EIOPA-CP-14/060

27 November 2014

Consultation Paper

on

the proposal for draft Implementing Technical Standards with regard to standard deviations in relation to health risk equalisation systems

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Responding to this paper

EIOPA welcomes comments on the Consultation Paper on the proposal for draft Implementing Technical Standards with regard to standard deviations in relation to health risk equalisation systems.

Comments are most helpful if they:

- 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 Consultation_Set2@eiopa.europa.eu, by 2 March 2015.

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

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 documents[1].

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

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Please note that personal contact details (such as name of individuals, email addresses and phone numbers) will not be published.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'.

[1] https://eiopa.europa.eu/fileadmin/tx_dam/files/aboutceiops/Public-Access-(EIOPA-MB-11-051).pdf

Consultation Paper Overview & Next Steps

EIOPA carries out consultations in the case of drafting Technical Standards in accordance to Articles 10 and 15 of the EIOPA Regulation.

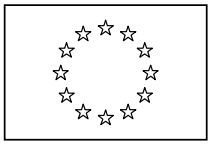
This Consultation Paper presents the draft Technical Standards.

The analysis of the expected impact from the proposed policy is covered under Annex I Impact Assessment.

Next steps

EIOPA will consider the feedback received and expects to publish a Final Report on the consultation and to submit the Consultation Paper for adoption by the Board of Supervisors.

1. Draft Technical Standard



EUROPEAN COMMISSION

Brussels, 29.6.2011
C(20..) yyy final

COMMISSION DELEGATED REGULATION (EU) No …/..

of [ ]

COMMISSION IMPLEMENTING REGULATION (EU) No …/.. laying down implementing technical standards with regard to standard deviations in relation to health risk equalisation systems according to Directive 2009/138/EC of the European Parliament and of the Council

of [ ]

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Directive 2009/138/EC of the European Parliament and of the Council of 25 November 2009 on the taking-up and pursuit of the business of Insurance and Reinsurance (Solvency II)[2] and in particular Article 109a(4) thereof,

Whereas:

(1) For the purpose of facilitating the calculation of the health underwriting risk module, this Regulation should set out the standard deviations for premium and reserve risk for business subject to a health risk equalisation system (HRES).

(2) Following a survey across the Member States and an assessment under the eligibility criteria laid down in Article 109a(4) and (5) of Directive 2009/138/EC, a standard deviation has only to be determined in relation to the Dutch legislative measure – basisverzekering – providing for a mandatory basic health insurance in accordance with the Zorgverzekeringswet (Health Insurance Act) (hereinafter the 'Dutch HRES').

[2] OJ L 335, 17.12.2009, p.1

(3) The standard deviations have been determined by taking into account the calculations provided by De Nederlandsche Bank.

(4) This Regulation is based on the draft implementing technical standards submitted by the European Insurance and Occupational Pensions Authority to the Commission.

(5) The European Insurance and Occupational Pensions Authority has conducted open public consultations on the draft implementing technical standards on which this Regulation is based, analysed the potential related costs and benefits and requested the opinion of the Insurance and Reinsurance Stakeholder Group established in accordance with Article 37 of Regulation (EU) No 1094/2010.

HAS ADOPTED THIS REGULATION:

Article 1
Standard Deviations

For medical expense insurance and proportional reinsurance subject to the Dutch HRES, undertakings shall use in the calculation of the health underwriting risk module the following standard deviations:

(a) 2.7 % for the NSLT health insurance premium risk; and
(b) 5 % for the NSLT health insurance reserve risk.

Article 2
Entry into force

This Regulation shall enter into force on the twentieth day following that of its publication in the *Official Journal of the European Union*.

This Regulation shall be binding in its entirety and directly applicable in all Member States.

Done at Brussels, [ ]

[For the Commission
The President]

[On behalf of the President]

[Position]

Annex I: Impact Assessment

Section 1: Procedural issues and consultation of interested parties

According to article 15 of EIOPA Regulation, EIOPA conducts analysis of costs and benefits when drafting implementing technical standards. The analysis of costs and benefits is undertaken according to an Impact Assessment methodology.

The draft ITS and its Impact Assessment are envisaged to be subject to public consultation.

Section 2: Problem definition

According to the Solvency II Directive, the calculation of the Solvency Capital requirement (hereinafter SCR) for health insurance should reflect national health risks equalisation systems (hereinafter HRES), which permit the sharing of claims payments in respect of health risk amongst insurance and reinsurance undertakings and meet certain specific criteria. Otherwise the underlying risks of those health insurance undertakings would not be properly reflected in their SCR.

For that purpose, EIOPA is required to develop draft implementing technical standards, taking into account the calculations provided by the supervisory authorities of the Member States concerned, on standard deviations in relation to specific national HRES.

In case standard deviations for health premium and reserve risk for business subject to HRES were not properly calculated and publicly provided by EIOPA, this would imply a too large level of the SCR for underwriting risk. This would cause a non-optimal allocation of capital and distort risk management as well.

Evidence
A survey was launched across the Member States to identify the national legislative measures meeting the eligibility criteria. According to the survey only one case was identified: the Dutch legislative measure – basisverzekering – providing for a mandatory basic health insurance in accordance with the Zorgverzekeringswet (Health Insurance Act).

The calculations provided by the De Nederlandsche Bank used a dataset for premium risk on 25 portfolios for accident years 2006-2012 and a dataset for reserve risk on 25 portfolios for accounting years 2007-2012.

Baseline
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.

The baseline is based on the current situation of EU insurance and reinsurance markets, taking account of the progress towards the implementation of the Solvency II framework achieved at this stage by insurance and reinsurance undertakings and supervisory authorities.

In particular the baseline will include:
- The content of Directive 2009/138/EC as amended by Directive 2014/51/EU.
- The relevant Implementing Measures.

Article 109a(4) of the Solvency II Directive contains the legal requirement for EIOPA to develop draft implementing standards.

Section 3: Objective pursued

The objective of this ITS is to set out the standard deviations for premium and reserve risk for business subject to a HRES for facilitating the calculation of the health underwriting risk module of the SCR.

This objective is consistent with the following objectives for the Solvency II Directive:
- improved risk management of EU undertakings,
- better allocation of capital resources, and
- harmonised risk sensitive and prospective solvency standards.

Section4: Policy options

The Kingdom of the Netherlands is the only Member State in which a HRES is currently in place that meets the criteria of the Directive and the Implementing Measures. The calculations provided by the Dutch supervisory authority have been duly taken into account when developing the draft implementing technical standards. Following these calculations, a single option for calibration has been considered technically admissible: use of a lognormal probability distribution.

The methodology to derive the standard deviations for Dutch HRES completely adheres to the methodology that EIOPA used for the calibration of non-life and non-similar to life techniques health underwriting risk parameters. Then both the normal probability distribution and the lognormal probability distribution served to derive and compare numerical results in order to arrive at a final calibration. In case of HRES, only the lognormal distribution serves this purpose.

The impact of this lognormal choice on the numerical results for the standard deviations can be depicted in a quite general way based on the properties of elementary probability distributions. Both normal and lognormal distribution are such that parameter estimation for the mean and standard deviation cannot diverge too much and a divergence should decrease with increasing sample size, even though the

normal distribution is known to have light tails whereas the lognormal distribution is heavier tailed. For probability distributions such as Gamma, inverse Gaussian and Weibull, that have tails in-between the normal and lognormal distribution, this property will even hold stronger.

For the implementation of the Dutch HRES, the standard deviation under a normal distribution was derived as a comparative shadow analysis. The numerical result for the normal and lognormal distribution appeared to coincide.

Section 5: Analysis of impacts

Benefits

- There is a lower risk that undertakings have to build a partial internal model because the standard formula does not adequately reflect their risk profile. They are also not forced to hold more own funds than necessary.
- The likelihood that supervisory authorities have to enter into a dialogue with undertakings regarding the compliance of their SCR with Article 101(3) Solvency II is reduced. There might also be fewer situations where the approval of a partial internal model is necessary.
- Policyholders benefit from adequate capital requirements. They ensure a proper coverage of risks while avoiding premiums that are higher than necessary.

Costs

- No additional costs are foreseeable for the concerned undertakings.
- The maintenance of templates for the calculation of the standard deviations creates resourcing costs for EIOPA and the supervisory authorities involved.
- No additional costs have been identified for policyholders.

Appendix I: The Dutch legislative measures with respect to the mandatory basic health insurance (basisverzekering)

The Dutch legislative measures with respect to the mandatory basic health insurance (basisverzekering), laid down in the Dutch Act on Health Insurance (Zorgverzekeringswet), permit the sharing of claims payments in respect of health risk amongst insurance and reinsurance undertakings. These legislative measures meet the criteria set out in Article 109a par. 5 of Directive 2009/138/EC. In particular:

Article 109a(5)(a) of Directive 2009/138/EC:

The Dutch legislative measures with respect to a mandatory basic health insurance (basisverzekering) have a mechanism for the sharing of claims, which is transparent and fully specified in advance of the annual period to which it applies, as provided for in Article 32 of the Dutch Act on Health Insurance (Zorgverzekeringswet) and the ministerial decrees adopted annually on basis thereof.

Article 109a(5)(b) of Directive 2009/138/EC:

The design of the equalisation mechanism for the Dutch mandatory basic health insurance (basisverzekering) is such that volatility-reducing forces are built-in. On the one hand there is the utilisation of the nation-wide dataset, from which minimum variance econometric prediction of expected claim costs generates actuarially fair premium calculation. On the other hand there is mutual claims pooling, that also reduces volatilities. The latter is a well-known fact in probability calculus and the mathematical economics of reinsurance markets, as displayed in any textbook on actuarial risk theory. These volatility reductions apply to each portfolio, whether for premium or reserve risk.

Article 109a(5)(c) of Directive 2009/138/EC:

Health insurance subject to the Dutch mandatory basic health insurance (basisverzekering) is compulsory, pursuant to section 2 of the Dutch Act on Health Insurance (Zorgverzekeringswet), and serves as a (partial) alternative to health cover provided by the statutory social security system.

Article 109a(5)(d) of Directive 2009/138/EC:

In the event of default of insurance undertakings participating in the Dutch statutory system of mandatory basic health insurance (basisverzekering), the Dutch National Health Care Institute (Zorginstituut Nederland) meets the policyholder claims of the defaulting insurance undertaking in full, for which payments the Dutch State is liable vis-a-vis the Dutch National Health Care Institute (Zorginstituut Nederland), pursuant to section 31 of the Dutch Act on Health Insurance (Zorgverzekeringswet).

Appendix II: Calibration methodology

To improve consistency between the calibration of the pan-European parameters and parameters of business subject to a Health Risk Equalisation System (HRES) the same methodology for the calculation of the standard deviation applies.

On top of the result of the calibration procedure, a floor and ceiling, as defined in the Implementing Measures, may apply in deriving the final value for the standard deviation.

The data of all insurance portfolios is viewed to have a panel-structure that in the aggregate reflects the average diversification in the industry.

The method of calculation to be used when calculating standard deviations for NSTL health premium and reserve risk for business that is subject to a HRES should be the following:

Lognormal method for Premium Risk

(1) Where, for the inputs,

a) T_i is the number of accident years for (re)insurance portfolio i

b) I is the number of (re)insurance portfolios (undertakings)

c) n is the total number of observations $n = \sum_i T_i$

d) t is the accident year indexed as $t=1,\ldots,T$

e) i is the (re)insurance portfolio (undertaking) indexed as $i=1,\ldots,I$

f) x_{ti} is the earned premium as exposure for accident year t and (re)insurance portfolio i

g) y_{ti} is the aggregate loss for accident year t and (re)insurance portfolio i, (gross loss year-end concept or gross current estimate concept)

Both earned premium and aggregate loss should incorporate effects of the HRES.

(2) And for the outputs,

a) β_i is the expected loss ratio for (re)insurance portfolio i

b) δ is the mixing parameter, $0 \leq \delta \leq 1$

c) σ is the HRES estimate standard deviation for premium risk

(3) The assumptions are that for any particular undertaking and any accident year:

- Expected aggregate loss is proportional to exposure $E(y_{ti})=\beta_i x_{ti}$

- Variance of aggregate loss is quadratic in exposure:

$$V(y_{ti}) = \sigma^2\left((1-\delta)\bar{x}x_{ti} + \delta x_{ti}^2\right) \quad \text{where} \quad \bar{x} = \tfrac{1}{n}\sum x_{ti}$$

  and where Σ denotes summation over all relevant indices *t* and *i*. When $\delta = 0$ the variance becomes proportional with exposure and when $\delta = 1$ it becomes proportional with the square of exposure.

- Aggregate loss follows a lognormal distribution
- Maximum likelihood estimation is appropriate.

(4) The derivation of the lognormal method is as follows:

An aggregate loss *y* with parametric functions for mean and variance can be related to a lognormal distribution with mean and variance μ and ω for log(*y*) as follows:

$$E(y) = \exp(\mu + \tfrac{1}{2}\omega) = \beta x$$
$$V(y) = \exp(2\mu + 2\omega) - \exp(2\mu + \omega) = (\beta x)^2\left(e^{\omega} - 1\right) = \sigma^2\left((1-\delta)\bar{x}x + \delta x^2\right)$$

From this we can express the mean μ and the variance ω as:

$$\mu = \log(\beta x) - \tfrac{1}{2}\omega$$

$$\omega = \log\left(1 + \frac{\sigma^2\left((1-\delta)\bar{x}x + \delta x^2\right)}{(\beta x)^2}\right) = \pi^{-1}$$

For notational simplicity we write

$$z_{ti} = \log(y_{ti}/x_{ti})$$

The estimation criterion function follows as:

$$\ell(\sigma, \delta, \beta_1, \ldots, \beta_I \mid data) = \tfrac{1}{2}\sum \pi_{ti}(z_{ti} + (2\pi_{ti})^{-1} - \log\beta_i)^2 - \tfrac{1}{2}\sum \log\pi_{ti}$$

Numerical minimisation of this function gives the optimal value for σ.
As a different approach, this (*I*+2)-dimensional function can be reduced by rewriting:

$$\sigma\beta_i^{-1} = e^{\gamma_i} \Rightarrow \omega_{ti} = \log\left(1 + \left((1-\delta)\bar{x}x_{ti}^{-1} + \delta\right)e^{2\gamma_i}\right) = \pi_{ti}^{-1}$$

$$u_{ti} = z_{ti} + (2\pi_{ti})^{-1} + \gamma_i$$

that results in:

$$\ell(\sigma, \delta, \gamma_1, \ldots, \gamma_I \mid data) = \tfrac{1}{2}\sum \pi_{ti}(u_{ti} - \log\sigma)^2 - \tfrac{1}{2}\sum \log\pi_{ti}$$

This expression allows analytical optimisation with respect to σ, conditionally on γ and δ:

$$\log \hat{\sigma}(\gamma_1,\ldots,\gamma_I,\delta) = \log \hat{\sigma} = \frac{\sum u_{ti}\pi_{ti}}{\sum \pi_{ti}}$$

resulting in an (I+1)-dimensional concentrated estimation criterion function:

$$\ell(\gamma_1,\ldots,\gamma_I,\delta \mid data) = \tfrac{1}{2}\sum \pi_{ti}(u_{ti} - \log \hat{\sigma})^2 - \tfrac{1}{2}\sum \log \pi_{ti}$$

that must be minimised with respect to γ and $0 \le \delta \le 1$.

After the optimisation the standardised residuals are calculated. Observations with absolute values of standardised residuals that exceed the Normal quantile corresponding with $n/(n+1)$ are put aside. Next follows a further round of parameter estimation, again followed by identifying and putting aside outlying observations. With the resulting dataset the final parameter estimates are obtained.

The national supervisory authority should make sure that a global optimum is identified. This may be done by exploring several optimisations with different starting points for γ and δ. At the global optimum we have estimates for γ and δ that should be used in the optimal expression for σ. In order to get an approximate unbiased expression for the volatility, we multiply this by a correction factor to get finally the volatility:

$$\bar{\sigma} = \hat{\sigma}(\hat{\gamma},\hat{\delta}) \cdot \sqrt{\tfrac{1}{2}n} \cdot \exp\left\{\ln\Gamma\left(\tfrac{1}{2}(n-I)\right) - \ln\Gamma\left(\tfrac{1}{2}(n-I+1)\right)\right\}$$

Here lnΓ denotes the natural logarithm of the Gamma function.

(5) The compliance analysis is defined as following:

The appropriate standard deviation for a portfolio of size x results as:

$$\bar{\sigma}\sqrt{\delta + (1-\delta)\bar{x}x^{-1}} > \bar{\sigma}\sqrt{\delta}$$

A common calibrated level of the standard deviation can be expressed as a multiple κ of the unbiased estimate for the appropriate standard deviation of an average sized portfolio. Whatever the choice of κ, it will imply that the *SCR* will be too large for the larger portfolios and too small for the smaller ones. The question arises when and how often this occurs and to what degree. An undertaking with portfolio size x_i will be compliant when:

$$\bar{\sigma}\sqrt{\delta + (1-\delta)\bar{x}x_i^{-1}} \le \kappa\bar{\sigma} \quad \text{or} \quad \kappa \ge \kappa_i \quad \text{where} \quad \kappa_i = \sqrt{\delta + (1-\delta)\bar{x}x_i^{-1}} > \kappa_0 = \sqrt{\delta}$$

In the industry there are (observed) portfolio sizes, denoted and ordered as:

$$x_1 > x_2 > \cdots > x_I > 0 \quad \text{implying} \quad \kappa_0 < \kappa_1 < \kappa_2 < \cdots < \kappa_I$$

We define the Boolean indicator as a function of κ :

$$1(\kappa \geq \kappa_i) = \begin{cases} 1 \text{ if } \kappa \geq \kappa_i \\ 0 \text{ if } \kappa < \kappa_i \end{cases}$$

and define a family of compliant shares depending on a further control parameter ρ :

$$C_\rho(\kappa) = \frac{\sum_i x_i^\rho 1(\kappa \geq \kappa_i)}{\sum_i x_i^\rho} \qquad 0 \leq \rho \leq 1$$

This ratio can be interpreted as:

ρ=0 compliant share of *portfolios* in the industry
with security level ≥0.995 when the *SCR* is calculated according to $\kappa\overline{\sigma}$

ρ=1 compliant share of *policyholders* that are insured by undertakings
with security level ≥0.995 when the *SCR* is calculated according to $\kappa\overline{\sigma}$

This compliant share is a right-continuous step-function of κ that increases from 0 to 1:

$$\begin{aligned} C(\kappa) &= 0 && \kappa < \kappa_1 \\ &= C(\kappa_i) && \kappa_i \leq \kappa < \kappa_{i+1} \qquad i = 1, \cdots, (I-1) \\ &= 1 && \kappa_I \leq \kappa \end{aligned}$$

When the statistical estimate for δ equals 1 each portfolio is compliant as soon as $\kappa \geq 1$ and the step function reduces to the simple form:

$$\begin{aligned} C(\kappa) &= 0 && \kappa < 1 \\ &= 1 && \kappa \geq 1 \end{aligned}$$

When calibrating one may single out a representative portfolio size and calculate the corresponding standard deviation that implies a value for κ that defines the level of the compliant share $C(\kappa)$ The choice of κ could also be made by having it satisfy an acceptable level of $C(\kappa)$ and solving for κ Unfortunately, as $C(\kappa)$is a step-function it does not have a straight-forward inverse. If we replace $C(\kappa)$ by a piece-wise linear function by linking the points of increase this numerical problem can be settled:

$$\begin{aligned} C^*(\kappa) &= 0 && \kappa < \kappa_0 \\ &= C(\kappa_i) + \frac{C(\kappa_{i+1}) - C(\kappa_i)}{\kappa_{i+1} - \kappa_i}(\kappa - \kappa_i) && \kappa \leq \kappa < \kappa_{i+1} \quad i = 0, \ldots, (I-1) \\ &= 1 && \kappa_I \leq \kappa \end{aligned}$$

Solving $C^*(\kappa)=p$ for κ gives:

$$\begin{aligned} \kappa &= \kappa_0 && p = 0 \\ &= \kappa_i + \frac{\kappa_{i+1} - \kappa_i}{C(\kappa_{i+1}) - C(\kappa_i)}\left(p - C(\kappa_i)\right) && C(\kappa_i) \leq p < C(\kappa_{i+1}) \qquad i = 0, \cdots, (I-1) \\ &= \kappa_I && p = 1 \end{aligned}$$

The national supervisory authority should choose κ such that the calibrated volatility reflects the average portfolio.

(6) The data used should be yearly and meet the following requirements:

- Data should reflect the premium risk that is covered in the (sub)line of business during the next accident year, in particular in relation to its nature and composition.
- Data should be purged for catastrophe claims to the extent that they are addressed in the health catastrophe risk submodules.

Lognormal method for Reserve Risk

(7) For runoff reserve risk, the premium risk HRES Lognormal calculation can be applied under appropriate redefinition and interpretation of the various symbols. Financial (accounting) year will occur in this context.

(8) Where, for the inputs,

a) x_{ti} is the total claims provision at the start of financial year t as exposure for insurance portfolio i

b) y_{ti} is the aggregate loss for accident years $<t$, incurred during financial year t for insurance portfolio i, that is: incremental claim payments plus current claims provision.

(9) The data used should be yearly and meet the requirements as stated in premium method.

a) Historical claims data should be transformed using the relevant past and the next twelve months reinsurance and risk mitigation in such a way that the resulting notional SCR of the modelled (sub)line of business is appropriate in the meaning of Article 101 of the Directive.
b) The transformed data should be representative of the risk in the next twelve months.