can be drawn (most of them as expected):

- The simplifications tend to deviate more from the true result (without using the simplification), the higher the proportion of non-allocated exposure.

- The simplifications tend to deviate more from the true result without simplification for perils where the zonal weights have large variability (see Hail Austria for large variability and WS Denmark for low variability)
- Option 3 (with maximal prudence factor p_r) and Option 5 tend to be very conservative, especially for the “average industry” (AI) undertaking. However, option 5 tends to overestimate the SCR a bit less than option 3 (with maximal prudence factor p_r), and is thus the – quantitatively – superior solution.
- Option 3 without prudence factor (which is identical to Option 2) tends underestimate the risk for the risk concentrated undertakings, when the non-allocated exposure exceeds 10%, for some settings materially so. This still applies when the prudence factor is set to a moderate value of 3.
- Option 6 works well for AI (by construction), but not so for RC, where the risk can be underestimated to a large degree for $\gamma_r > 10\%$.

29. Annex to chapter 6 – Description of recalibration process

I. Input to the recalibration

Two different types of input are used in the recalibration process:

- **Models:**
Compared to the situation of the CAT Task Force (CTF) of EIOPA's predecessor organisation CEIOPS, nowadays more models are available for most of the scenarios. This means in all but one case, that now at least one model exists in the market, where the CTF might have had to find solutions without any model as a starting point.
- **Industry Exposure Data:**
The data used is, where available for a particular scenario, provided by PERILS AG. Where this is not the case, model owners are asked to use their own data. For the zonal calibration, NSAs were able to support by providing exposure data in some cases.

In all cases, model and data providers revealed features, assumptions and policy conditions, implicit to their input.
1836.

II. Recalibration of the country factors

It was agreed to first recalibrate the country risk factor for each scenario: as a global factor to the SCR-determining 1-in-200y scenario loss, it the most impact on a (re)insurance undertaking's SCR for a given scenario.
1837.

The following steps were agreed to arrive at a proposal value¹⁵¹ for the country factor of a given scenario ('mini Delphi method'):

- 1) Initial input to the (re-)calibration process:
 - a) collection of candidate values from all models available for a given scenario, incl. a set of objective criteria; Country factors of neighbouring (current, and potentially recalibrated values) regions/countries need to be taken into account to ensure proper risk relativities per perils.
 - b) In case there is no model available for a given scenario, experts were asked to come up with a guess for an initial value, based on their specific expertise. Plausible proposal values were derived from the gathered information for country factor, raw risk zone weights and aggregation matrix, which were subsequently discussed.

¹⁵¹ 'proposal value' here means a value that the CAT WS will eventually propose to the SCR review Project Group (SCR PG) for adoption and subsequent submission to the European Commission as part of the envisaged Technical Advice, i.e. 'output' of the recalibration process. The term 'candidate value' is used for submissions of, e.g., own model output of model vendors to the CAT WS as input to the recalibration process.

Experts provided documentation on what, why and how the information outlined above was used to produce the estimates.

- 2) Anonymising of input values and circulation to experts.
- 3) Comments from experts to be collected, incl. recommended value (or ranking thereof) and explanation of choice; calculation of SCR resulting for the given scenario on the basis of each candidate value.
- 4) Comparison and subsequent consolidation of recommendations and comments on proposals and re-circulation to experts.
- 5) Continue with step 3 until a single value is identified as the final recommendation.

Along the sequence of steps above, experts were requested to continuously document the decision process and all relevant input information available.

Mode of decision under 5)

Convergence on a recalibrated country factor was assumed, when either

- a. all experts agreed to keep the proposed value of the current round of comments, or
- b. a proportion of experts agreed to keep the proposed value of the current round of comments and the remaining experts were roughly split by half between requesting increase and requesting decrease for this value.

III. Decision on recalibration of more granular parameters

For certain scenarios (currently: GR EQ, HU FL, SK EQ, SE WS), particular zonal weights and correlations have been challenged. For five newly introduced scenarios (CZ Hail, FI WS, HU WS, SI Hail and SI WS) risk zone weight vector and aggregation matrix needed to be proposed and calibrated.
1838.

It was assessed, that no other scenarios (apart from the nine already identified above) currently require recalibration of the risk zone weights and/or aggregation matrices.

IV. Recalibration of risk zone weights and aggregation matrices

Due to the increased granularity, only a subset of the models used to provide candidate values for the recalibration of the country factors above were capable of providing candidate input for risk zone weight and/or aggregation matrix recalibration.
1839.

For scenarios where it was agreed to also recalibrate these latter sets of parameters, it was proposed to provide experts with only one set of parameters per scenario (vector of zonal weights and aggregation matrix), as the use of

more than one set would increase the complexity by several orders of magnitude¹⁵². Even more important, zonal weights and aggregation matrix form a coherent set, as they are calculated on the basis of a) the same model and b) with a common set of industry exposure data (IED). Thus, combining individual elements of the zonal weight vector or the matrix across several model-IED combinations is not an option.

1840.

The following steps were followed when recalibrating risk zone weights and aggregation matrix for a given scenario:

- Choose a model or a set of models, where the output of each provides for a level of granularity that corresponds to the SF's risk zones for a given scenario; the set of models should be a subset of those used for the first iteration of the country factor recalibration;
- Let the relevant model(s) generate a vector of raw risk zone weights and an aggregation matrix (all amounts w.r.t. the specific peril, e.g. SI_i^{ind} is meant to be the industry exposure to windstorm risk in risk zone j of a given scenario, when windstorm risk is calibrated for this scenario):

Raw risk zone weights / zonal relativities

Calculate

$$F_i = \frac{GLR_{0.995,i}}{GLR_{0.995,r}}$$

with

F_i – non-normalised zonal relativity for zone i in region r ,

$GLR_{0.995,i}$ – 1-in-200a occurrence industry gross loss ratio in risk zone i ,

$GLR_{0.995,r}$ – 1-in-200a occurrence industry gross loss ratio for region r (current country),

where

$GLR_{0.995,i}$ is calculated as $GL_{0.995,i}/SI_i^{ind}$, with $GL_{0.995,i}$ being the 99.5% quantile of the distribution of industry gross loss for zone i and SI_i^{ind} being the total industry exposure in zone i and

$GLR_{0.995,r}$ is calculated as $GL_{0.995,r}/SI_r^{ind}$, with $GL_{0.995,r}$ being the 99.5% quantile of the distribution of industry gross loss for region r and SI_r^{ind} being the total industry exposure in region r (i.e. the country which's scenario is currently calibrated).

Aggregation Matrix Coefficients

¹⁵² n risk zone weights, plus n^2 aggregation matrix entries equals $n(n+1)$ times the same mini-Delphi method to be applied as described above for the country factor; in addition, certain scenario-specific restrictions on the risk zone weights and between the aggregation matrix entries might further complicate the iterations involved when using more than one model for input.

Method 1 (to be used for most windstorm, flood and hail scenario calibration cases): calculate

$$1841. \text{Corr}_{ij} = \frac{\text{GL}_{0,995,ij}^2 - \text{GL}_{0,995,i}^2 - \text{GL}_{0,995,j}^2}{2 \cdot \text{GL}_{0,995,i} \cdot \text{GL}_{0,995,j}}$$

with

Corr_{ij} – non-normalised correlation of risk zones i and j ,

$\text{GL}_{0,995,i}$ – 1-in-200a occurrence industry gross for risk zone i and

$\text{GL}_{0,995,ij}$ – 1-in-200a occurrence industry gross loss for risk zones i and j combined

Method 2 (to be used for most earthquake scenario calibration cases): calculate

$$1842. \text{Corr}_{ij} = \frac{\text{TCE}_{0,995,ij}^2 - \text{TCE}_{0,995,i}^2 - \text{TCE}_{0,995,j}^2}{2 \cdot \text{TCE}_{0,995,i} \cdot \text{TCE}_{0,995,j}}$$

with

Corr_{ij} – non-normalised correlation of risk zones i and j ,

$\text{TCE}_{0,995,i}$ – 1-in-200a occurrence industry gross for risk zone i and

$\text{TCE}_{0,995,ij}$ – 1-in-200a occurrence industry gross loss for risk zones i and j combined,

where $\text{TCE}_{0,995,}$ is the mean of all losses larger than the 1-in-200a loss.

This parameter/random variable is sometimes also designated as 'Tail Value-at-Risk' ($TVaR$), 'Conditional Value-at-Risk' ($CVaR$), 'Average Value-at-Risk' ($AVaR$), or 'expected tail loss' (ETL).

- Form an element-wise average for the vector and the matrix across the submitted sets/models used.
- experts to comment on potential inconsistencies/peculiarities they might discover when assessing the appropriateness of each parameter (set).
- experts to receive the output of the previous step for final consistency checks.

1843. *Rounding and normalisation*

1844. Rounding and normalisation of both the risk zone weights and the aggregation matrix coefficients is done according to the following steps:

- Set each $\text{Corr}_{\text{peril,region},i,j} \in \{0, .25, .5, .75, 1\}$, i.e. choose the value from this set that is closest to the $\text{Corr}_{\text{peril,region},i,j}$ above; zonal relativities to be rounded to one decimal place;
- risk zone weights and aggregation matrix are normalised under the restriction that, for an exposure with industry average spatial distribution across zones in region r (i.e. $\text{SI}_r^{\text{ind}} = \sum_i \text{SI}_i^{\text{ind}}$), the 1-in-200y loss based on the zonal aggregation must equal the total exposure times the country risk factor:

$$(*) \text{Q}_r \text{SI}_r^{\text{ind}} = \text{L}_r = \text{Q}_r \sqrt{\sum_{(i,j)} \text{Corr}_{r,i,j} \cdot \text{F}_{r,i} \cdot \text{SI}_{r,i}^{\text{ind}} \cdot \text{F}_{r,j} \cdot \text{SI}_{r,j}^{\text{ind}}}$$

As Q_r can be cancelled out on both sides of the equation, this shows the independence of the zonal weights – or relativities, as they are sometimes called – from the regional/country risk factor.

- Input the industry zonal distribution into the formula (*) (PERILS data sets to be used where available);
- Set the normalisation weight to 1;
- Repeat the following steps as many times as necessary:
 - i. Multiply the raw zonal weights/relativities by the normalisation weights and round to the nearest 1-digit mantissa;
 - ii. Calculate the result of the scenario as a percentage of exposure using the normalised weights/relativities;
 - iii. Divide the country factor by the result of (ii);
 - iv. If the result of (iii) is not sufficiently close to 1, then multiply the normalisation weight by (iii) and repeat from step (i); otherwise: arrive at final W_r and AGG_r (*i.e. the calibrated versions of the vector F_r of risk zone weights and of the aggregation matrix $Corr_r$ for the current scenario*).

30. Annex to chapter 6 – Spanish Windstorm country factor recalibration

CONSORCIO DE COMPENSACIÓN DE SEGUROS.

The 'Consortio de Compensación de Seguros' (CCS), is a public business organization that is attached to the Ministry of Economy, Industry and Competitiveness, through the General Directorate for Insurance and Pension Funds. It performs many functions within the insurance field, and amongst which those related to coverage of catastrophic risk. The Consortio was not considered in the 2010 initial calibration but it covers directly most of losses caused by windstorms in Spain (in the Spanish market only a residual part of windstorm losses are covered by the Spanish insurance undertakings, less than a third). Therefore the WS recalibration has to be net of Consortio coverage, to pick up only the losses that (re)insurers effectively pay. This is the main explanation for the modification of the country factor for WS in Spain.

The Consortio cannot be considered a risk mitigant because the Consortio assumes nat cat risks directly from the insurance policies written by the insurers for any risk located in Spain, in a way that insurers never assume the cat risks. Therefore, there is not a previous cat risk acquisition by the insurers and a posterior risk transfer to the Consortio; the cat risk is acquired by the Consortio at inception. In the event that the Consortio were to bankruptcy, policyholders would not have any right to demand any claim for cat events to their insurers with which they signed the contracts. This system operates by law (it does not depend on contractual arrangements).

The Consortio de Compensación de Seguros has its own capital, independent to that of the State. Its revenue is formed by its premiums, its surcharges and the product of its investments, and as with any other insurance company, it constitutes the corresponding technical provisions and it upholds a solvency margin. Being a public entity, the CCS does not depend on the budgets of any Public Administration.

For every insurance policy covering risks located in Spain there is a surcharge over the prime in order to cover catastrophic events. This surcharge associated to the risk is transferred to the Consortio, which is the Entity in charge of paying the claims and assuming the risks. This applies not only to Spanish undertakings but also to every undertaking assuming risks in Spain.

Consortio pays all losses caused by windstorm in which there are bursts exceeding 120 km/h (in case of doubt about the wind speed, Consortio will pay as well).

METHODOLOGY FOLLOWED TO RECALIBRATE THE COUNTRY FACTOR FOR WINDSTORM AND CONCLUSIONS.

A statistical study was carried out to collect data of payments and insured sums in the Spanish market. Data were collected net of payments recovered by the CCS and gross of reinsurance. The sample obtained was necessarily small, given the nature of the event analyzed.

The losses due to WS phenomenon were modeled by means of Extreme Value Theory, having in mind that the Generalized Pareto distribution (GPD, Pareto case) should be an adequate model for this kind of losses. Due to the small amount of data available, the justification for this model selection relied mainly

on a well-known limit theorem for the excesses called the Pickands-Balkema-de Haan theorem.

To obtain the parameters of GDP, two different approaches were applied, always taking the most prudent decisions. The first approach is a **Bayesian estimation** and the outcome for the country factor is 0.0093%.

The second approach was more **classical**, and different estimation methods were applied, choosing the most prudent and conservative outcome (in this case, obtained from probability weighted moments). After it, a non-parametric bootstrap was applied to add the estimation error, obtaining finally a country factor equal to 0.00997%.

This analysis had been developed choosing in all cases the most conservative alternative.

Finally, once the outcomes were studied, the proposal is to define the Spanish WS country factor as **0.01%**.

A more detailed explanation on this recalibration can be found in <http://www.dgsfp.mineco.es/>

31. Annex to chapter 6 – Example of model information

Recalibration of the DE_WS scenario (Windstorm Germany) – documentation –

Recalibrated parameter:	<i>country risk factor</i>
New (recalibrated) value:	<i>0.07%</i>
Sequence of values to final outcome¹⁵³:	0.09% 0.07%, 0.065%
Current calibration (DR (EU) 2015/35):	<i>0.09%</i>
Input to recalibration process:	
Number of different models that proposed a value:	5
Number of model outputs:	7 ⁽¹⁵⁴⁾
Range of model-based proposal values:	0.0457% - 0.062%

Properties of model sources:

- Model revision: 2017 (one model) to 2011 (one model)
- Exposure data used: PERILS AG's Industry Exposure Data (PERILS IED), as of 2017, plus proprietary data of model owner (for one model)
- Model basis for three of the models: fully stochastic model on the basis of a Global Climate Model, GCM (in most cases, also: inclusion of North Atlantic Oscillation) with extratropical cyclones for the EU windstorm season of March to October, sometimes also summer convective winds; loss amplification was sometimes included (inclusion most likely increases SCR to some extent)

¹⁵³ Initial input to the Delphi process for recalibration (see Consultation Paper section on analysis under the recalibration topic) were the output values from the models as given here. Member's views on this were gathered and compiled to a new input value for the subsequent Delphi round until a stable outcome had been reached (= convergence was assumed, when those members not agreeing on a given input value were roughly split by half between increasing and decreasing it).

¹⁵⁴ One of the models was run on both proprietary exposure data and PERILS IED.

- Timespan of historic windstorm observations, used for calibration: in most cases, ranging back to the year 2000; in some cases data from 1950-1970 was used to calibrate the underlying GCM or even 1958
- Windstorm clustering (temporal and spatial): explicitly modelled in some cases, but less relevant, as Standard Formula looks at Occurrence Exceedance Probabilities, not Annual Aggregated Losses.
- Special model features:
 - Subperils/secondary hazards: specific vulnerability curves for subperils when modelled, storm surge, frozen precipitation not always explicitly modelled, but impact of those subperils is implicitly captured via validation of physical model against actual reported losses.
 - Model spatial resolution: varying (values given range from 7kmx7km to 1kmx1km)
 - Exposure resolution: CRESTA up to Lat/Long location level;
 - Distinct occupancies: residential, commercial, industrial, agricultural and sometimes forestry -> note: not every model takes into account all of the occupancies!
 - Specific/regional/national vulnerability for: construction and occupancy type, year built, height, coverage type (building, content, and business interruption) derived from engineering principles, local building codes, quality of workmanship and claims data.-> Note: not every model takes into account all categorization levels! PERILS IED did not contain all of the occupancies!
 - LOBs: where PERILS IED were used, it covered Property (with LoBs Residential, Commercial, Industrial)
 - Deduction and limits: where PERILS IED was used, market average deductibles and loss limits were included

General remarks on NatCat modelling:

Significant reductions of model output values in comparison to 2010 initial calibration exercise were explained as being due to:

- Progress in meteorological, physical, engineering (i.e. in relation to vulnerability) and other sciences,
- Progress in modelling (adopted scientific results, manageable computational burden, available observation data),

- Changes in vulnerabilities (differences in construction due to emerged building codes, improvements in hazard prevention/risk mitigation measures),
- Data availability (exposure, damages, losses)
- The Solvency II requirement for approval of internal models and the related validation work has forced undertakings to ask more and more specific questions on Cat risk models to vendors. The vendors, as a result, have had to significantly improve their client documentation. Many reinsurance brokers and reinsurers have set up or increased the level of resourcing in their Cat risk research and model evaluation teams. Again, this has increased the pressure on the model vendors to implement up-to-date scientific findings to their models.

Remarks on windstorm modelling:

- Storm tracks are generally west-to-east in Europe
- Generally: considerable variation in output across models available in the market due to variation in modelling approaches
- Advances in physically modelling WS nowadays reduce model uncertainty, compared to e.g. EQ
- Model experience for WS quite long, as compared to e.g. Flood or Hail

Specific remarks on DE_WS scenario:

- Large exposure model with high insurance penetration-> large demand for good modelling -> more modelling efforts -> better information! DE WS is definitely no "not enough information" scenario!
- Forestry is not included: could increase SCR to a certain extent.

32. Annex to chapter 7 – Statistical estimation of the affine model

First, an affine stress has the general form

$$r_t^{up,down}(m) = a^{up,down}(m)r_t + b^{up,down}(m). \quad (7)$$

The slope parameter $a(m)$ is specified through the relative stress factors from the Delegated regulation. Then, the stress can be written

$$r_t^{up,down}(m) = (1 \pm s^{up,down}(m))r_t + b^{up,down}(m). \quad (8)$$

The estimation reduces to estimating the additive component $b^{up,down}(m)$. Solving (8) for the additive component, we obtain

$$r_t^{up,down}(m) - (1 \pm s^{up,down}(m))r_t(m) = b^{up,down}(m). \quad (9)$$

To make an estimation feasible, one can use the one-year later observable interest rate $r_{t+\omega}(m)$ with $\omega = 262$ as a proxy for $r_t^{up,down}$ and then perform a quantile regression on a constant to estimate the additive components.

In this simple and special case of a quantile regression on a constant, the estimator reduces to the corresponding quantile of the empirical distribution.

That is,

$$Q_p(r_{t+\omega}(m) - (1 \pm s^{up,down}(m))r_t(m)) = \widehat{b^{up,down}}(m), \quad (10)$$

where Q denotes the empirical quantile function and p is the considered 0.995 (0.005) quantile.

Then one can readily obtain an estimate for the additive components in the affine approach for each maturity and each RFR currency.

To simplify the approach in the standard formula and to avoid currency specific parameters, a unique additive shift in the affine approach is estimated for the two interest rate scenarios.

To do so, in the first step a maturity and currency-dependent additive component is estimated for the RFR data currencies EUR, SEK, GBP, CZK and CHF. As the affine model only applies in the lower yield environment, only those currencies, which have significantly been exposed to a low yield environment, have been considered in the estimation below. Moreover, as the considered currencies have not been in a low yield environment for the entire historical data period available, a more representative subsample for the low yield environment is specified as well. In this case the data period from 01/10/2010 until 30/12/2016 is considered a suitable candidate for a for the low yield environment subsample.

In the second step, the maximum (minimum) additive shock is derived for each currency in the data set considered. This yields a prudent currency-specific estimate for the additive components.

Table 4 presents the results of the second step for the representative subsample from 2010 until 2016.

Table 1: Estimation of the maximum (minimum) additive parameter in the affine shock for different currencies and the entire available data set.

Currency	b_{min}^{down}	b_{max}^{up}
EURO	-1.10%	0.33%
GBP	-0.84%	0.94%
CHF	-1.07%	0.99%
CZK	-0.91%	0.43%
SEK	-0.91%	1.41%

In the final third step, the selected currency-specific additive components are transformed into a unique additive shock component. To do so the following summary statistic of the empirical distribution of the currency-specific additive components in table 2 provides useful insight.

Table 2: Summary statistic of the estimation results in table 4.

Statistic	b_{min}^{down}	b_{max}^{up}
Median	-0.91%	0.94%
Mean	-0.96%	0.82%
p-quantile(0.995,0.005)	-1.10%	1.4%

For the additive component in the interest rate down scenario, all descriptive statistics are sufficiently close to -1%. An estimate of -1% seems to be a good candidate for the additive component in the down scenario. This estimate is in line with the observation in figure 4 that in the low yield environment absolute annual downward movements considerably larger than -1% have rarely been observed. Consequently, an additive downward component of **-1 %** is set for the downward scenario.

For the additive component, the distribution of the currency-specific additive up components is wider (larger difference between the 0.995% quantile and the median). The current standard formula already includes a 1% minimum upward shock. From an economic perspective, a large upward movement seems to be more likely than a large downward movement in a low yield environment.¹⁵⁵ Taking these further insights into consideration, the 99.5 % quantile in table 5 is considered a prudent estimate of the additive upward component in the affine model. Accordingly, an additive upward component of **+1.4 %** is set for the upward scenario.

¹⁵⁵Note the absolute change in the affine model is $r*s+b$.

33. Annex to chapter 10 – Possible financial ratios

Below possible financial ratios are listed. For the categories Leverage I, Leverage III and Margins also averages over a number of years are considered (so far 5 years were tested). Also ratios based on the coefficient of variation were so far tested for a period of 5 years.

Leverage I

Total Debt / EBITDA
Net Debt / EBITDA
Net Debt / EBITDA after CAPEX
Total Debt / EBIT
Net Debt / EBIT
Net Debt / Cash from Operations
Total Debt / Funds from Operations
Total Debt / Cash From Operations
Total Debt / Free Cash Flow
Net Debt/ Retained Cash Flow

Leverage II

Total Equity / Share Capital
Total Debt / Total Capital
Net Debt / Total Capital
Long-Term Debt / Total Capital
Total Liabilities / Total Equity
Total Debt / Total Equity
Net Debt / Total Equity
Short-Term Debt / Total Equity
Long-Term Debt/ Total Equity
Total Liabilities / Total Assets
Total Debt / Total Assets
Long-Term Debt / Total Assets
Long-Term Debt / Total Capital
Total Equity / Total Assets
Total Assets / Total Equity
Retained Earnings / Total Assets
Long-Term Debt / Total Assets
Long-Term Debt /Total Capital
Total Debt / Cash Equivalentents
Total Debt / Enterprise Value

Leverage III

EBITDA / Total Interest Expense

EBITDA / Interest Expense
EBITDA less CAPEX / Total Interest Expense
Fixed Charge Coverage
EBIT / Interest Expense
EBIT / Total Interest Expense
EBT / Interest Expense
Cash From Operations / Total current liabilities

Growth

5-Year Growth Sales
5-Year Growth EBITDA
5-Year Growth Operating Income
5-Year Growth Net Income
5-Year Growth Book Value
5-Year Growth Earnings per Share
One-Year Change Sales
One-Year Change EBITDA
One-Year Change Net Income
One-Year Change Funds from Operations
One-Year Change Earnings per Share

Margins

EBITA Margin
EBITDA Margin
Gross Margin
Operating Margin
EBIT Margin
Pre-tax Profit Margin
Net Margin
Free Cash Flow Margin

Returns

Return on Common Equity
Return on Total Equity
Return on Assets
Return on Capital
Return on Invested Capital
Return on Capital Employed
Cash From Operations / Total Assets
Funds from Operations / Total Assets

Stability

Volatility of Net Income
Volatility of Net Sales
Volatility of Total Assets
Coefficient of Variation Net Sales
Coefficient of Variation Total Assets
Coefficient of Variation Return on Total Equity
Coefficient of Variation Return on Invested Capital
Coefficient of Variation Return on Capital Employed
Coefficient of Variation Return on Assets
Coefficient of Variation Net Income
Coefficient of Variation Profit Margin
Coefficient of Variation EBITDA Margin
Coefficient of Variation Operating Margin
Coefficient of Variation Total Debt / EBITDA
Coefficient of Variation EBITDA / Total Interest Expense
Coefficient of Variation Interest Rate Coverage Ratio
Coefficient of Variation EBITDA less CAPEX/Total Interest Expense

Consecutive years of dividends
Consecutive Years without a Net Loss
No Net Loss in last 5 Years (Yes/No)
No Net Loss in last 10 Years (Yes/No)
Dividend per Share > 0 (Yes/No)
Basic Earnings per Share > 0 (Yes/No)
Net Income > 0 (Yes/No)
Annual Change in Current Liabilities

Liquidity

Current Ratio
Cash Ratio
Quick Ratio
CFO / Short-Term Debt

Other

Altman's Z-Score
Health Grade
Capital Expenditure / Sales
Working Capital / Sales

34. Annex to chapter 13 – Derivation of a simplification for the risk-mitigating effect of reinsurance arrangements

Assuming that the reinsurance obligation has no impact on non-life lapse risk one can approximate the risk mitigating effect of a reinsurance obligation on a single LOB, according to Art. 196 as follows

$$\begin{aligned}
 RM(Re) &= SCR_{uw}^{hyp} - SCR_{uw}^{net} \\
 &= \sqrt{(SCR_{CAT}^{hyp})^2 + (SCR_{P\&R}^{hyp})^2 + 2 * 0.25 * SCR_{CAT}^{hyp} SCR_{P\&R}^{hyp}} \\
 &\quad - \sqrt{(SCR_{CAT}^{net})^2 + (SCR_{P\&R}^{net})^2 + 2 * 0.25 * SCR_{CAT}^{net} SCR_{P\&R}^{net}} \quad (1) \\
 &\leq \sqrt{(SCR_{CAT}^{hyp} - SCR_{CAT}^{net})^2 + (SCR_{P\&R}^{hyp} - SCR_{P\&R}^{net})^2 + 2 * 0.25 * (SCR_{CAT}^{hyp} - SCR_{CAT}^{net})(SCR_{P\&R}^{hyp} - SCR_{P\&R}^{net})} \quad (2)
 \end{aligned}$$

where the the approximation (2) is implied by the triangle inequality.

If one considers premium and reserve risk as two separate risks and aggregates these two risks as well assuming that the correlation between the Cat risk and these two subrisks is the same (i.e 0.25) one obtains:

$$\begin{aligned}
 RM(Re) &= SCR_{uw}^{hyp} - SCR_{uw}^{net} \\
 &= \sqrt{(SCR_{CAT}^{hyp})^2 + (SCR_P^{hyp})^2 + (SCR_R^{hyp})^2 + 2 * 0.5 * SCR_P^{hyp} SCR_R^{hyp} + 2 * 0.25 * SCR_{CAT}^{hyp} SCR_P^{hyp} + 2 * 0.25 * SCR_{CAT}^{hyp} SCR_R^{hyp}} \\
 &\quad - \sqrt{(SCR_{CAT}^{net})^2 + (SCR_P^{net})^2 + (SCR_R^{net})^2 + 2 * 0.5 * SCR_P^{net} SCR_R^{net} + 2 * 0.25 * SCR_{CAT}^{net} SCR_P^{net} + 2 * 0.25 * SCR_{CAT}^{net} SCR_R^{net}} \quad (1*) \\
 &\leq \sqrt{\begin{aligned} &(SCR_{CAT}^{hyp} - SCR_{CAT}^{net})^2 + (SCR_P^{hyp} - SCR_P^{net})^2 + (SCR_R^{hyp} - SCR_R^{net})^2 + 2 * 0.5 * (SCR_P^{hyp} - SCR_P^{net})(SCR_R^{hyp} - SCR_R^{net}) \\ &+ 2 * 0.25 * (SCR_{CAT}^{hyp} - SCR_{CAT}^{net})(SCR_P^{hyp} - SCR_P^{net}) \\ &+ 2 * 0.25 * (SCR_{CAT}^{hyp} - SCR_{CAT}^{net})(SCR_R^{hyp} - SCR_R^{net}) \end{aligned}} \quad (2*)
 \end{aligned}$$

The different terms within the square root expression containing the differences between the underwriting SCR's can be approximated by the same expressions as in the Technical specifications

$$\sqrt{\begin{aligned} &(NL_{CAT}^{hyp} - NL_{CAT}^{without})^2 + (3\sigma_p(P_p^{hyp} - P_p^{without}))^2 + (3\sigma_r recoverables)^2 + 9\sigma_p\sigma_r(P_p^{hyp} - P_p^{without})recoverables \\ &+ 2 * 0.25 * \sigma_p * 3\sigma_p(P_p^{hyp} - P_p^{without})(NL_{CAT}^{hyp} - NL_{CAT}^{without}) \\ &+ 2 * 0.25 * \sigma_r recoverables(NL_{CAT}^{hyp} - NL_{CAT}^{without}) \end{aligned}} \quad (3*)$$

where

- $(NL_{CAT}^{hyp} - NL_{CAT}^{without})$ denotes the counterparty's share of CAT losses
- $(P_p^{hyp} - P_p^{without})$ is the reinsurance premium of the counterparty in the affected line of business

- *recoverables* are the Reinsurance recoverables in relation to the counterparty in the affected line of business
- σ_p and σ_R are the standard deviation for premium risk, reserve risk respectively.

The first term in the square root formula (3*) is the former QIS 5 simplification, which was suggested by some stakeholders. Other stakeholders came up with a proposal that adds the second and third line in (3*) to the QIS 5 simplification. From the fact that all terms in (3*) are nonnegative one can immediately observe that this latter amendment leads to a more conservative approximation.

Both suggestions, the QIS 5 and the adjusted QIS 5 simplification, in particular rely on the assumption that the premium and reserve risks are considered as two separate subrisks and not as a unique (integrated) risk as in the current version of the standard formula. Moreover, the proposal in equation (3*) additionally relies on assumption about the correlation between CAT and premium risk, reserve risk respectively, which is not specified as such in the Delegated Regulation.

Applying instead similar approximations for the SCR differences in (2) one could alternatively come up with the following approximation

$$\sqrt{\frac{(NL_{CAT}^{hyp} - NL_{CAT}^{without})^2 + (3\sigma_S(P_p^{hyp} - P_p^{without} + recoverables))^2}{+ 2 * 0.25 * 3 \sigma_S(P_p^{hyp} - P_p^{without} + recoverables)(NL_{CAT}^{hyp} - NL_{CAT}^{without})}} \quad (3)$$

where σ_S is the standard deviation for non-life premium and reserve risk as defined in Article 117(2) of the Delegated Regulation and the other terms are defined as above. This formula does not disentangle the premium and reserve risk and it relies on the current correlation between the CAT and the non-life premium and reserve risk.

35. Annex to chapter 18 – Relative size of the risk margin

Based on the reporting of insurance and reinsurance undertakings to their national supervisory authorities EIOPA has analysed the size of the risk margin at the end of the first, second and third quarter of 2016. The size of the risk margin was compared to the best estimate (BEL), the own funds and the SCR. The comparison was performed for all undertakings and separately for life insurance undertakings, non-life insurance undertakings and undertakings pursuing both life and non-life insurance activities simultaneously.

The ratio of the risk margin over the best estimate can be negative where the best estimate is negative.

All insurance and reinsurance undertakings

Country	Risk Margin as % SCR			Country	Risk Margin as % Own Funds			Country	Risk Margin as % BEL		
	Q1	Q2	Q3		Q1	Q2	Q3		Q1	Q2	Q3
AUSTRIA	27%	25%	25%	AUSTRIA	11%	10%	10%	AUSTRIA	4%	4%	4%
BELGIUM	27%	29%	28%	BELGIUM	16%	16%	17%	BELGIUM	2%	2%	2%
BULGARIA	11%	12%	13%	BULGARIA	7%	7%	7%	BULGARIA	4%	4%	4%
CROATIA	20%	17%	19%	CROATIA	9%	7%	8%	CROATIA	4%	4%	4%
CYPRUS	18%	18%	18%	CYPRUS	7%	7%	7%	CYPRUS	4%	4%	4%
CZECH REPUBLIC	33%	34%	35%	CZECH REPUBLIC	15%	16%	15%	CZECH REPUBLIC	6%	6%	7%
DENMARK	16%	17%	20%	DENMARK	6%	7%	7%	DENMARK	1%	1%	1%
ESTONIA	32%	31%	31%	ESTONIA	18%	17%	16%	ESTONIA	8%	8%	8%
FINLAND	32%	32%	32%	FINLAND	16%	17%	16%	FINLAND	4%	4%	4%
FRANCE	24%	25%	25%	FRANCE	11%	12%	12%	FRANCE	2%	2%	2%
GERMANY	29%	31%	30%	GERMANY	11%	11%	11%	GERMANY	3%	3%	3%
GREECE	27%	28%	30%	GREECE	20%	19%	23%	GREECE	5%	5%	5%
HUNGARY	27%	28%	28%	HUNGARY	13%	13%	13%	HUNGARY	3%	3%	3%
IRELAND	39%	40%	40%	IRELAND	23%	24%	24%	IRELAND	3%	3%	3%
ITALY	15%	15%	15%	ITALY	7%	7%	7%	ITALY	1%	1%	1%
LATVIA	9%	8%	10%	LATVIA	6%	6%	4%	LATVIA	2%	2%	3%
LIECHTENSTEIN	44%	35%	35%	LIECHTENSTEIN	19%	14%	14%	LIECHTENSTEIN	2%	1%	1%
LITHUANIA	28%	29%	31%	LITHUANIA	13%	14%	15%	LITHUANIA	6%	7%	7%
LUXEMBOURG	34%	34%	35%	LUXEMBOURG	15%	15%	15%	LUXEMBOURG	1%	1%	1%
MALTA	59%	58%	63%	MALTA	15%	16%	16%	MALTA	12%	12%	13%
NETHERLANDS	51%	52%	51%	NETHERLANDS	28%	28%	28%	NETHERLANDS	4%	4%	4%
NORWAY	30%	28%	30%	NORWAY	15%	14%	15%	NORWAY	3%	3%	3%
POLAND	28%	27%	27%	POLAND	11%	10%	10%	POLAND	6%	6%	6%
PORTUGAL	20%	20%	21%	PORTUGAL	17%	15%	15%	PORTUGAL	3%	2%	2%

ROMANIA	12%	12%	12%
SLOVAKIA	39%	38%	40%
SLOVENIA	20%	20%	20%
SPAIN	28%	30%	30%
SWEDEN	19%	19%	18%
UNITED KINGDOM	20%	19%	21%

ROMANIA	7%	7%	7%
SLOVAKIA	17%	16%	17%
SLOVENIA	9%	8%	8%
SPAIN	12%	13%	13%
SWEDEN	7%	7%	7%
UNITED KINGDOM	13%	13%	14%

ROMANIA	3%	3%	3%
SLOVAKIA	6%	6%	6%
SLOVENIA	4%	4%	4%
SPAIN	3%	4%	4%
SWEDEN	3%	2%	2%
UNITED KINGDOM	1%	1%	1%

Life insurance undertakings

Country	Risk Margin as % SCR			Country	Risk Margin as % Own Funds			Country	Risk Margin as % BEL		
	Q1	Q2	Q3		Q1	Q2	Q3		Q1	Q2	Q3
AUSTRIA	17%	18%	18%	AUSTRIA	11%	11%	12%	AUSTRIA	1%	1%	1%
BELGIUM	21%	23%	23%	BELGIUM	16%	17%	16%	BELGIUM	1%	2%	1%
BULGARIA	18%	24%	24%	BULGARIA	8%	8%	7%	BULGARIA	3%	5%	6%
CROATIA	15%	16%	14%	CROATIA	5%	5%	5%	CROATIA	2%	2%	2%
CYPRUS	30%	30%	25%	CYPRUS	11%	12%	9%	CYPRUS	4%	4%	2%
CZECH REPUBLIC				CZECH REPUBLIC				CZECH REPUBLIC			
DENMARK	6%	7%	10%	DENMARK	1%	2%	3%	DENMARK	0%	0%	0%
ESTONIA	48%	48%	48%	ESTONIA	28%	28%	26%	ESTONIA	8%	9%	9%
FINLAND	35%	35%	36%	FINLAND	20%	20%	21%	FINLAND	3%	3%	3%
FRANCE	27%	28%	28%	FRANCE	16%	16%	16%	FRANCE	1%	1%	1%
GERMANY	48%	51%	47%	GERMANY	23%	25%	24%	GERMANY	2%	2%	2%
GREECE	29%	29%	43%	GREECE	21%	23%	45%	GREECE	2%	2%	2%
HUNGARY	32%	34%	38%	HUNGARY	15%	15%	14%	HUNGARY	2%	2%	2%
IRELAND	49%	51%	50%	IRELAND	26%	27%	27%	IRELAND	2%	2%	2%
ITALY	22%	23%	22%	ITALY	10%	12%	13%	ITALY	1%	1%	1%
LATVIA				LATVIA				LATVIA			
LIECHTENSTEIN	59%	46%	47%	LIECHTENSTEIN	40%	29%	28%	LIECHTENSTEIN	1%	1%	1%
LITHUANIA	48%	48%	47%	LITHUANIA	23%	22%	22%	LITHUANIA	18%	20%	19%
LUXEMBOURG	45%	44%	45%	LUXEMBOURG	26%	26%	27%	LUXEMBOURG	1%	1%	1%
MALTA	43%	43%	43%	MALTA	15%	15%	14%	MALTA	2%	2%	2%
NETHERLANDS	76%	78%	76%	NETHERLANDS	46%	42%	43%	NETHERLANDS	4%	4%	4%
NORWAY	78%	72%	75%	NORWAY	65%	52%	53%	NORWAY	4%	4%	3%
POLAND	43%	43%	42%	POLAND	12%	13%	12%	POLAND	5%	5%	6%
PORTUGAL	33%	27%	30%	PORTUGAL	21%	17%	18%	PORTUGAL	1%	1%	1%
ROMANIA	27%	27%	28%	ROMANIA	9%	9%	9%	ROMANIA	2%	2%	2%

SLOVAKIA	67%	48%	47%
SLOVENIA			
SPAIN	45%	47%	45%
SWEDEN	23%	22%	20%
UNITED KINGDOM	22%	20%	23%

SLOVAKIA	34%	26%	27%
SLOVENIA			
SPAIN	20%	21%	21%
SWEDEN	8%	8%	7%
UNITED KINGDOM	15%	14%	17%

SLOVAKIA	12%	9%	9%
SLOVENIA			
SPAIN	3%	3%	3%
SWEDEN	2%	2%	2%
UNITED KINGDOM	1%	1%	1%

Non-life insurance undertakings

Country	Risk Margin as % SCR			Country	Risk Margin as % Own Funds			Country	Risk Margin as % BEL		
	Q1	Q2	Q3		Q1	Q2	Q3		Q1	Q2	Q3
AUSTRIA	6%	6%	6%	AUSTRIA	2%	2%	2%	AUSTRIA	7%	7%	7%
BELGIUM	26%	30%	31%	BELGIUM	14%	17%	18%	BELGIUM	11%	11%	12%
BULGARIA	10%	11%	11%	BULGARIA	6%	7%	6%	BULGARIA	4%	5%	4%
CROATIA	12%	6%	13%	CROATIA	7%	3%	7%	CROATIA	7%	4%	7%
CYPRUS	9%	8%	8%	CYPRUS	4%	3%	3%	CYPRUS	5%	5%	5%
CZECH REPUBLIC	9%	10%	12%	CZECH REPUBLIC	5%	5%	7%	CZECH REPUBLIC	4%	4%	5%
DENMARK	18%	20%	23%	DENMARK	8%	9%	9%	DENMARK	4%	4%	4%
ESTONIA	9%	9%	9%	ESTONIA	4%	4%	4%	ESTONIA	4%	4%	4%
FINLAND	26%	27%	27%	FINLAND	12%	12%	12%	FINLAND	7%	7%	7%
FRANCE	23%	22%	22%	FRANCE	9%	9%	9%	FRANCE	7%	7%	7%
GERMANY	24%	25%	28%	GERMANY	8%	8%	10%	GERMANY	4%	4%	4%
GREECE	16%	17%	17%	GREECE	11%	11%	12%	GREECE	6%	6%	6%
HUNGARY	10%	14%	15%	HUNGARY	6%	8%	8%	HUNGARY	6%	8%	8%
IRELAND	15%	15%	15%	IRELAND	9%	9%	9%	IRELAND	4%	4%	4%
ITALY	20%	20%	20%	ITALY	12%	12%	12%	ITALY	5%	5%	5%
LATVIA	9%	8%	10%	LATVIA	7%	6%	4%	LATVIA	4%	3%	4%
LIECHTENSTEIN	17%	18%	11%	LIECHTENSTEIN	5%	5%	3%	LIECHTENSTEIN	6%	8%	4%
LITHUANIA	12%	12%	14%	LITHUANIA	8%	7%	8%	LITHUANIA	6%	5%	6%
LUXEMBOURG	19%	18%	18%	LUXEMBOURG	8%	7%	7%	LUXEMBOURG	6%	6%	6%
MALTA	13%	14%	17%	MALTA	6%	9%	10%	MALTA	5%	4%	4%
NETHERLANDS	13%	13%	13%	NETHERLANDS	6%	7%	6%	NETHERLANDS	4%	4%	4%
NORWAY	14%	12%	14%	NORWAY	7%	6%	7%	NORWAY	7%	7%	7%
POLAND	20%	18%	18%	POLAND	9%	8%	8%	POLAND	8%	7%	7%
PORTUGAL	14%	15%	16%	PORTUGAL	10%	10%	10%	PORTUGAL	4%	4%	5%
ROMANIA	9%	8%	9%	ROMANIA	7%	7%	7%	ROMANIA	3%	3%	3%

SLOVAKIA			
SLOVENIA	10%	11%	12%
SPAIN	17%	17%	17%
SWEDEN	15%	16%	15%
UNITED KINGDOM	19%	23%	21%

SLOVAKIA			
SLOVENIA	4%	4%	5%
SPAIN	9%	9%	8%
SWEDEN	7%	7%	7%
UNITED KINGDOM	12%	14%	13%

SLOVAKIA			
SLOVENIA	10%	10%	11%
SPAIN	7%	7%	7%
SWEDEN	7%	7%	7%
UNITED KINGDOM	6%	7%	6%

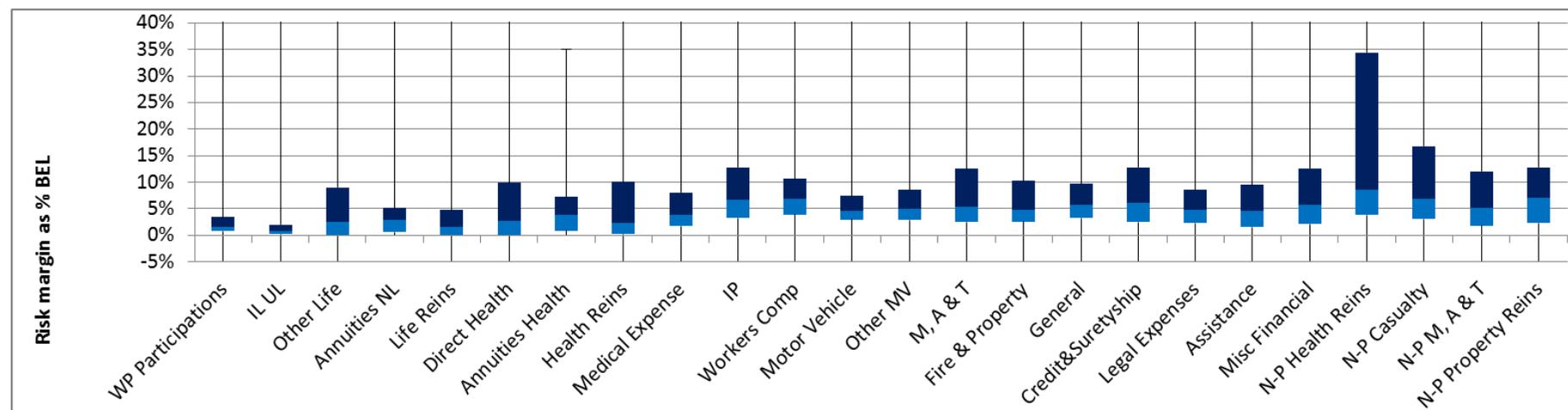
Undertakings that pursue life and non-life insurance activities simultaneously

Country	Risk Margin as % SCR			Country	Risk Margin as % Own Funds			Country	Risk Margin as % BEL		
	Q1	Q2	Q3		Q1	Q2	Q3		Q1	Q2	Q3
AUSTRIA	40%	38%	37%	AUSTRIA	20%	19%	19%	AUSTRIA	5%	4%	4%
BELGIUM	28%	29%	28%	BELGIUM	16%	15%	17%	BELGIUM	2%	2%	2%
BULGARIA	25%	27%	28%	BULGARIA	14%	15%	17%	BULGARIA	5%	3%	3%
CROATIA	23%	22%	22%	CROATIA	9%	9%	9%	CROATIA	4%	4%	4%
CYPRUS	17%	17%	28%	CYPRUS	5%	5%	9%	CYPRUS	7%	7%	5%
CZECH REPUBLIC	34%	35%	36%	CZECH REPUBLIC	15%	16%	16%	CZECH REPUBLIC	6%	7%	7%
DENMARK				DENMARK				DENMARK			
ESTONIA	69%	66%	62%	ESTONIA	55%	44%	41%	ESTONIA	12%	12%	11%
FINLAND	48%	47%	47%	FINLAND	31%	32%	30%	FINLAND	4%	4%	4%
FRANCE	23%	25%	25%	FRANCE	11%	12%	12%	FRANCE	1%	1%	1%
GERMANY	4%	9%	9%	GERMANY	1%	3%	3%	GERMANY	6%	6%	6%
GREECE	32%	33%	33%	GREECE	23%	21%	26%	GREECE	5%	5%	5%
HUNGARY	29%	29%	28%	HUNGARY	13%	14%	13%	HUNGARY	3%	3%	3%
IRELAND	57%	58%	60%	IRELAND	38%	40%	41%	IRELAND	18%	19%	19%
ITALY	13%	13%	13%	ITALY	6%	6%	6%	ITALY	1%	1%	1%
LATVIA	8%	8%	8%	LATVIA	6%	6%	5%	LATVIA	1%	1%	1%
LIECHTENSTEIN			52%	LIECHTENSTEIN			24%	LIECHTENSTEIN			23%
LITHUANIA	35%	37%	41%	LITHUANIA	11%	13%	16%	LITHUANIA	3%	4%	4%
LUXEMBOURG	43%	45%	47%	LUXEMBOURG	13%	12%	13%	LUXEMBOURG	4%	5%	5%
MALTA	87%	73%	77%	MALTA	16%	16%	17%	MALTA	21%	21%	22%
NETHERLANDS	30%	29%	31%	NETHERLANDS	17%	17%	19%	NETHERLANDS	7%	6%	7%
NORWAY	36%	38%	37%	NORWAY	18%	19%	18%	NORWAY	3%	3%	3%
POLAND				POLAND				POLAND			
PORTUGAL	19%	19%	20%	PORTUGAL	18%	17%	16%	PORTUGAL	4%	3%	3%
ROMANIA	10%	10%	11%	ROMANIA	7%	6%	6%	ROMANIA	4%	3%	4%

SLOVAKIA	33%	37%	38%	SLOVAKIA	14%	15%	16%	SLOVAKIA	5%	5%	5%
SLOVENIA	24%	23%	23%	SLOVENIA	11%	10%	10%	SLOVENIA	4%	4%	4%
SPAIN	29%	31%	31%	SPAIN	12%	13%	13%	SPAIN	3%	3%	3%
SWEDEN	20%	20%	19%	SWEDEN	6%	6%	6%	SWEDEN	1%	1%	1%
UNITED KINGDOM	16%	14%	15%	UNITED KINGDOM	11%	9%	10%	UNITED KINGDOM	3%	3%	2%

Dispersion of risk margin by line of business

With regard to the ratio of the risk margin and the best estimate the following graph shows the dispersion of ratios across undertakings for different lines of business. For each line of business the bottom of the box correspond to the 25% quantile and the top to the 75% quantile of the distribution of ratios. The median of the distribution is indicated by the change of colour of the box.



36. Annex to chapter 18 – EEA (re)insurance undertakings used to derive beta factor

Undertaking	Country
Admiral Group plc	United Kingdom
AEGON N.V.	Netherlands
Ageas SA/NV	Belgium
Allianz SE	Germany
Alm. Brand A/S	Denmark
Aon plc	United Kingdom
April Société Anonyme	France
ASR Nederland N.V.	Netherlands
Assicurazioni Generali S.p.A.	Italy
Assiteca S.p.A.	Italy
Aviva plc	United Kingdom
AXA SA	France
Beazley plc	United Kingdom
Charles Taylor plc	United Kingdom
Chesnara plc	United Kingdom
CNP Assurances SA	France
Coface SA	France
Curtis Banks Group plc	United Kingdom
Delta Lloyd NV	Netherlands
Direct Line Insurance Group PLC	United Kingdom
esure Group plc	United Kingdom
Euler Hermes Group SA	France
Europejskie Centrum Odszkodowan Spólka Akcyjna	Poland
Gjensidige Forsikring ASA	Norway
Grupo Catalana Occidente, S.A.	Spain
Hastings Group Holdings plc	United Kingdom
Helios Underwriting Plc	United Kingdom
Insplanet AB	Sweden
Insr Insurance Group ASA	Norway
Jardine Lloyd Thompson Group plc	United Kingdom

KD Group, finančna družba, d. d.	Slovenia
Lancashire Holdings Limited	United Kingdom
Legal & General Group Plc	United Kingdom
Mapfre, S.A.	Spain
Net Insurance S.p.A.	Italy
NN Group N.V.	Netherlands
Novae Group Plc	United Kingdom
NÜRNBERGER Beteiligungs-Aktiengesellschaft	Germany
Old Mutual plc	United Kingdom
Personal Group Holdings Plc	United Kingdom
Phoenix Group Holdings	Channel Islands
Poste Italiane SpA	Italy
Powszechny Zakład Ubezpieczeń Spółka Akcyjna	Poland
Protector Forsikring ASA	Norway
Prudential plc	United Kingdom
Rheinland Holding AG	Germany
RSA Insurance Group plc	United Kingdom
Saga plc	United Kingdom
Sampo Oyj	Finland
Silesia One S.A.	Poland
Società Cattolica di Assicurazione - Società Cooperativa	Italy
St. James's Place plc	United Kingdom
Standard Life plc	United Kingdom
Storebrand ASA	Norway
Talanx AG	Germany
Topdanmark A/S	Denmark
Tryg A/S	Denmark
Unipol Gruppo Finanziario S.p.A.	Italy
UnipolSai Assicurazioni S.p.A.	Italy
UNIQA Insurance Group AG	Austria
Vienna Insurance Group AG	Austria
Vittoria Assicurazioni S.p.A.	Italy
Votum Spółka Akcyjna	Poland
WDB Brokerzy Ubezpieczeniowi Spółka Akcyjna	Poland

Wüstenrot & Württembergische AG	Germany
Zavarovalnica Triglav, d.d.	Slovenia