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Annexes to the

QIS5 Technical Specifications

This document is a working document of the Commission services for testing purposes. It does not purport to represent or pre-judge the formal proposals of the Commission.

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ANNEX A - Definition of terms for the calculation of technical provisions

1. **Market consistency**: consistent with information provided by the financial markets and generally available data on underwriting risks (Article 76(3) of the Solvency II Framework Directive (Directive 2009/138/EC)).
2. **Undertaking specific**: Specific to the undertaking and thus with potential to differ from that of other market participants holding an obligation that is identical in all respects.
3. **Portfolio specific**: Dependent on the characteristics of the insurance portfolio, i.e. that the characteristic would apply irrespective of which undertaking holds the liability.
4. **Realistic**: Aimed at identifying scenarios or parameters as they are or will be in the future, without distorting the situations and by neither underestimating nor overestimating the value of the parameters.
5. **Stochastic asset model**: A stochastic asset model is a tool for producing meaningful future projections of market parameters. It is based on detailed studies of how markets behave, looking at statistic properties of various market and non market factors. The model estimates correlated probability distributions of potential outcomes by allowing for random variation in one or more inputs over time. It then produces economic scenario files (ESFs), economic scenario generator files (ESGs), which are inputs for stochastic asset-liability modelling.
6. **Deep, liquid and transparent financial market**: See the definition in the subsection regarding circumstances in which technical provisions should be calculated as a whole.
7. **Validation techniques**: The tools and processes used by the (re)insurance undertaking to ensure valuation methods, assumptions and results of the best estimate calculation are appropriate and relevant.
8. **Up-to-date (or current) information**: Recent or the latest available information which reflects the situation at the valuation date.
9. **Credible information**: Information for which it can be reasonably believed that the information is not manipulated nor distorted in any other way so that it can be used for valuation purposes
10. **Methodology**: The term valuation methodology (or methodology) is understood as a set of principles, rules or procedures for carrying out a valuation of technical provisions. A valuation methodology would include all stages of a valuation process, such as gathering and selecting the data, determining the assumptions, selecting an appropriate model for quantifying the technical provisions, assessing appropriateness of estimations and documentations and controls.
11. **Method(s)**: The term valuation method(s) or method(s) is used to denote a procedure or technique which is applied for calculating technical provisions.
12. **Projection horizon**: The length of the time used in the projection of cash-flows starting from the date the valuation refers to.
13. **Homogenous risk group**: Homogenous risk group is a set of (re)insurance obligations which are managed together and which have similar risk characteristics in terms of, for example, underwriting policy, claims settlement patterns, risk profile of policyholders,

likely policyholder behaviour, product features (including guarantees), future management actions and expense structure. The risks in each group should be sufficiently similar and the group sufficiently large that a meaningful statistical analysis of the risks can be done. The classification is undertaking specific.

14. **Model points**: One of the important inputs of most life actuarial model is information about policies/policyholders. Examples of such data items include age of policyholder, original term of policy, outstanding term of policy, amount of benefit on maturity, amount of benefit on surrender etc. Information about similar policies can be grouped into single representative data vector known as model point.
15. **Going concern**: The assumption that undertaking is going to continue in operation for the foreseeable future and that it has neither the intention nor the necessity of liquidation.
16. **Best estimate:** The technical provisions should be equal to the sum of a best estimate and a risk margin, except in circumstances where they should be calculated as a whole. The best estimate is calculated gross, without deduction of the amounts recoverable from reinsurance contracts and special purpose vehicles. Unless otherwise specified, it is the gross best estimate.

ANNEX B - Examples of techniques for the calculation of the best estimate of technical provisions

Simulation techniques

1. Rather than considering all possible future scenarios, (re)insurance undertakings can choose a suitably large number of scenarios which are representative of all possible future ones. This approach is referred to as a "simulation technique".
2. For certain life insurance liabilities, in particular the future discretionary benefits relating to participating contracts or other contracts with embedded options and guarantees, simulation may lead to a more appropriate and robust valuation of the best estimate liability.
3. Examples of simulation techniques:
    a) Monte-Carlo simulations: the value of the liabilities is calculated in a large number of scenarios where one or more assumptions are changed in each scenario. By simulating the behaviour of the random variable(s) in a very large number of scenarios, the model produces a distribution of possible outcomes so that a probability weighted average can be calculated ("mean of the distribution").
        - For example, the nature of the financial options and guarantees embedded in some life (re)insurance contracts, particularly those with profit participation, is such that a set of deterministic best estimate assumptions may not be sufficient to produce a best estimate liability. The application of closed form analytical solutions to value the options and guarantees may also be limited, if it is difficult to find market hedges that replicate the cash-flows under the contract, for example to reflect the use of management actions or the effects of path dependency. A deterministic or an analytical technique may therefore not be suitable for valuing such contracts, and a simulation technique may be needed.
        - Stochastic variation in non-market assumptions such as lapses and option take-up rates can have a material influence on the valuation of options and guarantees. One possible approach used is to assume that they are highly correlated with interest rates/market value which allows the insurer to include the relationship within the liability models without an additional stochastic variable.
    b) Bootstrapping: one of the most extended uses of bootstrap within actuarial work is associated with estimation of claims provisions. Starting from a model that explains how losses are paid, it consists of resampling residuals from that model and obtaining a large sample of estimated provisions required to pay future outstanding losses.
    c) Simulating losses above a certain threshold and up to a certain limit is also a frequently used technique by (re)insurers to calculate an estimated expected loss in respect of a given excess of loss programme.
    d) Bayesian approaches, where explicit prior assumptions are blended with observations resulting in an estimate for the ultimate claim.

Analytical techniques

4. The (re)insurance undertaking may be able to use a valuation technique based on closed form solutions. Such techniques are referred to as analytical techniques and are based on the distribution of future cash-flows.
5. For the estimation of non-life best estimate liabilities as well as life insurance liabilities that do not need simulation techniques, deterministic and analytical techniques can be more appropriate.
6. Examples of analytical techniques:
    a) Stochastic variation in non-market assumptions (such as mortality).
    b) The time value of options and guarantees may be captured by reference to the market costs of fully hedging the option or guarantee; if the market price is not directly observable, it may be approximated using option pricing techniques, for example closed form solutions such as the Black-Scholes formula.
    c) Techniques which use an assumption that future claim amounts follow a given mathematical distribution (e.g. Bayesian). These techniques calculate an undiscounted probability weighted average set of cash-flows without explicitly considering each potential scenario. An example may be the Mack method, also known as the distribution free chain ladder.

Deterministic techniques

7. The (re)insurance undertaking may also be able to use a technique where the projection of the cash-flows is based on a fixed set of assumptions. The uncertainty is captured in some other way for example through the derivation of the assumptions. This is referred to below as a "deterministic approach".
8. For the estimation of non-life best estimate liabilities as well as life insurance liabilities that not need simulation techniques, deterministic and analytical techniques can be more appropriate.
9. At the current point in time, stochastic reserving techniques, especially in non-life insurance, are not considered as necessary valuation techniques to calculate best estimate values. The application of deterministic techniques and judgement can be far more important than the mechanical application of simulation methods.
10. (Re)insurance undertakings may consider deterministic techniques appropriate in circumstances such as:
    a) Where an alternative technique may require the calibration of parameters for which only inadequate data is available.
    b) Where the nature of the liability is complex but the complexity does not materially affect the result or the complexity cannot be captured better by other techniques.
    c) Where the nature of the liability is sufficiently simple or for other reasons the nature is such that cash-flow projections based on best estimate assumptions result in a best estimate liability.
11. Examples of deterministic techniques:

a) Actuarial methods such as Chain ladder, Bornhuetter-Ferguson, average cost per claim method, etc…

b) Stress and scenario testing; for example, adjusting data for inflation and allowing inflation to vary, thus producing sensitivities around this parameter.

c) Influential observations or outliers have been allowed for appropriately, for example via case by case reserving.

d) Systematic as well as other random features are being captured through sensitivity testing, diagnostics or other techniques (this could be stochastic).

e) Where a calculation relies on assumptions of an even spread of risk over the policy year and this is not the case (e.g. seasonality such as due to weather or hurricane season) the proportions should be adjusted.

f) The use of relevant assumptions or other external/portfolio specific data as an input to the calculation when there is lack of data or as a benchmark for comparison.

g) Embedded options may be captured by considering different scenarios chosen to capture, as far as possible, the full range of future scenarios. An appropriate average or worst-case technique could be used to derive an initial estimate of the value of options embedded in the life insurance portfolio. A deterministic-to-stochastic adjustment could then be applied. This adjustment may be derived from any standardised method including flat benchmarked percentages.

Combination of techniques

12. A (re)insurance undertaking may use a combination of approaches when calculating the best estimate. For example:

    a) The (re)insurance undertaking may use a valuation technique which fails to include one or more causes of uncertainty. The excluded/additional cause of uncertainty could then be valued accurately as a separate set of cash-flows or measured through the use of validation tools and appropriate adjustments made.

    b) The (re)insurance undertaking may identify that much of the cause of uncertainty arises from one or more risk (e.g. investment returns) with the remaining risks making a much smaller contribution to the uncertainty (e.g. mortality experience). In this example, the (re)insurance undertaking may choose to use a valuation technique which combines a simulation approach for investment returns with either a deterministic or analytical approach for mortality experience provided the loss of accuracy is sufficiently small.

Special case of pure unit-linked contracts

13. Pure unit-linked contract [for these purposes] refers to case of a pure financial savings product, linked to the performance of a particular portfolio, with no financial guarantees attached, but which pays the market value of the units at the earlier of maturity, death or surrender. The underlying portfolio (used as reference to set out the amount to be paid in

case of maturity, death or surrender), is composed of assets which are not traded on a deep, liquid and transparent market.

14. The calculation of technical provisions for these type of contracts will require modelling the assets set out as reference according the three building block scheme (discounted projected cash flows), considering that non traded assets need in any case a mark to model (which in most of cases implies stochastic modelling, at least to incorporate the non trade feature passed on to policyholders).

15. Where the proportionality principle is applicable, the guarantees of these contracts exclusively dependent on the value of the non-traded assets might be valued in a simplified manner, directly allowing for the valuation derived from an appropriate mark-to-model approach of the assets used as a reference.

ANNEX C - Guidance on the definition on health insurance

1. The following table sets out the treatment of several insurance products in relation to the definition of health insurance.

Definition	Classification
Critical illness insurance = dread disease insurance An insurance policy that makes a lump sum payment in the event of the policyholder contracting one of a list of critical illnesses (e.g. cancer). Critical illness insurance can be sold as a separate health or life insurance policy, but can also be a rider to a (group) life or health insurance contract. Under this product different types of covers may exist (creditor insurance, individual protection...). Such different covers may need classification under SLT or non-SLT depending on the underlying risks.	Health insurance obligations
So called "Accelerated critical illness insurance" An insurance policy that makes a lump sum payment on the earlier of the following events: - The death of the policyholder - The policyholder contracting one of a list of critical illnesses (e.g. cancer) or (potentially) on disability because the main risk driver is usually death rather than contracting the illness.	Life insurance obligations, but not health insurance obligations
Permanent health insurance not subject to cancellation currently existing in Ireland and the United Kingdom An insurance policy that pays a monthly income if the policyholder become unable to work because of illness or accidental injury	Health insurance obligations (SLT Health) – because it is income protection

for a given period Terminology: PHI is not just available in the UK and Ireland. It is just another term referring to disability insurance. It is also referred to as income protection (IP)	
Private medical insurance (as sold in the UK) An insurance policy that pays for the treatment for curable short-term illness or injury (commonly known as acute conditions). Cover is generally renewed annually	Health insurance obligations (Non-SLT Health)
Funeral cost insurance A life policy with a low sum assured intended to pay for the burial costs on the death of the insured. Also referred to as an assistance policy or rider to a health insurance policy	Life insurance obligations, but not health insurance obligations
Long term care insurance An insurance policy that makes periodic payments when the policyholder needs assistance for activities of daily living or medical care required to manage a chronic condition. The policy will generally cover some of, if not all, the costs associated with skilled nursing facilities, residential care homes, assisted living or other types of similar facilities.	Health insurance obligations
Health insurance as an alternative to social security (as defined in Article 206 of the Solvency II Framework Directive)	Health insurance obligations
Workers compensation insurance Insurance cover for the cost of medical care and rehabilitation for workers injured on the job, during the way to and from the job, or to work related diseases. Workers compensation insurance also compensates for wage loss and provides disability or death benefits for beneficiaries if the insured person is killed or injured in work-related accidents.	Health insurance obligations

Annuities paid on non-life products which are not health insurance (e.g. stemming from third party liability claims or motor third party vehicle liability claims)	Life insurance obligations
Annuities related to income protection insurance and workers' compensation	Health insurance obligations (SLT Health)
Unemployment guarantees	Non-life insurance obligations, but not health insurance obligations
Assistance as defined in Article 6 of the Solvency II framework Directive	Non-life insurance obligations
Supplementary insurance underwritten in addition to life insurance, in particular: (1) insurance against personal injury including incapacity for employment, (2) insurance against death resulting from an accident and (3) insurance against disability resulting from an accident or sickness	Health insurance obligations
Preventive medical expenses	Health insurance obligations

Mortgage insurance contracts

2. In some cases, creditor insurance provides for the following guarantees: death guarantee, accidental death guarantee, disability/critical illness. In some markets, credit insurance is offered in connection with trade credits and insures against default of the debtor. It is usually purchased by companies and not individuals. The insurance pays in case of default:
    - Independent of the cause of default (subject to any restrictions mentioned in the insurance contract).
    - Dependant on the employment state.
3. For consumer credit, it usually insures against death, morbidity/disability and possibly unemployment. The mortality component is priced using life methodologies, whereas other components tend to be priced using non-life methodologies (but could also be based on life methodologies).
4. For personal loans, the insurance covers mostly mortality risk (so that it is actually a term insurance with varying death benefit). It is also possible to add morbidity/disability protection as for consumer credits.
5. Mortgage insurance could be treated similarly to income insurance, although the risks could depend more on macroeconomic parameters than in other health insurance products.

6. In each case, mortgage insurance can in most or all cases be unbundled in:
    - Life insurance obligations, but not health insurance obligation (term insurance)
    - Health insurance obligations (disability insurance)
    - Non-life insurance obligations, but not health insurance obligation (unemployment insurance)

ANNEX D - Examples on the boundary of insurance contracts

This annex sets out a number of examples to illustrate the definition of the contract boundary that is used to decide which insurance and reinsurance obligation should be recognised and included in the calculation of technical provisions. The examples are taken from a letter of several insurance associations to the International Accounting Standards Board.[1] However the conclusions for some examples differ from the conclusions set out in the letter. (Namely examples A4, A5, B3, B5, B6, B8, B9. Example A9 was left out because it was not conclusive.)

For each example a conclusion according to the definition of contract boundary set out in subsection V.2.2 is provided. However, where the example description does not clarify relevant details of the terms and conditions of the contract, the analysis may well arrive at different conclusions depending on the details of a specific contract. This applies in particular to the following phrases which lack precision: "pricing formula is partly fixed" in examples A1 and A2, "premiums are capped" in example A3, "current market premiums" in examples A4 and A5 as well as "no claims discount" in example A13, "review the premium rates" and "experience is significantly different to that expected" in the description of product B6 and "adjustment for general market experience" in the description of product B8.

Example contract	**Contract boundary**
A1) The contract is for a fixed term and the pricing formula is at least partly fixed throughout the term. There are no options to extend the policy term in the contract. Neither the insurer nor the policyholder can cancel the policy during the term. The policyholder can compel the insurer to continue accepting premiums and pay valid claims, and the insurer can compel the policy holder to continue paying premiums.	The fixed term is the contract boundary.
A2) The contract is for a fixed term and the pricing formula is at least partly fixed throughout the term. There are no options to extend the policy term contained in the contract. The insurer cannot cancel the policy during its term. The policyholder can compel the insurer to continue accepting premiums and pay valid claims. The policyholder can cease paying premiums, in which case the policy lapses. The insurer cannot, in practice, compel the policyholder to continue paying premiums.	The fixed term is the contract boundary.

[1] See http://www.cea.eu/uploads/DocumentsLibrary/documents/1241447091_joint-contract-boundaries-paper.pdf

A3) The contract is for a fixed term and there are no options to extend. The insurer cannot cancel the policy during its term. The premiums for each year are based on current market premiums, but the premiums are capped. This cap will be valuable for impaired lives. The policyholder can compel the insurer to continue to accept premiums and pay valid claims. The policyholder can cease paying premiums, in which case the policy lapses. The insurer cannot, in practice, compel the policyholder to continue paying premiums. Policyholders have an economic incentive to continue paying premiums because this keeps alive their option to renew if the cap is likely to come into the money.	The fixed term is the contract boundary.
A4) The contract is for a fixed term and there are no options to extend. The insurer cannot cancel the policy during its term. The premiums for each year are based on current market premiums but there is no reassessment of the individual policyholder's risk profile. The policyholder can compel the insurer to continue accepting premiums and pay valid claims. The policyholder can cease paying premiums, in which case the policy lapses. The insurer cannot, in practice, compel the policyholder to continue paying premiums. The contract includes an investment component and a significant penalty for early surrender gives policyholders an economic incentive to continue paying premiums.	The contract includes the premiums for the first year only, because the insurance undertaking has an unlimited ability to amend the premium after one year. As the undertaking has an unlimited ability to amend the market premiums, the restriction of the contract's premiums to the market premiums does usually not effectively limit the ability of the undertaking to amend the premiums.
A5) The contract is for a fixed term and there are no options to extend. The insurer cannot cancel the policy during its term. The premiums for each year are based on current market premiums at the time of renewal but there is no reassessment of the individual policyholder's risk profile. The policyholder can compel the insurer to continue accepting premiums and pay valid claims. The policyholder can cease paying premiums, in which case the policy lapses. The insurer cannot, in practice, compel the policyholder to continue paying premiums. The policyholder has some economic incentive to continue paying premiums because of the guarantee of continued insurability, but the premiums charged will always reflect the current market rates.	The contract includes the premiums for the first year only, because the insurance undertaking has an unlimited ability to amend the premium after one year. As the undertaking has an unlimited ability to amend the market premiums, the restriction of the contract's premiums to the market premiums does usually not effectively limit the ability of the undertaking to amend the premiums.
A6) The contract is renewable annually. The policy is renewed automatically each year at current premium rates for a further year unless the policyholder or insurer gives three months notice of cancellation.	The contract boundary is one year.

A7) The contract is annual. The insurer sends the policyholder a renewal notice annually. In practice, a new contract starts at current premium rates, unless the policyholder informs the insurer that renewal will not take place. The insurer has the right to reassess the individual policyholder's risk profile. Legally, renewal is not automatic, but in practice, the contract is administered in a way that makes renewal virtually automatic.	The contract boundary is one year.
A8) The contract is annual. The policyholder is required to sign a preprinted proposal form containing all the relevant contract details, as recorded in the insurer's database, and to confirm any changes in circumstances. If the policyholder does not sign and return the proposal form, no new contract starts.	The contract boundary is one year.
A10) The contract is annual. Because of concerns for its reputation, the insurer feels obliged to continue writing certain classes of business. There is no constraint in the contract on pricing or ability to underwrite.	The contract boundary is one year.
A11) The contract is annual. There are no legal, commercial or other considerations that compel the insurer to continue writing insurance. However, no other insurers are active in a certain class of business. As a result, policyholders feel compelled to continue renewing policies with the insurer.	The contract boundary is one year.
A12) The contract is annual. There are no legal, commercial or other considerations that compel either the insurer or the policyholder to renew contracts. Past experience shows that the level of renewals is highly predictable.	The contract boundary is one year.
A13) The contract is annual. There are no legal, commercial or other considerations that compel either the insurer or the policyholder to renew contracts. However if the policyholder has not claimed in the past year the insurer will insure the policy for a further year inclusive of a "no-claims" discount (subject to a maximum).	The contract boundary is one year.
B1) Group Life/Group PHI/ Individual annual motor The policyholder expects to pay premiums for one year and for the insurer to pay claims if the insured event occurs during that same year. The contract is for a period of one year. There is no restriction on the	The contract boundary is one year.

price or underwriting for any further new one-year contract. There is no obligation on the part of the policyholder to renew, although in practice a vast proportion may do (and have done). These contracts are annually renewable.	
B2) Extension of term (with premiums) at maturity The policyholder pays premiums for the full contract term. At the end of the term, the policyholder decides to extend the term of the policy, continuing to pay premiums. The insurer is not required to accept the premium and the policy does not include any clauses which constrain the price and underwriting that can be performed at maturity.	The maturity date determines the boundary of the contract.
B3) Deferred annuity with guaranteed annuity option At the end of a savings/accumulation phase, the maturity benefit may be paid out as a lump sum or as an annuity, for which a guaranteed annuity rate is provided. This guaranteed rate effectively provides an investment and mortality guarantee (combined). Premiums may be single or variable during the accumulation phase. These products are offered in the USA.	Where the terms and benefits of the annuity are specified in the initial contract, the contract includes the annuity, because the insurance undertaking has no ability to cancel the annuity, to re-underwrite it or to amend the premiums for it.
B4) Voluntary automatic premium increases Certain recurring premium contracts have a facility in the application form and the policy contract that premiums will increase automatically on an annual basis at a fixed rate or at the rate of inflation. If the policyholder takes no further action, then the premiums will increase (and the insurer will increase debit orders etc annually so as to receive the increased premiums). The policyholder has the option at any stage of intervening to prevent future increases from being deducted.	The premium increases are within the boundary of the contract.
B5) Universal Life type products There are many variants around the world for these products. They work on the principle that every month, the recurring premium can be divided into a savings component and a life cover component. The life cover component is calculated as the rate for the insured's age for that month multiplied by the sum insured. The sum insured may have a pre-defined pattern or is fixed in some other way (e.g. there is a fixed death benefit, including the savings component,	Where the terms and conditions of the contract allow the undertaking to amend premiums in line with the market premiums, the contract does not include these premiums. Usually, the link of the contract's premiums to the market premiums does not effectively limit the ability of the undertaking to amend the premiums.

until breakout point; life cover is thus the balancing figure). From the policyholder's perspective, there is flexibility in terms of premium payment. If policyholders fail to pay premiums, cover may still continue to be provided by deducting the cost of the life cover from the savings account each month. At least some versions do not guarantee mortality rates. In other words, the insurer may increase the cost of the life cover purchased during the term if mortality experience is worse than expected. The policyholder could elect to either pay a higher premium or to leave the premium unchanged in which case less of the premium would be available for savings resulting in a reduction in life cover.	
B6) Term assurance with premium reviews Term assurance or whole life contracts are issued where premiums are guaranteed for a certain number of years. In terms of the policy contract, at this guaranteed cover date, the life office has the opportunity to review the premium rate for the balance of the term if experience is significantly different to that expected. The policyholder can reject the premium change – in which case the contract would cease. Importantly, review means increases and decreases to rates, depending how experience unfolds.	Where the terms and conditions of the contract allow the undertaking to amend premiums in line with its subjective experience, the contract does not include these premiums. Usually, the restriction of the premium amendment to subjective experience does not effectively limit the ability of the undertaking to amend the premium.
B7) 5 year motor policy The policyholder and insurer enter into a policy that runs for 5 years. The policy generally cannot be cancelled by the insurer without the occurrence of an accident or without cause, but may be cancelled by the policyholder in the event of premium increase. The policyholder pays one year of premium (full or instalments can be possible), and expects the insurer to pay claims originating during the policy period. At the end of each year, the insurer can re-rate the contract, i.e. adjust for experience during the policy period, as well as make general rate increases. In practice, few policyholders cancel at the end of a policy year, although liberalisation of the market has increased the trend. The insurer pays the agent 5 years of commission upfront, but commissions are generally recoverable on a pro rata scale should the policyholder cancel.	The contract boundary is one year. However, to the extent that accidents are expected which allow the insurance undertaking to cancel the contract, the proportion of the annual premium that relates to insurance cover after the opportunity to cancel does not belong to the contract. (This is not likely to make a relevant difference for the purposes of QIS5.)
B8) Post-level term products A term policy with scheduled rate increases.	Where the terms and conditions of the contract allow the undertaking to amend premiums in line with its

Policyholder may be given a choice at inception as to how long the policy runs before a rate increase (e.g. 10, 20 or even 30 years), but the policy will cover not only that period but the additional period thereafter. The rate increase will not reflect a re-underwriting of the individual policy at that time, but will in fact be an adjustment for general market experience which would apply to all policies at that point if they reach the point of the "step-up" in the premium. We would be obliged to accept the premium if the policyholder continues to pay the new premium.	subjective experience, the contract does not include these premiums. Usually, the restriction of the premium amendment to subjective experience does not effectively limit the ability of the undertaking to amend the premium.
B9) Whole-Life Insurance with Term Life Rider Premiums for the whole-life insurance contract are fixed and guaranteed at the issue of the contract. The term life rider has a certain period of coverage (typically 10 years), and premiums for the term are fixed and guaranteed at the issue or renewal of the rider. Neither the whole-life insurance contract nor the term life rider can be cancelled by the insurer after the issue. The policyholder has an option to renew the term life rider. The policyholder can renew the term life rider without reassessment of the risk profile of the policyholder, and the insurer cannot reject the renewal. Re-pricing of premiums for the renewed term life rider is based on current market premiums without reassessment of the individual policyholder's risk profile.	Where the terms and conditions of the contract allow the undertaking to amend premiums in line with its subjective experience, the contract does not include these premiums. Usually, the restriction of the premium amendment to subjective experience does not effectively limit the ability of the undertaking to amend the premium.

ANNEX E - Extrapolation of the risk-free interest rates

1. For the specification of the relevant risk-free interest rate term structures macroeconomic extrapolation techniques are used to derive the extrapolation beyond the last available data point. This requires specification of the following:
    - Determination of the ultimate forward rate
    - Interpolation method between the last observable liquid forward rate and the unconditional forward rate

Specification of the ultimate forward rate (UFR)

2. The UFR is specified as the sum of the following two-components:
    - the expected long-term inflation
    - the expected real rate of interest

3. For QIS5 the following UFR are used:

Category	**Currencies**	**UFR (%)**
1	JPY, CHF	3.2
2	Euro, SEK, NOK, DKK, GBP, USD, PLN, RON, HUF, ISK, CZK, BGN, LVL, LTL, EEK, CAD, AUD, SGD, MYR, KRW, THB, HKD, TWD, CNY	4.2
3	TRY, ZAR, MXN, INR, BRL	5.2

Interpolation method between the last observable liquid forward rate and the unconditional forward rate

4. In QIS5 two techniques are used to interpolate between the estimated forward rates and the unconditional ultimate forward rate: the linear extrapolation technique and the Smith-Wilson technique.[2]

[2] For QIS5 purposes, the maturity at which the forward rate curve reaches the UFR is 90 years.

ANNEX F - Method to derive the relevant risk-free interest rate term structure for currencies where it is not provided

1. Where for a certain currency the risk-free interest rate term structures are not provided, insurance and reinsurance undertakings should determine the relevant term structure according the four steps described below, and following the same principles applied to calculate the risk-free interest rate term structures for those currencies whose risk-free interest rate term structure is provided in these specifications.

Step 1. Calculation of the non-extrapolated part of the curve, prior to adjustment.

2. The interest rates of this part of the curve should be based on data observed in financial markets, according to the following principles:

   (a) The relevant risk-free interest rate term structure should be determined on the basis of market data which is relevant for the valuation date.

   (b) The relevant risk-free interest rate term structure should ideally meet the following criteria ("risk-free rate criteria"):

   - No credit risk: the rates should be free of credit risk. Swap rates may be used as a starting basis for this purposes, (although as reflected in the step 2, they should be adequately adjusted to reflect that these rates are not credit risk-free and to remove any bias –see principle f below).

     If swap rates are available, but they do not meet the criteria set out in these specifications, then the undertaking may use data based on government bonds trades in the relevant currency. Those data should be adjusted for their deficiencies relating to these criteria (e.g. to fit rates based on government bond data with the risk-free criteria).

     If neither swaps nor government bonds are available or cannot be adjusted to meet the risk-free rate criteria for practical or theoretical reasons, other financial instruments can be used to derive the risk-free interest rates. These instruments should be as similar to swaps as possible. Their rates should be adjusted for credit risk and any other deviations from the criteria with the objective of approximating swap rates which meet the risk-free criteria.

   - Where the instruments used (swap, government or any other) do meet the risk-free rate criteria (or can be adjusted to meet them) for some maturities but not for all maturities, they should be used to derive the relevant risk-free rate for these maturities only. Different financial instruments may be used to derive the relevant risk-free rates for different maturities.

   - Realism: it should be possible for all undertakings to earn the rates in practice in a risk-free manner. Technical provisions should not be discounted with rates

that create hidden losses which would materialise during the run-off period of the liabilities.

- Reliability: The data basis and the method chosen to determine the term structure should be robust. It should result in a reliable and accurate estimate. This criterion should in particular apply in times of market crisis or turbulence.

- High liquidity: the rates should be based on financial instruments for which a reliable market value is observable. A reliable market value is observable from deep, liquid and transparent markets (as these features are defined in the item regarding calculation of technical provisions as a whole).

- For most term structures, there is sufficient liquidity up to a certain maturity. Beyond this point the term structure needs to be extrapolated when necessary (see step 4).

- No technical bias: Supply and demand distortions should be filtered in the determination of the relevant discount rates for the cash flows considered in the calculation of technical provisions.

- Proportionality. The principle of proportionality does not allow for simplified or approximate derivations of the risk-free rate term structure.

Step 2. Adjustment of the non-extrapolated part of the curve.

3. According to the principles set out above, the interest rate term structure derived in step 1 should be adequately adjusted to reflect that these rates are not credit risk-free and to remove any bias.
4. In those cases where the undertaking lacks a sufficient basis to robustly assess the magnitude of the aforementioned adjustment the following approach should be used. The adjustment should be quantified by using the adjustment applied for the interest rate term structure relevant for euro, multiplied by the proportion which the interest rates in the relevant currency bear to the euro. To calculate this proportion the longest term available which meets the requirements set out in step 1 for the relevant currency should be used. The proportion should never be lower than 1.

Step 3. Calculation of the illiquidity premium.

5. The illiquidity premium existing at the date relevant for the valuation should only be assessed for those currencies where these specifications do not provide risk-free interest rate term structures. For this purpose, undertakings should base their assessment on long-term illiquid financial assets maturing in that currency, and follow the methodology described in the CRO Forum/CFO Forum calibration paper on the risk free interest rates.
6. Liabilities expressed in the relevant currency may be discounted with the interest rate term structures that allow for a portion of the illiquidity premium under the same requirements on how to assess the portion of the illiquidity premium set out above in respect of those currencies whose interest rate term structures are provided in these specifications.
7. For those currencies where these specifications do not provide risk-free interest rate term structures no illiquidity premium will apply where it is not possible to apply in a robust manner the methodology to derive the illiquidity premium (e.g. due to the lack of appropriate or adequate long-termed illiquid assets, or lack of reliable prices or data, or the principles aforementioned on the illiquidity premium are not met).

Step 4. Extrapolation of the interest rate term structure

8. As part of the QIS5 package, participants will find a spreadsheet which automatically calculates the extrapolated part of the interest rate term structures. The following inputs are required:

    i) The observed points used to derive the non-extrapolated part of the curve (with and without liquidity premium).

    ii) The size of the illiquidity premium.

    iii) The ultimate forward rate, which should be derived according the methodology provided in the calibration paper included in the QIS5 package.

    iv) The term where the extrapolation should meet the targeted unconditional ultimate forward rate, UFR (or a sufficiently nearby value). Unless sufficient evidence is provided by the undertaking, this term will be 90 years for all currencies.

9. Practicalities which are not resolved in the spreadsheet provided should be resolved in a way which is consistent with the following principles:

    (a) All relevant observed market data points should be used.

    (b) For each currency, the extrapolated part of the basic risk free interest rate term structure should be based on forward rates converging smoothly from one or a set of data points in relation to the longest maturities observed in a liquid market to an unconditional ultimate long term forward rate.

    (c) The principles applied when extrapolating the basic risk free interest rate term structure should be the same for all currencies, in particular as regards the determination of the data points in relation to the longest maturities observed in a liquid market and the mechanism to ensure a smooth convergence to the unconditional long term forward rate. .

    (d) For each relevant currency, the unconditional ultimate long term forward should be stable over time and only change due to fundamental changes in long term expectations. The principles used to determine the macro-economic long-term forward rate should be made explicit by the undertaking.

10. For the sake of efficiency and comparability, undertakings deriving the interest rate term structures for each relevant currency, are invited to inform CEIOPS of the complete structures they have derived, so that CEIOPS can make them available to all undertakings.

ANNEX G - Comparison of implied and historic volatilities in the assumptions underlying market consistent asset models

1. With regard to the volatility assumptions that are being used to calibrate the asset model, there are two possible approaches. Both approaches have advantages and disadvantages:
    a) The assumptions about the volatility of a market price may be based on an analysis of its historic volatility; or

    b) Volatility assumptions may be derived from the price of financial instruments where the price of the instrument depends on assumptions regarding future volatility (implied volatility) in a context of deep, liquid and transparent financial market.

2. The use of historical volatilities has the following advantages:

    a) Experience shows that implied volatilities may misestimate the real volatility. In these cases implied volatilities may not lead to a realistic best estimate.

    b) Furthermore, implied volatilities tend to be higher than the real volatility in times of crises and lower than real volatility in times of economic well being. Therefore, the value of the financial options and guarantees included in the technical provisions may be underestimated before a crisis and overestimated during the crisis. This mechanism has a pro-cyclical effect. Historical volatilities may be more stable as they are based on long time horizons.

    c) The derivation of implied volatilities is based on financial models such as the Black-Scholes model which relates market prices to volatility. These models may not be an accurate reflection of reality, particularly in extreme market conditions.

3. The use of implied volatilities has the following advantages:

    a) Implied volatilities are based on current information derived from financial markets.

    b) Historical volatilities may not be relevant to current market conditions.

    c) Where an insurer is holding a hedging instrument for which there is a price, using historical rather than implied volatilities will lead to unnecessary balance sheet volatility.

    d) The derivation of implied volatilities based on financial models such as the Black-Scholes is consistent with the way in which market participants analyse the prices of traded financial instruments and price over-the-counter financial instruments

    and following disadvantages:

    e) Implied volatility on equity and interest rate are not available for each horizon of cash-flows projection (in practice less than 10 years are potentially available).

f) Implied volatilities are only available on OTC transactions (i.e. the information is not publicly available). Each trading desk develops its own implied volatility curve regarding the specific market data used. Thus implied volatilities for the same horizon are not harmonised between undertakings.

g) Implied volatilities for equity is based on the Black-Scholes model which underestimate the tail of distributions as it is based on normal distribution.

h) Implied volatilities could be affected by undertakings using the market to hedge their risks and could be distorted.

4. Implied volatilities seem to be more appropriate for the purpose of a market consistent valuation. However there may be circumstances in which it is appropriate to use historical volatilities. For example, in some cases, it may not be possible to calibrate volatility assumptions to market data. In such cases the calibration should be based on historical analysis of the volatility.

ANNEX H - Some technical aspects regarding the discount factors to be used in the calculation of the risk margin

1. The purpose of this annex is to explain in some detail the discount factors to be used in the calculation of the risk margin.

2. In a first step the usual formula for the calculation of the risk margin is presented. In a second step the corresponding scenario is described and thereby the appropriateness of the risk margin formula is verified.

Definition of the risk margin

3. The following nomenclature is applied:

   - Let the risk relating to the obligations run off within n years. Thus, it is sufficient to consider the time period which spans from $t = 0$ (valuation date) to $t = n$.
   - Let $CoCM_0$ be the risk margin for the transferred insurance obligations at the time of transfer. After transfer, the obligations run off. This has an effect on the risk margin that the reference undertaking has to reserve.
   - Let $CoCM_1,\ldots,CoCM_{n-1}$ be the Cost of capital margins at $t = 0,\ldots,n$ respectively.
   - Let $SCR_0, \ldots,SCR_{n-1}$ be the Solvency Capital Requirements of the reference undertaking in relation to the transferred insurance obligations at $t = 0,\ldots,n$ respectively.
   - Let CoC denote the Cost-of-Capital rate.
   - Let $r_{(1,0)},\ldots,r_{(n,0)}$ be the relevant risk-free rates at $t = 0$ for the maturities $1,\ldots,n$ respectively. Let $r_{(m,k)}$ ($k = 1,\ldots,n$ and $m = 1,\ldots,n-k$) be the corresponding risk-free forward rates at $t = k$ for maturity m.

4. The risk margin at $t = 0$ can be calculated according to the formula as follows:

$$CoCM_0 = CoC \cdot \sum_{s=0}^{n-1} \frac{SCR_s}{(1 + r_{(s+1,0)})^{s+1}}.$$

5. The formula for the risk margin at $t = 0$ implies a similar formula for the risk margin at $t = k$ as follows:

$$CoCM_k = CoC \cdot \sum_{s=k}^{n-1} \frac{SCR_s}{(1 + r_{(s+1,k)})^{s+1}}.$$

6. If the reference undertaking covers $CoCM_k$ with risk-free assets that match the cash-flow pattern of the formula, then these assets earn during the year from $t = k$ to $t = k+1$ an interest of

$$CoC \cdot \sum_{s=k}^{n-1} r_{(s,k)} \frac{SCR_s}{(1+r_{(s+1,k)})^{s+1}},$$

and the unwinding of the margin in that year (including the interest) yields an expected profit of $CoC \cdot SCR_k$ as can easily be calculated.

The capitalisation scenario

7. The reference undertaking receives the obligations as well as assets to cover best estimate and risk margin from the original insurer. The reference undertaking has no own funds to cover the SCR relating to the obligations. In order to meet the capital requirement, the reference undertaking requests external capital of the amount SCR_0 for one year. The interest on this capital is $CoC+r_{(1,0)}$, so in return, the reference undertaking has to pay back the amount $(1+CoC+r_{(1,0)}) \cdot SCR_0$ at the end of the year.

8. Under the assumption that the obligations run off according to best estitmate assumption, the position of the reference undertaking at the end of the year ($t = 1$) is as follows:

    - The development of the best estimate does not affect own funds: the assets covering the best estimate in $t = 0$ plus the risk-free rate earned during the year equal the claims payments during the year and best estimate at the end of the year.
    - The unwinding of the risk margin produces own funds of the amount $CoC \cdot SCR_0$.
    - The assets covering SCR_0 earn a risk-free rate of $r_{(1,0)} \cdot SCR_0$.
    - The repayment of the capital reduces own funds by $(1+CoC+r_{(1,0)})\ SCR_0$.

    To sum up, the own funds of the reference undertaking are reduced by the amount SCR_0, so that own funds are zero again.

9. Therefore, the reference undertaking is at $t = 1$ in the same situation as at $t = 0$. It has to raise new capital of the amount SCR_1 in order to meet the SCR. The process outlined above can be iterated until run-off of the liabilities. At $t = n$, the reference undertaking is relieved from the insurance obligation and no own funds will be left.

10. This proves that the formula stated in these specifications is in line with the risk margin definition of the Level 1 text. In particular, the way of discounting is accurate because the payment of the amount $CoC \cdot SCR_s$ is made at $t = s+1$.[3]

[3] Indeed, the reference undertaking could agree with the capital provider to pay the spread $CoC \cdot SCR_s$ in advance at $t=s$. But then the value of the spread would be $CoC \cdot SCR_s/(1+r_{(1,s)})$.

ANNEX I - Example to illustrate the first method of simplification to calculate the best estimate of incurred but not reported claims provision.

General formulation

1. The final estimate of this technical provision is derived from the following expression, where just for illustrative purposes a three-year period of observation has been considered (the adaptation of the formula for longer series is immediate):

$$\text{IBNR reserve year } t = C_t \times N_t \quad ,$$

where

C_t = average cost of IBNR claims, after taking into account inflation and discounting. This cost should be based on the average cost of claims reported in the year t. Since a part of the overall cost of claims reported in the year t comes from provisions, a correction for the possible bias should be applied.

and

$Nt = Rt * Av$, being

$$AV = \left[(N_{t-1} / p_1) + (N_{t-2} / p_2) + N_{t-3} \right] / \left[R_{t-1}+R_{t-2}+R_{t-3} \right]$$

2. Furthermore, in these expressions

N_{t-i} = number of claims incurred but not reported at the end of the year t-i, independently of the accident year (to assess the number of IBNR claims all the information known by the undertaking till the end of the year t should be included).

p_1= percentage of IBNR claims at the end of year t-3 that have been reported during the year t-2

p_2= percentage of IBNR claims at the end of year t-3 that have been reported during the years t-2 and t-1

R_{t-i}= claims reported in year t, independently of accident year.

3. It should be noted that the sufficiency of this method should be regularly checked using run-off results.

Numeric example

4. Assuming as date of reference of the valuation December the 31st of 2008, the undertaking has the following information:

N_2007 = 90

N_2006 = 100

N_2005 = 100 (85 reported in 2006 and 10 reported in 2007)

furthermore

R_2008 = 10.500 ; R_2007 = 8.500

R_2006 = 8.200 ; R_2005 = 8.700

5. The overall cost of claims reported in 2008 amounts 11.000.000 €, from which 5.500.000 € are case reserves (with an estimated bias = 0.9).
6. The estimated inflation for 2009, 2010 and 2011 is 5 per cent (every year). The discounting rate is 4 per cent for the same years.
7. The claims reported every year are paid in a 50% the year of reporting, the year after is paid the 35%, and the third year is paid the 15% (this is an estimation based on entity experience or market experience).

A.1. Solution

Bias correction =	6.111.111		
	11.611.111		
50% =	5.805.556	6.095.833	5.861.378
35% =	4.063.889	4.480.438	4.142.416
15% =	1.741.667	2.016.197	1.792.392
After bias correction and inflation+discounting=			11.796.186
Overall cost of claims reported in 2008 =			11.796.186
		C2008 =	1.123
		p1=	0,85
		p2=	0,95
N2007/p1=	106	N2006/p2=	105
N2008=	129		
IBNR reserve =	144.501,20 €		

8. If the average cost of IBNR claims is different to the average cost of reported claims, C_t can be adjusted.
9. This method needs at least four years of experience. Thus, in case of new undertakings or a new line of business this simplification does not apply.

ANNEX J - Examples for the construction of the equivalent scenario

Example 1

Step 1: Derive individual/undiversified capital for each risk factor, and the correlation matrix

Risk factor	*Stress test applied (% change)*	*Matrix of undiversified capital (U)*
Risk A	30%	500
Risk B	-30%	25
Risk C	20%	100
Risk D	-10%	200
Risk E	10%	75
Sum		900

Correlation Matrix (C)				
1.00	0.75	0.25	0.00	0.00
0.75	1.00	0.25	0.00	0.00
0.25	0.25	1.00	0.00	0.00
0.00	0.00	0.00	1.00	0.00
0.00	0.00	0.00	0.00	1.00

Step 2: Check the correlation matrix is positive definite (PD) because in theory the single equivalent scenario works only if the matrix is PD. One way of doing it is to check the least eigenvalue of the matrix and make sure it is positive.

Eigenvalues of C	1.89	1.00	1.00	0.86	0.25

Step 3: Use the matrix multiplication to multiply the correlation matrix (C) and the undiversified capital matrix (U). The result is a new matrix Y.

		Y = mmult(C,U)

Risk A		544
Risk B		425
Risk C		231
Risk D		200
Risk E		75

Step 4: Use matrix multiplication to multiply the transpose undiversified capital matrix U with matrix Y and take the square root of the result to get the diversified capital requirement.

Note that Step 3 and 4 are the equivalent matrix algorithm to the square root method of deriving diversified capital ie

$$C_{div} = \sqrt{\sum C_i^2 + \sum \rho_{ij} C_i C_j}$$

Hence, diversified capital = (U^T x (C x U)) ^0.5 =(U^T x Y) ^ 0.5 = 593

Step 5: Allocate diversification benefit allowing for relative weight of risks and correlations.

	U		Y		Capital		Allocation
Risk A	500	x	544	/	593	=	459
Risk B	25	x	425	/	593	=	18
Risk C	100	x	231	/	593	=	39
Risk D	200	x	200	/	593	=	67
Risk E	75	x	75	/	593	=	9
Sum	900					Sum	**593**

Which gives:

			Split of diversified capital (Matrix A)	Diversification reduction factor for risk	Implied percentile for medium bang scenario	Original 99.5th stress test	Stress test in the single equivalent scenario
Risk A			459	92% (=459/500)	99%	30%	28%
Risk B			18	72% (=18/25)	97%	-30%	-22%
Risk C			39	39% (=39/100)	84%	20%	8%
Risk D			67	34% (=67/200)	81%	-10%	-3%
Risk E			9	12% (=9/75)	63%	10%	1%
		Sum	593 *	66% (=593/900)	96%		

* The single equivalent scenario algorithm guarantees that the capital allocations sum to the diversified capital, and that the scenario is most likely to occur.

Please note that the approach above is not without its limitations, for example in finding the combined scenario:

- It assumes that capital linearly increases in line with risk and this may not be the case.
- Changing the direction in which some risk factors are stressed may increase the overall capital requirement.
- The reduced stress tests have been derived assuming that all risk factors are multivariate-normally distributed and correlations are used to measure the dependencies between different risks, which may not be the case.

Example 2

1. Suppose that a firm is exposed to three risks A, B and C for which the capital requirements excluding loss absorbency of technical provisions are 50, 100 and 200 respectively.

2. Assume that the above capital requirements are calculated based on stress tests of 25%, -40% and 40% respectively.

3. Suppose the three risks are aggregated using the following correlation matrix M_{corr}:

	A	**B**	**C**
A	1	0.25	0.5
B	0.25	1	0.75
C	0.5	0.75	1

4. The undiversified gross capital requirements may be represented by the following matrix M_{gross}:

A	50
B	100
C	200

Step A

5. The first step in the construction of the single equivalent scenario is to calculate the product of the matrices M_{corr} and M_{gross}. For ease of reference this matrix may be referred to as M_1.

A	175
B	263
C	300

Step B

6. The aggregate, diversified capital requirement, D, may then be calculated as follows:

$$D = (M_{gross}^{T} * M_1)^{1/2},$$

where M_{gross}^{T} is the transpose of the matrix M_{gross}. In the example above D is equal to 308.

Step C

7. For each risk i, the diversification benefit may then be allocated to each of the different risks as follows:

$$M_{gross,i} * M_{1,i} / D,$$

where $M_{gross,i}$ is the gross capital requirement for risk i and $M_{1,i}$ is the entry in matrix M_1 for risk i.

8. This allows for both the relative weights of each risk and the correlations between risks. For example, for risk A the allocated diversified capital is (50 * 175)/308 = 28.

9. Let the matrix M_2 represent the allocated diversified capital for each risk.

A	28	
B	85	
C	195	
Total	*308*	

Step D

10. The allocated diversified capital may then be used to derive the required stress test.

	M_2	Diversification factor	Implied[4] percentile	Original stress test	Stress test in single equivalent scenario
A	28	57% (= 28/50)	93%	25%	14% (=57% * 25%)
B	85	85% (=85/100)	99%	-40%	-34% (= 85% * -40%)
C	195	97% (= 195/200)	99%	40%	39% (= 97% * 40%)
Total	*308*				

[4] Note that this assumes that all risks are normally distributed

ANNEX K - Illiquidity premium shock

1. Due to the scarcity of available data on the illiquidity premium observed in the financial markets, the risk of decrease of the illiquidity premium has been calibrated on the evidence shown in the years 2008 and 2009. Some data were also available for the years 2005 to 2007[5] but this corresponds to a situation where the observed illiquidity premium increased.

Variation of the illiquidity premia from 2008 to 2009

	31/12/2008	31/12/2009	variation
EUR	179	53	-70%
GBP	221	82	-63%
USD	231	71	-69%
JPY	42	15	-64%
CHF	32	9	-72%
SEK	84	54	-36%
DKK	62	40	-35%
NOK	70	20	-71%
CZK	63	19	-70%
PLZ	63	19	-70%
HUF	63	19	-70%
EKK	63	19	-70%
LVL	63	19	-70%
LTL	63	19	-70%
CAD	200	48	-76%
ZAR	85	70	-18%
AUD	139	75	-46%
HKD	170	54	-68%

2. On average, for all those currencies, the variation was of -62%.

3. For the purposes of QIS5, the calibration of the illiquidity premium was done on a formula calibrated on EUR, GBP and USD. On these three currencies, the variation was of -68% on average.

4. For the purposes of QIS5, the shock on illiquidity premium has been set up at the mean level between -62% and -68%.

[5] See p.32 of the Task Force Report on the Liquidity Premium, CEIOPS-SEC-34/10, 1 March 2010, http://www.ceiops.eu/media/files/publications/submissionstotheec/20100303-CEIOPS-Task-Force-Report-on-the-liquidity-premium.pdf.

ANNEX L.1 - Arena capacities for the health catastrophe risk sub-module

Stadium/Arena information			
Country	**Name**	**Location**	**Capacity**
Austria	Ernst Happel Stadion	Vienna	50,000
Belgium	Koning Boudewijn Stadion	Brussels	50,000
Bulgaria	Vasil Levski National Stadium	Sofia	43,632
Croatia	Maksimir Stadium	Zagreb	37,168
Cyprus	Neo GSP Stadium	Nicosia	22,859
Czech Republic	Synot Tip Arena (Eden)	Prague	21,000
Denmark	Parken	Copenhagen East	50,000
Estonia	A. le Coq Arena	Tallinn	9,700
Finland	Helsinki Olympic Stadium	Helsinki	50,000
France	Stade de France	Saint Denis	80,000
Germany	Signal Iduna Park	Dortmund	80,552
Greece	Athens Olympic Stadium	Athens	72,000
Hungary	Puskás Ferenc Stadion	Budapest	56,000
Iceland	Laugardalsvöllur	Reykjavík	20,000
Ireland	Croke Park	Dublin	82,300
Italy	Giuseppe Meazza	Milan	83,679
Latvia	Mezaparks	Riga	45,000
Lithuania	Siemens Arena	Vilnius	12,500
Luxemburg	Rockhal	Esch-sur-Alzette	7,700
Malta	Ta' Qali National Stadium	Ta' Qali	35,000
Netherlands	Amsterdam Arena	Amsterdam South East	51,628
Norway	Ullevaal Stadion	Oslo (North)	25,600
Poland	National Stadium	Warsaw	55,000
Portugal	Estádio da Luz	Lisbon	65,400
Romania	Arena Romana	Bucharest	50,000
Slovakia	Tehelne pole	Bratislava	30,000
Slovenia	Ljudski vrt	Maribor	12,435
Spain	Camp Nou	Barcelona	98,787
Sweden	Nya Ullevi	Gothenburgh	43,000
Switzerland	St. Jakob-Park	Basel	38,512
UK	Wembley Stadium	London	90,000

ANNEX L.2 - Insurance penetrations for the health catastrophe risk sub-module

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	UK	FR	DE	IT	ES	NL	BE	AT	PT	DK	NO	CZ	FI	HE	HU	IE
% population																
Income protection	5%	64%	21%	39%	48%	33%	5%	0%	2%	42%						
Medical expenses insurance: including hospital cash, etc.	10%	91%	25%	34%	24%	99%	50%	12%	17%	16%	1%	0%			0%	51%
Medical expenses insurance: reimbursement only			11%			18%	5%		4%	37%			10%			
Long term care	0%	5%	13%	1%	0%		3%	1%								
Standalone critical illness	1%									47%			1%		1%	
Personal accident	20%	18%	15%	5%	3%	55%	6%	47%	48%	70%		13%	20%		9%	

	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
	PL	CH	SK	SE	SI	LU	LT	LV	IS	BG	CR	CY	EE	MT	RO
% population															
Income protection	10%		1%	78%	0%	1%									
Medical expenses insurance: including hospital cash, etc.	1%		1%	82%	74%	15%	1%								
Medical expenses insurance: reimbursement only	4%				0%										
Long term care	2%														
Standalone critical illness	9%		0%		0%										

Personal accident	5%		20%	52%	25%		14%								

Where factors are missing, this may be due to the fact that the product type is not present in the market or because the member state has not provided the information.

ANNEX L.3 - Examples for the allowance of reinsurance in the health and non-life catastrophe risk sub-modules

A 1 Country; Cat Excess of loss cover
Assume 850 excess 100 with 1 reinstatement cost 40

Gross loss	**1,000**
ri recovery	850
ri premium	40
Net loss	**190**

B 1 Country; Cat Excess of loss cover with 10% quota share
Assume 850 excess 100 with 1 reinstatement cost 40
Quota share applies after Cat XL programme

Gross loss	**1,000**
Cat XL ri recovery	850
net loss after Cat XL	150
QS ri recovery	15
Cat XL ri premium	40
Net loss	**175**

C 1 Country; Cat Excess of loss cover with 10% quota share
Nat Cat type event
Assume 800 excess 100 with 1 reinstatement cost 40
Quota share applies before Cat XL programme

Gross loss	**1,000**
QS ri recovery	100
net loss after Cat XL	900
Cat XL ri recovery	800
Cat XL ri premium	38
Net loss	**138**

D 2 countries; Global Cat Excess of loss
Nat Cat type event affects 2 countries
Same currency in each country
In this situation the firm aggregates its gross losses across countries using 3.4
It then applies its RI programme to the result.
Assume 1900 excess 100 with 1 reinstatement cost 100

Assume the 2 countries have a correlation of 75%

	Total	**Country A**	**Country B**
Gross loss	**1,414**	**1,000**	**500**
RI recovery	1,314		

RI premium	69		
Net loss	**169**		

Note: need to take care if different currencies are used in different countries. This will depend on the details of the reinsurance treaty

E 2 countries; Separate Cat Excess of loss covers
Nat Cat type event affects 2 countries
Same currency in each country
In this situation the firm applies its RI programme to the gross loss in each country
Then aggregates the net results using 3.4
Assume 1350 excess 50 with 1 reinstatement cost 65 for country A
Assume 550 excess 50 with 1 reinstatement cost 35 for country B
Assume the 2 countries have a correlation of 75%

	Total	Country A	Country B
Gross loss	**1,414**	**1,000**	**500**
RI recovery		950	450
RI premium		46	29
Net loss	**163**	**96**	**79**

Note: need to take care if different currencies are used in different countries

F 2 countries; Global Cat Excess of loss
Nat Cat type event affects 2 countries
Same currency in each country
Allocating the RI cover pro-rata to the countries to get net results by country
Then aggregates the net results using 3.4
Assume 1266 excess 67 with 1 reinstatement cost 67 for country A, and appropriately scaled down for country B.

Assume the 2 countries have a correlation of 75%

	Total	Country A	Country B
Gross loss	**1,414**	**1,000**	**500**
RI recovery		933	467
RI premium		49	25
Net loss	**174**	**116**	**58**

Note: need to take care if different currencies are used in different countries
- will depend on the details of the reinsurance treaty
This is the same example as D, but aggregated in a different way

ANNEX L.4 - List of countries that are materially affected by natural perils for the non-life catastrophe risk sub-module

Country	Windstorm	Earthquake	Flood	Hail	Subsidence
AT	X	X	X	X	
BE	X	X	X	X	
BG		X	X		
CR		X			
CY		X			
CZ	X	X	X		
CH	X	X	X	X	
DK	X				
EE					
FI					
FR	X	X	X	X	X
DE	X	X	X	X	
HE		X			
HU		X	X		
IS	X				
IE	X				
IT		X	X	X	
LV					
LT					
LU	X			X	
MT					
NL	X			X	
NO	X				
PL	X		X		
PT		X			
RO		X	X		
SK		X	X		
SI		X	X		
ES	X			X	
SE	X				
UK	X		X		
Guadeloupe	X	X			
Martinique	X	X			
St Martin	X	X			
Reunion	X				

The ‘X’ indicates that the peril is considered material for this particular country when compared to other perils. A complete scenario for this particular peril and country has been developed. Where the factor fails the significance test (smaller than 1/15th of the largest country-wide factor), no factor has been provided.

ANNEX L.5 - List of 1 in 200 year gross loss damage ratios by country (QCTRY) for the non-life catastrophe risk sub-module

Country	Windstorm	Earthquake	Flood	Hail	Subsidence
AT	0.08%	0.10%	0.15%	0.08%	
BE	0.16%	0.02%	0.10%	0.03%	
BG		1.60%	0.15%		
CR		1.60%			
CY		2.35%			
CZ	0.03%	0.10%	0.40%		
CH	0.08%	0.25%	0.15%	0.06%	
DK	0.25%				
EE					
FI					
FR	0.12%	0.06%	0.10%	0.01%	0.05%
DE	0.09%	0.10%	0.20%	0.02%	
HE					
HU		0.20%	0.40%		
IS	0.03%				
IE	0.20%				
IT		0.80%	0.10%	0.05%	
LV					
LT					
LU	0.10%			0.03%	
MT					
NL	0.18%			0.02%	
NO	0.08%				
PL	0.04%		0.30%		
PT		1.20%			
RO		1.70%	0.40%		
SK		0.15%	0.45%		
SI		1.00%	0.30%		
ES	0.03%			0.01%	
SE	0.09%				
UK	0.17%		0.10%		
Guadeloupe	2.74%	4.09%			
Martinique	3.19%	4.71%			
St Martin	5.16%	5.00%			
Reunion	2.50%				

ANNEX M - Geographical segmentation for the Non-SLT health and non-life premium and reserve risk sub-modules

This annex defines the 18 geographical segments which are used in the health and non-life underwriting risk sub-modules of the standard formula to measure geographical diversification. The segmentation is based on "macro-geographical regions" developed by the United Nation Statistics Division for statistical purposes.

1. Central & Western Asia *(UN geo-scheme Central Asia and Western Asia, less Cyprus)*

Armenia	Azerbaijan	Bahrain	Georgia
Iraq	Israel	Jordan	Kazakhstan
Kuwait	Kyrgyzstan	Lebanon	Oman
Palestinian Territories	Qatar	Saudi Arabia	Syrian Arab Republic
Tajikistan	Turkey	Turkmenistan	United Arab Emirates
Uzbekistan	Yemen		

2. Eastern Asia *(UN geo-scheme Eastern Asia)*

China	Hong Kong	Japan	Macao
Mongolia	North Korea	South Korea	Taiwan

3. South and South-Eastern Asia *(UN geo-scheme Southern Asia and South-Eastern Asia)*

Afghanistan	Bangladesh	Bhutan	Brunei Darussalam
Cambodia	India	Indonesia	Iran
Lao PDR	Malaysia	Maldives	Myanmar
Nepal	Pakistan	Philippines	Singapore
Sri Lanka	Thailand	Timor-Leste	Vietnam

4. Oceania *(UN geo-scheme Oceania region)*

American Samoa	Australia	Cook Islands	Fiji
French Polynesia	Guam	Kiribati	Marshall Islands
Micronesia	Nauru	New Caledonia	New Zealand
Niue	Norfolk Island	N. Mariana Islands	Palau
Papua New Guinea	Pitcairn	Samoa	Solomon Islands
Tokelau	Tonga	Tuvalu	Vanuatu
Wallis & Futuna Islands			

5. Northern Africa ***(UN geo-scheme Northern Africa and Western Africa plus Cameroon, Central African Republic and Chad)***

Algeria	Benin	Burkina Faso	Cameroon
Cape Verde	Central African Rep.	Chad	Cote d'Ivoire
Egypt	Gambia	Ghana	Guinea
Guinea-Bissau	Liberia	Libya	Mali
Mauritania	Morocco	Niger	Nigeria
Saint Helena	Senegal	Sierra Leone	Sudan
Togo	Tunisia	Western Sahara	

6. Southern Africa ***(UN geo-scheme Southern Africa, Eastern Africa and Middle Africa other than countries specified under Northern Africa)***

Angola	Botswana	Burundi	Comoros
Dem Rep of Congo	Djibouti	Equatorial Guinea	Eritrea
Ethiopia	Gabon	Kenya	Lesotho
Madagascar	Malawi	Mauritius	Mayotte
Mozambique	Namibia	Rep of the Congo	Reunion
Rwanda	Sao Tome & Principe	Seychelles	Somalia
South Africa	Swaziland	Uganda	United Rep. of Tanzania
Zambia	Zimbabwe		

7. Eastern Europe ***(UN geo-scheme Eastern Europe)***

Belarus	Bulgaria	Czech Republic	Hungary
Moldova	Poland	Romania	Russian Federation
Slovakia	Ukraine		

8. Northern Europe ***(UN geo-scheme Northern Europe)***

Aland Islands	Channel Islands	Denmark	Estonia
Faeroe Islands	Finland	Guernsey	Iceland
Republic of Ireland	Isle of Man	Jersey	Latvia
Lithuania	Norway	Svalbard, Jan Mayen	Sweden
United Kingdom			

9. Southern Europe ***(UN geo-scheme Southern Europe, plus Cyprus)***

Albania	Andorra	Bosnia	Croatia
Cyprus	Gibraltar	Greece	Italy
fYR of Macedonia	Malta	Montenegro	Portugal
San Marino	Serbia	Slovenia	Spain

Vatican City

10. Western Europe ***(UN geo-scheme Western Europe)***

Austria	Belgium	France	Germany
Liechtenstein	Luxembourg	Monaco	Netherlands
Switzerland			

11. Northern America excluding the USA ***(UN geo-scheme Northern America, less the USA)***

Bermuda	Canada	Greenland	St Pierre & Miquelon

12. Caribbean & Central America ***(UN geo-scheme Caribbean and Central America)***

Anguilla	Antigua & Barbuda	Aruba	Bahamas
Barbados	Belize	British Virgin Islands	Cayman Islands
Costa Rica	Cuba	Dominica	Dominican Republic
El Salvador	Grenada	Guadeloupe	Guatemala
Haiti	Honduras	Jamaica	Martinique
Mexico	Montserrat	Netherlands Antilles	Nicaragua
Panama	Puerto Rico	St-Barthelemy	St Kitts & Nevis
St Lucia	St Martin	St Vincent	Trinidad & Tobago
Turks & Caicos Is'ds	US Virgin Islands		

13. Eastern South America ***(UN geo-scheme South America divided)***

Brazil	Falkland Islands	French Guiana	Guyana
Paraguay	Suriname	Uruguay	

14. Northern, southern and western South America ***(UN geo-scheme South America divided)***

Argentina	Bolivia	Chile	Colombia
Ecuador	Peru	Venezuela	

15. North-east US ***(NAIC North-eastern zone)***

Connecticut	Delaware	District of Columbia	Maine
Maryland	Massachusetts	New Hampshire	New Jersey
New York	Pennsylvania	Rhode Island	Vermont

16. South-east US ***(NAIC South-eastern zone, less US Virgin Islands)***

Alabama	Arkansas	Florida	Georgia
Kentucky	Louisiana	Mississippi	North Carolina
Puerto Rico	South Carolina	Tennessee	Virginia
W. Virginia			

17. Mid-west US ***(NAIC Midwestern zone)***

Illinois	Indiana	Iowa	Kansas
Michigan	Minnesota	Missouri	Nebraska
North Dakota	Ohio	Oklahoma	South Dakota
Wisconsin			

18. Western US ***(NAIC Western zone, less American Samoa and Guam)***

Alaska	Arizona	California	Colorado
Hawaii	Idaho	Montana	Nevada
New Mexico	Oregon	Texas	Utah
Washington	Wyoming		

ANNEX N - Adjustment factor for non-proportional reinsurance for the Non-SLT health and non-life premium and reserve risk sub-modules

1. The premium and reserve risk sub-modules allow undertakings to calculate an adjustment factor for non-proportional reinsurance in order to take into account their risk-mitigating effect.

2. The adjustment factor for non-proportional reinsurance should only be calculated in relation to per risk excess of loss reinsurance which complies with the following conditions:

    - it covers all insurance claims that the insurance or reinsurance undertaking may incur in the segment during the following year;
    - it allows for reinstatements;
    - it meets the requirements for risk mitigation techniques set out in subsection SCR.13.

$$NP_{lob} = \sqrt{\frac{1+\left(\Omega_{lob}^{net} / M_{lob}^{net}\right)^2}{1+\left(\Omega_{lob}^{gross} / M_{lob}^{gross}\right)^2}}$$

where

$$M_{lob}^{net} = M_{lob}^{gross} \cdot \left[1 - F_{m+\sigma^2,\sigma}(a+b) + F_{m+\sigma^2,\sigma}(a)\right] + a \cdot \left[F_{m,\sigma}(a+b) - F_{m,\sigma}(a)\right] - b \cdot \left[1 - F_{m,\sigma}(a+b)\right]$$

$$\Omega_{lob}^{net} = \left(\begin{array}{l} \left(\left(\Omega_{lob}^{gross}\right)^2 + \left(M_{lob}^{gross}\right)^2\right) \cdot \left[1 - F_{m+2\sigma^2,\sigma}(a+b) + F_{m+2\sigma^2,\sigma}(a)\right] \\ + a^2 \cdot \left[F_{m,\sigma}(a+b) - F_{m,\sigma}(a)\right] \\ - 2b \cdot M_{lob}^{gross} \cdot \left[1 - F_{m+\sigma^2,\sigma}(a+b)\right] + b^2 \cdot \left[1 - F_{m,\sigma}(a+b)\right] - \left(M_{lob}^{net}\right)^2 \end{array} \right)^{1/2}$$

$$\sigma = \sqrt{\ln\left(1 + \left(\frac{\Omega_{lob}^{gross}}{M_{lob}^{gross}}\right)^2\right)}$$

and

$$m = \ln M_{lob}^{gross} - \frac{\sigma^2}{2}$$

$$M_{lob}^{gross} = \begin{cases} \widetilde{M}_{lob}^{gross} & \text{if } S \geq 1 \\ S \cdot \widetilde{M}_{lob}^{gross} & \text{otherwise} \end{cases}$$

$$\Omega_{lob}^{gross} = \begin{cases} \widetilde{\Omega}_{lob}^{gross} & \text{if } S \geq 1 \\ S \cdot \widetilde{\Omega}_{lob}^{gross} & \text{otherwise} \end{cases}$$

and

$$S = \sqrt{\frac{n \cdot \sigma_{(prem,gross,lob)}^2 \cdot V_{(prem,gross,lob)}^2}{N \cdot \left(\left(\widetilde{\Omega}_{lob}^{gross}\right)^2 + \left(\widetilde{M}_{lob}^{gross}\right)^2\right)}}$$

3. The terms used in these formulas are defined as follows:

$\widetilde{M}_{lob}^{gross}$	=	Average cost per claim gross of reinsurance per LOB, estimated from the claims of the last *n* years, where $n \geq 1$
$\widetilde{\Omega}_{lob}^{gross}$	=	Standard deviation of the cost per claim gross of reinsurance per LOB, estimated with the standard estimator from the claims of the last *n* years, where $n \geq 1$
a	=	Retention of non-proportional reinsurance contract
b	=	Limit of the non-proportional reinsurance contract
$F_{m,\sigma}$	=	Distribution function of a Lognormal random variable with parameters (m, σ)
$F_{m+\sigma^2,\sigma}$	=	Distribution function of a Lognormal random variable with parameters $\left(m + \sigma^2, \sigma\right)$
$F_{m+2\sigma^2,\sigma}$	=	Distribution function of a Lognormal random variable with parameters $\left(m + 2\sigma^2, \sigma\right)$
n	=	Number of years used in the estimation of $\widetilde{M}_{lob}^{gross}$ and $\widetilde{\Omega}_{lob}^{gross}$
N	=	Number of claims during the last *N* years
$\sigma_{(prem,gross,lob)}$	=	Standard deviation for premium risk gross of reinsurance, calculated by putting the adjustment factor NP_{lob} to 1

$V_{(prem,gross,lob)}$ = Volume measure for premium risk gross of reinsurance, calculated in the same way as the usual volume measure but based on gross premiums instead of net premiums

4. Where the excess of loss reinsurance contract has no limit the adjustment factor for non-proportional reinsurance of a line of business shall be calculated in the same way as set out above, but with the following changes:

$$M_{lob}^{net} = M_{lob}^{gross} \cdot F_{m+\sigma^2,\sigma}(a) + a \cdot \left[1 - F_{m,\sigma}(a)\right]$$

$$\Omega_{lob}^{net} = \left(\left(\left(\Omega_{lob}^{gross}\right)^2 + \left(M_{lob}^{gross}\right)^2\right) \cdot F_{m+2\sigma^2,\sigma}(a) + a^2 \cdot \left[1 - F_{m,\sigma}(a)\right] - M_{lob}^{net}\right)^{1/2}$$

ANNEX O - Completeness, accuracy and appropriateness of data for the calculation of undertaking-specific parameters

1. For the purpose of QIS5, data is considered to represent numerical values including those that have been subject to qualitative adjustments based on expert judgement and/or prior analysis and experience.

2. Undertakings should not rely solely on expert judgment, and without reference to specific internal or external data.

3. Data used for the purpose of estimating undertaking-specific parameters shall comply with the following criteria:

    - The data can be internal or external directly relevant for the operations of that undertaking.
    - The data used for calibration of undertaking-specific parameters should be consistent with the underlying assumptions of the standardised methodology.
    - The undertaking's data set can be easily adapted and incorporated into the proposed standardised methodology. This shall apply at all stages of the calculation.
    - The estimation error as a result of using the data shall not imply that the data is inappropriate.
    - The data is considered to be representative for the expected conditions in the following year. When undertaking-specific parameters are calibrated on the basis of historic data, especially on the basis of lengthy time series, all historic data should be representative for the future conditions and environment of operations.
    - Where adjustments to the data have been introduced, such adjustments should have only been introduced to make the data more relevant and appropriate. The adjustments must be documented.
    - Any bias in the data shall be borne in mind and its impact shall be analyzed.

4. When external data is used solely or as a combination of both internal and external data, data shall be directly relevant for the operations of that undertaking, i.e. this data shall accurately reflect the risk profile of the undertaking and be as suitable as, or complement, internal data.

5. Furthermore undertakings are allowed to use external pooled data. Pooled data can be useful in cases such as the launch a new product or when undertakings do not have sufficient internal data. For example, small undertakings may not have a sufficient internal data to calculate own parameters and might therefore wish to use pooled data.

6. If undertakings use pooled data to calibrate undertaking-specific parameters, the following additional criteria should be met:

- Governance of pooling mechanism and of new database is set up as well as signed and fulfilled by members of the pooling mechanism.

- The pooling mechanism is transparent and auditable.

- The rules on data management shall ensure that the data provided to the pool by different members are sufficiently comparable: in particular this shall relate to data collection, definition, assessment and cleaning/adjustment.

- The pool shall comprise similar undertakings with similar risk profile not only among them but also to the undertaking, that is:

  - The pooled data shall represent data from undertakings with a similar risk profile and the nature of the business carried out is the same,

  - The pool of data shall be based on gross data of the business considered in order to allow each undertaking to derive values net of reinsurance by applying their own reinsurance programme.

  - In respect of the volatility levels estimated by the undertaking-specific parameters, the undertaking shall verify whether the pooled data provide homogeneous features compared to those of the undertaking. In particular, where the size of the pooled data is significantly different from the size of risk exposures of the undertaking, and this difference in size has impact on volatility, an appropriate adjustment shall be carried out to guarantee that the undertaking specific parameters reflect the volatility of the undertaking rather than the volatility of the wider pooled data considered.

7. The general data quality requirements in relation to appropriateness, completeness and accuracy which apply to all replaceable parameters can be complemented by requirements that relate to particular replaceable parameters. These additional requirements, if needed, are provided together with the standardised method to calculate the undertaking-specific parameter. For example, particular requirements on the data for the average claim size and the average claim number estimations could be:

   - the data should reflect the current reinsurance programme of the undertaking (i.e. either the data were observed under a comparable reinsurance cover or they were prepared for that purpose by taking gross data and applying the current reinsurance programme in order to estimate data net of reinsurance);

   - the data should stem from a sufficiently long period such that if cycles exist, at least a full cycle is covered in the data. For example, if the average claim number for hail crop insurance needs to be estimated, it would not be appropriate to use only data from the past year where no big hail events were observed;

   - the data is sufficiently homogeneous to produce a reliable estimate (this could be specified by limits on the coefficient of variation of the data set).

8. Examples where data may be considered to be unsatisfactory are (non-exhaustive):

- Low frequency of claims due to the nature of claim process/small portfolio which limit the extraction of the proper sample length,

- Data set from a time point before a significant change (for example legislation), whose impact cannot be adequately analyzed,

- New business without suitable external data,

- No reliable data collection process.

9. Undertakings may have data limitations, with respect to availability of best estimate data in the format required to estimate undertaking-specific parameters, for example:

    - Many undertakings may have made "best estimates" in the past and then adjusted them for reporting purposes.

    - Some "best estimates" may not be in line with the Solvency II requirements: for instance, intended to be the mean and fully adjusted for extreme events not sufficiently represented in the data, and they may not have been discounted using the appropriate risk free yield curve.

    - The degree of rigour and consistency in the estimation may be lower than the standard undertakings need to adopt under Solvency II.

    - Where undertakings have not calculated best estimates in the past (this would be the case where their estimates were deliberately prudent) it would not seem appropriate to use these estimates.

10. Undertakings are able to do the estimation on an underwriting year basis, if they do not have historic data on an accident year basis.

11. The application and relevance of the proportionality principle is limited due to the optional character of the use of undertaking-specific parameters and because poor quality data is unlikely to give rise to a more appropriate reflection in the parameter values of the risk profile than the standard formula. Standard parameters should only be replaced where the estimation based on the internal data or external data is more appropriate and relevant to the undertaking’s risk profile than that used otherwise.

ANNEX P - Principles for recognising risk mitigation techniques in the SCR standard formula

Principle 1: Economic effect over legal form

- Risk mitigation techniques should be recognised and treated consistently, regardless of their legal form or accounting treatment, provided that their economic or legal features meet the requirements for such recognition.

- Where risk mitigation techniques are recognised in the SCR calculation, any material new risks shall be identified, quantified and included within the SCR. Where the risk mitigation technique actually increases risk, then the SCR should be increased.

- The calculation of the SCR should recognise risk mitigation techniques in such a way that there is no double counting of mitigation effects.

Principle 2: Legal certainty, effectiveness and enforceability

- The transfer of risk from the undertaking to the third party shall be effective in all circumstances in which the undertaking may wish to rely upon the transfer. Examples of factors which the undertaking shall take into account in assessing whether the transaction effectively transfers risk and the extent of that transfer include:
    - whether the relevant documentation reflects the economic substance of the transaction;
    - whether the extent of the risk transfer is clearly defined and beyond dispute;
    - whether the transaction contains any terms or conditions the fulfilment of which is outside the direct control of the undertaking. Such terms or conditions may include those which:
        - would allow the third party unilaterally to cancel the transaction, except for the non-payment of monies due from the undertaking to the third party under the contract;
        - would increase the effective cost of the transaction to the undertaking in response to an increased likelihood of the third party experiencing losses under the transaction;
        - would oblige the undertaking to alter the risk that had been transferred with the purpose of reducing the likelihood of the third party experiencing losses under the transaction;
        - would allow for the termination of the transaction due to an increased likelihood of the third party experiencing losses under the transaction;
        - could prevent the third party from being obliged to pay out in a timely manner any monies due under the transaction; or
        - could allow the maturity of the transaction to be reduced.

- An undertaking shall also take into account circumstances in which the benefit to the undertaking of the transfer of risk could be undermined. For instance, where the undertaking, with a view to reducing potential or actual losses to third parties, provides support to the transaction, including support beyond its contractual obligations.

- In determining whether there is a transfer of risk, the entire contract shall be considered. Further, where the contract is one of several related contracts the entire chain of contracts, including contracts between third parties, shall be considered in determining whether there is a transfer of risk. In the case of reinsurance, the entire legal relationship between the cedant and reinsurer shall be taken into account in this determination.

- The undertaking shall take all appropriate steps, for example a sufficient legal review, to ensure and confirm the effectiveness and ongoing enforceability of the risk mitigation arrangement and to address related risks. 'Ongoing enforceability' refers to any legal or practical constraint that may impede the undertaking from receiving the expected protection. In the case of financial risk mitigation, the allowance in the SCR of the 'counterparty default risk' derived from the 'financial risk mitigation technique' does not preclude the necessity of satisfying the 'ongoing enforceability'.

- In the case of financial risk mitigation, instruments used to provide the risk mitigation together with the action and steps taken and procedures and policies implemented by the undertaking shall be such as to result in risk mitigation arrangements which are legally effective and enforceable in all jurisdictions relevant to the arrangement and, where appropriate, relevant to the hedged asset or liability.

- Procedures and processes not materialized in already existing financial contracts providing protection at the date of reference of the solvency assessment, shall not be allowed to reduce the calculation of the SCR with the standard formula.

Principle 3: Liquidity and certainty of value

- To be eligible for recognition, the risk mitigation techniques shall be valued in line with the principles laid down for valuation of assets and liabilities, other than technical provisions. This value shall be sufficiently reliable and appropriate to provide certainty as to the risk mitigation achieved.

- Regarding the liquidity of the financial risk mitigation techniques, the following applies:
  - the undertaking should have written internal policy regarding the liquidity requirements that financial risk mitigation techniques should meet, according to the objectives of the undertaking's risk management policy;
  - financial risk mitigation techniques considered to reduce the SCR have to meet the liquidity requirements established by the undertaking; and
  - the liquidity requirements shall guarantee an appropriate coordination of the liquidity features of the hedged assets or liabilities, the liquidity of the financial risk mitigation technique, and the overall policy of the undertaking regarding liquidity risk management.

Principle 4: Credit quality of the provider of risk mitigation

- Providers of risk mitigation instruments should have an adequate credit quality to guarantee with appropriate certainty that the undertaking will receive the protection in the cases specified by the contracting parties.

- Credit quality should be assessed using objective techniques according to generally accepted practices.

- The assessment of the credit quality of the provider of protection shall be based on a joint and overall assessment of all the features or contracts directly and explicitly linked to the financial risk mitigation technique. This assessment shall be carried out in a prudent manner, in order to avoid any overstatement of the credit quality.

- The correlation between the values of the instruments relied upon for risk mitigation and the credit quality of their provider shall not be unduly adverse, i.e. it should not be materially positive (known in the banking sector as 'wrong way risk'). As an example, exposures in a company belonging to a group should not be mitigated with CDS provided by entities of the same group, since it is very likely that a failure of the group will lead to falls in the value of the exposure and simultaneous downgrade or failure of the provider of protection. This requirement does not refer to the systemic correlation existing between all financial markets as a whole in times of crisis.

Principle 5: Direct, explicit, irrevocable and unconditional features

- Financial risk mitigating techniques can only reduce the capital requirements if:
  - they provide the undertaking with a direct claim on the protection provider;
  - they contain an explicit reference to specific exposures or a pool of exposures, so that the extent of the cover is clearly defined and incontrovertible;
  - they are not subject to any clause, the fulfilment of which is outside the direct control of the undertaking, that would allow the protection provider to unilaterally cancel the cover or that would increase the effective cost of protection as a result of certain developments in the hedged exposure; and
  - they are not subject to any clause outside the direct control of the undertaking that could prevent the protection provider from its obligation to pay out in a timely manner in the event that a loss occurs on the underlying exposure.

ANNEX Q - Comparison between the QIS5 criteria for classification of own-fund items and the QIS5 classification criteria to be used for transitional provisions

Tier 1 Basic Own-Funds – Criteria for QIS 5 classification		Grandfathering Criteria for QIS 5	Comments
(a)	The item should be the most deeply subordinated or in the case of other paid in capital instruments (OF.4(1)(g)) senior only to the most deeply subordinated Tier 1 item in a winding up.	The item should rank after the claims of all policyholders and beneficiaries and non-subordinated creditors.	It is acknowledged that the relative ranking between different paid in capital instruments currently may make it unlikely that the paid in capital instrument is senior only to the most deeply subordinated Tier 1 item in a winding up.
(b)	The item should not cause or accelerate the insolvency of the insurance or reinsurance undertaking. The holder of the instrument must not be in a position to petition for the insolvency of the issuer. The instrument should not be taken into account for the purposes of determining whether the institution is insolvent (either because it is treated as shareholders' equity or it is not treated as a liability in determining balance sheet insolvency – i.e. whether liabilities exceed assets). The undertaking must be able to cancel coupon dividend payments without the risk of investors invoking default and triggering legal insolvency.	The item should not cause or accelerate the insolvency of the insurance or reinsurance undertaking. The holder of the instrument must not be in a position to petition for the insolvency of the issuer. The instrument should not be taken into account for the purposes of determining whether the institution is insolvent (either because it is treated as shareholders' equity or it is not treated as a liability in determining balance sheet insolvency – i.e. whether liabilities exceed assets). The undertaking must be able to cancel or defer coupon/ dividend payments without the risk of investors invoking default and triggering legal insolvency.	Same criteria, except that coupons/ dividends may be either cancelled or deferred for grandfathered instruments.
(c)	The item is fully paid in and is immediately available to absorb losses.	The item is fully paid in and is immediately available to absorb losses.	Same criteria

(d)	The item absorbs losses at least once when the insurance or reinsurance undertaking breaches its Solvency Capital Requirement and it should not hinder its re-capitalisation.	The item has flexibility on coupon/ dividend payments and is undated, but there is not necessarily a principal loss absorbency mechanism such as conversion or write-down.	Criteria based around the SCR and principal loss absorbency mechanisms may not exist currently.
(e)	The item is undated or has an original maturity of at least 10 years. The maturity date is deemed to be the first opportunity to repay or redeem the basic own-funds item unless there is a contractual obligation to replace the item with an item of the same or higher quality capital.	The item is undated.	Grandfathered instruments in Tier 1 should be undated.
(f)	The item is only repayable or redeemable at the option of the insurance or reinsurance undertaking, subject to approval from the supervisory authority …	The item is only repayable or redeemable at the option of the insurance or reinsurance undertaking, subject to approval from the supervisory authority.	Same criteria
	….and must not include any incentives to redeem or repay that item. Incentives to redeem can include but are not limited to step-ups associated with a call option.	Any incentives to redeem are moderate. Incentives to redeem can include but are not limited to step-ups associated with a call option. Step-ups must not apply before 10 years from issue date and must not exceed the higher of 100bps or 50% of the initial credit spread in order to be considered moderate.	Many existing instruments have incentives to redeem so the grandfathering criterion permits moderate incentives to redeem.
(g)	The item must provide for the suspension of the repayment or redemption if the insurance or reinsurance undertaking breaches its Solvency Capital Requirement or would breach it if the instrument is repaid or redeemed. The supervisory authority may waive the suspension of repayment or redemption of the item provided that it is exchanged for or converted into another item of equivalent or higher	The item is undated and the item is only repayable or redeemable at the option of the insurance or reinsurance undertaking, subject to approval from the supervisory authority.	Criteria based around the SCR are unlikely to exist under Solvency I.

	quality and the Minimum Capital Requirement is complied with.		
(h)	The insurance or reinsurance undertaking has full discretion over payment of coupon/dividend or other similar payments. For items in OF.4(1)(a) and (b) (ordinary share capital and equivalent items for mutuals) the level of distribution is not in any way tied or linked to the amount paid in at issuance and is not subject to a cap and there is no preference as to distribution of income or capital.	The undertaking must be able to cancel or defer coupon/dividend or other similar payments in a period of stress. Instruments may have a range of provisions relating to the waiver of coupon/dividend or other similar payments. These may range from full discretion at all times to mandatory cancellation under certain conditions.	The Solvency II criterion is likely to be too narrow for instruments where the legal documentation could not have been drafted with this criterion in mind.
(i)	In respect of other paid in capital instruments OF.4(1)(g), the item must provide for the cancellation of coupon/dividend or other similar payments if the insurance or reinsurance undertaking breaches its Solvency Capital Requirement or if paying the coupon/dividend would breach its Solvency Capital Requirement. The supervisory authority may waive the cancellation of the payment of interest or dividend provided that the payment does not further weaken the solvency position of the undertaking and the Minimum Capital Requirement is complied with.	In addition, although the item may not exhibit the characteristics which are specifically linked to compliance with the SCR under Solvency II, it should possess some features which enable it to absorb losses on a going concern basis. These might include some form of conversion or write-down mechanism and features requiring cancellation of coupon/dividend or other similar payments even if they are not expressed in terms of the relevant Solvency II criteria in respect of these matters.	Criteria based around the SCR are unlikely to exist under Solvency I.

(j)	Where an insurance or re-insurance undertaking exercises its discretion or is required (because of actual or potential breach of the SCR) to cancel a coupon/dividend payment, there must be no requirement or entitlement to settle that payment at a future date. Alternative coupon satisfaction mechanisms (ACSM) may be permitted under the terms of the instrument only in the case of "other paid in capital instruments" (OF.4(1)(g)) where they provide for coupons/dividends to be settled through the issue of ordinary shares. The use of ACSM is only acceptable if it achieves the same economic result as the cancellation of the coupon (i.e. there is no decrease in own funds because the reduction of reserves by the amount of the coupon/dividend is matched by an increase in share capital). To meet this condition, any coupons not paid in cash should be satisfied without delay using unissued ordinary shares which have already been approved or authorised under national law or the appropriate statutes of the undertaking.	The undertaking must be able to cancel or defer coupon/dividend or other similar payments in a period of stress. Instruments may have a range of provisions relating to the waiver of coupon/dividend or other similar payments. These may range from full discretion at all times to mandatory cancellation under certain conditions.	Criteria based around the SCR are unlikely to exist under Solvency I.

(k)	The item must be free of any encumbrances and must not be connected with any other transaction, which when considered with the item could undermine the characteristics and features of that item. Examples of potential encumbrances include, but are not limited to: rights of set off, restrictions, charges or guarantees. Where an investor subscribes for capital in an undertaking and at the same time that undertaking has provided financing to the investor, only the net financing provided by the investor is considered as eligible own funds. In addition, adopting an economic approach and applying the principle of substance over form, where there is evidence of a group of connected transactions whose economic effect is the same as the holding of 'own shares', the assets that those transactions generate for the undertaking should be deducted from its own funds, to the extent necessary to guarantee that own funds reliably represent the net financial position of its shareholders, further to other allowed items.	The item must be free of any encumbrances and must not be connected with any other transaction, which when considered with the item could undermine the characteristics and features of that item. Examples of potential encumbrances include, but are not limited to: rights of set off, restrictions, charges or guarantees. Where an investor subscribes for capital in an undertaking and at the same time that undertaking has provided financing to the investor, only the net financing provided by the investor is considered as eligible own funds. In addition, adopting an economic approach and applying the principle of substance over form, where there is evidence of a group of connected transactions whose economic effect is the same as the holding of 'own shares', the assets that those transactions generate for the undertaking shall be deducted from its own funds, to the extent necessary to guarantee that own funds reliably represent the net financial position of its shareholders, further to other allowed items.	Same criteria
	Items in other paid in capital instruments (OF.4(1)(g)) must possess one of the following principal loss absorbency mechanisms for which the trigger event is a significant breach of the Solvency Capital Requirement: (a) the item automatically converts into either ordinary share capital or the initial fund at the trigger event; or	The item has flexibility on coupon/ dividend payments and is undated, but there is not necessarily a principal loss absorbency mechanism such as conversion or write-down.	Criteria based around the SCR and principal loss absorbency mechanisms may not exist currently.

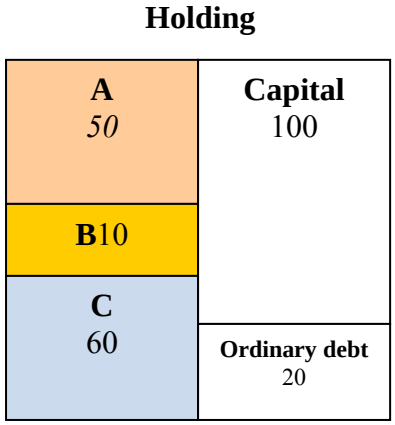
(b) at the trigger event, the principal amount of the item is written down pari passu with retained earnings, by the amount of the breach of the Solvency Capital Requirement. The item can only be written back up again from future profits also on a pari passu basis once the undertaking complies with the Solvency Capital Requirement. A significant breach of the Solvency Capital Requirement is defined as the earlier of the following events (a) own funds are equal to or less than 75% of the Solvency Capital Requirement or (b) a breach of the Solvency Capital Requirement is not resolved within a two month period.		

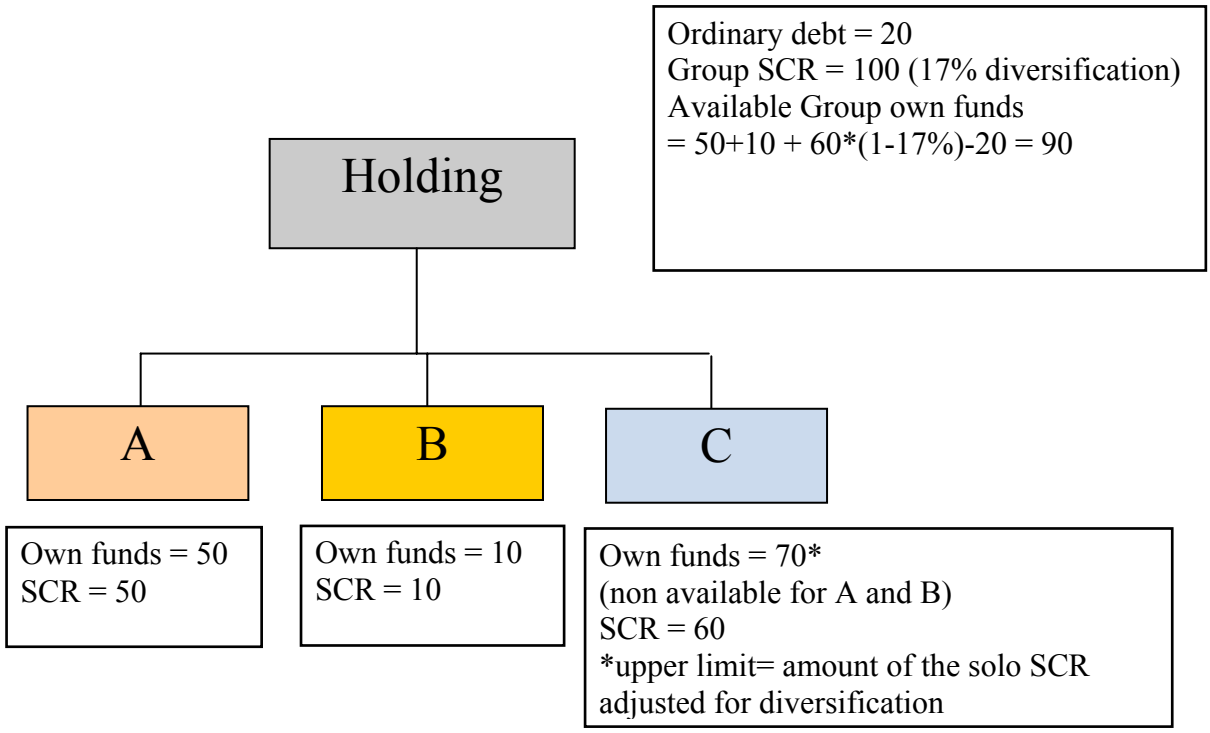
Tier 2 Basic Own-Funds – Criteria for QIS5 classification		**Grandfathering Criteria for QIS5**	**Comments**
(a)	The item should rank after the claims of all policyholders and beneficiaries and non-subordinated creditors.	The item should rank after the claims of all policyholders and beneficiaries and non-subordinated creditors.	Same criteria
(b)	In the case of a capital instrument that is called up but not paid up, the instrument must meet the criteria for tier 1 other than the item being fully paid in and being immediately available to absorb losses.	The item is fully paid in and is immediately available to absorb losses.	The grandfathering criterion is related to capital instruments which would need to be paid in to qualify under Solvency I.
(c)	The item will not cause or accelerate the insolvency of the insurance or reinsurance undertaking.		
(d)	The item is undated or has an original maturity of at least 5 years. The maturity date is deemed to be the first opportunity to repay or redeem the basic own-funds item unless there is a contractual obligation	The item is undated or has an original maturity of at least 5 years. The maturity date is deemed to be the first opportunity to repay or redeem the basic own-funds item unless there is a contractual obligation	Same criteria

	to replace the item with an item of the same or higher quality capital.	to replace the item with an item of the same or higher quality capital.	
(e)	The item is only repayable or redeemable at the option of the insurance or reinsurance undertaking, subject to approval from the supervisory authority	The item is only repayable or redeemable at the option of the insurance or reinsurance undertaking, subject to review by the supervisory authority.	Repayment or redemption may not be subject to supervisory approval, but supervisory authorities should be notified of redemption or repayment.
	and can include moderate incentives to redeem or repay that item. Incentives to redeem can include but are not limited to step-ups associated with a call option. Step-ups must not apply before 5 years from issue date and must not exceed the higher of 100bps or 50% of the initial credit spread in order to be considered moderate.	Any incentives to redeem are moderate. Incentives to redeem can include but are not limited to step-ups associated with a call option. Step-ups must not apply before 5 years from issue date and must not exceed the higher of 100bps or 50% of the initial credit spread in order to be considered moderate.	Same criteria
(f)	The item must provide for the suspension of its repayment or redemption if the insurance or reinsurance undertaking breaches its Solvency Capital Requirement or would breach it if the instrument is repaid or redeemed. The supervisory authority may waive the suspension of repayment or redemption of the item as long the instrument is exchanged for or converted into an own-fund item of the same or higher quality capital and the Minimum Capital Requirement is complied with.		Criteria based around the SCR are unlikely to exist under Solvency I
(g)	The item must provide for the deferral of payments of interest or dividends or other similar payments if the insurance or reinsurance undertaking breaches its Solvency Capital Requirement or if paying the interest, dividends or other similar payments would breach the Solvency Capital Requirement. The supervisory		Criteria based around the SCR are unlikely to exist under Solvency I

	authority may waive the cancellation of the payment of interest or dividend provided that the payment does not further weaken the solvency position of the undertaking and the Minimum Capital Requirement is complied with.		
(h)	The item should be free of any encumbrances and must not be connected with any other transaction, which when considered with the item could undermine that characteristics and features of that item. Examples of potential encumbrances include, but are not limited to, rights of set off, restrictions, charges or guarantees. Where an investor subscribes for capital in an undertaking and at the same time that undertaking has provided financing to the investor, only the net financing provided by the investor is considered as eligible own funds.	The item must be free of any encumbrances and must not be connected with any other transaction, which when considered with the item could undermine the characteristics and features of that item. Examples of potential encumbrances include, but are not limited to: rights of set off, restrictions, charges or guarantees. Where an investor subscribes for capital in an undertaking and at the same time that undertaking has provided financing to the investor, only the net financing provided by the investor is considered as eligible own funds.	Same criteria

ANNEX R - Example for the contribution of non available own funds of the related undertakings to group own funds





ANNEX S - Spread shock on underlying assets of structured products

1. The spread shock on underlying assets of structured products is the immediate effect on the net asset value expected in the event of an instantaneous decrease of values in structured products due to the widening of the credit spreads of bonds of the underlying assets:

$$\sum_i MV_i \frac{max\left(H\left(ratingdist_i, tenure_i\right) \bullet \left(1 - R\left(ratingdist_i\right)\right) - attach_i; 0\right)}{detach_i - attach_i}$$

where

$H(ratingdist_i, tenure_i)$ = a function of the rating class and tenure of the credit risk exposure within a securitised asset pool which is calibrated to deliver a shock consistent with VaR 99.5%

$R(ratingdist_i)$ = a function of the rating class of the credit risk exposure within a securitised asset pool which is calibrated to deliver a shock consistent with VaR 99.5%

2. The function H is determined as follows:

$H(ratingdist_i, tenure_i)$	**AAA**	**AA**	**A**	**BBB**	**BB**	**B**	**CCC or lower**	**Unrated**
0-1.9 years	0.8%	1.6%	4.7%	8.1%	20.9%	41.5%	65.9%	9.7%
2-3.9 years	1.6%	3.1%	8.1%	14.7%	34.1%	59.7%	83.3%	17.6%
4-5.9 years	2.3%	5.0%	10.9%	20.2%	43.0%	68.2%	88.4%	24.2%
6-7.9 years	3.5%	7.4%	14.0%	25.2%	50.4%	73.3%	90.7%	30.2%
8+ years	4.7%	9.7%	17.1%	30.2%	56.2%	77.1%	91.9%	36.2%

3. The function R is determined as follows:

$R(ratingdist_i)$	**AAA**	**AA**	**A**	**BBB**	**BB**	**B**	**CCC or lower**	**Unrated**
Recovery rate	50%	45%	40%	35%	30%	25%	20%	35%

4. For the sake of simplicity, a function G was derived from functions H and R: G=H.(1-R).

5. The function G is determined as follows:

$G(ratingdist_i, tenure_i)$	**AAA**	**AA**	**A**	**BBB**	**BB**	**B**	**CCC or lower**	**Unrated**
0-1.9 years	0.4%	0.9%	2.8%	5.3%	14.6%	31.1%	52.7%	6.3%
2-3.9 years	0.8%	1.7%	4.9%	9.6%	23.9%	44.8%	66.6%	11.4%
4-5.9 years	1.2%	2.8%	6.5%	13.1%	30.1%	51.2%	70.7%	15.7%
6-7.9 years	1.8%	4.1%	8.4%	16.4%	35.3%	55.0%	72.6%	19.6%
8+ years	2.4%	5.3%	10.3%	19.6%	39.3%	57.8%	73.5%	23.5%