Submission by the Society of Actuaries in Ireland

On the Discussion Paper produced by the Financial Regulator on

Capital Requirements for Variable Annuities

Contents

1 Executive Summary

The Society of Actuaries in Ireland welcomes the Discussion Paper produced by the Financial Regulator on the subject of Capital Requirements for Variable Annuities and the opportunity to make this submission in that regard.

We understand that this discussion is a precursor to the Financial Regulator issuing a formal consultation with a view to setting guidance in this area. As such, this submission concentrates on the high level policy issues. We look forward to the formal consultation when we will welcome the opportunity to respond in detail to the questions posed by the Financial Regulator.

1.1 Preamble and scope

In this context we identify Variable Annuities as any product which contains a significant level of embedded financial derivatives. The defining characteristic of these liabilities is that they generally require stochastic methods in order to understand and evaluate their asymmetric profile. Another characteristic is that the projected liability cash flows cannot generally be directly matched by conventional assets or even by available derivative instruments. Often, but not invariably, this leads companies to follow a "dynamic hedging strategy" which, rather than attempting to directly match future cash flows, attempts to match the current market sensitivities of the liability profile with assets which have similar sensitivities.

Actuarial Standard of Practice LA-3 addresses the issue of using stochastic methods to evaluate embedded financial options in section 3.6.5. Whilst the general principles are captured by that ASP, we acknowledge that it leaves a wide scope for interpretation in practice. We also accept that it was written in a context which did not address the phenomenon of dynamic hedging. We see the Discussion Paper as an attempt to correct this deficiency and we support that objective. This submission makes recommendations in that direction.

We understand that the Financial Regulator is only interested in introducing additional guidance for Variable Annuity business with so called GMxB type liabilities and that it would like to avoid changes to the requirements for other business with embedded financial options. We think this approach is reasonable. While the requirements in section 3.6.5 of ASP LA-3 are relatively limited in scope, they have been used successfully for these other types of business. We believe that the formal guidance from the Financial Regulator will need to be precise about its intended scope to avoid unintended ambiguity in respect any other types of business.

1.2 Recommended approaches

Following the thrust of the Discussion Paper we have focussed on the **total** capital requirement rather than its constituent components.

We identify two acceptable approaches to determining this total capital requirement. The first approach outlined below is compatible with Solvency II whilst the second is more in keeping with current practice.

We believe that both approaches should achieve similar levels of safety and it is important to note that we are not recommending that companies should adopt the higher of the two. We envisage that companies currently using the second approach will transition to the first as they prepare for the full implementation of Solvency II in 2012. Moreover, given that most companies, if not all, will be participating in Quantitative Impact Study 5 in 2010 we see no reason why they should not be in a position to comply with the first approach by the end of 2010.

Meanwhile, of course, companies are required to maintain a minimum level of technical provisions in compliance with the Regulations, which can be broadly described as "prudent deterministic". However, since both our recommended approaches use a stochastic model to evaluate the embedded derivative we expect that in most cases these will produce a higher total capital requirement than the regulatory minimum.

Section 5 discusses in more detail the transition from Solvency I to Solvency II. We also address in that section the distinction between technical reserves and total capital requirement and discuss different approaches for determining the former.

We now outline our two alternative approaches for determining total capital requirement.

1.2.1 Short Term Horizon - The one year VAR test

This test is essentially along the lines of the Solvency II standard formula test for the Solvency Capital Requirement (SCR) and has the advantage of providing a "glide path" to that regime. The market consistent best estimate of the cost of the embedded derivative is calculated by performing stochastic simulations of the run off of the portfolio, using a risk neutral model with additional risk margins for non market risks. Policyholder behaviour would be a factor which needs to be modelled in these simulations and the actuary should allow for a prudent level of "rational" behaviour in this regard.

The total capital requirement is then determined by stress testing this best estimate for its main risk sensitivities. The stress tests would mirror the current thinking on the Solvency II standard formula. These "instantaneous" stress tests are a proxy to a one year VAR test at the 99.5% level.

In terms of the application of such a regime prior to the completion of the Level 2 Advice and the full implementation of Solvency II we suggest that the Financial Regulator should indicate its required stress tests in the annual letter to Appointed Actuaries for this line of business.

The implementation of such stress tests would of course be instead of a resilience test, though the normal resilience tests would apply in determining the regulatory minimum amount of technical provisions.

Section 2 discusses this one year VAR approach in more detail.

1.2.2 Long Term Horizon - The product life CTE test

This approach is the one which is currently widely practised in Ireland and is the basis of actuarial reserves (AG 43) and regulatory capital (C3 Phase II) in the US.

Again the central methodology is to produce stochastic simulations of the run off of the portfolio. In contrast to the first approach, though, these product life simulations are used to directly set the total capital requirement by evaluating the average of the worst outcomes, the so called Conditional Tail Expectation (CTE).

In this regard we are satisfied that a product life CTE set at a level of at least the 90th percentile would be an acceptable standard for the total capital requirement provided the economic scenario generator is suitably calibrated.

This CTE approach is discussed in more detail in Section 3.

The difference between the two approaches is more than merely methodological. The first approach is in essence a "market exit" stress test, whilst the second approach concentrates on product fulfilment by the company. In a sense the first approach does not envisage actual insolvency but assumes that a failing company could offload its liabilities to the market, or at least raise new capital from the market. Accordingly, a single point VAR test i.e. at the 99.5% percentile is consistent with the market exit approach. The second approach, on the other hand, could be seen to envisage that the enterprise does in fact become insolvent and therefore the focus is both to minimise the chances of that eventuality and also to minimise its monetary effect if it should happen. Accordingly the CTE test is more appropriate in this context.

Furthermore, since the first approach is based on market exit it is appropriate that a risk neutral market consistent model is employed. This is not the case for the second approach where a "real world" model is more appropriate.

1.2.3 Dynamic Hedging and the Future Trading Offset

Consistent with the current Solvency II thinking the "instantaneous" stress tests, which would be applied in the first approach outlined above, would not allow for the effects of future dynamic hedging, though of course any existing hedge would be integrated into the market stress test.

A key factor of most product fulfilment tests, as outlined in the second approach above, is the allowance for the effects of a dynamic hedging strategy. This is described in the Discussion Paper as the Future Trading Offset. We broadly agree with the sentiments expressed in the Discussion Paper on the use of a FTO, specifically that it can be permissible to do so but that stringent constraints should apply.

It would be difficult to fully prescribe either the standards required for the model or the adjustments to be made for the various practical shortcomings in applying an idealised dynamic hedging strategy, although observations from the American profession provide some assistance, as do the requirements outlined by CEIOPS in their Level 2 guidance on financial risk mitigation as outlined in CP31.

Hence we feel that the allowance for such an offset must be a product of continual dialogue between each company and the Financial Regulator.

Section 4 looks more closely at the allowance for a dynamic hedging strategy.

1.2.4 Possible additions to Actuarial Standards

We believe that existing actuarial standards of practice in this context could benefit from further clarifications, specifically in regard to:

- Reserving for embedded financial options generally
- The appropriateness of a VAR or CTE approach
- The credit which may be taken for future trading where a dynamic hedging strategy is adopted.

2 Short Term Horizon – One Year VAR

This is the central approach of the Solvency II regime.

CEIOPS have invested a considerable amount of time in developing an appropriate infrastructure for the calculation of capital requirements under Solvency II and therefore it is logical that this approach should be given serious consideration as an interim option for the calculation of capital requirements for Variable Annuities in advance of the formal introduction of Solvency II in 2012. There would, of course, be some practical issues associated with the use of a VAR methodology in the context of the current Solvency I framework. We return to these issues in section 5 of this response.

There are a number of different issues to consider in the implementation of any VAR methodology:

1. What calibration standard should apply?
2. How should the scenarios be calibrated and how many scenarios are appropriate for a suitable level of calculation?
3. Is the standard formula calculation as outlined in the Solvency II measures appropriate or are some amendments required?
4. Should there be any allowance for future trading or should the calculations be based simply on the assets held at the valuation date?
5. How should the regime adjust to reflect changes in Solvency II calibration?

We address each of these issues below.

2.1 What calibration standard should apply

Solvency II applies a one in 200 year standard over one year. Given that this is the standard that will apply across Europe from 2012, it would seem appropriate that this would be the minimum benchmark for the calculation of capital requirements under a VAR standard.

2.1.1 How should the scenarios for the calculation of best estimate provisions be calibrated and how many scenarios are appropriate for a suitable level of calculation?

The Solvency II structure is based on the calculation of best estimate technical provisions, with the addition of a Risk Margin for non market risks and unavoidable market risks (or calculation of these two items as a whole in certain limited circumstances) and then the application of a range of shocks.

Since the technical provisions are calculated by using the average of all of the shocks, relatively straightforward distributions such as the lognormal are generally suitable unless the embedded derivative is particularly unusual with, for example, very high liabilities in very extreme scenarios and no liability in other scenarios. Except in these unusual circumstances, therefore, a lognormal or similar distribution seems appropriate provided the model uses an appropriately detailed and market consistent volatility surface.

The number of scenarios should depend on the nature of the risks. Normally at least 1,000 scenarios would be recommended. Where the nature of the guarantees is such that claims only arise in very few scenarios, then a greater number of scenarios should be used.

Scenarios should be market consistent risk neutral as envisaged in Solvency II. Generally the calibrations can be read from market data. There could be some difficulty deriving the following information:

- Volatility assumptions for very long durations
- Risk free rates for very long durations.

CEIOPS is addressing both of these issues at present as part of its consultations and therefore greater clarity should become available over time. In the meantime we would suggest that the approach used should follow the response from the Groupe Consultatif to the latest round of consultation papers, namely:

- The Groupe considers that both implied and historic volatilities have a role to play. Implied volatilities tend to be volatile and there can be difficulties of suitable liquidity. They recommend that historic realised volatilities over long periods which include periods of particular stress should be used in these circumstances. We have included an extract from the Groupe's response to CP39 below:

  > "Implied volatility normally is the more germane to current estimate valuations, but at times of stress it will be appropriate to have regard **also** to historic volatility. It is a matter of professional judgement (to be supported by transparent reasoning) as to the appropriate degree of regard to be had to implied and to historical volatility.
  >
  > Overall, we believe that judgement should be used here and either method should be acceptable and may be the most correct answer in different circumstances and differing markets.
  >
  > We believe that implied volatilities are too volatile as they are heavily affected by market conditions on a day to day basis. The options and futures market has proved not to be deep and liquid enough in the recent past to provide useful forecasts on the future. We also believe that implied volatilities in 2006 and 2007 were far too low compared with the underlying risk as the markets were too confident. Therefore, we would suggest that historic volatilities should be used with a time frame as long as possible. For UK equities, we would suggest at least a hundred years to include the market crashes in the 1930s and the 1974 crash.
  >
  > On a technical point of view, the implied volatility would be affected by undertakings using the market to hedge their risks and could be distorted. No such distortion would apply to historic data.
  >
  > Judgement is necessary on historic data to interpret results especially during times of major European wars.
  >
  > On a practical viewpoint, we would suggest that implied volatilities can be used if the market exists and the historic data is not there but with considerable judgement being applied."

- For extrapolation of the risk free rate for very long durations, the Groupe favour a macroeconomic option. The text below is extracted from the Groupe's response to CP40:

  > "The Groupe is inclined to favour the macroeconomic approach, recognising that considerable care is required in implementation. We do believe that the ultimate interest rate needs to be kept under supervisory review, although the expectation should be that this would change only rarely and then by modest amounts.

From our point of view macroeconomic extrapolation techniques in combination with mathematical techniques for a smooth extrapolation of market data is a reasonable approach for long-term valuations. The approach should be based on the longest observable market data (forward rates and forward rate volatilities), macroeconomic considerations for the long-term equilibrium level of the unconditional forward rate and a mean-reversion-effect of interest rates. Using appropriate mathematical techniques a smooth path from the longest observable interest rates to the long-term equilibrium level should be deduced from observed yield curve behaviour and interest rate volatility (e.g. an approach of Barrie&Hibbert for ultra long-term cash flows)."

2.2 Is the Standard Formula calculation as outlined in the Solvency II measures appropriate or are some amendments required?

The standard formula covers a number of different modules that are relevant to Variable Annuity business. We believe that most of these shocks are equally appropriate to Variable Annuity business as to other business. For example we believe that the calibration of the following shocks should be suitable for most types of variable annuity business:

- Equity market risk;
- Interest Rate risk;
- Spread risk;
- Counterparty risk;
- Equity Volatility
- Interest Rate Volatility
- Lapse risk, including mass lapse risk;
- Mortality Risk;
- Catastrophe risk;
- Morbidity risk where this is relevant to the product;

The areas where we believe that some additional shocks may be required are:

- Dealing with basis risk. While this is covered in the Solvency II specifications, it would be appropriate to give greater guidance on how this risk should be addressed in the calculations. Basis risk can take the form of short term noise (where the short term performance deviates from the hedging proxy) or longer term drift (where the fund systematically underperforms against the proxy). A short term approach which considers the maximum deviation from the proxy over one year would appear to be most consistent with the Solvency II framework.
- Longevity risk – many of the variable annuity products include an element of longevity risk. The longevity shock in the Solvency II specification is quite simple with a once-off reduction in mortality rates. We would recommend that any stress test type calculation for variable annuity business which includes longevity risk should include a shock which is based on high levels of mortality improvements rather than simply a one off decrease in mortality.

With the above adjustments, we believe that a Solvency II style VAR calculation would provide an appropriate capital measure. It would also have the advantage of providing a smooth transition to Solvency II. Certain companies who have particular risks may wish to adapt the calculation to use an internal model type of approach. Any use of internal models, particularly where it would lead to a reduction in the capital required should be subject to rigorous analysis.

2.3 Should there be any allowance in the capital calculation for future trading or should the calculations be based simply on the assets held at the valuation date?

There is still uncertainty in the design of Solvency II about the appropriate allowance to make for dynamic hedging. Therefore there is a question about whether there should be any adjustment on this count in the calculation of capital. The various considerations which apply to the use of what the Discussion Paper refers to as a future trading offset is covered in section 4 of this submission.

On balance we believe that it would be best to wait until the Solvency II specifications become clearer before any future trading offset is allowed in the VAR capital calculations.

2.4 How should the VAR regime adjust to the inevitable changes in the Solvency II specification before its final implementation?

We have seen a number of changes to the specification for Solvency II as it has been developed. For example there were numerous changes between QIS 3 and QIS 4. There have also been additional changes in calibration in the recent Level 2 consultation papers issued by CEIOPS. Further changes are inevitable before Solvency II is finalised.

Therefore, the Financial Regulator needs to give clear guidance on the appropriate calibration for the various different elements of the calculation. Ideally this guidance would reflect the latest Solvency II calibration. This would smooth the transition to Solvency II. The guidance from the Financial Regulator could be updated on a frequent basis in the same way that the current guidance is issued in relation to the resilience reserve. The Society would be happy to supplement this guidance with appropriate Actuarial Standards of Practice. These could cover areas such as the calibration of scenarios, appropriate stresses for volatility, basis risk and longevity and the standards that would be appropriate for models which might lead to results that are lower than the Standard Formula as outlined above.

3 Long term horizon – the product life CTE

Most, if not all, companies writing variable annuity business in Ireland use the Conditional Tail Expectation (CTE) methodology to set statutory reserves and in some cases total capital requirements, an approach drawn from practice in the US.

Revenues (charges) and outgo (claims and expenses) are projected (usually on a policy by policy basis) in a number of simulations. A higher number of simulations may be required in this situation than for the VAR approach of section 2 as we are now assessing the tail of the distribution rather than its expectation.

For each simulation, the reserve is calculated as the excess of the present value of outgo over revenue and the total reserve is calculated as the average of the highest reserves produced in the tail. For instance, CTE90 is the reserve set by averaging the reserves produced in the worst 10% of simulations, CTE70 averages the worst 30% of simulations etc.

3.1 Calibration of Real World Scenarios

The simulations used to generate the reserves are based on real world scenarios (as opposed to risk neutral scenarios), which allow for higher average return on riskier assets and in some cases with greater volatility of returns. 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 companies using the same CTE framework or as compared to a market consistent approach. We suggest that the risk premia on real assets would be in the same range as is recommended in the context of pension fund valuations.

The principal areas of consideration for market risk are :-

- Central Path for “risk free” Interest Rates/Returns
- Allowances and levels for Risk Premia – Equity, Bonds, Property etc
- Volatility Calibration for equity and interest rates
- Correlations between factors
- The projection method used. The projection model needs to produce adequately dispersed scenarios that give suitable calibration in the tails.

At present no detailed Irish standards exist for actuaries producing these real world scenarios and practice in the area has developed partly from the guidance available in the US and elsewhere. Since the CTE methodolgy calculates the capital needs using the tails of the distribution we believe that greater consistency of standards is required for the calibration of real world scenarios. Therefore, we recommend that actuarial standards be produced in this area. The Society would be pleased to put standards in place on this topic. We would expect our standards to rely heavily, where appropriate, on the standards and guidance implemented in the UK and the US.

3.2 Demographic Assumptions

In addition to market risks there are key considerations as to the modelling of demographic risks which incorporate the behaviour of policyholders and additionally the decrement and survivorship risks associated with mortality. These demographic considerations of course apply equally in the market consistent context of the VAR approach discussed in section 2. Prudent best estimates are used for policyholder behaviour assumptions, e.g. lapses, withdrawal utilisation (where the guarantee relates to withdrawal benefits), fund switching, etc. Consideration should be given to the extent to which these assumptions should be dynamic, i.e. vary due to economic circumstances. We recommend that actuaries should allow for a prudent level of policyholder "rational" behaviour in this regard, recognising that any such assumptions in extreme scenarios will necessarily be a matter of judgement.

Note that we are suggesting that prudent assumptions should be used for all demographic assumptions in the calculation of total capital requirement. This includes the use of prudent lapse assumptions rather than the current standard for direct writers of zero lapse. We feel that this is a more approriate standard in the context of examining the tail of CTE approaches and indeed it is consistent with the approach used in the US. It is likely that dynamic lapse assumptions will lead to low lapse assumptions in the tail. In section 5 we consider how this can be achieved in the context of the current Solvency I regime.

4 Dynamic Hedging

This section will look at the basis and allowance for dynamic hedging in the context of the Total Capital Requirement and its consequent implication for the Technical Provisions. In particular, the section will look at the allowances for Future Trading Offset and the conditions specified by the Financial Regulator in order to determine the Percentage Offset Credit. This is an essential component to consider as part of the transition from the Solvency I environment through to the Solvency II environment; thus the issue here is one of bridging from one system to the other.

4.1 CEIOPS Advice

Very briefly it is useful to contemplate the advice of CEIOPS to the Commission in respect of dynamic hedging in the context of Financial Risk Mitigation. The CEIOPS Advice as released to the Commission in October 2009 makes it clear that dynamic hedging will not be considered an appropriate risk mitigation system in the context of the Standard Formula. Consequently, we have recommended that there should not be any Future Trading Offset for any dynamic hedging strategy in the VAR type calculation in Section 2 above. However, CTE capital calculations are calculated by projecting policies for their full lifetime and then considering the capital needs in the tail of the distribution. In examining this longer term perspective it is appropriate to consider the impact of dynamically adjusting the hedging portfolio. We agree with the Discussion Paper that some credit for future hedging could be allowed in this context.

Owing to the internal or entity specific nature of the proposals required it is then beyond the scope of this paper to cover what the solutions or outcomes may be for individual cases. However we have commented on the different considerations in determining the Percentage Offset Credit (POC). We have considered the Discussion Paper's list of requirements in respect of POC and have provided comment on the respective elements and proposed extensions to the list that may be considered under a future consultation.

4.2 Current Limits and Limitations under existing US Regulations

The CTE regime in Ireland was derived from the regime in the US. In the years since CTE was introduced here, there have been developments in the US market with particular emphasis on the credit that can be taken for dynamic hedging. Therefore it is appropriate to consider the operation of the regime on that jurisdiction.

Since the US framework has been developed over a number of years and implemented over recent years, we believe that it gives a very useful framework for any system to be implemented in Ireland. It would not make sense to try to develop an alternative framework in the short time that remains before the introduction of Solvency II.

The US framework now has detailed separate explicit rules for Total Capital (C3 Phase II requirements) and Technical Provisions (Actuarial Guidelines 43). The maximum credits for hedging are limited to 95% and 70% respectively. Since the Financial Regulator is recommending an approach based on Total Capital Requirement (and we agree with this approach) this would suggest that credits for hedging of up to 95% might be allowed.

The actual amount of credit taken by the undertaking in the US is the subject of actuarial sign off which places a significant burden of responsibility on the signing actuary. This is different from the system proposed in the Discussion Paper where the Financial Regulator will make a decision about the POC. We would suggest that the US system be considered with an appropriate POC proposed by the Appointed Actuary and then subject to regulatory review by the Financial Regulator. This is consistent with the principles that apply to other products.

What then can we take from this North American framework when contemplating a system for implementation in a European context?

The North American profession has reduced a significant component of the framework uncertainty through the provision of economic scenarios to provide the real world outer loop for actuaries to consider and thus removes initial queries or challenges to the scenarios to be assessed and allows the focus for the undertakings to be the modelling of the inner loops. We have suggested in Section 3 above that greater guidance is needed on the production of real world scenarios in the Irish market to achieve similar consistency.

The American Academy of Actuaries produced a guidance paper in June 2005 for actuaries calculating capital requirements for variable annuity business. This paper entitled "Recommended Approach for Setting Regulatory Risk-Based Capital Requirements for Variable Annuities and Similar Products" is available to download from the NAIC's website at:

http://www.naic.org/documents/committees_e_capad_lrbc_2_LCASDocFinal.pdf.

This paper gives guidance for actuaries in the US. It suggests that the credit for hedging would be high where the projection models are "state of the art" and relatively lower where more simplistic approaches are used.

Similar approaches are likely to be appropriate in the Irish market with greater levels of offset being approved where the modelling is more detailed.

4.3 Future Trading Offset and Percentage Offset Credit

It is important that any formal consultation from the Financial Regulator gives greater clarity on the Future Trading Offset and the Percentage Offset Credit. In determining the appropriate credit to take for hedging the Appointed Actuary will need to consider:

- The detail of the modelling which produces the Future Trading Offset;
- The risks that are not hedged;
- The quality of the hedging program.

For example:

- Company A may have a very simple hedging strategy which uses a simple delta hedge. In this case the calculation of the Future Trading Offset should be relatively straightforward. The Percentage Offset Credit may be high to reflect the high level of predictability of this strategy.

- Company B may have a more complex hedging strategy. In this case the company may dynamically hedge delta, rho, gamma and vega. The calculation of the Future Trading Offset is a much more complex task but should produce a much higher FTO figure. On the other hand a somewhat lower POC may be needed to reflect the greater variability in the hedging result.

These contrasting examples show that it is not simply a case of applying a high POC for companies with complex hedging strategies. There needs to be integration between the calculation of the POC and the FTO.

4.4 Clearly Defined Hedging Strategy

It is unarguable that the starting point for any credit is to have clarity as to what risks are expected to be mitigated by the hedging strategy. This is not a trivial exercise as hedging itself requires certain flexibility given that trading operates in a dynamic market. That said the following key questions need to be covered :-

4.4.1 Identification of what is to be mitigated through the strategy :

In analysing the liability into its market sensitivities the undertaking needs to identify which of these are to be mitigated. In this regard we can identify the need to specify which liability "greeks" (delta, vega, rho, gamma etc.) are to be mitigated. Obviously if the policy does not contemplate hedging a greek no credit can be taken for the capital associated with that sensitivity.

The strategy should state clearly which measure of liability is to be mitigated, viz. the statutory or economic measurement of risk.

4.4.2 Identification of how risk is to be mitigated through the strategy :

There needs to be clarity as to the instruments to be utilised in achieving the hedging whether through index based futures and options or the implementation of hedging using a combination of approaches using actual underlying assets.

Which markets will be utilised to effect the trading e.g. will the instruments be exchange traded or over the counter markets?

What are the policies as regards to rebalance frequency, whether fixed or dynamic and whether to contemplate tolerances and limits for trading discretion?

What is the liquidity of the various markets and how they respond to market dislocations? For example, where the policy is reliant on rolling over or rebalancing risks, an important consideration is how such a policy is to be applied in the context of markets that are in a period of dislocation or disequilibrium.

In addition to the direct questions to be considered above it is important to contemplate the risks acquired through implementation of a particular policy. Some of these risks will be addressed below such as basis risk and operational governance. Of these risks the most important are perhaps as follows:

- Counterparty
- Funding Liquidity Risk
- Trading Liquidity Risk.

The strategy should outline the approach to be used for each of these risks.

It is to be expected that the hedging strategy should be capable of change or alteration, whether to increase or decrease the scope of coverage or the method of implementation. To the extent that the strategy changes, it is essential that such changes are captured in the valuation process. However, the hedging offset should not take credit for future planned enhancements to the hedging strategy in advance of their implementation.

The Clearly Defined Hedging Strategy requires comprehensive documentation that needs to be grounded in the operational capability of the particular undertaking. As such, where there is either an absence of policy or an absence of implementation capability, it would appear to be inappropriate to claim that there is a Clearly Defined Hedging Strategy.

4.5 Comments on Specific items listed in the Discussion Paper

The following sections take each of the discussion paper's other bullet points and makes comments and extensions for consideration in a subsequent consultation.

4.5.1 Proven Operation of Hedging Program

The Clearly Defined Hedging Strategy above outlines the intent. This needs to be supported by demonstration of actual results over prior periods. The primary benefit and use of this reporting cycle will be for the operation and governance of the policy. However, there is also a need to apply this information into the allowance for POC in the total capital requirement calculation. The American Academy of Actuaries has issued practice notes in this area. It suggests that the items to be considered should include the following:

- Tracking error between policyholder fund values and mapped index exposures;
- Basis risk between derivative contracts and underlying index exposures;
- Market gap risk;
- Price Risk;
- Parameter estimation risk expenses, such as transaction costs, margins, bid/offer spreads and administration costs;
- Variation in assumptions (mortality, persistency etc)

They also recommend that it may be preferable to limit the hedging credit taken due to the uncertainty associated with the company's ability to implement the hedging strategy in a timely and effective manner. This would be a judgement based on the detail of the undertakings hedging strategy.

4.5.2 Basis Risk

Basis risk is a critical aspect and can incorporate a wide range of related but distinct components.

As outlined in the Financial Regulator's Discussion Paper, the starting point in considering the impact of Basis Risk on the POC is a statistical and analytical determination of the relationship between the assets and liabilities, where it is important to understand not just the historic relationship between components but also the structural relationship between them.

We agree that the allowance for basis risk in determining the POC is an important component of future modelling of hedge effectiveness where allowances for both noise and trend variations are required as are allowances for dislocations in periods of extremis in order to achieve a POC at the upper end of the allowable range.

4.5.3 Delay Risk

We agree that delays in the hedging program can cause difficulties that should be reflected in the FTO/POC. Different undertakings will have different levels of sophistication in their hedge programs. For those undertakings where there is an observed trend or bias arising through the organisation being persistently "behind the market", this will manifest itself as a trend risk which needs to be addressed through a combination of operational efficiency and adjustment to the FTO/POC.

4.5.4 Testing Nature of Stochastic Model

The Discussion Paper's commentary in this section to some degree incorporates many of the items identified above, particularly our recommendations of appropriate actuarial standards on the real world scenarios to be used. The calibration of the stochastic model also overlaps with some of the considerations of basis risk, funding risk and trading risks. We echo the need to capture these attributes to achieve a high offset. We agree that a higher offset might be allowed in situations where the undertaking can demonstrate that this is appropriate in a wide range of scenarios.

4.5.5 Operational Risk and Governance

This arguably comprises the most significant challenge and hurdle for any entity looking to implement and achieve credit for a dynamic hedging program and again we would echo the advice of CEIOPS in identifying the need for an internal models approach for companies seeking to achieve significant Future Trading Offset through a Dynamic Hedging strategy. Additionally we would identify the need for such undertakings to have specific regard to the systems of governance and administration and the burden and obligations on risk and audit functions. In effect what is being given is credit for a process. The process thus represents an asset of the undertaking and needs to be managed accordingly.

There will be an onus on the Financial Regulator to interrogate and potentially approve an undertaking's application for internal model approval. This is an area of considerable further development where we envisage an opportunity for significant dialogue between the actuarial profession, industry and the Financial Regulator.

4.5.6 Extent of Modelling

The comments in the Discussion Paper under this heading raise perhaps the most intractable of the problems.

The nature of the product is important in deciding how extensive and comprehensive the model needs to be. For relatively straightforward liabilities simple models calibrated to historic values of mean and volatility may well be adequate.

For complex liabilities with only rare but significant payouts the requirement to model the "tails" obviously becomes more demanding as does the need to perform more simulations.

Arguably, if a product design gives rise to exposures which cannot credibly be modelled from existing observable data or from reasonable extrapolations of experience, the undertaking should consider the advisability of launching such a product or keeping it open to new business.

Again this is an area in which we see ourselves providing more input at the formal consultation stage.

4.6 Summary & Conclusion

We agree that there is a comprehensive challenge to the Financial Regulator, the industry and the actuarial profession in successfully implementing a coherent policy for dynamic hedging and the offset that should be allowed for the hedging program. Significant guidance is needed to set the framework for the credit to be taken. We believe that the C3 Phase II structure introduced in the US gives a useful template and that guidance from the Financial Regulator should follow the US model as much as possible. We would welcome further dialogue and engagement with the Financial Regulator in this area and would be happy to provide supplementary guidance/standards as needed.

5 Solvency I and Transition to Solvency II

The purpose of this section is to propose how the capital requirements move from Solvency I to Solvency II.

The Society believes that the "final destination" for the capital requirements can only be Solvency II Solvency Capital Requirement (whether implemented through a variation on the Standard Formula or a Regulator Approved Internal Model). Therefore the ultimate target is 1 year 99.5th percentile VAR or equivalent. The issue is how the transition between Solvency I and Solvency II takes place and where the current practice used by VA writers fits in with these.

5.1 Direct Writers

5.1.1 Current Position

Annex IV of the EC (Life Assurance) Framework Regulations, 1994 ("the Regulations") sets out a number of principles for the calculation of reserves for liabilities. The methodology set out under these Regulations is in essence deterministic. The treatment of options and guarantees is "prudent" rather than based on stochastic calculations.

In contrast with the best estimate approach of Solvency II, Solvency I requires prudent estimates of technical provisions. For example, there is no allowance for lapses if this leads to a reduction in reserves and options and guarantees should be allowed for prudently.

The Financial Regulator augments these requirements through resilience testing requirements set out in an annual letter.

The requirements under the Regulations are further enhanced by the Actuarial Standards of Practice. In ASP LA-3 Section 3.6.5, the requirement for stochastic calculations is set out. In particular there is the requirement to calibrate the model to market consistent parameters. However this is confined to a paragraph and was mainly targeted at guaranteed annuity options. The focus of this paragraph is to use stochastic calculations to augment reserves rather than for capital calculations.

Neither the Regulations nor ASP LA-3 mentions anything about taking into account future dynamic hedging. For the resilience tests, the effect of the shock is assumed to be instantaneous.

The Regulations are fundamentally deterministic in nature i.e. based on one scenario, albeit prudently calibrated, and supplemented by several resilience scenarios. This usually results in the reserves for options being considerably less than a stochastic CTE calculation at, say, the 90th percentile. ASP LA-3 should be clarified to confirm that it is appropriate to relax the other regulatory constraints, such as the treatment of lapses, when performing stochastic CTE calculations, provided that such relaxation does not result in reserves which are less than those required by the Regulations.

Thus for variable annuities, the Financial Regulator permits the use of "real world" stochastic modelling, not just of market returns but also of policyholder behaviour. The Financial Regulator has also allowed for some offset to reflect dynamic hedging strategy which may be in place. This latter aspect is discussed in detail in Section 4.

Of course, there remains the minimum requirement to meet the various deterministic scenarios set by the regulations and the annual letter from the Financial Regulator to Appointed Actuaries.

5.1.2 Proposed Approach

We propose the following approach to the transition from the current situation to Solvency II.

Minimum Requirement to Technical Reserves

- The reserves for options and guarantees are calculated under the principles set out under the Regulations. The reserves are calculated in a deterministic fashion and incorporate prudence, the current restrictions on lapses, discount rates, surrender value floors etc. In addition the current resilience test structure will continue to be applied.

Total capital requirement

- The total capital requirement is calculated using either the VAR approach discussed in section 2 or the CTE approach discussed in section 3, this latter possibly adjusted for a future trading offset, as discussed in section 4.

Under the current regime the constituents of this total capital requirement are as follows:

- Minimum technical provisions as per the Regulations
- Any additional "option" reserve as a result of the application of ASP LA-3
- The EU solvency margin formula
- Any additional solvency margin imposed by the Financial Regulator

We have concentrated in this submission on the determination of the total capital requirement rather than its distribution among the above constituents. However, for sake of completeness, we discuss two possible methods as to the presentation of the total capital requirement. Methods in between the two extremes are also possible.

<u>Method 1 ("top down")</u>

- A. The Technical Reserves are calculated as the difference between the total capital requirement and the sum of the EU formula solvency margin and any generic additional solvency margin required by the Financial Regulator (e.g. 50%).
- B. The additional option reserve is calculated as the difference between the calculation in A. above and the minimum Technical Reserves per the Regulations. Of course this additional option reserve could not be negative.

<u>Method 2 ("bottom up")</u>

- The Technical Reserves are calculated as the minimum per Regulation, possibly augmented by an ASP LA-3 stochastic option reserve
- Any remaining capital requirement (after application of the EU formula solvency margin) is met from free assets by the FR making a direction to maintain additional solvency margins, similar to the generic requirement but now individually tailored to each company. This would be based on supplementary reporting provided by the company.

5.2 Reinsurers

For life reinsurers the situation is somewhat different. The 2005 Reinsurance Directive and EC (Reinsurance) Regulations 2006 are more recent developments. The basis for calculation of the reinsurance technical provisions is founded on the 2002 Life Directive and 1991 Accounts Directive. This is supplemented by various regulatory guidance and actuarial standards.

Due to the broad nature of reinsurance business, the Reinsurance Regulations contain fewer restrictions (such as lapse restrictions) on the calculation of technical provisions. The focus of the Regulations is more on the economic level of the liabilities plus a margin for deviation.

The Financial Regulator has also introduced an Augmented Solvency Margin calculation for reinsurers writing finite re and financial reinsurance business. The purpose of this is to capture the risks that would not be covered in a Solvency I solvency margin calculation. Such an Augmented Solvency Margin is calibrated to the most current Standard Formula as issued by CEIOPS for the purpose of its Quantitative Impact Studies. As such the framework countenances a 1 year Var Assessment.

The less restrictive nature of the Regulations permits Section 5 of ASP LA-11 to contain greater detail in the valuation of options and guarantees than ASP LA-3.

However there is no guidance within the Regulations or the ASP for a credit for dynamic hedging within the calculations.

For life reinsurers the Society proposes similar rules to those of direct writers with the baseline reserve being at least that required for the technical provisions under the Reinsurance Regulations. For the Total Capital Requirement there is additionally the scope for Reinsurers not currently producing Real World Valuations to utilise a Solvency II , Short Horizon for the provision of their Risk Sensitive Peak. Again, the actual display of the results again can be as described by the two methods above.

5.3 Proposed Changes to Actuarial Standards

The Society believes that ASP LA-3 and ASP LA-11 should be expanded to provide more detail on reserving for guarantees and options. However, to avoid repetition a new ASP could be created to cover guarantees and options, with ASP LA-3 and LA-11 referring to this new ASP. The standard could address the following issues:

- Number of scenarios
- Use of core approach and either CTE or VAR
- Calibration of scenarios for either CTE or VAR calculations
- Clarification of treatment of lapses
- Use of FTO/POC for CTE approach.

5.4 Summary

The Society believes these proposals are suitable as:

- They do not require any legislative change since the changes can be achieved through regulatory guidance or ASPs;
- They ensure that the liabilities under Solvency I requirements are covered;
- They provide a framework for evolution to Solvency II.

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