



THE SOCIETY OF ACTUARIES IN IRELAND

**Submission on the Financial Regulator's Consultation Paper
"Investment Guarantees – Guidance on Reserving and Risk
Governance" (CP42)**

July 2010

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1 Introduction

The Society of Actuaries in Ireland is the professional body representing the actuarial profession in Ireland. Many of our members hold responsible roles within or as advisers to financial services firms, especially insurance and reinsurance companies. They act as Board members, Appointed Actuaries (with statutory responsibilities), Signing Actuaries (also with statutory responsibilities), and senior managers carrying a range of responsibilities including financial and risk management.

The Society welcomes the opportunity to participate in this consultation on “Investment Guarantees – Guidance on Reserving and Risk Governance” (“CP42”). We support the regulators aims of providing greater guidance on calculations of capital requirements and on appropriate risk management procedures for undertakings writing material amounts of Investment Guarantee business in general and Variable Annuity related guarantees in particular. We also agree with the Financial Regulator’s stated objectives of moving the requirements towards Solvency II where possible. The Society recognises that Variable Annuity products can contain features that increase risk and complexity and therefore that additional layers of governance and supervision are appropriate.

Regarding the scope of the consultation, we recognise the challenge in identifying particular classes of business to be subject to additional requirements and identify that the appropriate approach would be to take a risk based assessment based on the existence of material asymmetric risk with respect to investment and mismatch risk. However, noting that the requirements are to a certain extent a temporary measure in anticipation of Solvency II we see there being scope for excluding major classes of business which contain material Investment Guarantees, such as With Profits business, for practical reasons noting that to accelerate implementation of Solvency II for such a wide swathe of business would be impractical.

In our response we have inevitably focussed our attention on the issues surrounding capital and reserves since Appointed Actuaries and Signing Actuaries will be required to sign-off the liabilities of the undertaking. However we have also commented on other areas of more general governance

Comments on QIS5 in this document were based on the draft QIS5 specification and to not reflect the final specification issued on July 6th 2010.

In the Executive Summary in section 2 we have highlighted some of the more significant comments. In the subsequent sections we address the detailed requirements:

- Section 3 deals with issues surrounding scope of application of the proposed guidance (notes 1-3)
- Section 4 addresses Capital and Reserve requirements. This addresses notes 5-9 and note 13 of the proposed guidance.
- Section 5 provides some quantitative examples of possible results under the various possible capital and reserve calculations
- Section 6 deals with particular issues surrounding Economic Scenario Generators
- Section 7 addresses Governance issues, including the proposed Financial Risk Analysis and RVC process

We are available to discuss this response with the Financial Regulator if desired.

2 Executive Summary

2.1 Scope of Application

We understand that the Financial Regulator does not intend to impose new requirements on established types of business, which it believes to be adequately covered by existing guidance and where current risk mitigation, reserving and governance techniques are adequate. However we believe that additional clarity of scope could be added.

In finalising the definition of Investment Guarantee business we would recommend that this is done having regard to:

- The risks involved in different classes of business
- The net of reinsurance risks retained by the undertaking.
- That, notwithstanding the strict applicability of the risk definition above that for practical reasons, rather than principled reasons that certain classes are exempted, such as With Profits business.
- Guidance should be provided on the allowance for reinsurance, the extent to which the new minimum capital & reserves standards apply to undertakings who reinsure and any additional reporting requirements in relation to reinsurance counterparty exposure.

Two possible options as to how this guidance is implemented are:

1. The Financial Regulator can determine whether the new rules apply to each undertaking individually based on their assessment of the undertaking's business; or
2. The rules could be applied more generally with a provision for a proportionality principle allowing for simplifications depending on how much investment guarantee business is being written relative to the overall business of the undertaking. This could be self determined by the undertakings subject to a right of rebuttal or refusal by the Financial Regulator.

2.2 Capital and Reserve Requirements

With Solvency II due to be implemented in a little over two year's time, it is essential that any proposals are not just consistent with Solvency II but that they should lead undertakings more rapidly in that direction and hopefully lead to a better Solvency II implementation when complete. Against this background we are concerned by the proposed Basis 1 tests. We believe that the introduction of the Basis 1 requirements could require considerable additional effort on the part of undertakings without enhancing their readiness for Solvency II. We propose that the Financial Risk Analysis is the appropriate home for additional stress testing implied by Basis 1.

We propose that the Financial Regulator should focus efforts on Basis 2 with undertakings moving to Basis 3 as their internal models reach the levels appropriate for Financial Regulator approval. This would lead to a requirement to be able to meet at least the current Solvency I requirements and also to be able to meet the additional tests under Basis 2 or Basis 3 as appropriate. The Financial Regulator will need to provide clear guidance on the specific Basis 2 calibration to use in advance of the formal adoption of Solvency II. This calibration may include some features which are not captured in the standard formula for Solvency II, such as volatility if this is removed from the Standard Formula.

Greater clarity of how the proposed capital and reserving requirements interact with Solvency I requirements is needed. We propose some solutions in section 4.1 below.

We provide some quantitative results in section 5. These show that the Basis 1(a) CAR is a consistently higher metric than Basis 2 and the level of difference is significant, ranging from 2% to 15% of Single Premium. Such an amount is material, and would have considerable impacts on pricing and affordability of the contracts, and on the ability of undertakings to provide them. If the Financial Regulator intends to retain the Basis 1(a) measure, we would recommend that the calibration be changed to a lower level VAR.

2.3 Economic Scenarios

There are a number of detailed discussion points on Economic Scenarios. These are addressed in section 6 of this response. The selection of model and its calibration will differ depending on the nature of the liabilities and the type of valuation – for example lifetime projection will use real world scenarios while Solvency II type calculations rely heavily on market consistent scenarios.

Owing to its importance, and to the range of reasonable alternatives for implementation, we see model selection and governance as a key risk management function and note that there will be a significant reliance on expert judgement. For Basis 3 calculations the Financial Regulator will have the opportunity to review the planned approaches when it reviews internal model application documentation. For Basis 2 calculations the calibration is defined quite closely and the use of option tables as envisaged in Note 16 of CP42 should help ensure consistency.

2.4 Governance Requirements

Risk Governance for undertakings providing guarantees will by definition be subject to the general requirements for the undertakings. As such, Insurance Undertakings (and possibly Reinsurance Undertakings) will be subject to the requirements of the recently exposed CP41 once the requirements become final, and reinsurers currently will remain subject to Corporate Governance for Reinsurance Undertakings requirements as issued by the Financial Regulator in December 2007 unless such a requirement is replaced or subsumed into CP41.

Furthermore, Insurance and Reinsurance Undertakings will be subject to the requirements of Solvency II when implemented.

These current and proposed governance requirements have been enhanced to take account of the lessons learned from the financial crisis. Additional governance requirement for guaranteed business should aim to enhance these requirements where the Financial Regulator believes that significant gaps still exist.

In the Society's response to CP41, we suggested that undertakings should be subject to graded levels of governance depending on scale and complexity. We accept that undertakings writing substantial volumes of guaranteed business should be considered to be towards the upper end of the scale and subject to the highest levels of corporate governance, particularly where they are managing large volumes of complex risks and managing the risks through dynamic hedging techniques.

We believe that the introduction of the proposed Financial Risk Analysis adds significantly to the governance of undertakings, and as such, we strongly support this development. We have suggested some amendments to the format of the report (see section 7.3.5 below). The FRA should be prepared by a competent and independent agent, such as the Appointed Actuary, and presented to the Board for review and, if appropriate, to be applied annually.

We also agree in general terms with the requirement for Independent Oversight as outlined in Note 4 of the proposal. We feel that, consistent with good governance and Solvency II developments, the whole Board should have responsibility for oversight rather than having reliance on a single Board director. If the Board feels that they require external assistance to exercise this role, then this should be commissioned by the Board, either from an external party or possibly from a member of the Board¹.

We are, to a certain extent, unclear as to the Financial Regulator's specific expectation in respect of the RVC outlined on Note 18 of CP42. To the extent that we view it as an expectation that undertakings adopt a forward looking assessment of risk and capital requirements, we see this as being included within the FRA, in particular under the generalised heading of Strategic Risk and Capital Planning. We do not believe that any additional requirements are necessary for undertakings writing business with investment guarantees as distinct from other undertakings in the marketplace. Therefore, we would suggest that any additional requirements in this area should be introduced as part of the introduction to Solvency II rather than adding an extra requirement now.

We make additional comments on specific aspects of the proposed Governance requirements in section 7 below.

2.5 Timescales for Implementation

The Society has a number of concerns about the ability of undertakings to meet the reporting requirements as set out in CP42 by the end of 2010. We believe that a phased implementation would be more appropriate with some of the requirements perhaps being introduced at the end of 2010 and other beings implemented over the following two years.

We recommended that the Financial Regulator should initially focus on Basis 2 as the capital and reserve test with a move towards Basis 3 as undertakings complete their internal models. We believe that undertakings should be in a position to make this change for end 2010 (since most will have completed QIS5 anyway). The FRA could then be implemented over the course of 2011.

2.6 Summary

We believe that CP42 is a valuable contribution to the risk management and governance of products with investment guarantees. We believe that the Financial Regulator should consider changes in the following areas before implementing final guidance:

- Clarify the scope in a number of areas.
- Focus the capital requirements on Basis 2 initially and on Basis 3 as internal models for Solvency II are approved.
- If Basis 1(a) is retained that it is included within a Pillar 2 assessment, such as the FRA
- Clarify some of the requirements for Economic Scenarios particularly as they relate to different uses and to allow undertakings to take account of their specific risks.
- Make some changes to the proposed FRA and use of independent oversight though we generally agree with the value of these proposals.
- Remove the requirement for a RVC process until the implementation of Solvency II.
- Consider a phased implementation of the requirements rather than implementing all requirements from end 2010.

¹ Taking care as necessary to avoid conflicts of interest for the board member.

3 Scope of Application

We understand that the Financial Regulator does not intend to impose new requirements on established types of business, which it believes to be adequately covered by existing guidance and where current risk mitigation, reserving and governance techniques are adequate. The definition of Investment Guarantee business as currently drafted reflects this aim. However, there is some ambiguity in the proposed definition in that certain classes of established business would appear to fall within the scope. We therefore recommend that the scoping definition be re-worded to more precisely capture the business classes intended to be covered.

Some observations follow on the definition of Investment Guarantee business in the consultation paper:

3.1 Excluded classes of business

Note 3 – Defined Classes of Business - lists seven established classes of business which are to be excluded from scope.

- Broadly we agree that Pure Protection policies (presumably including unit linked protection), Conventional Annuities and Conventional Guaranteed Bonds should be excluded from scope since there are established immunisation approaches for the management of these types of risks. Similarly there are established reserving techniques including the use of a conservative reinvestment rate, resilience tests etc.
- Guaranteed Equity Bonds and “plain vanilla” CPPI should be excluded from scope to the extent that the risk is passed to a third party where the policy is effectively a unit linked product from the perspective of the undertaking. Indeed these could also be excluded where the undertaking solely takes counterparty risk and otherwise takes no investment risk. Where the undertaking is managing these guarantees through its own hedge strategy or indeed as a naked unhedged exposure, we believe that they should be in scope since the risks are not dissimilar to variable annuity type products.
- Notwithstanding with profits business (including unitised with profits) is significantly different from unit linked business, due to the built in risk mitigation techniques, these policies do retain material investment risks which are very company specific. Thus, from an in principle perspective we can see there being a case from bringing such classes within scope for a consultation on Investment Guarantees. That said, we see the business as being sufficiently different from Variable Annuities to argue that the framework of CP42 is not sufficiently With Profit specific to be applied to this class. Furthermore, owing to the scale of With Profits business both domestically and internationally we recognise that this is best tackled through the Solvency II process and along the existing Solvency II time line.

Whilst Note 3 gives a list of excluded products we believe that the guidance would benefit from specifically clarifying whether the following situations are in scope, if that is indeed the intention of the Financial Regulator.

We believe that unit linked guaranteed minimum death benefit (GMDB) products should be included in scope. Many undertakings have small amounts of this business from older product lines. We believe that the requirements should apply to these, except to the extent that they are not otherwise excluded by materiality limits (which we expect will apply in many situations).

We believe that Guaranteed Annuity Options (on either with profit or unit linked products) should be covered by the scope of the paper since these products demonstrate many of the same complex features that would require stochastic testing.

3.2 Reinsurance & Structured Products

We feel that the guidance should also address the extent to which it is to apply to direct writers who use reinsurance.

For direct writers who write business with investment guarantees which are fully reinsured, it may be appropriate to consider different requirements which would focus more on counterparty risk.

Similarly, the guidance should address the extent to which it applies to undertakings who purchase structured products or other assets from investment banks to closely match the investment guarantee offered. In such cases, if the default risk is not passed to the policyholder, the undertaking is exposed to counterparty risk.

In the case of a reinsured liability the Undertaking is still required to calculate Gross Reserves before taking account of the reinsurance. We suggest that conventional prudent deterministic calculations with resilience tests would suffice for the calculation of Gross Reserves in this situation and that it would only be the net liability which would be subject to the various CAR tests.

For the avoidance of doubt we advocate that the Undertaking should consider collateral or other structures to protect itself in the event of the Risk Mitigation structures failing or unwinding.

3.3 Materiality thresholds

We believe that the materiality thresholds specified in Note 1 are low such that, particularly for larger undertakings, the Investment Guarantee business could be insignificant in relation to the undertaking's overall business but could be considered material under the definition. In particular, owing to the proposed implementation of the CAR tests requiring a valuation of the entire Undertaking on a Solvency II basis (see 4.1 below) we see there being a considerable hurdle to implementation and thus would look to focus the testing on companies with a preponderance of Investment Guarantees that are in Scope. To achieve such an assessment, noting the challenge of determining a materiality threshold we propose that the basis of classification is left to the Board of Directors of an undertaking (akin to the requirements of the Board to determine classification of Finite Reinsurance). For practical purposes, undertakings with a self evident preponderance of Investment Guarantee risk can declare their status to the Financial Regulator without significant analysis and thus come within the scope of the requirements. Undertakings making a declaration that they do not have a preponderance of exposure to Investment Guarantees must justify their position through quantitative analysis and to make such an assessment available to the Financial Regulator for review. The Financial Regulator could retain a right of veto of such determinations and require companies to come within the scope of the requirements based on a reasonable rebuttal of the justification.

3.4 Recommendations

In finalising the definition of Investment Guarantee business we would recommend that this is done having regard to:

- The risks involved in different classes of business.
- The net of reinsurance risks retained by the undertaking.

- That, notwithstanding the strict applicability of the risk definition above that for practical reasons, rather than principled reasons that certain classes are exempted, such as With Profits business.
- Guidance should be provided on the allowance for reinsurance, the extent to which the new minimum capital & reserves standards apply to undertakings who reinsure and any additional reporting requirements in relation to reinsurance counterparty exposure.

Two possible options as to how this guidance is implemented are:

1. The Financial Regulator can determine whether the new rules apply to each undertaking individually based on their assessment of the undertakings business; or
2. The rules could be applied more generally with a provision for a proportionality principle allowing for simplifications depending on how much investment guarantee business is being written relative to the overall business of the undertaking. This could be self determined by the undertakings subject to a right of rebuttal or refusal by the Financial Regulator.

4 Capital and Reserve Requirements

We understand that CP42 requires an undertaking to hold a minimum amount of capital based on the largest of five amounts: the current Solvency I reserves plus required minimum solvency margin and four new amounts. A summary of our understanding of the calculation methods of the four new amounts is as follows:

- 1a Lifetime 99½% VAR, undertaking's model with real-world economic assumptions
- 1b Lifetime 95% VAR with no lapses, undertaking's model with real-world economic assumptions
- 2 QIS 5 Solvency II Standard Model Calibration (1-year 99½% VAR, European Commission model with market-consistent economic assumptions)
- 3 1-year 99½% VAR, undertaking's Solvency II Internal Model or equivalent model with meets the Solvency II standards

With Solvency II due to be implemented in a little over two years time, it is essential that any proposals are not just consistent with Solvency II but that they should lead undertakings more rapidly in that direction and hopefully lead to a better Solvency II implementation when complete. Against this background we are concerned by the proposed Basis 1 tests. We believe that the introduction of the Basis 1 requirements could require considerable additional effort on the part of undertakings without enhancing their readiness for Solvency II.

We propose that the Financial Regulator should focus efforts on Basis 2 with undertakings moving to Basis 3 as their internal models reach the levels appropriate for Financial Regulator approval. This would lead to a requirement to be able to meet at least the current Solvency I requirements and also to be able to meet the additional tests under Basis 2 or Basis 3 as appropriate.

4.1 Interaction with Solvency 1

It is not always clear from CP42 how the proposed CAR requirements should interact with Solvency I. It will be particularly important for Appointed Actuaries to understand the proposed implementation to allow them to discharge their statutory function to monitor the solvency of the undertaking. We suggest the following:

- An undertaking is required to demonstrate compliance with Solvency I. This means producing reserves which comply with the appropriate regulations for direct writers or reinsurance companies. They must also comply with appropriate actuarial standards of practice.
- The undertaking must also meet the Required Minimum Solvency Margin and must also hold an additional margin in addition to this level (typically 150% in total for direct writers)
- These requirements should continue. We suggest that it would be appropriate to consider the basis for reserve calculations in this instance so that there is some consistency of application. The Financial Regulator could define an appropriate methodology consistent with current regulations. If needed the Society would be happy to enhance its standards to address any new methodology.

- The reserves, solvency margin and capital as calculated above would be communicated to the Financial Regulator in the normal way as part of the regular quarterly and annual returns to the Financial Regulator. They would therefore represent a hard requirement. Any failure to meet these requirements would lead to regulatory action in the normal way.
- The undertaking would also be required to calculate its capital and reserve requirements in accordance with Basis 2 or Basis 3 as appropriate as outlined in CP42. Since these requirements are based on the Solvency II methodology the undertaking would also be expected to calculate its assets using the Solvency II methodology.
- The undertaking would report these results to the Financial Regulator in an additional private submission. The timing and frequency of this submission should be considered. It may be disproportionate to require this submission in line with the quarterly submissions to the Financial Regulator since undertakings' Solvency II systems are still in development and the requirements are still changing. The figures would be signed by the Board annually with the quarterly figures provided as part of management information in the normal way.
- The Basis 2/Basis 3 calculations should be based on all of the business of the undertaking. This provides consistency between all calculations. For undertakings where the guaranteed business represents a small part of the total business of the undertaking, the Financial Regulator may consider it appropriate to require more limited calculations based on the guaranteed business only. Any decision of this nature should be agreed individually between the undertaking and the Financial Regulator.
- Where the Basis 2/Basis 3 figures show that the assets are inadequate to cover the reserve and capital requirements, this should lead to interaction between the undertaking and the Financial Regulator which is consistent with the levels of intervention in Solvency II. These should be set at a standard equivalent to failure to cover the SCR under Solvency II though possibly with some flexibility on the recovery period compared with Solvency II..

In the sub-sections below we comment on the individual proposed peaks.

4.2 Basis 1(a)

The capital requirement for Solvency II is based on a 1-year time horizon, introducing a new capital requirement that is based on a lifetime horizon and that will be in force for only 2 years is inappropriate. Furthermore, to the extent that this requirement (as we expect) would lead to capital requirements for undertakings increasing in the near term and then decreasing on implementation of Solvency II would be an inappropriate and counterproductive imposition on undertakings.

That said, investigations based on a long horizon will be informative and, indeed, could well form part of the ORSA under Solvency II, but will not fit into the Pillar 1/SCR framework. Therefore, we believe that any requirements for quantitative information in this space should be included in the Financial and Risk Analysis section rather than being included as an additional capital peak.

Regarding calibration of the proposed 1(a) requirement, noting the impact of duration effectively expanding the capital requirement in monetary amounts, for a fixed percentile we believe it may be appropriate to reconfigure the test. Such a test may be to assess the implicit percentile of the Basis 2 test on a Lifetime basis or some other information metric. To support this assessment we have included quantitative information in section 5 below to demonstrate the likely impact. In summary, a VAR 99.5% standard over the full lifetime of a policy will consistently lead to a materially higher level of capital than the capital required under the one year VAR approach envisaged in Solvency II.

4.3 Basis 1(b)

The foregoing comments in relation to 1(a) also apply here. We also question the additional value of obtaining information on a no lapse basis. A no-lapse scenario would be more extreme for some undertakings than for others (more extreme for longer duration products or products with higher lapse experience), so the overall confidence level of the VAR—that is, the combination of no lapses and 95% VAR for other risks—could be quite different for different undertakings. We believe that it is appropriate for undertakings to quantify lapse risk and the generality of policyholder behaviour risks. However we believe that the Financial and Risk Analysis is the most appropriate home for this analysis instead of including it as an additional capital requirement.

4.4 Basis 2

This basis clearly converges with Solvency II, so it is appropriate. It will be important that the Financial Regulator sets clear guidance on the method to use since there may be instances where the Commission and/or CEIOPS is testing a number of different options.

The method outlined by the Financial Regulator may go beyond the standard specification in some instances. For example, there is some speculation that the volatility stresses may be excluded from the standard formula in its final format. If this were to happen the Financial Regulator could continue to require a volatility stress in its specification. The final result would therefore have some elements of standard formula augmented with additional elements which deal with the specific risks of the business covered. The Financial Regulator may also want to be more specific on risk mitigation to make it clear what credit undertakings can take for risk mitigation where there is basis risk between the liabilities and the assets.

We believe that the Basis 2 test should be the primary test initially. All undertakings are expected (but not required) to produce responses to QIS5 and therefore many undertakings will be in a position to generate these figures.

4.5 Basis 3

This basis clearly converges with Solvency II, so it is very much appropriate. However, while Solvency II will ultimately allow replacement of the standard formula figures with those produced by an internal model, we believe that the Financial Regulator should not base capital on the Basis 3 method until it has approved an internal model. This will prevent undertakings using an incomplete and unapproved model to gain reductions in capital.

An internal model better reflects an undertaking's risks than a standard formula does, so Basis 3 should generally be superior to Basis 2. However, it is unlikely that an internal model could be built by an undertaking and be reviewed and approved by the Financial Regulator within the proposed timeframe. Therefore, until an internal model is ready and approved, it makes sense to use Basis 2 initially with Basis 3 being adopted when the internal model is ready and approved.

The Financial Regulator should also consider that an internal model may not be appropriate for all undertakings which are covered by the scope of this consultation. For example the following may not require an internal model

- Undertakings who reinsure the risk on a total basis to another counterparty or who transfer the risk using an over the counter hedge. The key risk for these undertakings would be counterparty exposure. Management of this exposure is a general governance issue rather than something that can be captured by an internal model.

- Undertakings with a relatively small part of their business in guaranteed products may feel that an internal model is inappropriate if the remaining business is quite simple with risks adequately captured by the standard formula. In such situations there may be little reason to put an internal model in place and, in any case, the Financial Regulator may not require one.

4.6 FTO

In this subsection we address the allowance for dynamic hedging which is presented in note 13 of the consultation paper. We refer to the Society's submission on the Capital Requirements for Variable Annuities discussion paper issued in August 2009 for more technical details. Here we restrict ourselves to comments with regard to the specific structure of capital requirements and future trading offset proposed in CP42.

To get an idea of the impact of a possible FTO it is worth taking a look at the probable implementation order of the proposed calculation methods:

- In sections 4.2 and 4.3 we recommended that issues raised by lifetime projections are best considered as part of the ORSA/FRA.
- It will be some time before undertakings will have developed an internal model which has been approved by the Financial Regulator.
- This means that most undertakings will start with a standard model type approach as prescribed for Basis 2 CAR. As this model is based on instantaneous shocks there can be no allowance for a dynamic hedging strategy.

It follows that most undertakings will start with a model which does not allow for dynamic hedging. On the other hand, undertakings are encouraged to work on an internal model which better reflects the undertaking's risk. Those undertakings who use dynamic hedging will incorporate it in their internal model where dynamic hedging constitutes their most important risk mitigation method.

This raises the question of the significance of a specific definition of the FTO in the consultation paper. In particular:

- Will an internally developed FTO as part of the undertaking's internal Solvency II model supersede the CP42 FTO once the internal model is approved by the Financial Regulator?
- Does it make sense to prescribe a specific method for calculating an FTO now as undertakings are developing similar – or even more sophisticated – methods at the moment as part of their internal model development?

These points lead to the question of the adequacy of the proposed FTO. For detailed comments on the requirements for calculating an adequate allowance for dynamic hedging we again refer to the Society's submission to the discussion paper on Capital Requirements for Variable Annuities. There we commented on both modelling of the hedge strategy (variable B in the FTO formula in CP42) and maximum credit for dynamic hedging (variable α). It is worth noting that practical constraints currently exist in the accurate determination of variable B under such an approach. In particular, it is likely to require a nested stochastic approach² which would be very time consuming. Therefore, consideration should be given to the actual performance of the hedge strategy (i.e. a retrospective basis) in determination of FTO, in advance of practical solutions to accurately determine variable B e.g. development of Grid networks to ease processing times.

² a real world-outer loop and a risk neutral inner loop to recalculate delta at each time step/scenario

The relationship between these two variables B and α , represents a very important issue. A complex hedging strategy might lead to a low value of B , but also to a low value for α because of the greater variability of the hedging result. A simple hedging strategy, on the other hand, might have the opposite effect. Given this complex relationship it is questionable whether the simple linear structure of the formula set out in CP42 captures such complexity.

We therefore recommend not prescribing a specific formula but instead to concentrate on the requirements for modelling the dynamic hedging strategy and the criteria for the credit for dynamic hedging which may be recognised in the calculation of capital and reserve requirements. This would ensure that guidance will not preclude models that undertakings are working on as part of their Solvency II internal models. The processes for determining an appropriate allowance for dynamic hedging will continue to develop as the Financial Regulator works through the Internal Model approval process with a number of undertakings writing variable annuity business.

5 Quantitative Results

In section 4 above, we outlined qualitative comments on the proposed capital and reserve requirements. In this section we outline the results of analysis performed by the working party to demonstrate the impact of the tests to the Financial Regulator.

We have used economic scenarios provided by Barrie and Hibbert calibrated at 31st December 2009. The working party are grateful to Barrie and Hibbert for providing these scenarios.

5.1 Product Descriptions

Within the scope of this response it is not possible to consider all possible products and it is important to note that the results for every product will be different, as will the impacts at differing durations and market states. That said, in order to illustrate the key issues, (being level of capital and relative strength of the different tests) we have developed a response based on two representative products. These products are a 10 year GMAB product to demonstrate issues as they relate to relatively short duration products with high degrees of embedded option risk and a GMWB for life product to demonstrate the impact of longer term sensitivities such as interest rates and longevity/behaviour risks.

See Appendix A for a detailed description of the products modelled together with information on the calibration of the economic scenarios.

5.2 Modelling

The results presented in 5.3 below have focussed on quantifying the level of, and assessing the difference in, capital requirements between Bases 1(a) and Basis 2 as described in CP42.

Basis 1 (a) is calculated as the VaR 99.5 percentile over a life-time projection. For this analysis Basis 1 (a) is calculated without the prudent measures required under current Irish reserving methodologies e.g. zero lapses. Due to time constraints the analysis is gross of hedging. Real-world scenarios were provided by B&H for Basis 1(a) results, assuming both constant volatility and stochastic volatility.

Basis 2 is calculated by applying the market risk and life risk shocks, as specified in QIS5 to the liability side of the balance sheet. The asset side (including hedge assets and shareholder funds) have been ignored³. Risk-neutral scenarios provided by B&H for Basis 2 results allowed for a base case, and the following shocks:

- Interest rate shock down (as specified in QIS 5)
- Interest rate volatility shock up (as specified in QIS 5)
- Equity volatility shock up (as specified in QIS 5)

Credit Spread tests and Equity Shock tests have been allowed for directly through shocking the Account Values and reapplying the base case risk neutral scenarios for revaluing the Technical Provisions.

We have not calculated Basis 3 capital requirements, as internal models are undertaking-specific and results may vary considerably between models.

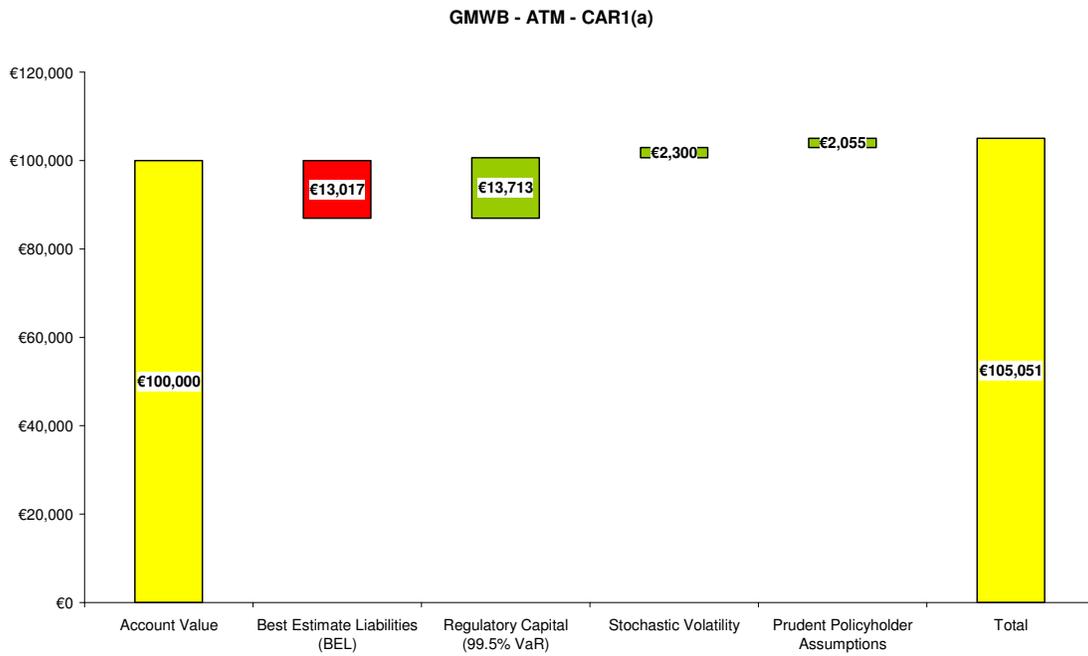
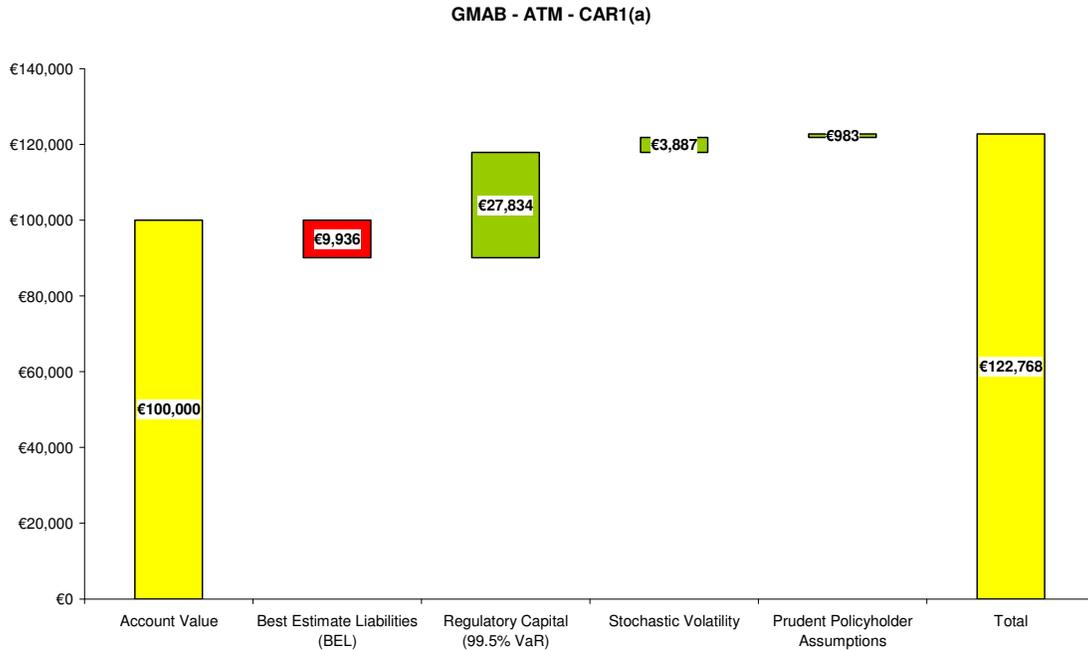
5.3 Results

The following sections summarise the results of the modelling.

³ This provides consistency with Basis 1(a) where no allowance is made for hedge assets

5.3.1 CAR 1(a): Real-world lifetime capital test

The following diagrams illustrate the balance sheet impacts of the various components of capital and reserves as illustrated separately for our GMAB and GMWB contracts. This analysis assumes an initial Account Value equal to Single Premium received (€100,000) which are described as "at the money"⁴ (ATM) at the valuation date.



⁴Reference in this analysis are to a relative moneyness, based on account value and not a strict assessment of forward moneyness.

Assuming we start with our Account Value, the first impact is a recognition of the implicit profit margins of the contract on a “real world” basis which will be significantly impacted by the equity risk premium assumption.

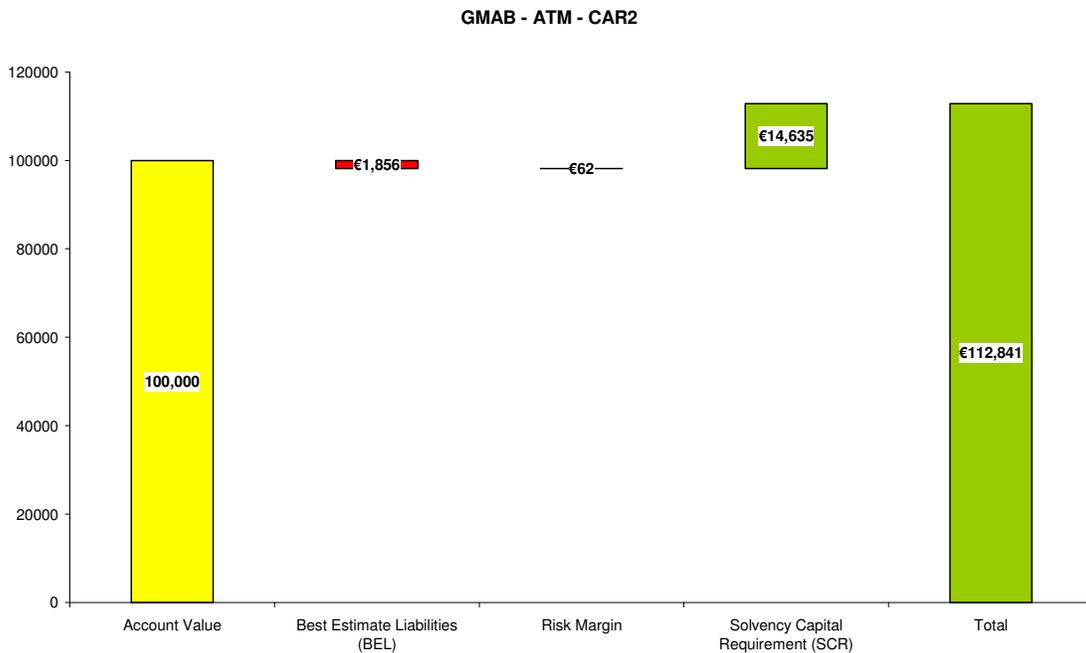
Having made this adjustment to reflect the mean of our projected outcomes we can then look to add back the “unexpected loss” as determined by our 99.5th percentile outcome, under a constant volatility model.

When we allow for the impact of stochastic volatility we can observe the impact being an extension of the tail event thus an addition to the capital required.

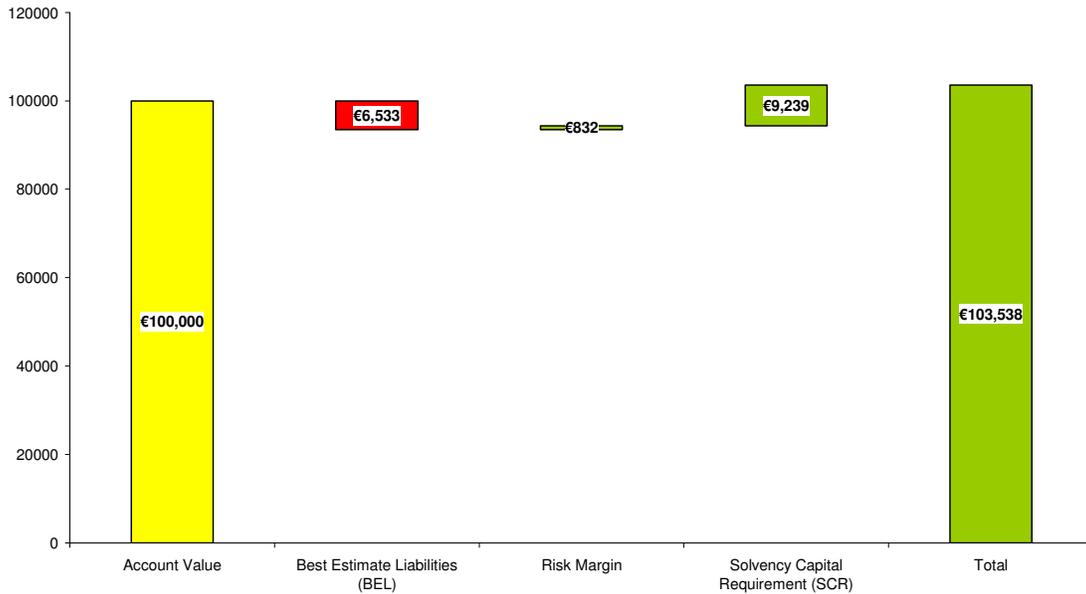
The final component of the test is an allowance for prudence in mortality and lapse experience. This requirement is determined by increasing/decreasing mortality rates by 10% for the GMAB/GMWB respectively and decreasing lapse rates by 20% for both products introduces additional capital requirements.

5.3.2 CAR 2: Instantaneous shock tests as calibrated to QIS 5

Similar to the diagram of the CAR 1(a) tests above, we look to decompose the balance sheet impacts of the CAR 2 test in the following charts. Reflecting the QIS 5 framework, it is clear the capital requirements are dominated by the shock tests, with a less significant impact of implicit profit margins on a “risk neutral” basis.



GMWB - ATM - CAR2

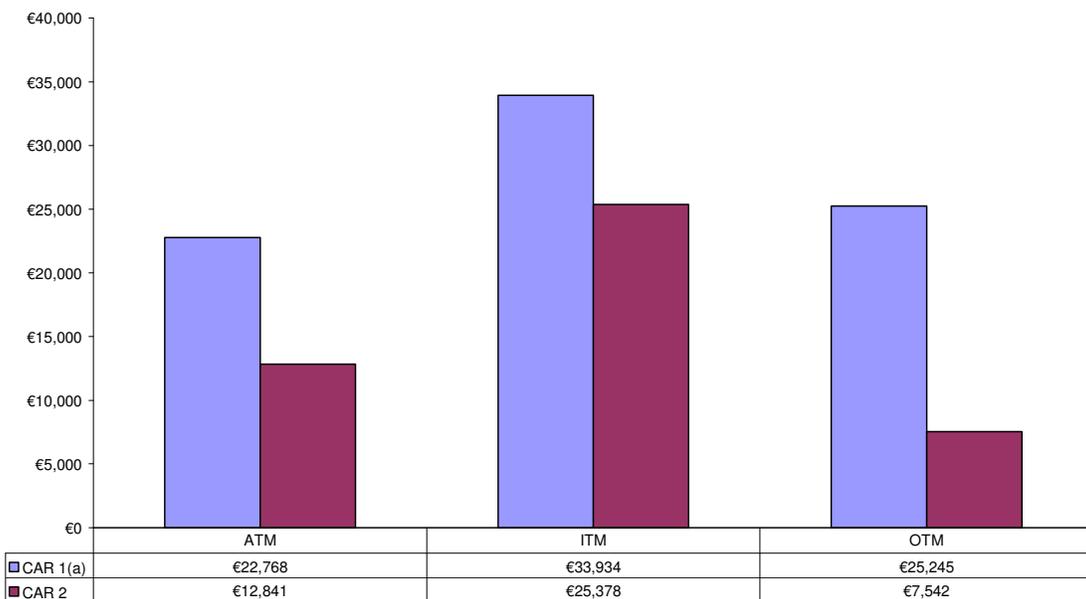


5.3.3 Impact of Account Value level (moneyness)

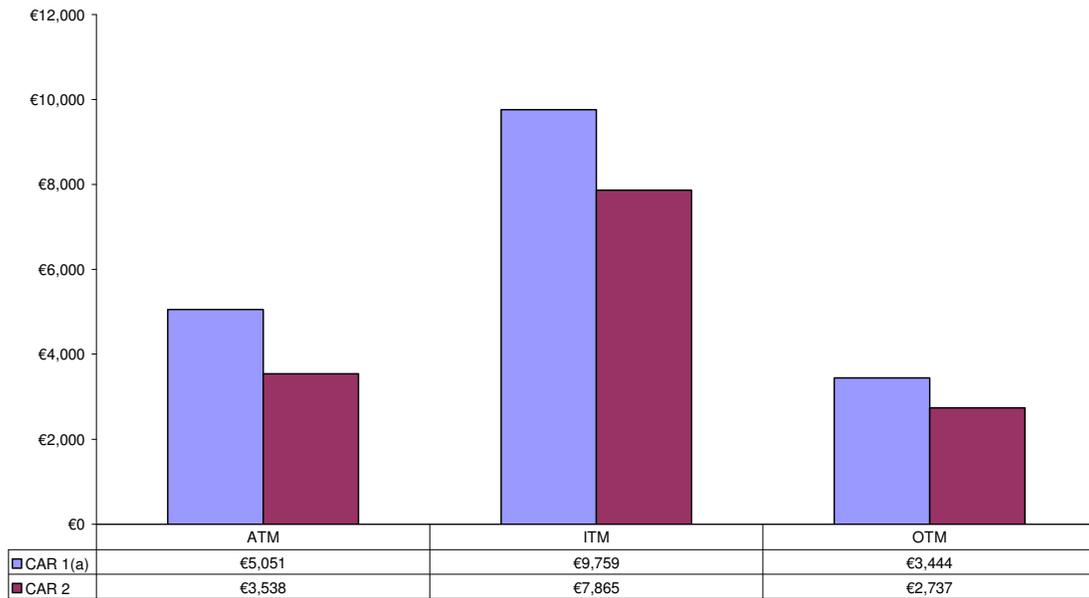
Shareholder capital support

The above diagrams illustrate the impact of the capital tests assuming Account Values of €100,000. For completeness we have analysed different levels of Account Value, being €75,000 (in-the-money – ITM) and €125,000 (out-of-the-money – OTM) to identify how the tests behave for different start points. To summarise the impact of the tests, the diagrams below illustrate the shareholder capital support required to back the liability in each scenario, being the excess of the total capital requirement over the Account Value, ie Total – Account Value, in the charts above.

GMAB "Shareholder Capital Support"



GMWB "Shareholder Capital Support"



It is clear that the capital support under each contract is dominated by the CAR 1(a) test. In particular, the excess of our CAR1(a) capital requirement over our CAR2 assessment in our base at-the-money scenario is significant, being c. 10% of single premium for our GMAB contract and a more modest c. 2% for our GMWB contract.

Discussion

The relative capital levels will be particularly impacted by the calibration of the Real World Scenarios in longer durations. The Real World scenarios used here produce quite high average longer term returns with relatively low volatility. To the extent that the scenarios are conservative the additional capital for the GMWB product in particular will increase.

When we review the impact of moneyness we can observe a material variation in the level of capital required under both CAR bases, with the difference reducing for ITM and increasing for OTM. However, the ranking of capital required remains the same and thus the CAR 1(a) test continues to dominate the capital requirement.

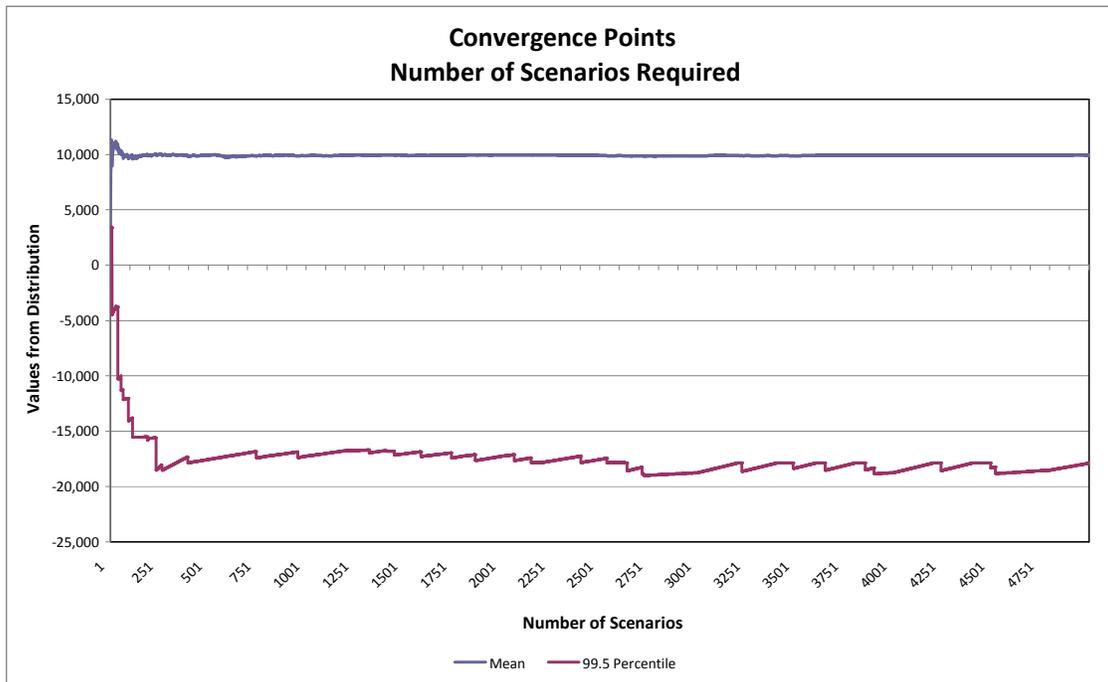
Summary

The finding of our quantitative analysis is that the Basis 1(a) CAR is a consistently higher metric than Basis 2 and the level of difference is significant, ranging from 2% to 15% of Single Premium. Such an amount is material, and would have considerable impacts on pricing and affordability of the contracts, and on the ability of undertakings to provide them. If the Financial Regulator intends to retain the Basis 1(a) measure, we would recommend that the test be moved to the FRA as a pillar 2 metric.

5.3.4 Convergence point / number of scenarios

CP42 Note 11 refers to the number of runs / simulations / scenarios that are required as part of a stochastic analysis. It states that “the number of runs should not normally be less than 5000”. In fact, the number of runs necessary to ensure convergence depends on the number of risk factors modelled and the design of the product in question. Hence it would not be appropriate to set a minimum number of scenarios for the entire industry. Instead the undertaking should supply quantitative analysis to demonstrate convergence (that is, stability of results) at the chosen number of runs.

The graph below demonstrates the values attained for the mean and 99.5th percentile of a given distribution as the number of scenarios increases.⁵ It is clear that the mean value stabilises (or converges) relatively quickly. This is important as Solvency II is based on calculating the mean of the distribution. The 99.5th percentile never reaches the same level of stability, However variability dramatically reduces after c. 500 scenarios.



⁵ The distribution in question is the GMAB modelled using real-world constant volatility scenarios.

6 Economic Scenarios

In this section we comment on the role and requirements of Economic Scenario Generators as utilised in the calculation of Capital and Reserves. The requirements of the ESG are to a certain extent determined by Note 6, 7 and 8, being the purposes to which the output of valuations based on an ESG will be applied. The details of these requirements being further specified in Notes 10, 11 and 16.

6.1 Real World V Risk Neutral ESG

The note appears to be silent on the selection of ESG in respect of a “Real World” or “Risk Neutral” simulation. Having regard to existing practice and the future Solvency II framework we have assumed that the Financial Regulator seeks to underpin the CAR 1 calculations with a “Real World” ESG and CAR2 with a “Risk Neutral” ESG. Note 10 specifies that the stochastic model is to be market consistent and in this we interpret this to refer to the determination of the reserves (or in Solvency II parlance, Technical Provisions) with an unspecified framework for how the shock or VaR test will be implemented to determine the total Capital and Reserve amount. Thus we see the CAR3 basis being as yet unspecified and any of a Real World, Risk Neutral or Hybrid (eg Real World outer loop and Risk Neutral Inner Loop) may be appropriate.

6.2 Closed Form Solutions

Having regard to the scope of CP42 as addressed at the start of this response and noting a need for proportionate implementation it is worth noting that simple guarantees may be adequately priced and reserved using closed form solutions with appropriate parameterisation. Furthermore, as the CAR 2 tests are stress based and follow a change in Net Asset Value approach as per the Basic Solvency Capital Requirement they do not require a direct statistical calculation of future outcome to determine either reserves or capital.

Thus, for example, GMAB and GMDB exposures providing simple guarantees such as return of premium or fixed roll up, can be adequately represented in a closed form basis. Requiring an undertaking currently using closed form solutions and supplementary shock tests to move to a fully stochastic basis is a significant requirement. Thus the requirement for those undertakings that are at the periphery of the scope of this exercise this is a significant and arguably disproportionate obligation.

6.3 Model of Sufficient Prudence (Note 10)

It is stated that “volatility of volatility must be allowed for.....if the companies hedge assets are shorter than its liabilities”.

- We interpret this as the Financial Regulator seeking to ensure that undertakings allow for the change in the market consistent cost of liabilities and hedge assets as a result of changing volatility parameters. We see this as an appropriate requirement.
- We further note that there will be second order considerations in a Solvency II world in relation to counter party default risk as an extension of risk mitigation. Such evaluations will require that undertakings have regard to both gross and net of risk mitigation calculations. Thus, there will be a need for some regard to the impact of volatility of volatility on gross capital measures.

We agree that “heteroscedasticity” (the technical term for the statistical process of volatility of volatility leading to the probability density function of returns having a high central peak with fat tails) should be recognized in the calculation of reserves and assessment of capital for embedded options. Furthermore we note that the Black-Scholes-Merton formula assumes a Lognormal process for returns, based on a constant volatility parameter. Thus, without appropriate adjustment for the liability under consideration, such a model may lead to under or overestimation of reserves. Furthermore such an approach may produce insufficiently fat tails for a direct estimation of Value at Risk measurements. That said, the Black Scholes framework can be utilized in practice, for the measurement and creation of risk neutral positions and for the direct valuation of liabilities with the use of an appropriately adjusted volatility surface and forward rate.

More generally there are a range of direct and indirect methods for incorporating heteroscedasticity into valuations, whether through the model underlying the ESG or the calibration of the ESG. Furthermore, the selection of the appropriate approach will be dependent on the products, the underlying funds and the purpose of the valuation.

Thus, owing to its importance, and to the range of reasonable alternatives for implementation we see model selection and governance as a key risk management function and note that there will be a significant reliance on expert judgement. The Financial Regulator will have the opportunity to review the planned approaches when it reviews internal model application documentation.

6.4 Additional Specific Points

- Financial Models and Financial Theories are continually evolving and developing as are the technological platforms on which they can be implemented and run. The pace at which new methodologies, technologies and requirements are drawn into use needs careful consideration in its own right. Such considerations underpin the Risk Management Function and Actuarial Function requirements and obligations under Solvency II and are further developed in the context of Internal Model governance and requirements. We are reluctant to fast track any such determination of requirements within the timescale of this consultation. We would not look to prescribe the use of any particular model, parameterisation, modelling framework or methodology and see this being an appropriate topic for Level 2 and Level 3 advice within the Solvency II framework.
- We identify a need for consideration of the dynamic dependency structure that exists between asset classes as this will skew the returns of funds that comprise a “basket” of returns. This is an area that merits further development and investigation.
- We support the Financial Regulator’s call for care in considering minimum levels of volatility within ESG’s. In this it is important to note the interrelationship of volatility and market levels, and in particular the observations of lower implied volatilities in rising markets and generally increasing implied volatilities in falling markets. To the extent that these are reflected in market consistent values of liabilities and assets then such calibrations are appropriate (on the basis that the risks can be replicated at these prices). However such valuations do not consider the contingent risk for unhedged positions. For this reason we endorse the application of a “vega” stress test as a critical component of any capital regime and note its inclusion within the current QIS5 draft specification to be included within the CAR 2 assessment.
- It is stated that the “Risk premia where used must be prudent”. We feel assumptions with respect to risk premia should be on a best estimate basis. In particular, prudence is

already being captured by benchmarking reserve/capital requirements on scenarios in the tail of the distribution.

6.5 Sufficient Number of Runs (Note 11)

We agree with the principle that “ companies need to satisfy themselves that the number of runs undertaken is fit for purpose” and further agree that such comfort needs to be supported by appropriate tests of convergence. We would, however, be reluctant to guide that “the level should not normally be less than 5000” as this is inappropriately prescriptive and the impact of such a prescription may lead to an inappropriate and significant burden in timing and resource consumption. We show results in section 5.3.4 above which demonstrate convergence for a sample product at much lower numbers of scenarios, especially for CAR basis 2 tests.

6.6 Note 12 – Modelling Accuracy

We agree that appropriate model governance will require justification of the use of model points as opposed to per policy modelling and that this justification is appropriately documented and approved by those charged with model governance.

6.7 Real World Scenarios

In our submission to the Discussion Paper last year, we commented on some of the issues associated with the production of Real World scenarios especially over long durations. The production of real world scenarios requires a number of calibration assumptions and considerable subjectivity can be applied to these assumptions, leading to substantially different reserving results, whether between undertakings using the same CTE framework or as compared to a market consistent approach. If the Financail Regulator proposes to proceed with Basis 1 type calculations it will be important that there is consistency of approach for the production of Real World scenarios. Otherwise companies which appear equally strong may in fact have very different levels of financail strength.

7 Governance Requirements

7.1 Interaction with Existing and Evolving Governance Requirements

Risk Governance for undertakings providing guarantees will by definition be subject to the general requirements for the undertakings. As such, Insurance Undertakings (and possibly Reinsurance Undertakings) will be subject to the requirements of the recently exposed CP41 once the requirements become final, and reinsurers currently will remain subject to the Corporate Governance for Reinsurance Undertakings requirements as issued by the Financial Regulator in December 2007 until such a requirement is replaced or subsumed into CP41.

Furthermore, Insurance and Reinsurance Undertakings will be subject to the requirements of Solvency II when implemented.

These current and proposed governance requirements have been enhanced to take account of the lessons learned from the financial crisis. Additional governance requirement for guaranteed business should aim to enhance these requirements where the Financial Regulator believes that significant gaps still exist.

7.2 High Level Comments

In the Society's response to CP41, we suggested that undertakings should be subject to graded levels of governance depending on scale and complexity. We accept that undertakings writing substantial volumes of investment guaranteed business should be considered to be towards the upper end of the scale and subject to the highest levels of corporate governance, particularly where they are managing large volumes of complex risks and managing the risks through dynamic hedging techniques (or no hedging at all).

We believe that the introduction of the proposed Financial Risk Analysis adds significantly to the governance of undertakings, and as such, we strongly support this development. We have suggested some amendments to the format of the report (see section 7.3.5 below). The FRA should be prepared by a competent and independent agent, such as the Appointed Actuary, and presented to the Board for review and, if appropriate, adoption at least annually.

We also agree in general terms with the requirement for Independent Oversight as outlined in Note 4 of the proposal. We feel that, consistent with good governance and Solvency II developments, the whole Board should have responsibility for oversight rather than having reliance on a single Board director. If the Board feels that they require external assistance to exercise this role, then this should be commissioned by the Board, either from an external party or possibly from a member of the Board⁶.

In any event, the internal model will require external verification as part of the Solvency II approval process. This will ensure some level of independent oversight.

To allow the Board to exercise its oversight responsibilities, the Society supports a requirement for a comprehensive training regime for Directors, in particular Independent Non Executive Directors, to ensure that they obtain and maintain the necessary skills to perform their duties.

⁶ Taking care as necessary to avoid conflicts of interest for the board member.

We also support a requirement for a high level of relevant expertise among management and Board members. This can be managed through the governance requirements outlined in CP41 and through the fitness and probity regime.

7.3 Specific Comments

7.3.1 Note 4 – Independent Oversight

We agree that undertakings should have independent oversight and that this needs to be appropriately implemented and demonstrated through the undertakings' systems of governance. This will include implementing the requirements for Corporate Governance as currently being developed by the Financial Regulator. Owing to the complexity of the risks and the scope for material policyholder deficit, we would expect undertakings with material exposures to such risks to adhere to the upper end of a spectrum of "proportionate" implementation.

7.3.2 Note 8 – Basis 3 CAR

The Internal Model Approval Process expects that an Internal Model meets a series of principles namely:

- Use Test
- Internal Model Governance
- Statistical Quality Standards
- Calibration Standards
- Profit and Loss Attribution
- Validation
- Documentation Standards
- External Models and Data

We see there being some element of conflict between a regulator's mandated requirement for an Internal Model and the elective use of an Internal Model. In particular, the tenets of Use Test may well be compromised under such requirements, and furthermore, the evidentiary requirements of Statistical Quality Standards and Calibration Standards may not be demonstrable where policies are implemented by necessity and not choice. That is, if an internal model or aspects of such a model are imposed that the undertaking does not think properly reflect its risks, it is inappropriate to expect the undertaking to demonstrate that the model meets the IMAP principles.

Thus, the IMAP can serve as a guide only to a best efforts implementation.

We would thus look to the requirements of the IMAP as a collaborative approach to develop a system that meets the needs of all stakeholders, and look to develop and evolve these over time in a balanced fashion. Of course, if the Financial Regulator does not believe that an undertaking is adequately capturing its risks it can ultimately apply a capital add-on.

7.3.3 Note 9 Expectation of Future Requirements

We agree with the Financial Regulator that a broad reaching annual report (the FRA) as contemplated by the Financial Regulator would be a precursor to an Own Risk Solvency Assessment (ORSA). In this regard, we see the current guidance on ORSA as being a useful tool to guide undertakings as the purpose and content of an ORSA. Our expectations in relation to elements b) and c) of this note do not agree exactly with those of the Financial Regulator, but we do recognise that there is a value in including “longer horizon” measurements of risk within a Pillar 2 framework and that there will be an interaction between Standard Formula and Internal Model Solvency Capital Requirements within Pillar 1.

7.3.4 Note 13 – Future Trading Offset

In making an allowance for Future Trading Offset, the undertaking is seeking to take credit for a process as opposed to existing hedge assets.

We support a view that this imposes a significant hurdle on an undertaking seeking to take material credit for future trading.

We see this as an area that requires significant additional analysis and development by the Financial Regulator, perhaps in conjunction with the CEIOPS Task Force on Variable annuities. Clearly, the Board should be aware of the credit taken for future trading and should use independent oversight where appropriate to satisfy itself that any credit taken is appropriate.

7.3.5 Note 14 – Financial Risk Analysis

We endorse the requirement for an annual risk report that addresses the primary risks of the organisation as contemplated by the ORSA, within a Solvency II context.

We believe that among the key risk considerations for consideration by a Board are:

- Liability model selection, implementation and governance particularly as it relates to the ESG
- Risk mitigation design, specification, implementation and Governance
- Risk appetite, measurement and capital requirements
- Treasury and collateral risk management
- Limitations and reliances on 3rd party and Intra-group services and expertise

The FRA should ensure that it addresses each of these issues.

Although we see the value in prescribing a list of items for consideration, as it provides clarity to undertakings, we believe there may be a benefit in grouping considerations under broad headings as an initial step.

Such a grouping may include:

- Strategic Risk and Capital Planning
- Liability Valuation Consideration (including model selection and governance)
- Primary Risk Drivers
- Secondary Risk Drivers
- Emergent Risk Considerations
- Primary Risk Mitigation Considerations and Allowances
- Secondary Risk Mitigation Consideration and Allowances

➤ Interaction and Convolutions

Within such a risk architecture undertakings may then seek to identify and outline their response to the risks that are most appropriate to their business.

The Financial Regulator can then use the Supervisory Review process to query risks not addressed by an undertaking with a view to establishing the relevance of such risks. This approach would appear to blend more appropriately with Solvency II, where the responsibility lies with the undertaking to identify its own risks. A prescribed checklist of risks can be helpful in some circumstances, but the danger is that undertakings unthinkingly use the list rather than take responsibility for investigating and identifying the risks specific to it.

7.3.6 Note 15 – Profit and Loss Attribution

We agree that this as an essential element of management information. Profit and Loss attribution is an essential part of the overall governance of the company's model and risk mitigation efforts. It should be part of the ongoing improvement process.

7.3.7 Note 17 – Existing Reserving and Actuarial Practice

The governance requirements outlined herein will to a certain degree overlap with the obligations and purview of the Appointed Actuary/Signing Actuary for existing organisations. As Solvency II develops, we see this developing towards the Risk and Actuarial Functions. We see actuaries as being particularly well placed to take leadership roles in this respect.

7.3.8 Note 18 – RVC Process

We are, to a certain extent, unclear as to the Financial Regulator's specific expectation in respect of the RVC. To the extent that we view it as an expectation that undertakings adopt a forward looking assessment of risk and capital requirements, we see this as being included within the FRA, in particular under the generalised heading of Strategic Risk and Capital Planning. We do not believe that any additional requirements are necessary for undertakings writing business with investment guarantees as distinct from other undertakings in the marketplace. Therefore, we would suggest that any additional requirements in this area should be introduced as part of the introduction to Solvency II rather than adding an extra requirement now.

8 Timescales

The Society has a number of concerns about the ability of undertakings to meet the reporting requirements as set out in CP42 by the end of 2010. We believe that a phased implementation would be more appropriate with some of the requirements perhaps being introduced at the end of 2010 and other elements being implemented over the following two years.

- The Society supports the Financial Regulator's intention to clarify the reserving requirements for Investment Guarantee business and move towards Solvency II compliance. However the proposal in effect is a significant acceleration of aspects of Solvency II for this type of business, from 2012 to 2010, while the current Solvency I regime still applies. We feel that both undertakings and the Financial Regulator will struggle in the face of these significant resource requirements given the proposed timelines.
- Overall the proposed regime will be at least as complex and demanding as Solvency II. Including the current Solvency I requirements, the CAR is the maximum of 5 calculations, some of which are not yet clearly understood. With the advent of Solvency II, the Basis 1 lifetime projections will not be part of the CAR and Solvency 1 will not apply.
- Many undertakings currently use methods which are similar to Basis 1. However this is not the case for all undertakings. Even for those who use this methodology, the introduction of the FTO with appropriate governance will lead to significant additional work.
- Whilst a number of undertakings will have commenced the approval process for an internal model, it is unclear how many will have been approved by the end of 2010 since the pre-approval process is just beginning. We would question whether the results of a model which has not been approved would be suitable as part of a regulatory requirement. In fact given the current Solvency II implementation date of 2012, we expect many undertakings still to be refining and testing their internal model at the end of 2010. Undertakings may also need to further develop their ESG.
- For undertakings operating within a group structure, and perhaps relying on group resources, it may be difficult to accelerate local reporting ahead of group Solvency II plans based on the 2012 deadline.
- Opportunities for communicating with management, directors and shareholders will be limited given the short lead time. It may not be possible for all undertakings to bring all stakeholders along in the required timeframe.
- For quarterly reporting, the addition of a number of significant tasks to capture the various capital requirements, effectively running in parallel, is likely to place a strain on resources of some undertakings. In practice, many undertakings may find it difficult to calculate the CAR on more than one basis (in addition to Solvency I) within the quarterly timetable. Perhaps the Financial Regulator could implement a more approximate calculation at quarter end with detailed calculation at year end. This would be consistent with the Solvency II requirement to calculate the SCR on an annual basis.
- While the Society is supportive of the introduction of the FRA, all undertakings may not be in a position to submit an FRA including all the required detail with the 2010 regulatory returns. This would appear to be something that could be introduced during 2011 rather than being a requirement at the start of the year.
- While the Society has identified some classes of CPPI and GAO risks as being arguably within scope, we see there being a relatively low risk in providing a longer lead time for implementing

the finalised requirements than for the primary Variable Annuity related risks that are the target of CP42.

Earlier in this response, we recommended that the Financial Regulator should initially focus on Basis 2 as the capital and reserve test with a move towards Basis 3 as undertakings complete their internal models. We believe that many undertakings should be in a position to make this change for end 2010 (since most will have completed QIS5 anyway), though the production systems may not be at the full implementation standard that would apply when Solvency II formally comes into operation. The FRA could then be implemented over the course of 2011.

9 Appendix A – Product Descriptions and Modelling Assumptions

9.1 Product & Policyholder

Two representative products were selected to illustrate the impact of the requirements, the following summarises the key features of the benefits and underlying funds :

	GMAB Guaranteed Minimum Accumulation Benefit	GMWB Guaranteed Minimum Withdrawal Benefit
Single Premium	€100,000	€100,000
Deferral	Nil	5 Years
Withdrawal Rate	N/A	4%
Maturity Guarantee	€100,000	N/A
Term	10 Years	Lifetime
Ratchet	N/A	Uncapped, Annual Ratchet
Death Benefit	Higher of Account Value and €100,000	Return of o/s Account Value
Fund	€ Denominated Fund, with Monthly Rebalancing Sub Account Composition 50% Eurostoxx 50 25% € Sovereign 25% € Corporate Fund Management Charge 1.5%	€ Denominated Fund, with Monthly Rebalancing Sub Account Composition 50% Eurostoxx 50 25% € Sovereign 25% € Corporate Fund Management Charge 1.5%
Guarantee Charge	1.5% of Account Value per annum	1% of Account Value per annum
Commissions & Surrender Penalty	100% Allocation , 0% bid/offer spread, No surrender penalties	100% Allocation , 0% bid/offer spread, No surrender penalties
Policyholder	60 Year Old Male	60 Year Old Male

9.2 Non Financial Assumptions

The following table summarises the key projection assumptions, including the expense basis for the undertaking to determine the impact of the underlying contract on outcomes.

	GMAB Guaranteed Minimum Accumulation Benefit	GMWB Guaranteed Minimum Withdrawal Benefit
Mortality Basis	German reserving table DAV2004R	German reserving table DAV2004R
Lapse Basis	5% per annum Dynamic Adjustment = {Account Value/Maturity Guarantee} amplified by 2, subject to maximum lapse rate 10% and minimum lapse rate 1%	5% per annum in deferral and 2% per annum in drawdown (100% utilisation) No “dynamic” adjustment
Expenses	Fund Management Expense 1% Administrative Expense : 0.25% of Account Value per annum + €50 pa + Expense Inflation 3%	Fund Management Expense 1% Administrative Expense : 0.25% of Account Value per annum + €50 pa + Expense Inflation 3%

9.3 Financial Assumptions & ESG

Fund returns and short rate, risk free returns were provided by Barrie & Hibbert to whom we are grateful. The following summarises the model version, model type and key calibration parameters underlying the scenarios provided:

9.3.1 Market consistent scenarios

The scenarios generated are based on the provisional QIS 5 specification published by CEIOPS. Details are provided of the simulation structure as well as how each asset was modelled.

9.3.1.1 Simulation details

Horizon	50 years
Time – step	Monthly
No. of trials	5000
Base date	31/12/2009
Base economy	EUR

Calibration file

MC end Dec 09

Model type

Nominal Interest rate

Libor market model

Equity

Stochastic volatility jump diffusion model

Credit

Extended JLT

9.3.1.2 Approach to calibration

As this is a ‘market consistent’ calibration, wherever possible, i.e. where there is a liquid enough market, we calibrate to traded market instruments. We calibrate the following assets to market data:

- Nominal yield curves
- Interest rate volatilities
- Equity volatility
- Initial equity dividend yield
- Initial credit spreads

Other elements of the calibration are based on our real world target for the relevant quantity. This includes:

- Correlations
- Credit spread volatility and long term mean
- Dividend yield volatility and long term mean
- Credit transition matrix

At the end-December 2009 calibration date, this produced a 10-year equity option-implied volatility of 27%, and a swaption-implied vol of 17% for a 10-year option on a 10-year swap.

9.3.1.3 QIS 5 stresses

5 scenarios set where provided based on CEIOPS provisional QIS 5 specification.

Scenario set	YC	LMM	Equity	Credit
Base case	CEIOPS	End Dec 09 market	End Dec 09 market	End Dec 09 market
Interest rate level	CEIOPS defined stress			
Interest rate Vol up	12% absolute stress to market			
Equity IV up	10% absolute stress to market			
Credit spread Up	2.6% increase in 7yr A rated spread			

9.3.1.4 Output

Cash total return index – return index based on 1 month Government Zero Coupon Bond.

Equity total return Index – based on cash return + excess equity return

Government bond total return index – based on a portfolio of government bonds with the following weighting:

2 yr Govt	0.25
5 yr Govt	0.3
10 yr Govt	0.2
20 yr Govt	0.25

Corporate bond total return index – based on a portfolio of corporate bonds with the following weighting:

AA (duration 4.3 convexity 32)	0.25
A (duration 4.1 convexity 28)	0.5
BBB (duration 4 convexity 26.8)	0.25

9.3.2 Real world scenarios

Two Real world scenario sets were provided with the following simulation structures.

9.3.2.1 Constant volatility scenarios

Nominal Interest rate	Extended 2 factor Black Karasinski
Equity	Constant volatility
Interest rate risk premium	Time varying term premium
Equity risk premium	Fixed equity return
Credit	Extended JLT

9.3.2.2 Volatile volatility scenarios

Nominal Interest rate	Extended 2 factor Black Karasinski
Equity	Stochastic volatility jump diffusion model
Interest rate risk premium	Time varying term premium
Equity risk premium	Fixed equity return

Credit	Extended JLT
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An arithmetic equity risk premium of 4.5% per annum was assumed. The interest rate term premium was parameterised to fit to a long-term expected interest rate for Euro swap rates of 5.5%.

9.4 Simulations & Modelling

As described above, 5,000 simulations were made available to the working party by Barrie & Hibbert. This data was applied by the working party to the modelling of the products and assumptions as outlined above. The modelling included in this report was conducted using a purpose built model, written in visual basic and run in excel.



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