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Capital management in a Solvency II world





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1. INTRODUCTION

1.1. BACKGROUND

There has been a growing trend recently amongst insurance and reinsurance undertakings towards placing greater focus on capital management. The financial crisis has shown that undertakings cannot assume that capital will be readily available as and when it is needed and, even if it is available, it may not be accessible at the right price. Solvency II will change the way insurance and reinsurance undertakings determine their regulatory capital requirements, as well as introduce new rules with regard to what forms of capital can be used to meet those requirements. As a result, Solvency II will bring about both challenges and opportunities for undertakings. This paper aims to address some of the key issues for insurers and reinsurers with regard to capital management in a Solvency II world.¹

Full implementation of Solvency II will take effect from 1 January 2016 following the enactment by the European Parliament of Omnibus II on 11 March 2014. The Omnibus II Directive included some amendments to the Solvency II Directive, most noticeably in respect of the long-term guarantees (LTG) package.

The European Insurance and Occupational Pensions Authority's (EIOPA) preparatory guidelines on the preparation for Solvency II were published in October 2013 and soon afterwards adopted by member states. The aim of the preparatory guidelines is to ensure that regulators and undertakings take active steps towards implementing the key elements of Solvency II in a consistent manner. The main focus of the guidelines is on Pillar 2 aspects such as governance, risk management and the Forward Looking Assessment of Own Risk (FLAOR), as well as on Pillar III reporting. We note that these aspects are largely compliance-related, rather than necessarily considering the various aspects of capital management.

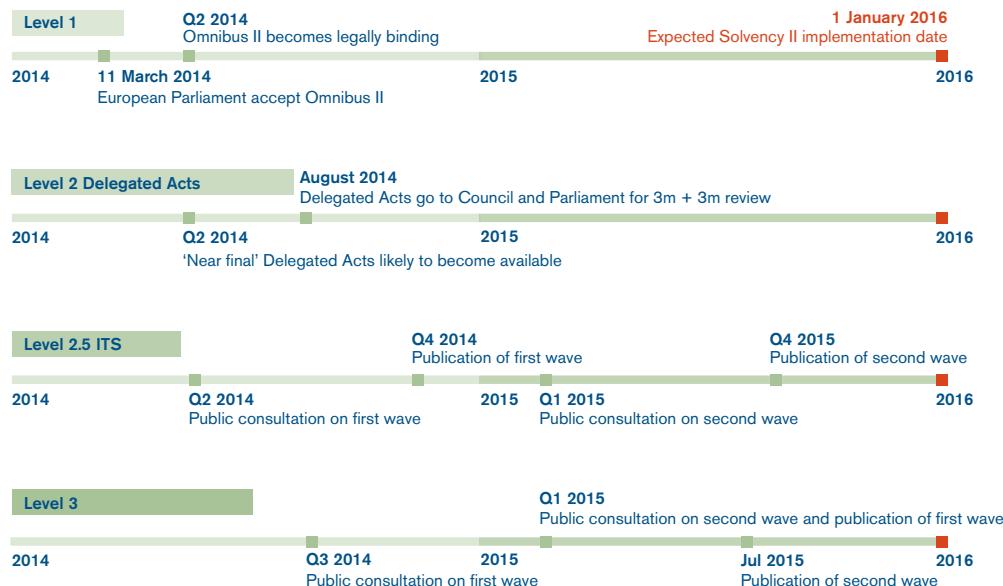
Over 2014, the European Commission will continue to develop the Delegated Acts (Level 2). It appears that the Commission does not have a strong appetite for change to the draft Delegated Acts, other than updating them to reflect the LTG package. However, some stakeholders are still lobbying for change in relation to specific aspects of the Delegated Acts. Therefore, it remains to be seen whether the final Delegated Acts will have any significant differences compared to what was issued to selected stakeholders for pre-consultation.

In addition, draft Implementing Technical Standards (Level 2.5, as they are sometimes called) and Guidelines (Level 3) will be published by EIOPA for public consultation in 2014. The Implementing Technical Standards (ITS) are legally binding standards, aimed at ensuring a uniform application of the Solvency II Directive. The Guidelines will provide additional detail on the application of the Solvency II Directive which is necessary to guarantee convergence of the Solvency II implementation across all member states.

The ITS and the Guidelines have each been divided into two waves for public consultation. From a capital management perspective, there is a significant amount of relevant information included in the ITS that were issued for public consultation at the end of April, together with the Guidelines that were issued for public consultation at the beginning of June 2014 (as part of 'Set 1' of the ITS and Guidelines respectively). In particular, the consultation on the guidelines includes a lot of useful detail on contract boundaries, valuation of technical provisions, classification of own funds, ring-fenced funds, adjustment for loss absorbing capacity of technical provisions and deferred taxes, risk mitigation techniques, application of the market risk module and various other risk sub-modules. Additional information on Pillar II and Pillar III requirements will be published for public consultation later in 2014.

¹ Throughout this paper the term 'insurance undertakings' is used to refer to both insurance and reinsurance undertakings.

FIGURE 1.1.1: SOLVENCY II TIMELINE 2014 – 2015



As the final Delegated Acts, ITS and Guidelines have not yet been published, this paper has been based on the most up to date material available from the Commission and EIOPA at the time of writing. This includes Final Advice and draft Delegated Acts published by EIOPA as well as Set 1 of the public consultation on the ITS and the Guidelines, together with documents issued to selected stakeholders for pre-consultation which are not yet officially in the public domain. As such, while we do not expect any significant changes to the detail or the application of Solvency II once the final documents are published, it should be noted that some of the points raised in this paper may be subject to change until such time as the final documents have been issued.

1.2. OUTLINE OF THIS PAPER

In Section 2 we provide context for the paper by describing the importance of a robust decision-making framework for capital management strategy.

Section 3 outlines how investment strategy can be used to achieve capital efficiency.

Section 4 outlines the use of reinsurance and capital market solutions.

Section 5 outlines the regulatory landscape in relation to capital structure and own funds under Solvency II.

Section 6 outlines some considerations with regard to corporate structure and portfolio restructuring.

Section 7 contains some examples of other potential risk management solutions which may apply in the case of individual undertakings.

Section 8 outlines the use and potential benefits of various risk modelling techniques in calculating technical provisions and capital requirements.

Section 9 outlines the Pillar II and Pillar III requirements that are relevant from a capital management perspective.

2. INFORMED DECISION-MAKING FOR OPTIMAL CAPITAL MANAGEMENT

For effective capital management under any regime, it is important to formulate a framework within which decisions can be made. In this section, we outline the key components of such a framework.

2.1. KNOWLEDGE AND EXPERTISE

It is an important aspect of any capital management plan that the appropriate knowledge and expertise is available in order to implement and execute the objectives of the undertaking. If, for whatever reason, this is unavailable within the organisation then it will be necessary to access such skills (at least initially) through third parties. If the management plans to have all expertise in-house then careful planning is required as regards training and possibly new recruitment. Such needs, and the associated costs and timescales, should be well understood in advance of the final design and implementation of any capital management plan.

2.1.1. Understanding the regulatory landscape

As a starting point for robust capital management, a natural prerequisite is a thorough understanding of the regulatory landscape. With a good knowledge, along with a robust measurement system, insurers can explore alternative capital strategies with an objective to optimise the capital position.

It is also important to bear in mind that constraints from other capital or reporting frameworks will likely remain following the implementation of Solvency II. Capital constraints may include alternative regulatory capital measures (e.g. for subsidiary entities of international groups in non-equivalent countries or indeed for undertakings in equivalent countries that continue to apply local frameworks), internal capital measures and rating agency frameworks. The planned introduction of new financial reporting standards under IFRS² may also introduce alternative performance metrics that form part of an insurer's management framework, as well as those that already exist from current reporting regimes. It is important, therefore, to understand and allow for any such constraints in the capital management process.

For certain options, it will be important to engage the regulator and/or the auditor at an early stage in the process to ensure the appropriate regulatory, reporting and tax treatment is understood and achievable without unintended and potentially adverse consequences.

2.1.2. Understanding the economic and risk environment

Solvency II is designed to be a risk- and economic-based framework and, therefore, generally encourages decision-making along these lines. Solvency II is also intended to be a principles-based regime, although it has increasingly moved towards a rules-based approach in relation to specific aspects. The result is that there remain some aspects of the regulatory framework which do not necessarily adopt a pure economic view and the potential arises for inconsistent application of the regulatory requirements.

2.2. MANAGING RISK AND CAPITAL WITHIN RISK APPETITE

With the introduction of Solvency II, European insurance undertakings are increasingly focusing efforts on understanding and defining risk appetite and aligning risk limits with that appetite. Historically, however, life insurers have not always aligned capital management decisions with an economic basis for risk appetite, and often focused on statutory measures when making decisions. Hence, this represents a change in mind-set for many insurers. A key challenge is for management to define risk appetite in an objective and quantifiable way. The Solvency II framework is set up to consider tolerance for a '1 in 200 year event', although some undertakings may target a more conservative level in order to meet internal target capital or rating agency requirements.

In theory, undertakings will generally want to retain risks for which they have appetite, to avoid sacrificing the associated expected returns. They will want to avoid or mitigate exposures that exceed tolerance levels to avoid exposing the future financial health of the undertaking to an unacceptable level of risk.

² International Financial Reporting Standards, issued by the International Accounting Standards Board (IASB).

In practice, however, there may be barriers which prevent an ideal alignment of risk profile with risk appetite, for example:

- Defining with any level of accuracy the events which correspond to the risk appetite is not always easy, especially for extreme risk events that occur, by their very nature, rarely.
- Corporate structures can often complicate the view of risk appetite across an entire organisation, which can lead to practical challenges of aligning risk appetite and risk profile.
- Pricing of risk and capital solutions may justify transferring more risk than risk tolerance alone might suggest.
- There may be limitations on the availability of certain types of capital solutions, or possibly their availability at an acceptable price.

2.2.1. Measuring the interaction of risk, capital and value

The concepts of risk, capital and value are closely connected, which is particularly well illustrated by the Solvency II framework. The economic balance sheet represents economic and risk-adjusted value; while the risk-based target capital, as measured by the Solvency Capital Requirement (SCR) under Solvency II, reflects the risk profile of the insurer.

A key prerequisite for insurers to quantify alternative capital management strategies is a robust, yet practical, cash flow projection model. Model results can then be used to support objective decision-making. Insurance groups can also choose to adopt a group model to support a holistic assessment of intra-group transactions and internal diversification before consideration of external transfer of residual risk to reinsurers or to the capital markets.

Once a robust model is in place, an undertaking can use this to support decision-making, as described in section 2.3 below.

2.3. FORMULATING A STRUCTURED APPROACH TO DECISION-MAKING

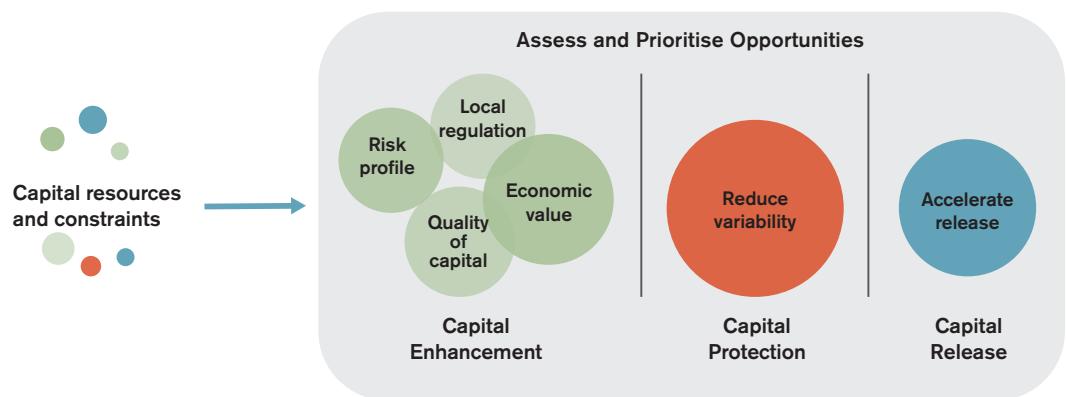
2.3.1. Identification of potential areas for improvement

Insurers face a multitude of options when it comes to capital management decision-making. In order to maintain a focused and effective strategy, there is a strong need for a consistent and systematic approach to the identification, evaluation and prioritisation of opportunities to enhance and/or protect the capital position of an insurer, or to release capital which is unnecessarily encumbered in the business.

Insurers will want to focus efforts on the most material opportunities, taking into account the benefits, constraints, risks, resources and timescales associated with capturing those benefits.

Given the inherent link between risk, capital and value, it will be important for the relevant functions and departments within an undertaking to align activities and objectives to ensure a consistent approach that is also compatible with corporate strategy.

FIGURE 2.3.1.1: ASSESSMENT AND PRIORITISATION OF OPPORTUNITIES



A well-designed management information dashboard can help to identify potential areas for improvement through alternative actions. For example, insurers can perform an evaluation of various business units or lines of business according to key metrics, such as current and forward-looking Solvency II capital requirements, split by each major risk and capital driver. By considering the degree of variability for drivers within the insurer's control, an initial indication can be obtained of the degree to which actions might yield a suitably rewarding improvement. For example, if a business unit has a small value under a particular metric and is not particularly sensitive to changes in the controllable drivers of that metric, then attempts to make improvements can be discarded. In contrast, if the business displays a significant degree of sensitivity to these key drivers, then there is the 'potential' for improvement. Areas which combine large current values with large sensitivity might represent the most interesting potential.

2.3.2. Possible capital management actions

Insurers can consider a wide range of actions associated with each source of variability. We present a variety of possible areas to consider in Table 2.3.2.1 below. In the later sections of this report we consider some of these areas in more detail.

TABLE 2.3.2.1: EXAMPLE OF POSSIBLE MANAGEMENT ACTIONS

Investment strategy	<ul style="list-style-type: none"> Asset-liability management (ALM) Hedging and derivatives Rebalancing investment portfolios Unit-linked matching or hedging the annual management charge
Reinsurance and capital market solution	<ul style="list-style-type: none"> Reinsurance Longevity swaps and catastrophe bonds VIF monetisation
Capital structure	<ul style="list-style-type: none"> Alternative financing instruments Grandfathering rules Ring-fenced funds
Corporate structure and portfolio management	<ul style="list-style-type: none"> Branch structure Mergers and acquisitions Portfolio restructuring Portfolio management Third country equivalence Interaction with Basel III if applicable
Other potential solutions	<ul style="list-style-type: none"> Operational risk management Credit risk management Expense management Claims management Tax management Risk retention
Risk modeling	<ul style="list-style-type: none"> Implement internal models to better reflect and understand own risk profile Consider proxy modelling techniques and automated modelling processes Data quality Modelling of management actions which mitigate risk impacts Capture the impacts of sophisticated risk management mechanisms, e.g. financial hedging programs

2.3.3. Cost-benefit analysis

For each potentially relevant driver an assessment can be made of the scale of benefit which might be obtained and the costs associated with obtaining it. The potential costs of certain actions might include:

- The time taken for implementation of the action
- The cost associated with the action (e.g. external adviser support, systems, etc.)
- The resource requirements for carrying out the action
- The execution risks associated with the action, particularly from a regulatory and an operational perspective
- Potential reputational consequences arising from the action which might have wider consequences for customers, distributors and the regulator, for example

2.3.4. Availability of capital and risk management solutions

When designing optimal capital management solutions for a particular undertaking or block of business, it is important to bear in mind the current cost and availability of the required solutions in the marketplace. It may be necessary to choose a sub-optimal solution in order to execute it at a reasonable cost or without introducing new risks or administrative or regulatory constraints, or to get a solution in place at all if there is a general lack of availability of potential solutions in the marketplace. For example, limiting longevity risk through a longevity swap could prove expensive if there is limited capacity amongst potential counterparties or the types of swap on offer imply accepting significant amounts of basis risk.

Hence, it is important to sense check proposed solutions at an early stage before significant effort has been expended in designing the most appropriate solution to the capital management objectives of the undertaking.

2.3.5. Cost of managing capital

Managing capital efficiency, and the cost of capital itself, can be expensive. Different capital market instruments can carry varying levels of cost for the undertaking. For example, the issuance of a bespoke convertible bond may involve the need to offer quite attractive yields to investors, thereby pushing up the cost of capital for the undertaking. Trading illiquid instruments can incur excessive transaction costs. Even frequent trading of liquid instruments can be costly.

Apart from these obvious investment considerations, there are costs associated with the ongoing determination of liability values and solvency capital requirements, an essential part of effective and efficient management of capital. Due to the nature and complexity of these calculations, huge demand may be placed on the resources of the undertaking, which can often lead to additional costs. There are some effective ways to address this issue though, as explored in section 8.3, which may lead to a more optimal allocation of resources across the business. Similarly, significant demands may be placed on management time, which could alternatively be spent pursuing the strategic objectives of the undertaking. Hence, it is important to bear these costs in mind when determining the optimal capital management plan within the organisation.

3. INVESTMENT STRATEGY

A key aspect of capital management, especially in the context of a risk-based capital regime such as Solvency II, is the successful application and operation of financial risk management strategies through, for example, asset liability matching and the use of derivatives. The assets in which the undertaking invests will have a direct impact on both the technical provisions and the SCR. For example, in calculating the technical provisions, the application of many of the elements of the long-term guarantees package depends on the characteristics of the underlying assets. Similarly, most of the SCR capital charges are calculated based on the change of the value of assets and liabilities in shocked scenarios.

This section of the paper considers different investment options and financial risk management techniques in the context of managing an undertaking's technical provisions and SCR.

3.1. ASSET LIABILITY MATCHING

It should be borne in mind that the choice of investment strategy or risk management technique to be employed depends on a wide range of factors including the individual circumstances of the undertaking and the risks to which they are exposed. There are further considerations to be borne in mind too, such as market practice, the resources and expertise of the undertaking and the undertaking's risk appetite. These issues will also be covered, where applicable, in the sections below. Due to the long-term nature of their business, life insurance undertakings (and, in particular, annuity providers) may be more incentivised than non-life undertakings to revisit their asset liability management (ALM) strategy under Solvency II. An optimal asset mix under Solvency II could aim to stabilise or minimise the technical provisions and SCR while remaining consistent with the prudent person principle.³ This could be achieved by matching assets and liabilities as closely as possible considering that both assets and liabilities are shocked in the market risk module of the standard formula.

Such matching techniques are commonplace under the existing solvency regime in Europe, mainly for the purpose of managing technical provisions, and will continue to be relevant under Solvency II. For example, writers of fixed annuity business generally seek to cash flow match their liabilities insofar as possible with suitable assets. Over time this should provide protection against changes in the level and shape of the yield curve. It also helps to minimise risk capital associated with the interest rate risk element of the solvency capital calculation at a point in time. However, it is generally not possible for undertakings to perfectly match their liabilities. In many cases, assets of sufficient duration do not exist to match long-term liabilities and the timing of liabilities is generally not certain so undertakings may need to consider other ALM strategies (such as the use of derivatives) in order to achieve more optimal capital management.

The recent financial crisis has led to some issues with regard to asset liability matching that the LTG package aims to resolve. For example, prior to the financial crisis, undertakings could use government bonds to back their long-term liabilities (which were valued using swap rates) as government bond yields and swap rates tended to move in the same direction. This provided undertakings with a basic hedge against interest rates movements. However, following the financial crisis the spread on government bonds in some markets increased significantly relative to swap rates, increasing balance sheet volatility. In response, the matching adjustment was introduced in order to allow for some of this spread to be used in calculating the value of the BEL.

The matching adjustment can only be applied in specific circumstances (see Appendix 1 for more detail) and the underlying assets meet certain criteria. The adjustment is calculated based on the undertaking's actual asset holdings, as opposed to a national specific reference portfolio, and is reduced for an allowance for fundamental spread. Therefore, it should provide a better reflection of the actual spread risk exposure of the undertaking than is likely to be the case with the volatility adjustment. As a result, undertakings that offer, for example, immediate annuities may benefit more from applying the matching adjustment than they would from applying one of the other elements of the LTG package such as the volatility adjustment for example (see Appendix 1 for more detail). The volatility adjustment is based on currency-specific and country-specific reference portfolios as opposed to an undertaking-specific investment portfolio so the adjustment will not provide an exact match to the spread on a

³ The prudent person principle requires that 'assets held to cover the technical provisions shall also be invested in a manner appropriate to the nature and duration of the insurance and reinsurance liabilities.'

given undertaking's actual asset holdings. Therefore, undertakings using the volatility adjustment may consider investing in interest rate swaps at the expense of government bonds or hedging the basis risk between government bond yields and swap rates. Undertakings will need to examine these issues carefully in order to assess what works best, given their individual circumstances.

Under Solvency II, undertakings will also need to consider the implications of various investment choices for shareholder assets (or free assets). Free assets tend to be invested in a more liberal fashion than assets supporting technical provisions. This enables undertakings to seek out higher expected rates of return on these assets, whilst recognising that relatively stable, lower yielding asset classes provide a better level of solvency protection. However, under Solvency II this may come at a direct cost to the level of solvency capital requirements, especially under the standard formula approach. This is because economic shocks that adversely affect the value of shareholder assets will not be offset in any way by changes in technical provisions. In contrast, adverse impacts on the value of assets supporting the BEL may be offset to some extent by changes in the value of those liabilities. Hence, it may make sense to consider the overall investment strategy for the balance sheet in a more holistic way in order to optimise returns without unduly altering the overall risk profile of the balance sheet. This is consistent with the 'prudent person' principle under Solvency II, though there are, of course, different degrees of prudence which may be considered.

3.1.1. Integrating investment strategy with capital considerations

Undertakings may want to integrate capital charge considerations into their asset allocation and investment decisions under the new solvency regime. The expected return to the shareholder needs to be considered as part of the overall ALM strategy. Expected returns and risk exposure should be weighed-up against capital charges for various assets. For example, high quality bonds result in low capital charges under Solvency II but the higher expected yields on lower quality bonds may provide sufficient compensation to undertakings to consider investment in such assets, after allowing for the cost of capital. Conversely, the spread risk capital charge for European government bonds is currently zero, regardless of the issuer's credit rating, but undertakings will still be exposed to spread risk if they invest in these bonds. This has been subject to much criticism following the turmoil in the EU bond markets for the past number of years, as it effectively implies that all of the bonds issued by EU member states are risk free. At the first annual EIOPA conference in Frankfurt in 2011, Gabriel Bernardino, the Chairman of EIOPA, hinted at the need to re-think the concept of zero risk. However, it is unlikely that this will be updated in advance of full Solvency II implementation. That being said, this issue is likely to be picked up by undertakings during the course of the ORSA process.

By integrating capital charge considerations into the ALM decisions, undertakings should be able to identify opportunities for capital efficiency in the subtle differences in the expected return of various asset classes and the associated capital charges and correlations across the market risk sub-modules. Market risk accounts for one of the highest capital charges under Solvency II—accounting for 67.4% of the diversified Basic Solvency Capital Requirements (BSCR) for European life undertakings and 32.8% of the diversified BSCR for European non-life undertakings in the QIS5 impact assessment.⁴ To the extent that investment strategy is within their control, undertakings may be able to modify their strategies in order to manage the market risk component of the SCR. For example, both equity and property could be considered to be 'expensive' asset classes under Solvency II. The equity risk sub-module alone accounted for 42% of the market risk capital charge for solo undertakings, before allowance for diversification in QIS5. Based on the draft standard formula calibrations, the stress applied to equities is a fall in value of 39%/49%⁵ (before any allowance for the equity dampener) and the stress test applied to property investments is a fall in value of 25%. A transitional measure has been introduced to phase in the equity risk shock for Type 1 equities (i.e. equities that are listed in European Economic Area [EEA] or Organisation of Economic Co-operation and Development [OECD] stock markets). Based on the latest technical specifications, a shock of 22% will apply in the year following the implementation of Solvency II and this will gradually be weighted towards the higher shock over a seven year period. Based on the latest text, no specific criterion applies in order to avail of this transitional measure so it is expected

⁴ As reported in the EIOPA Report on the fifth Quantitative Impact Study (QIS5) for Solvency II.

⁵ The equity risk sub-module is calibrated at a 39% fall in value of equities listed in regulated markets in countries which are members of the EEA or the OECD (Type 1 equities) and 49% fall in the value of equities listed in stock exchanges in countries which are not members of the EEA or OECD, equities which are not listed, private equities, hedge funds, commodities and other alternative investments (Type 2 equities). This calibration is before any allowance for the equity risk dampener.

that most undertakings will utilise this. However, even with the introduction of this transitional measure, some undertakings may still consider equities to be 'expensive' relative to other assets.

As a result, equity and property investments may become less attractive to some insurance undertakings compared to other asset classes once Solvency II is implemented. Undertakings may consider a combination of equity investments and derivatives to lower the capital charge. Alternatively, undertakings could consider using other asset classes to gain indirect exposure to equity markets, such as convertible bonds, which would not be stressed under the equity risk submodule. Some undertakings may wish to continue to hold equities and property, despite the high capital charge, for other reasons—for example, property investments act as a natural hedge against inflation. In certain central European markets, property is considered to be a relatively stable asset class as it has not been subject to the same collapse in value as other European countries. When Solvency II is implemented insurers in these markets will be faced with a choice between retaining their property investments (and the high capital charges) and trying to dispose of illiquid assets.

There are likely to be many alternative approaches to capturing the benefits of the differences in the market risk capital charges, depending on the exact nature and scale of the undertaking and its liabilities, so undertakings seeking capital efficiency will need to consider the requirements carefully when formulating their investment strategies.

3.1.2. Liquidity considerations

Optimal investment of assets, in particular capital market instruments, might be counter to the liquidity needs of the organisation. This could occur if the investments are illiquid (or at risk of becoming illiquid), such as may be the case with property/real-estate investments. If the undertaking invests in assets carrying high transaction costs (for example unquoted debt or equity instruments) then this can incur unnecessary expense if such investments need to be liquidated.

Likewise, if part of a long-term investment needs to be liquidated this could increase the risk of adverse short-term market conditions significantly denting overall investment performance. Hence, it is important to fully understand the short- and medium-term cash flow needs of the organisation before making such investment decisions. This may not always be clear-cut though. For example, the declaration of a dividend may lead to a short-term liquidity need, the quantum or timing of which may have been unknown at the time the investment allocation decision was made.

Additional liquidity considerations need to be borne in mind when using derivative instruments, and these are outlined in further detail in section 3.2 below.

3.2. HEDGING AND DERIVATIVES

Derivatives offer a potentially very effective solution to risk mitigation. Combinations of financial and non-financial derivatives can be used to address a range of risks, though financial risk management is certainly the area that is generally considered to be most suited to these instruments at present. This is because there is generally quite a deep and liquid market for 'plain vanilla' financial derivatives as well as a large number of counterparties willing to engage in bespoke 'over-the-counter' transactions. That said, markets are continuing to develop in other areas, such as longevity swaps for example, and this type of derivative is one which will continue to grow in popularity.

Hedging strategies may be constructed in a number of ways. Portfolios of derivatives may be 'static' in nature, meaning that they are only rebalanced to reflect the liabilities on an infrequent basis, or 'dynamic' in nature, meaning that they may be rebalanced as frequently as daily (and sometimes even more frequently). Undertakings may seek to either fully hedge or only partially hedge their liability exposures. The exact details of the intended strategy are key determinants of the effectiveness of the strategy at mitigating existing risks as dynamic hedges which seek to cover a wide array of risks tend to be more effective than partial hedges or static hedges. In contrast, however, dynamic hedges can generate more additional risks than static hedges, bearing in mind that any hedging activity involving derivatives will carry with it risks which would not be present—at least to the same extent—in the absence of hedging. Examples of these risks include operational risk associated with the management and trading of the derivative portfolio, basis risk, counterparty risk and liquidity risk (associated with margin calls). These additional risks may need to be further mitigated—for example, counterparty risk can be addressed to a large extent through appropriate collateral arrangements—unless additional capital is held to address them. Holding additional

capital though tends to dilute the beneficial impact of implementing the hedging strategy in the first place. However, mitigating actions can also be difficult or costly to pursue and hence, a balance needs to be achieved.

It is important to note that under the standard formula the use of a dynamic hedging strategy is limited to the actual derivatives held on the valuation date (unless there is some form of automatic process in place to roll-over short-dated positions once they expire, such that the hedge can be considered to be in place for the duration of the one year time horizon over which the solvency capital requirement is measured). Although dynamic hedging is used as a risk mitigation technique in reality, its application as a risk mitigant in calculating the SCR under the standard formula is therefore, generally limited. The standard formula SCR is calculated based on instantaneous shocks to the balance sheet, under which the dynamic nature of the hedging strategy would be ineffective because the assets cannot be re-balanced instantaneously. However, an internal model can more appropriately capture the impact of shock scenarios on the balance sheet in accordance with a one year time horizon, which allows the undertaking to capture the effect of rebalancing the hedge portfolio. Therefore, dynamic hedging can be more fully recognised in the SCR calculation in an internal model or partial internal model, where applicable. Rolling hedge strategies can be used in the SCR calculations under the standard formula approach to the extent that the hedges will be rolled over automatically once they expire.

A further development which has implications for insurers' ALM and hedging activity is the introduction of the European Markets Infrastructure Regulations (EMIR). These regulations are the European equivalent of Dodd-Frank in the US and aim to improve the security and transparency of the markets in over-the-counter (OTC) derivatives. EMIR introduces a number of new requirements for users of OTC derivatives but the key impact for insurers, in the short-term, will come from the shift to trading of interest rate swaps (IRS) and single-name credit default swaps (CDS) under a centrally cleared framework late in 2014.

The move to central clearing should reduce the counter-party risk associated with OTC derivatives. However, the change introduces new challenges in terms of liquidity management. Under the new system, users of IRS and CDS will face a new requirement to post initial margin in the form of cash or high quality, typically, government bonds to enter a trade. Beyond that, variation margin will need to be posted daily in cash to meet shifts in the mark-to-market value of the positions held. For insurers who are often heavy users of IRS in particular the liquidity demand generated by these requirements can be decidedly non-trivial.

It is possible that some liquidity support may be sourced from banks, via the repo market, but this cannot be guaranteed. Consequently, other options such as directly increasing the liquidity of the asset portfolio itself will need to be considered and there is a clear tension here with other investment objectives such as the delivery of yield and capture of illiquidity premia.

3.2.1. Hedging the risk-free rate

Hedging may be used not only for the management of capital requirements at a point in time but also for changes in the BEL, or components thereof, and the solvency capital requirements, over time. When it comes to hedging BEL over time, a number of complications may be introduced, mainly stemming from the definition of the risk-free rate under Solvency II. The market value of interest rate sensitive instruments such as interest rate swaps and swaptions is determined by reference to, amongst other things, the unadjusted market yield curve. Any adjustments to this curve due to, for example, extrapolation, the matching adjustment or the volatility adjustment will be reflected in the value of the liabilities but not in the value of the derivative instruments. Hence, rebalancing the portfolio over time can be very challenging and can lead to unintended consequences if due care is not taken.

For example, extrapolation on its own can lead to a number of challenges. Undertakings will need to employ different hedging strategies for long-term liabilities that fall due before and after the starting point of the extrapolation. The Solvency II hedge will be effectively the same as the market consistent hedge for liabilities that fall due before this point (if the matching adjustment and volatility adjustment are not applied). For liabilities that fall due after this point, however, the situation will be somewhat different. Figure 5.2.1.1 compares the hedges required for a euro-denominated once-off (bullet) liability due in 50 years' time, under a market consistent approach and a Solvency II

approach. The necessary hedges use market rates for the first 20 years (up to the starting point for the extrapolation for the euro currency). Thereafter, the rates converge to the UFR over a period of 40 years and the forward rates do not vary beyond the point at which the UFR is reached.

FIGURE 3.2.1.1: MARKET CONSISTENT VERSUS SOLVENCY II DELTA HEDGES

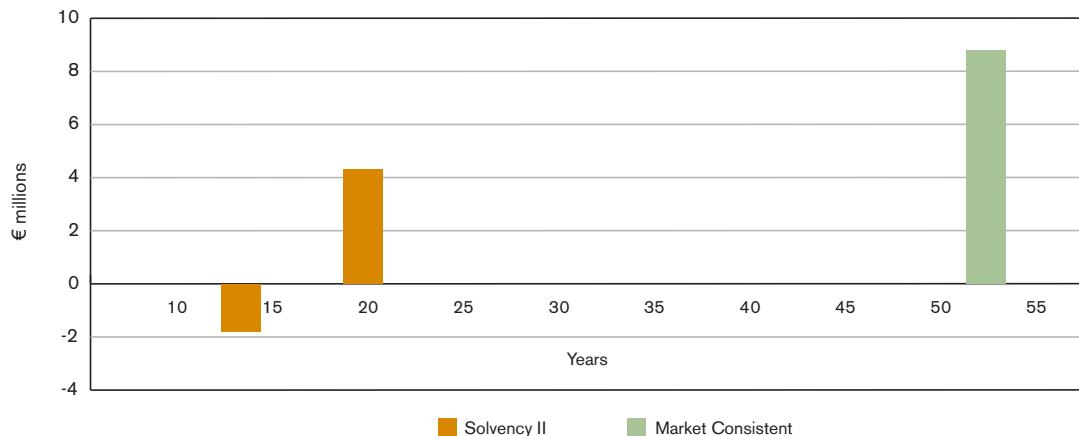


Figure 3.2.1.1 highlights the differences between the market consistent delta hedge and a Solvency II approach, as follows:

- The Solvency II hedges do not include any swaps beyond 20 years. This is because there is no sensitivity to the market yield curve after the starting point of the extrapolation. In reality, swap rates beyond this date provide valuable market information.
- The hedge under a market consistent approach is essentially a long position in a 50-year swap, which is intuitive given the liability. However, the Solvency II hedge consists of a short position in a 15-year swap and a long position in a 20-year swap. This is because the extrapolated Solvency II yield curve places a large degree of dependency on the swap rate at the starting point of the extrapolation and is highly sensitive to the slope of the market swap curve preceding the starting point of the extrapolation (between 15 and 20 years in this instance), which could result in market distortions around these points once Solvency II is implemented.
- The duration at which we need to purchase derivatives in order to hedge the liability reduces significantly under Solvency II because the modified duration of the liability has effectively been shortened.

Back-testing⁶ has shown that the Solvency II hedge is significantly more volatile over time than the market consistent hedge. It would also require frequent rebalancing to ensure that it converges towards a market consistent hedge as the outstanding term of the liability shortens due to the passage of time (and the liability eventually falls due before the starting point of the extrapolation). The delta hedges considered in this example are designed to stabilise the balance sheet for small movements in interest rates. However, the hedges may not be sufficiently robust under Solvency II due to the increased volatility. The matching adjustment and volatility adjustment will lead to additional differences between the hedges required under a Solvency II approach and a market consistent approach.

As a result of these differences, undertakings will face a potentially difficult choice between hedging against market risk exposures on their Solvency II balance sheet or their financial statements balance sheet (which is likely to be calculated on a market consistent basis). Choosing to hedge on a Solvency II basis introduces unwanted volatility on the undertaking's financial statements as any movements in the value of the hedge assets will impact the financial statements balance sheet directly without a corresponding movement (though there is likely to be some movement)

⁶ Carried out by the Institute and Faculty of Actuaries' 'How to practically hedge the risk-free rate under Solvency II' Working Party.

in the value of the liabilities (under the current IFRS rules). Under IFRS Phase II, the expected future profits can be held as an asset on the balance sheet but it is expected that the concept of a 'contractual service margin' will be introduced to smooth profits over time so some conflict may still remain between the hedging on a Solvency II basis and a financial statements basis. In addition, undertakings may face a tension between hedging against balance sheet volatility due to small changes in the interest rates and hedging against movements in the SCR as the capital charges are calculated based on, amongst a host of other factors, large changes to interest rates. As a result, there may be advantages to looking beyond simple delta hedging techniques when considering hedging strategies under Solvency II and instead evaluating different strategies, such as option based approaches.

3.2.2. Hedging capital requirements

In addition to hedging components of the BEL, undertakings can also employ various types of hedging strategies to limit exposure to specific risks or events with the aim of reducing capital requirements. Equity hedges can be used to reduce the capital charge for equity risk. For example, an undertaking could reduce its exposure to equity risk by purchasing a deeply out of the money put option that would only come into the money following a large fall in equity values. Such an option would have a low impact on the Solvency II balance sheet. However, it would reduce the undertaking's risk exposure to large market movements and, as such, could reduce the equity risk capital requirement (so long as the option is no longer out of the money following a fall in equity values based on the calibration of the equity risk scenario after allowing for the equity dampener).

Foreign currency hedges may be used in order to manage the currency risk capital charge. Under the standard formula, this is calibrated as a 25% movement in the value of most foreign currencies.⁷ Without using derivatives, by monitoring exposure to foreign currencies and investing in local currency instead, undertakings could, depending on their individual circumstances, significantly reduce the capital charge for the currency risk sub-module. However, in some cases this may not incentivise investing in assets that are denominated in the same currency as the liabilities to the extent one might expect. Options may be used in order to allow the undertaking to manage currency risk capital while at the same time investing assets in an intuitive way. However, this comes at a cost as the options will need to be rolled over as they expire.

Credit derivatives, such as CDS and total return swaps (TRS) can be used to reduce exposure to risks such as credit risk, concentration risk and spread risk.⁸ For example, under a CDS contract an undertaking can be compensated in the event of a loan default or another credit event, in exchange for a one-off payment or a series of payments to the CDS counterparty. This would reduce an undertaking's exposure to credit risk. A TRS would allow an undertaking to receive the return on a certain asset (e.g. coupons or dividends) without having to hold the underlying asset directly. In return, the undertaking would pay a variable amount depending on the returns achieved on the asset actually being held (effectively swapping the return on one asset for the return on another) to the counterparty. This type of arrangement can reduce credit risk, as the undertaking can gain exposure to an asset without directly holding the asset, and also market risk in general, in addition to rescuing other exposures, such as basis risk. TRS contracts will reduce an undertaking's exposure to counterparty or spread risk and the capital charges should reduce as a result. However, the TRS market is relatively immature as of yet so it does not currently offer substantial capability for hedging significant exposures.

It should be noted that credit derivatives used as part of a risk mitigating strategy will be stressed in the counterparty risk module under the standard formula. In addition, if an undertaking holds a credit derivative that is not held as part of the risk mitigation policy or if the undertaking does not hold the underlying instrument (or a similar exposure where the basis risk is immaterial) then the undertaking will need to hold a capital charge for that credit derivative contract under the spread risk sub-module in the standard formula. Before implementing a hedging strategy it is important that all interested parties have a clear understanding of the objectives of the hedging program and the extent to which different risks are hedged or unhedged. It is also important to understand the extent

⁷ Currencies that are pegged against the Euro are subject to a slightly lower capital charge.

⁸ TRS may also be used to manage basis risk in dynamic hedging programmes, where the liabilities are not linked to established market indices to which standard exchange-traded derivatives may be linked.

to which hedging will be beneficial to the capital position of the undertaking at any point in time. For example, as mentioned above, undertakings using the standard formula will be unable to take full credit for the benefits of a dynamic hedging strategy due to the construction of the standard formula itself. Hence, undertakings may need to consider developing a partial or full internal model in order to capture such benefits. The development, implementation and ongoing maintenance of such a model can prove to be an onerous task though and involves working closely with the relevant supervisory authorities.

Derivative products also offer undertakings a broader investment choice when it comes to diversification of asset portfolios. Assets such as mortgage-backed securities can offer potentially attractive returns. However, such assets may bring with them quite onerous capital requirements, depending on the precise nature of the assets in question. This additional capital can, in some cases, outweigh the benefits of the additional diversification and expected returns on offer and so it is very important to be fully aware of the capital implications of such investment decisions.

It should be noted that hedging strategies will typically not be able to remove all of the market risk and in most cases some element of basis risk will remain on the balance sheet (in addition to other risks which may have been introduced by the hedging strategy). It is important that undertakings are aware of the basis risk associated with their hedge portfolios and are able to quantify and monitor this risk even though basis risk is not considered in the standard formula SCR calculation. Undertakings with large dynamic hedge portfolios are likely to use full or partial internal models to calculate their SCR in order to take credit for dynamic hedging strategies. In this case it may be appropriate to consider an explicit capital charge in respect of basis risk in the internal model calibration.

3.2.3. Hedging the risk margin

The risk margin is also sensitive to the level of interest rates as it is based on the discounted value of the expected future solvency capital requirement for unavoidable market risks. As a result, undertakings could also consider hedging the risk margin in order to reduce balance sheet volatility.

One way to do this would be for undertakings to extend their current hedge portfolio if they are already hedging interest rate risk on the BEL. However, such an approach may result in additional capital requirements under the standard formula as the risk margin is not considered in the standard formula SCR calculations. In the standard formula, only the BEL is shocked on the liability side of the balance sheet but all the undertaking's assets, including any derivatives related to hedging of the risk margin, are shocked on the asset side. The derivatives are likely to be more sensitive to the SCR shocks than other assets that could be used to back the risk margin (for example cash or bonds). As a result the SCR is likely to increase if the risk margin is hedged.

The risk margin itself is also a function of the SCR but the capital requirements in respect of interest rate risk and default risk associated with derivatives are not included in the calculation of the risk margin. Therefore, extending the current interest rate hedge portfolio should not affect the current value of the risk margin, even if the SCR increases.

3.3. REBALANCING INVESTMENT PORTFOLIOS

A number of institutions have voiced concerns about the effect that Solvency II may have on the capital markets in general. There is a concern that market volatility will increase when Solvency II is implemented as undertakings rebalance their portfolios to improve capital efficiencies under the new regime. In addition, there is a fear that non-insurance undertakings will face issues raising capital through the issue of equities as the demand for equities among insurance undertakings is expected to fall. It remains to be seen whether or not these concerns will be borne out in reality once Solvency II is implemented.

Investments in different asset classes will attract different levels of capital requirement under Solvency II. Undertakings seeking to actively manage (and minimise) capital requirements will be interested in shifting the asset mix, where possible, towards those assets attracting lower capital requirements. For example, as mentioned in section 3.1.1, government bond holdings will not attract an explicit capital requirement under Solvency II while corporate bond holdings will have a capital charge. If there is increased demand for government bonds, this may put downward pressure on government bond yields relative to corporate bond yields, which could distort the market and have an adverse effect on undertakings seeking to prudently manage their assets.

If large segments of the industry, or even if a relatively small number of undertakings with significant asset portfolios, seek to rebalance their portfolios over a reasonably short time frame, this could lead to a number of difficulties. For example, the disposal of illiquid assets could lead to the realisation of poorer than expected sales proceeds. Even in the case of liquid assets, significant disposals could depress prices. On the flip side, the pursuit of certain asset classes could temporarily push up prices, thereby reducing future expected yields. Switching between asset classes also incurs transaction costs, which could be significant if there is sufficient switching activity. Therefore, a phased approach is required, through which any desired rebalancing can take place in a timely and controlled manner.

3.4. SPECIFIC CONSIDERATIONS FOR UNIT-LINKED BUSINESS

There are some specific considerations in relation to capital management for unit-linked business, such as unit-linked matching and hedging of the management charge. We discuss these in the following sub-sections.

3.4.1. Unit-linked Matching

Article 23(1) of the European Communities Third Life Assurance Directive,⁹ states that '*where the benefits provided by a contract are directly linked to the value of units in an UCITS¹⁰ or to the value of assets contained in an internal fund held by the insurance undertaking, usually divided into units, the technical provisions in respect of those benefits must be represented as closely as possible by those units or, in the case where units are not established, by those assets.*' This is generally interpreted to mean that policyholder's unit-linked liability should be matched as closely as possible by the assets to which the value of the units is linked. Under the current solvency regime, the non-unit reserves held in respect of expense and mortality liabilities on unit-linked contracts are not generally supported by unit-linked assets. Under Solvency II, the 'prudent person principle' (Article 132 in the Solvency II Directive) also states that for unit-linked contracts, 'the technical provisions in respect of those benefits must be represented as closely as possible by those units or, in the case where units are not established, by those assets.' This is the same wording as the current regulations.

However, under Solvency II the definition of technical provisions includes the BEL and the risk margin but the prudent person principle specifically refers to the technical provisions '*in respect of [unit-linked] benefits.*' This could be interpreted differently by different undertakings. For example, it could be interpreted to mean the best estimate value of the policyholders' unit-linked liability, calculated as the discounted value of projected unit-linked assets, allowing for surrenders, deaths, fund growth and fund-related charges. It may also include an allowance for the undertaking's overhead expenses and other cash flows that are not fund related. Some undertakings may also consider that this should include the risk margin. In whatever way this is interpreted, it is likely that the technical provisions in respect of the unit-linked benefits (referred to as the 'unit-linked technical provisions' for the remainder of this section of the paper) will be lower in value than the face value of the policyholders' unit-linked liability as the expected future income on the unit-linked assets will be valued as an asset. As such, only the unit-linked technical provisions will need to be matched by unit-linked assets and the remaining unit-linked liability can be matched by other assets. We have assumed that the excess unit-linked assets are equal to the value of the BEL for the remainder of this section of the paper. This means that undertakings can choose to make other investment choices that could improve capital efficiency, instead of holding the excess unit-linked assets. Undertakings may choose to invest in line with their existing investment strategy or they may choose to invest in an alternative manner. Of course, some undertakings may simply choose to continue to match the excess unit-linked liabilities with unit-linked assets.

In selecting an investment strategy, undertakings may be faced with a conflict between stabilising the net asset value (NAV) and stabilising the solvency coverage ratio. This is because where unit-linked assets and liabilities are perfectly matched, they fluctuate in equal and opposite directions thereby offsetting one another on the balance sheet. The BEL on unit-linked contracts is generally an asset, consisting of the annual management charge (AMC) or other specific product fee levied on the value of the assets under management net of expenses and other

⁹ Council Directive 92/96/EEC of 10 November 1992 on the coordination of laws, regulations and administrative provisions relating to direct life assurance and amending Directives 79/267/EEC and 90/619/EEC (third life assurance Directive).

¹⁰ Undertakings for Collective Investments in Transferable Securities.

forms of outgo. As the AMC is dependent on the value of unit-linked funds it can fluctuate due to market movements, i.e. if the fund price falls the value of the BEL will fall and vice versa if the fund price rises. This means that the BEL, and consequently the NAV, can be quite sensitive to price movements. However, there is a significant relationship between movements in the NAV and the amount of the SCR under Solvency II. A fall in fund prices would lead to a reduction in the BEL and consequently, a reduction in the NAV, but this will be accompanied by a reduction in the SCR because the SCR is calculated based on the movement in the NAV due to certain stresses. As a result, when the unit-linked assets and unit-linked liabilities are matched the solvency coverage ratio can remain relatively stable even if the NAV is volatile.

We consider here a very simple example of a unit-linked undertaking with unit-linked assets of 1,000 and unit-linked technical provisions of 950 (consisting simply of unit-linked liabilities of 1,000 plus a negative BEL of 50). In this simple example the BEL is purely made up of the discounted value of future fund related management charges.

FIGURE 3.4.1.1: FULLY MATCHED UNIT-LINKED ASSETS AND UNIT-LINKED LIABILITIES (EXAMPLE)

Unit price	0.80	1.0	1.20	
Unit-linked assets	800	1,000	1,200	In this example, the NAV is sensitive to price movements. If the unit price falls by 20%, the BEL and the NAV also decrease by 20% and vice versa if the unit price increases.
Cash	-	-	-	
Total assets (A)	800	1,000	1,200	
Unit-linked liabilities	800	1,000	1,200	
Best estimate liabilities	(40)	(50)	(60)	
Total unit-linked technical provisions (B)	760	950	1,140	However, the SCR is calculated based on the value of the NAV in stressed scenarios, therefore, the SCR is also sensitive to the price movements. In this simplified example, the SCR and the NAV both move in the same way so that the solvency coverage ratio remains stable following the price movements.
NAV (A - B)	40	50	60	
SCR	16	20	24	
Coverage ratio	250%	250%	250%	

However, by choosing to not match the full value of unit-linked liabilities with unit-linked assets, and instead to only match the unit-linked technical provisions with unit-linked assets, the undertaking can stabilise the NAV at the expense of the solvency coverage ratio. For example, the undertaking could choose to invest the excess funds in cash. The cash investment will not fluctuate in value with unit price movements so this will stabilise the NAV to a certain degree. The SCR is also likely to reduce as a result of the cash investment due to the lower inherent risks associated with cash than with other asset classes. However, the NAV and SCR will not be as closely aligned as under a more perfectly matched scenario. This can lead to a more volatile solvency coverage ratio. Some undertakings may be willing to take on the extra volatility in the solvency coverage ratio in exchange for a less volatile NAV, depending on the main objectives of their matching strategy. However, most undertakings are likely to look for a compromise between the two extremes.

Looking at our simple example again, by investing 50 in cash, the undertaking can immunise the NAV against price movements, in return for a more volatile coverage ratio.

FIGURE 3.4.1.2: MATCHED UNIT-LINKED ASSETS AND UNIT-LINKED TECHNICAL PROVISIONS (EXAMPLE)

Unit price	0.80	1.0	1.20	By investing in cash, the NAV becomes less sensitive to price movements because the cash value will not vary due to movements in unit-linked prices.
Unit-linked assets	760	950	1,140	
Cash	50	50	50	
Total assets (A)	810	1,000	1,190	
Unit-linked liabilities	800	1,000	1,200	The SCR is also likely to reduce as the cash will not be as sensitive to market shocks as unit-linked assets (ignoring any new risks introduced by the cash holding, e.g. counterparty risk).
Best estimate liabilities	(40)	(50)	(60)	
Total unit-linked technical provisions (B)	760	950	1,140	
NAV (A - B)	50	50	50	However, the solvency coverage ratio is likely to be more volatile in this scenario as the movements in the NAV and SCR will be less aligned than under a fully matched scenario.
SCR	8	10	12	
Coverage ratio	625%	500%	417%	

However, there are some practical issues with choosing this approach. One such issue arises from the fact that the value of the BEL will change on a daily basis as it is linked to the value of the underlying unit-linked funds. This means that the value of the excess unit-linked liability will also change on a daily basis. As a result, undertakings will need to monitor the value of the BEL and rebalance their other investments on a daily basis in order to ensure that the unit-linked technical provisions are continuously matched by unit-linked assets. In addition to the increase in transaction costs, there are other disadvantages to daily rebalancing, including small trade sizes and increased operational risk. It might be more practical to invest a smaller portion of the BEL in other assets and leave a buffer in place (by investing more heavily in unit-linked assets than may be strictly necessary to match the unit-linked technical provisions). Undertakings should be able to assess the optimal portion of the excess unit-linked assets to release such that the unit-linked technical provisions remain matched by unit-linked assets in all but the most extreme scenarios. In this case the undertaking would still need to monitor the position to ensure that they are matched and rebalancing may be necessary in some cases, for example following a large movement in unit prices.

In addition to the issues around continuous matching of liabilities, there may be other practical issues to consider in choosing to invest the excess unit-linked assets in other assets such as:

- Undertakings may need to consider how to deduct fund related management charges from policyholders if they are not fully invested in unit-linked assets.
- In some cases, it may not be possible to under invest in unit-linked assets, for example in the case of bespoke unit-linked products such as portfolio bonds.
- There may be increased reputational risk associated with this approach if it is perceived as adverse from the policyholders' point of view.
- There may be tax implications depending on the tax treatment of the unit-linked investments.

As with any capital management decision, the impact on the SCR should be examined before this type of investment strategy is employed because the total effect on the Solvency II balance sheet will depend on the exact circumstances of the undertaking, including the actual unit-linked funds and the manner in which the excess assets are invested. In addition, while moving away from a fully matched position acts as a hedge to remove downside market risk as the NAV will be protected from falls in market prices, such an approach will also remove (or reduce) the potential upside of market growth. However, the benefits of greater capital efficiency (as the unmatched assets will be available for reinvestment in the undertaking) may be sufficient reward to make it an attractive option.

A working party of the Institute and Faculty of Actuaries has recently been set up to look at unit-linked matching under Solvency II, with the aim of examining these issues in greater detail.

3.4.2. Hedging the annual management charge

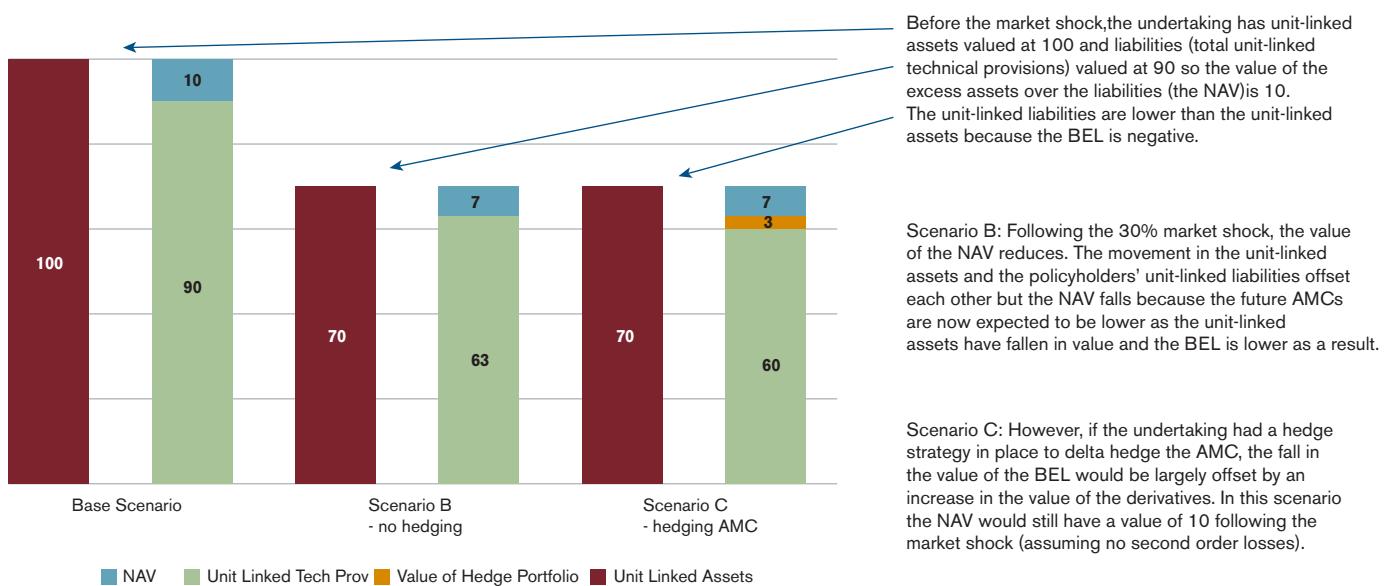
Under Solvency II, AMC on unit-linked funds will form part of the undertaking's capital base as it is expected that this will be included in Tier 1 own funds in the Solvency II Balance Sheet. As mentioned in section 3.4.1, AMCs tend to be relatively volatile as they fluctuate in response to market movements and the value of unit-linked funds. As a result, undertakings may consider hedging AMCs under Solvency II to reduce balance sheet volatility.

One way to do this would be to hedge the performance of an index that reflects the underlying investments of the unit-linked funds, e.g. the FTSE All Share if the unit-linked funds were predominately invested in UK equities. However, this would leave the undertaking exposed to basis risk as the actual underlying assets may not move in exactly the same manner as the index (even if, at a high level, they move in a similar pattern). The better the composition of the index reflects the composition of the actual unit-linked funds themselves, the lower the exposure to basis risk. This approach may be extended to use a combination of indices that broadly match the unit-linked funds investment mandates. However, it should be noted that if the policyholder funds are invested in specialist asset classes then it might not be possible to find appropriate indices to use without exposing the undertaking to significant basis risk.

An alternative method would be to delta hedge the upside and downside risk of each unit-linked fund. In order to do this, an undertaking would need to carry out a detailed analysis of the underlying assets of each unit-linked fund using a look-through approach. The undertaking would then be able to create a benchmark portfolio for hedging purposes based on the underlying assets and the AMC of each unit-linked fund. For example, if one of the underlying unit-linked funds invested in ten FTSE 100 companies and had an AMC of 1.00%, the undertaking could enter into equal and opposite put and call options based on 1.00% of the value of the equities in those ten companies in order to delta hedge the AMC and hence, reduce balance sheet volatility. However, this would also remove any upside from positive market movements.

The following chart shows the effectiveness of such a strategy following a market shock, based on a simple Solvency II balance sheet (where the BEL is calculated solely using the discounted future value of the AMCs).

FIGURE 3.4.2.1: HEDGING THE ANNUAL MANAGEMENT CHARGE (EXAMPLE)



Such a strategy would require a significant amount of work (and expense) but would be a more accurate way to hedge the AMCs than hedging the performance of indices. However, the undertaking would still be exposed to basis risk due to the fluctuations in unit-linked investments from new business, surrenders, fund switches, etc.

In addition to the type of hedge, there are a number of other practical issues that undertakings should consider before deciding to hedge AMCs. For example, contract boundaries will have a bearing on what contracts/cash flows are included in the BEL, which will in turn have a bearing on what undertakings actually needs to hedge. Another complication relates to the mismatch between solvency calculations and financial statements calculations. Under Solvency II, if the value of the unit-linked assets rises, the discounted value of the future AMCs will increase. This will be offset by a loss on the hedge portfolio, reducing the volatility on the Solvency II balance sheet. However, in the undertaking's financial statements, the loss on the hedge portfolio will be recognised immediately but the increase in the AMCs will only be recognised as they develop over time under the current IFRS rules. Under IFRS Phase II, the expected future profits can be held as an asset on the balance sheet but the 'contractual service margin' will be used to smooth profits over time. This means that the increase in AMCs may not be immediately recognised on an IFRS Phase II balance sheet either. The mismatch between the solvency balance sheet and the financial statements may result in an increase in earnings volatility which might not be welcomed by the undertaking's shareholders. In addition, the shareholders may not like the idea of hedging away the upside of increased future AMCs.

By hedging the AMCs, undertakings can also reduce the capital requirements as the hedges will reduce the change in NAV under various risk modules. For example, if an undertaking hedges the AMC based on the value of an equity index, such as the FTSE All Share, the value of the hedge would increase under the equity risk sub-module. This would help to offset the increase in the BEL under this risk sub-module and reduce the capital charge as a result.

An alternative, and probably less operationally intensive option, would be to fully monetise the value of in-force (VIF) (including the AMC) to lock in the balance sheet value. Under this approach, undertakings could avoid the commitment of an ongoing hedge program, and the operational risk that it entails, and instead implement a reinsurance contract which up-fronts and secures the value without much ongoing effort. Such an approach would also avoid some of the pitfalls mentioned above. VIF monetisation is covered in more detail in section 4.4 of this paper.

3.5. ALTERNATIVE ASSETS

There are various specific asset classes which are expected to attract different treatments under Solvency II. This section discusses some of the potential considerations which undertakings should be aware of for a (non-exhaustive) selection of asset classes:

3.5.1. Equity release/lifetime mortgages

Equity release mortgages are typically used in the UK to back annuity business since they provide a good matching asset to the annuity liabilities. However, it now seems clear that they are almost certainly not going to be eligible for matching adjustment purposes, and hence, the yields which can be used to calculate technical provisions will be restricted to risk-free yields. This will lead to a solvency hit to the undertaking compared to the current position, and will lead to a more volatile solvency position going forward.

This means that companies with non-trivial equity release portfolios may need to take actions such as:

- Transform the mortgages into matching adjustment compliant assets. This could be achieved by entering into an arrangement with a third party (e.g. a bank or reinsurer), or through internal group restructuring—in each case the end result will be to provide a matching adjustment compliant fixed-rate loan to the annuity business, with the residual risks held outside the annuity business.
- Sell the mortgages and reinvest in other assets.
- Seek to monetise the expected future margins (similar in concept to a VIF monetisation).
- Make use of the Solvency II transitional arrangements to smooth the impact over time.

3.5.2. Asset-backed securities

Asset-backed securities (ABS) have previously been used by insurers to gain exposure to pools of what would otherwise be highly illiquid and inaccessible assets. These assets came in a variety of forms from auto loans and credit card receivables to commercial and residential mortgages. The pooling mechanism coupled with credit enhancement through tranching and insurance wraps, it was argued, provided a potentially attractive risk return proposition for insurers seeking to match illiquid liabilities. However, during the financial crisis, these instruments did not always deliver the level of credit mitigation that was expected—for example, many of the monoline insurers which provided credit protection on these products are no longer in business.

Perhaps not surprisingly then, ABS as a general asset class has received a fairly harsh treatment in terms of capital requirements under Solvency II, with stress levels soon rising to 100% of asset value as credit rating falls and duration rises. However, there does now seem to be some recognition that the approach might have been too prudent, in particular:

- In December 2013, EIOPA published a review of the Standard Formula calibration for a number of alternative asset classes including securitisations. Very little ground was conceded here, though a slightly reduced capital charge was proposed for securitisations which met a number of requirements in particular around the nature and quality of the underlying collateral.
- From a broader economic perspective, however, there is now some recognition that the securitisation market may well be helpful in supporting future economic growth in the Eurozone and so activity is taking place with a view to seeing how the market might be bolstered—a recent example is the joint discussion paper issued on 30 May 2014 by the Bank of England and European Central Bank. With this in mind, it is possible that we will see further refinements of the capital requirements for these instruments though it remains to be seen if this will result in levels which prove sufficiently attractive to insurers.

A final point to note in relation to these instruments is that, in their current form, they are unlikely to qualify for the matching adjustment due to their embedded pre-payment risk. This is likely to be a major inhibitor to insurers with significant books of illiquid liabilities for whom the ability to take credit for an illiquidity premium in the Solvency II valuation is key. Unfortunately, these are the same insurers who might find the intrinsic investment characteristics of these assets attractive and, in the absence of a solution to the matching adjustment, it remains unclear whether further tweaks to the capital requirements will be sufficient to stimulate investment.

3.5.3. Alternative asset classes

There are a number of other so-called ‘alternative assets’ which are attracting attention at present as insurers seek to achieve the appropriate balance of expected yield and the likely capital and reserving implications of their choices under Solvency II.

A topical example currently is the interest in debt instruments associated with infrastructure projects. Such investments are generally long term and come with significant collateral support. However, as they are often arranged directly with individual or small groups of lenders they are highly illiquid and may well not carry an external credit rating. As such, these assets will be treated as vanilla unsecured corporate bonds for the purpose of calculating the standard formula SCR. However, it can certainly be argued that this approach is unduly conservative, in particular for assets which are in their operational phase and thus not exposed to construction risk. Nevertheless, a review by EIOPA, undertaken in December 2013, failed to find a sufficiently robust case to support a refinement in the calibration of the standard formula SCR. On the other hand, turning once again to the issue of the matching adjustment, there may be some compensation for insurers as bilateral deals offer scope to negotiate terms with borrowers (which will make the asset eligible).

4. REINSURANCE AND CAPITAL MARKET SOLUTIONS

Undertakings can also use reinsurance and/or capital market solutions to reduce their exposures to various risks. From a capital management point of view, this may have the added benefit of reducing technical provisions or capital requirements. In this section, we consider reinsurance and various capital market solutions, such as longevity transfer, catastrophe bonds and catastrophe swaps and VIF monetisation, from a Solvency II perspective.

4.1. REINSURANCE

Reinsurance strategy is typically considered within a broad economic, operating and regulatory environment, as illustrated in Figure 4.1.1.¹¹ Reinsurance has clear implications for risk, capital and value management, all of which are themselves closely inter-related in an economic context. Additionally, other services offered by the reinsurer are an important consideration when making reinsurance decisions.

FIGURE 4.1.1: ECONOMIC AND OPERATING ENVIRONMENT SUPPORTING REINSURANCE DECISIONS



Looking towards a Solvency II environment, the motivation for seeking reinsurance may be slightly different in some cases relative to what it is today. Under the current solvency regime, a key driver of reinsurance is often the exploitation of differences in the regulatory regime as it applies to insurers and reinsurers (often referred to as 'regulatory arbitrage'). In general, this occurs in cases where the capital requirements applicable to reinsurers are less onerous than those applying in the case of direct writers. With the expected levelling of the regulatory playing field between the insurance and reinsurance sectors under Solvency II this should no longer be a major factor within the European Union, except to the extent that any differences remain once Solvency II is introduced. For example, it is currently proposed¹² that contract boundaries will apply at the level of the (accepted) reinsurance contract and not at the level of the underlying reinsured contract or contracts. This may lead to different liabilities being recognised on the balance sheet in respect of the same block of business depending on whether or not it is reinsured, which could in turn provide incentives to pursue suitable reinsurance arrangements.

Of course, arbitrage opportunities will, in any case, remain between the European Union and other territories not operating a solvency regime that is equivalent to Solvency II (or likely to be so in the near term) and it is likely that these opportunities will continue to be exploited. This may then lead to a review of current reinsurance arrangements in order to ensure that they still make economic sense for both parties.

¹¹ We do not consider each of the components in detail in this paper; rather, we refer interested readers to Milliman's recent research report titled Optimising life reinsurance strategy under risk-based capital measures.

¹² EIOPA (2014) Consultation Paper on the proposal for guidelines on Solvency II relating to Pillar 1 requirements, Contract Boundaries guideline 10.

Similar to the situation at present, companies planning to engage in a reinsurance contract under Solvency II need to consider the likely cost and effectiveness of such cover. There are many factors likely to impact upon the cost of cover. Competition in the marketplace will be a key consideration. The market may break into two segments, one representing reinsurers regulated by Solvency II, or a broadly equivalent regime, and the other representing reinsurers that are not subject to such requirements. The impact of regulatory arbitrage should be one of the main drivers of price differential between these two segments. However, there may be a knock-on effect on the quality of the reinsurance asset (which is discussed below) that will need to be weighed up against any price differential. Within each segment, there will be different drivers of price, such as basic operating efficiency or appetite for risk (coupled with the resources to support it).

In order to optimise the quality of the reinsurance asset on the Solvency II balance sheet, certain steps will need to be taken. Apart from the natural first step of seeking out a reinsurance counterparty with a good credit rating (bearing in mind that such ratings can and do change over time) it would be considered good practice to put appropriate collateral arrangements in place. Such arrangements bring with them additional overhead (in the form of price, ongoing rebalancing and management of collateral balances) but they have the benefit of reducing the counterparty risk capital that needs to be held against exposure to the reinsurer by minimising loss-given-default. Collateral is a key distinguishing feature of the third country equivalence arrangements for reinsures under Solvency II. As outlined in section 6.4, reinsurers based in third countries which are not deemed to be equivalent may be required to post collateral in relation to the risks they reinsure into the EEA.

Reinsurance is most commonly used to reduce underwriting risk, which was the second highest capital charge for solo insurance undertakings under QIS5, with life underwriting risk and non-life underwriting risk accounting for 23.7% and 52.4% of the diversified BSCR, respectively.¹³ Life insurance undertakings commonly transfer mortality risk to reinsurers as part of their day-to-day risk management strategy, generally through proportional reinsurance arrangements such as quota share. It is expected that this form of risk transfer will continue following the implementation of Solvency II, especially in markets where these types of reinsurance cover are priced more competitively than the insurer's pricing basis.

Non-proportional reinsurance is also commonly used by undertakings to transfer the risk of extreme events such as catastrophes, for example through excess of loss and stop loss reinsurance arrangements. However, while the standard formula is capable of allowing for risk transfer through proportional reinsurance, there has been some criticism regarding its ability to allow for non-proportional reinsurance. For example, at the time of writing, when calculating the capital charge for non-life premium and reserve risk there are significant restrictions for how excess of loss reinsurance can be applied and other types of reinsurance are simply not considered, for example aggregate excess of loss and stop loss. The only risk module in the standard formula where non-proportional reinsurance is allowed for in full is in the life catastrophe risk module, which only applies to mortality risk. There have been a number of groups lobbying for a more comprehensive treatment of non-proportional reinsurance under the standard formula. Insurance Europe, the European insurance and reinsurance federation wrote to the head of the Insurance and Pension Unit of the European Commission in May 2013 to seek a better recognition of non-proportional reinsurance in the standard formula. In any case, some undertakings may decide to use an internal model or a partial internal model to more appropriately allow for the use of non-proportional reinsurance as a method of risk transfer in the SCR calculation if it has a significant effect on their solvency position.

There has been increased interest in catastrophe reinsurance arrangements ahead of the introduction of Solvency II. Catastrophe reinsurance arrangements, such as excess of loss per event treaties, will be of particular interest to insurers selling into territories that are exposed to extreme events such as acts of terrorism or natural disasters. This type of risk transfer can be used to reduce capital requirements under Solvency II, although this reduction is limited under the standard formula approach, as mentioned above.

13 As reported in the EIOPA Report on the fifth Quantitative Impact Study (QIS5) for Solvency II.

It is worth noting that while reinsurance arrangements can be used to reduce the capital charge for underwriting risk, such arrangements also tend to introduce new risks, primarily counterparty risk (in the absence of adequate collateral arrangements).

In addition to providing reinsurance coverage, reinsurers can offer valuable services such as knowledge support, underwriting, pricing, and product and claims management. These can be a major driver behind reinsurance decisions and it is, therefore, unlikely in the current environment that insurers will make reinsurance decisions based purely on financial and risk factors.

4.2. LONGEVITY TRANSFER

Amongst other longevity solutions, longevity risk can also be transferred to reinsurers, and other non-reinsurance counterparties, through the use of longevity swaps. Longevity risk was one of the largest components of the life underwriting risk module in QIS5, making up 36% of the capital charge for life underwriting for solo undertakings.¹⁴ As mortality improvements are expected to continue to arise through medical advances and improved healthcare, undertakings may be exposed to increasing levels of longevity risk in the future. By entering into a longevity swap, undertakings can swap uncertain future annuity payments for more certain future payments and thereby reduce their exposure to longevity. The exact details of the swap arrangement will depend on the contract between the parties but, in general, there are two main types of longevity swap, a cash flow indemnity-based longevity swap and an index-based, or parametric, longevity swap.

Considering a book of annuity business as an example, under a cashflow indemnity longevity swap arrangement the actual future annuity payments are paid to the cedant by the counterparty. In return, the cedant generally makes fixed payments to the counterparty based on the value of the expected annuity payments at the outset, plus a fixed fee. This is an exact hedge as the payments received by the cedant will reflect the actual longevity experience of the annuity book. As a result, these arrangements tend to be more expensive than index-based longevity swaps as no residual basis risk remains with the cedant although some new risks, such as counterparty risk, may be introduced.

Under an index-based longevity swap, the payments made to the cedant will be based on an agreed population index rather than the actual longevity experience of the annuity book. The population index is generally a published mortality table. Under this type of arrangement the cedant will still be exposed to some risk. For example, if longevity experience turns out to be worse than that underlying the population index to which the swap is linked, then the payments received from the counterparty will be insufficient to cover the full value of the annuity payments. This could leave the cedant exposed to significant levels of basis risk as it is likely to be difficult (if not impossible) to find a population index that accurately estimates the future mortality improvements that will be experienced by the book of business under consideration.

The longevity market has been growing steadily in recent years. For example, in late 2013, Deutsche Bank launched a population-based longevity product to help undertakings to hedge their longevity risk exposure. The index incorporates survival rates that are derived from publicly available data published by national statistics agencies. However, while banks and capital markets can be counterparties to longevity agreements, longevity risk is generally transferred to a reinsurer. Under the current version of the Solvency II standard formula, reinsurers will be able to take advantage of the diversification benefits of holding both mortality and longevity risk exposures, which should result in lower capital charges overall, so it is likely that the longevity market will continue to attract attention from undertakings seeking to manage capital needs. A recent example is the longevity swap arrangement that the Aviva Staff Pension Scheme entered into in March 2014 which transferred £5bn of longevity risk from the pension scheme to a number of reinsurers. In turn, reinsurers may increasingly consider transferring longevity risks to the capital markets, especially as market demand approaches—or exceeds—reinsurer capacity for longevity risk. This would mirror the current market practice of life and non-life catastrophe risks being transferred from reinsurers to capital markets via catastrophe bonds, as described in the next sub-section.

Other longevity solutions include single premium reinsurance cover. While many reinsurers still prefer to avoid the asset risk associated with single premium cover, there are a few who have an appetite for such risks and are willing to write single premium arrangements covering both asset and longevity risk.

14 As reported in the EIOPA Report on the fifth Quantitative Impact Study (QIS5) for Solvency II.

4.3. CATASTROPHE BONDS AND SWAPS

While direct writers can pass catastrophe risk on to reinsurers through traditional reinsurance arrangements, reinsurers can in turn transfer these risks to the capital markets through the use of instruments such as catastrophe bonds or swaps. Some larger insurance undertakings have also utilised this option.

Catastrophe bonds and swaps offer investors an investment option that is not correlated with the performance of other investments, such as bonds and equities. Under a catastrophe bond arrangement, capital market investors receive coupon payments from the insurance undertaking so long as a specified 'trigger event' does not occur. If a trigger event occurs the investors lose their principal investment as this would be used by the insurance undertaking to pay its liabilities following the trigger event. Trigger events are generally based on the insurance undertaking's actual losses, its modelled losses, total industry losses or other parametric events such as a natural disaster. A catastrophe bond should result in a reduction in capital charges under the standard formula if the trigger event is consistent with the catastrophes tested under the standard formula. However, many reinsurers are expected to opt for internal models. The tail events captured by such models may or may not dovetail with the benefits delivered by the bonds under such conditions.

With a catastrophe swap the payments are not linked to a specific trigger event but instead are generally linked to a catastrophe loss index, whereby an investor agrees to make regular payments to an insurance undertaking, based on potential losses as predicted by the catastrophe loss index, in exchange for either an upfront payment or fixed regular payments. As a result, some residual risk (such as basis risk) will remain with the undertaking as this is not an exact hedge. There are, of course, certain practical difficulties associated with such swap arrangements, such as the need to agree upon a suitable and acceptable index upon which to base the swap transaction.

In October 2013, Swiss Re Capital Markets arranged the issuance of €350 million of insurance-linked securities by Calypso Capital II Limited on behalf of AXA Global P&C. The securities provide per-occurrence protection against wind storms in a number of European countries on a weighted PERILS index basis.

4.4. VIF MONETISATION

Value of in-force (VIF) is the term often given to the economic value of future profits associated with an in-force book of business. The Solvency II concept of the Expected profit Included in Future Premiums (EPIFP) asset is a subset of the VIF asset. VIF monetisation involves realising a portion of this value as an upfront payment from a third party in exchange for a share of this expected future profit stream as it emerges.

Even though VIF is a recognised asset on the Solvency II balance sheet, there remain a number of benefits for life companies in considering a VIF monetisation solution. Its primary purpose is to raise finance and enhance liquidity, and is therefore a potentially attractive alternative to debt or equity issuance. However, it can also be used to significantly remove variability in the amount of the technical provisions over time, essentially via hedging a portion of the VIF asset, while at the same time potentially improving the quality of capital on the balance sheet. The primary insurer retains control over the administration of the book of business as well as retaining access to individual policyholders (allowing continued development of the relationship and the possible exploitation of future opportunities), and therefore, can be considered as an attractive alternative to selling the portfolio, whilst still gaining some of the economic benefits.

While such an option clearly has its benefits during times of financial stress, VIF monetisation can also form an important part of a pro-active capital management policy. Through a good understanding of the risk and value drivers, and by adopting a more efficient capital and liquidity structure, alternative strategic opportunities potentially open up.

Depending on the structuring of the arrangement, it is possible that a significant portion of the expected future profit stream can be exchanged for an upfront payment, with the insurer therefore being protected from some of the future variability in the risk drivers which affect future profits. The impact of this variability is passed to a third party.

Money released from the portfolio of in-force business may be used for a variety of purposes, including:

- Pursuit of other investment opportunities, which may enhance return on capital
- Pursuit of other risk mitigation and/or capital management strategies
- Payment of a dividend to a parent company to enhance shareholder returns, whilst maintaining adequate funds in the life entity to maintain policyholder security and an unconstrained business model
- Recognition on the balance sheet as high quality Tier 1 own funds

Additionally, Basel III has been a driver of recent publicised deals in Europe for bank-owned life insurers, partially due to the banking crisis across Europe and partially to support a more optimal capital management policy for the parent bank, including fuller recognition of economic value at the consolidated level.

Certain direct insurance undertakings might also consider VIF monetisation as a way to structure a suitable asset portfolio to back its own insurance liabilities, i.e. by 'buying' another insurer's VIF asset. However, care would be required to avoid any excessive exposure to certain risks, for example by being exposed to similar risks on both sides of the balance sheet, which may result in a 'double-gearing' effect. It might be possible, however, to gain from diversification benefits by buying the VIF of a block of business which has different risks to the undertaking's own liability portfolio.

The exact terms of the monetisation will depend on the specific contract but in most cases, such a transaction would transfer an agreed portion of cashflows and risks associated with the business to a third party. Depending on the portion transferred and the nature of the structure, the calculated SCR for a monetised line of business should be lower following the monetisation as the risks associated with the transferred future profits will no longer attract capital charges, assuming that the arrangement is structured in a way that optimises the counterparty risk capital requirements, for example through the use of collateral. If non-hedgeable risks have been transferred, the risk margin should also reduce and there may be balance sheet uplift, although this would depend on the price of the transaction relative to the undertaking's valuation basis.

The specific structures used in these transactions can be as simple or complex as the situation requires and can be tailored to the needs of all the parties involved. There are a number of broad structuring options available for a VIF monetisation deal, including:

- Contingent loan structure
- Financial reinsurance
- Original terms reinsurance structure
- Insurance-linked securitisation (ILS)

These broad categories can overlap to some extent and can capture a varied mix of debt- and equity-like features, much in the same way as hybrid instruments can combine features of both the debt and equity markets. Furthermore, the structure can vary significantly within these broad categories, depending on the specific circumstances.

In earlier consultations on Solvency II, the EPIFP was classified as Tier 3 own funds but more recently the EPIFP has been included in the reconciliation reserve and, as such, is therefore classified as unrestricted Tier 1 own funds. The EPIFP was initially classified as Tier 3 due to concerns over its availability and loss absorbency, in particular in a crisis situation. Despite now being classified as Tier 1, the fact remains that the VIF and EPIFP assets are not necessarily the highest quality capital, due to their exposure to the various underlying risks of the insurance contract. As mentioned, VIF monetisation solutions offer a way of improving the quality of that capital.

There may also be some opportunities for undertakings to monetise a portion of the future profits that are not allowed in the EPIFP due to contract boundaries. As discussed further in section 6.4.1, contract boundaries limit the premiums and obligations that can be included in the calculation of the technical provisions. Contract boundaries therefore reduce, or even exclude in some cases, the value of the EPIFP. This means that there would be a certain amount of economic value that is not recognised on the Solvency II balance sheet. By monetising the portion of future profits that are not allowed due to contract boundaries, undertakings can recognise an additional asset on the balance sheet that would otherwise be excluded under Solvency II.

It should be noted however, that, depending on pricing levels and difference between the pricing and Solvency II valuation bases, a VIF monetisation could involve a reduction in balance sheet value, after allowing for the cost of capital and profit margin for the counterparty, as well as costs of arranging the transaction.

5. CAPITAL STRUCTURE AND OWN FUNDS

Under Solvency II, an undertaking's capital is defined as own funds and this is divided into 'basic own funds' (balance sheet items) and 'ancillary own funds' (such as unpaid share capital and letters of credit). Own funds are further subdivided into three 'tiers' depending on the quality of the capital, i.e. its permanency and loss absorbency. There are restrictions in place in relation to the amount of capital from each tier that can be used to cover solvency capital requirements. Therefore, undertakings need to manage their own funds to ensure that they have capital of a sufficient quality to cover the SCR and the Minimum Capital Requirement (MCR).

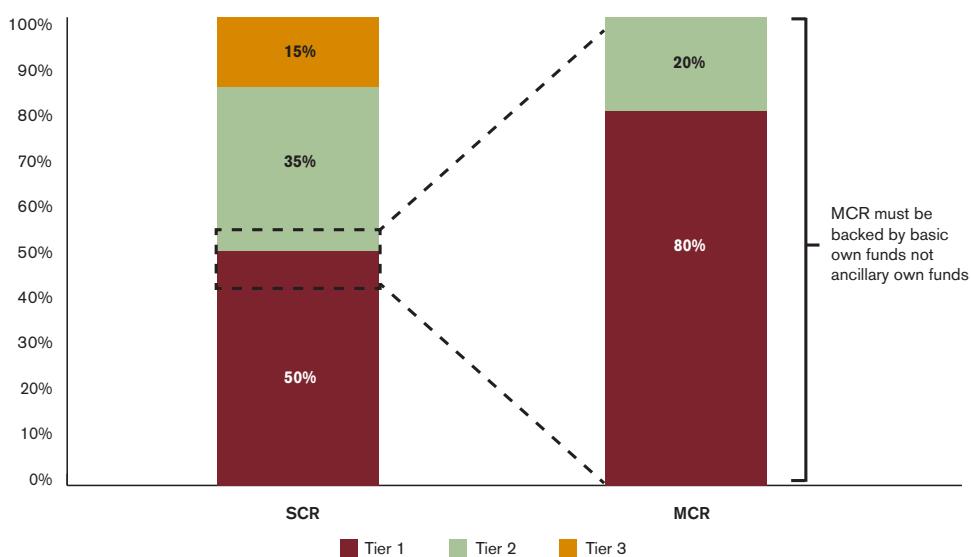
Capital of the highest quality is categorised as Tier 1 and capital of a lower quality is categorised either as Tier 2 or Tier 3. Tier 1 is also further divided into 'restricted' and 'unrestricted' Tier 1 capital. Appendix 2 contains details of the tiering requirements as they currently stand.

As mentioned above, restrictions will be placed on to the amount of capital from each tier that can be used to cover the capital requirements (both the SCR and the MCR). These restrictions aim to ensure that undertakings possess capital of a sufficient quality to absorb losses that may arise in the future due to unforeseen tail events. Capital of the highest quality will always be available, or can be called upon on demand, to fully absorb losses on a going-concern basis as well as in the case of winding-up. Forms of capital that have a fixed duration or provide the investor with the option to redeem early may not always be available to the undertaking when needed. In addition, any obligation to pay dividends or interest will reduce the amount of capital available to the undertaking. The rules setting out the categorisation of capital into tiers take account of these features. EIOPA has issued Level 3 guidelines on the classification of own funds as part of Set 1 of its recent Guidelines consultation (June 2014) and these represent the latest views on the subject.

5.1. ELIGIBILITY OF OWN FUNDS

Under the new rules, at least 50% of the SCR must be covered by Tier 1 capital and no more than 15% of the SCR can be covered by Tier 3 capital. In addition, at least 80% of the MCR has to be met by Tier 1 items and the remainder must be covered by Tier 2 capital. Tier 3 basic own funds items and ancillary own funds items are not eligible for the purposes of covering the MCR. Table 5.1.1 summaries the eligibility limits for the SCR and MCR.

FIGURE 5.1.1: ELIGIBILITY LIMITS FOR SCR AND MCR



In addition, restricted Tier 1 own funds cannot constitute more than 20% of total Tier 1 own funds used to cover the SCR and the MCR. However, restricted Tier 1 own funds in excess of the 20% limit are available to be used as Tier 2 basic own funds.

There are some additional requirements for composite reinsurers, whereby they are required to hold a notional MCR in respect of each of the life and non-life activities of the undertaking and the basic own funds covering each of these must be identified. In addition, there are specific requirements and restrictions with regard to ring-fenced funds. This is covered in more detail in section 5.3 below.

Undertakings must ensure that they have enough capital of a sufficient quality to meet the SCR and MCR eligibility requirements. Some undertakings may need to reassess their own funds and consider replacing Tier 2 or Tier 3 own funds with higher quality capital. It is expected that this will have an impact on the volatility of capital markets once Solvency II is implemented, as the demand for Tier 1 forms of capital will increase substantially and the cost of such forms of capital may be driven upwards as a result. Similarly, the cost (and therefore value) of lower tiers of capital may fall. Therefore, undertakings should consider when is the best time to restructure their capital bases in order to benefit from the most favourable prices in the market. For example, it may be beneficial to restructure as soon as possible, rather than to wait until Solvency II is implemented, to avail of higher quality capital at a lower cost.

The capital tiering rules are more explicit than current Solvency I rules, although certain European countries, such as the UK, have already introduced explicit capital tiering for insurance undertakings under local versions of the Solvency I regulation. As a result of the Solvency II tiering rules, we expect that many companies will re-visit their capital structures and consider whether the current structure is optimal under the new regime.

Undertakings considering capital restructuring should also be mindful of the proposed transitional arrangements in relation to forms of capital, as covered in the next section.

5.2. TRANSITIONAL ARRANGEMENTS

The Omnibus II text includes some transitional arrangements in respect of basic own funds, such that basic own funds issued prior to the date of adoption of Solvency II can be included in a higher tier of own funds for up to 10 years after the implementation date, subject to certain criteria. Under these transitional measures, undertakings may be able to use capital of a lower quality to back the SCR and MCR initially than would otherwise be allowed under Solvency II. Based on the Omnibus II text, Tier 3 basic own funds may be classified as Tier 1 basic own funds subject to meeting certain criteria.

Hence, demand may increase for Tier 3 capital that can be categorised as Tier 1 capital under the grandfathering arrangements up until the adoption date of Solvency II. The cost of such forms of capital may also increase as a result, but it is likely that this form of capital will still be less expensive than Tier 1 capital. Undertakings that are considering recapitalisation should bear the grandfathering arrangements in mind and monitor developments in this space. We note, however, that some regulators may be hesitant about approving structures that benefit from grandfathering, on the basis that any new issues may be assessed from a Solvency II and quality of capital viewpoint, and not with a view to taking advantage of transitional arrangements.

There is also a possibility that some insurers may choose to defer redemptions of certain bonds at the first call date, in order to benefit from the grandfathering rules. However, given that bonds are typically priced based on assumed redemption at first call, insurers would need to balance this strategy with the possible detrimental effect on credibility in the bond markets.

In the UK, the Prudential Regulatory Authority (PRA) is already requiring undertakings to issue new capital instruments in line with Solvency II standards. This means that those undertakings will only be able to take advantage of these transitional measures if they issued capital instruments before the PRA introduced this policy. We may see other regulators look to adopt a similar approach in the lead-up to Solvency II implementation, so undertakings should closely monitor any regulatory changes in this space if they wish to issue capital in advance of Solvency II.

5.3. RING-FENCED FUNDS

Under Solvency II, a notional SCR must be calculated for each ring-fenced fund. Any restricted own funds within the ring-fenced fund that exceed the notional SCR cannot be used to meet the SCR of other funds. As such, restricted own funds within ring-fenced funds are limited to meet the SCR requirements of the ring-fenced fund only. This restriction is allowed for in practice through a Tier 1 deduction at undertaking level, via the reconciliation reserve.

Under the current Solvency I regime, solvency cover is assessed at a total company level. This means that undertakings can use one fund to subsidise the solvency position of another fund. To put it another way, currently, a ring-fenced fund may not have sufficient capital within the fund to meet the required solvency margin of the contracts held within the fund. However, so long as the undertaking has sufficient capital at an overall level to meet its total solvency margin then it is compliant with the current solvency regime. This means that the undertaking does not need to hold capital within the ring-fenced fund to meet the solvency margin requirement of that fund. Instead the capital can be held within the shareholders fund for example, and used more efficiently.

However, under Solvency II, undertakings will need to ensure that there is sufficient capital within each ring-fenced fund to meet the notional SCR. Undertakings may have to de-risk ring-fenced funds, for example by investing in less volatile assets such as bonds in order reduce the notional capital requirements for each such fund, which may result in lower expected investment returns for policyholders. In some circumstances, undertakings may need to inject capital into ring-fenced funds to meet the notional SCR which would reduce the return to shareholders. Capital held within ring-fenced funds will be trapped for the sole use of that ring-fenced fund, via the reconciliation reserve deduction. Therefore, any excess capital within the ring-fenced fund cannot be used to back the total SCR of the undertaking. To address such capital inefficiencies, undertakings may wish to transfer funds to shareholders or policyholders if possible, depending on the operational rules of the ring-fenced fund.

5.4. SUBORDINATED DEBT INSTRUMENTS

Subordinated debt is debt owed to an unsecured creditor that can only be paid, in the event of liquidation, after the claims of policyholders and secured creditors have been met. It is generally constructed as a hybrid instrument between debt and equity and as such is generally less expensive than equity. As one would expect, the main drivers of the cost of issuing subordinated debt are the quality of the debt (which will affect its tiering under Solvency II) and the credit worthiness of the issuer. For example, Tier 1 debt will generally be more expensive than Tier 2 debt. Similarly, BBB-rated debt is more expensive than A-rated debt.

Article 88 of the Solvency II Directive, makes it clear that subordinated debt can be included in basic own funds rather than ancillary own funds. However, classification of subordinated debt as Tier 1, 2 or 3 basic own funds will depend on the specific features of the subordinated debt instrument. Based on draft versions of the Delegated Acts, it is expected that paid-in subordinated liabilities will be classified as Tier 1 basic own funds provided they meet certain criteria. Although the Delegated Acts have not yet been finalised, it is expected that the requirements will be as set out Appendix 2. For subordinated debt to be classified as Tier 2, the criteria are similar to the Tier 1 classification criteria except that the requirements on the duration of the debt instrument and the incentives to repay early have been relaxed somewhat, as outlined in section Appendix 2.

Undertakings who wish to issue subordinated debt instruments that are classified as Tier 1 or Tier 2 own funds under Solvency II should ensure that the instruments meet the specific requirements. Undertakings should focus on the duration of the debt and/or on the ability to include a limited step-up clause if they wish to differentiate between Tier 1 and Tier 2 own funds. For example, a subordinated debt instrument with a fixed duration of greater than 30 years would be classified as Tier 1 own funds but a duration of less than 30 years (but greater than 10 years) would be classified as Tier 2 own funds, all other things being equal.

Many of the subordinated debt instruments issued in the past did not comply with the criteria to be classified as Tier 1 or Tier 2 capital. However, the transitional arrangements outlined in section 5.2 above will ensure that insurers will still be able to use these to support capital requirements during the transitional phase at least. The criteria set out in the Solvency II Directive for Tier 1 and Tier 2 classification are expected to remove some of the perceived weaknesses in current subordinated debt instruments and improve the quality of these capital instruments. For example, insurers will need regulatory approval to pay coupons or redeem principal and default events will not be triggered in the instance where coupon or redemption payments are stopped by the regulator.

5.5. QUALITY VERSUS COST

The quality of capital influences the cost of that capital due to the relative risks to the investor. For example, if a capital instrument is deeply subordinated to policyholders, such as subordinated debt or share capital, the investor assumes an increased risk and will demand a higher price. In deciding on financing structure of the undertaking, therefore, management will need to balance the competing factors of quality and cost.

There are also situations where the Solvency II classification may not necessarily reflect the true underlying quality of the capital. Insurers may therefore 'look through' the tiering rules and independently assess the quality of certain sources of capital, to ensure best practice from a risk management perspective. A good example relates to the EPIFP asset which is implicit in the BEL component of the technical provisions. There has been significant debate about whether to classify EPIFP as Tier 1 or Tier 3 (with the result being that it has been classified as Tier 1). The rationale for the debate about the quality of EPIFP capital stems from the fact that EPIFP, and more generally the VIF portfolio, can be a volatile asset due to its exposure to various underlying risk drivers. This was particularly evident during the financial crisis when VIF, as measured for the purposes of embedded value reporting, was significantly eroded due to widening spreads, reducing interest rates and falls in equity markets. Despite being classified as Tier 1, the fact remains that the VIF and EPIFP assets are not necessarily the highest quality capital due to their volatile nature. This is, therefore, an area in which we might expect to see focus from insurers in managing the exposure and potential balance sheet volatility. In such cases, undertakings might consider 'VIF hedging' strategies and VIF monetisation solutions, which we covered in detail in sections 3 and 4.

6. CORPORATE STRUCTURE AND PORTFOLIO RESTRUCTURING

Solvency II may lead undertakings to consider a number of different forms of corporate restructuring, depending on their individual circumstances, though the exact drivers for any such restructuring may be wide and varied. We have considered some of these in further detail in this section.

6.1. BRANCH STRUCTURE

One option available to undertakings is the branch structure or 'hub and spoke' model. If, for example, a group has a range of subsidiaries spread across various European markets, it may make sense to set up a centralised structure whereby subsidiaries around Europe are reorganised to become branches of a single centralised pan-European entity. This is seen as a way by which to reap the full benefits of risk diversification under Solvency II as all the assets and liabilities are on one balance sheet. In theory, this model should provide greater fungibility of capital as funds can be easily transferred from the branches to the parent company and vice versa. However, in reality there may be cross-border controls and local regulatory requirements that prevent capital moving easily between countries, which may reduce the effectiveness of such a structure.

However, in some circumstances, a local presence may be beneficial. For example, the original outline of the matching adjustment restricted its use to business sold by a particular entity in the territory in which it is authorised. Such a restriction could have placed providers selling cross-border business (i.e. groups using the hub and spoke model) at a significant disadvantage to locally authorised competitors. This restriction has since been removed. However, there may be other reasons why an undertaking may desire to have a local presence in a market depending on the individual circumstances of the undertaking.

In Ireland, we have seen a number of international undertakings setting up their European headquarters in Dublin and selling into Europe on a cross-border basis using the hub and spoke model. For example, Zurich has established its European hub for both life and non-life business in Ireland. Zurich Insurance plc is headquartered in Dublin and is the group's main insurance risk carrier for the majority of its EU non-life insurance business. It operates in Ireland and has branches in a large number of European countries. In 2009, Zurich Global Life European Hub established a manufacturing and serving hub in Dublin for cross-border life insurance products for a range of European markets, including Ireland, Italy, Germany and the UK. MetLife has also established its European headquarters in Ireland, focussing primarily on variable annuity business. From Ireland, MetLife sells into Greece, Poland, Ireland, Germany, Spain, Italy and the UK.

6.2. PORTFOLIO RESTRUCTURING

Having a balanced portfolio of risks will generate advantages under Solvency II when it comes to the calculation of overall solvency capital requirements (through risk correlations and the creation of 'natural hedges' such as mortality and longevity, which serve to offset one another). Direct writers of insurance business may use product development in order to achieve a diversified portfolio of risks, by entering new lines of business or by adding additional 'rider' features to existing lines. Players in niche markets especially will need to reassess the continued viability of their existing market under Solvency II and make changes as appropriate as other players may seek out such markets if diversification benefits are deemed to be sufficiently attractive.

It can take some time to achieve a diversified position through product development though. Hence, insurers planning to use this route may need to start doing so as far in advance of Solvency II as possible. Depending on the intentions of the insurer and the existing portfolio of business, it may be necessary to seek regulatory approval. This is generally the case if branching into new lines of business which may represent a material change of business plan for the organisation. This can bring with it certain delays which need to be managed.

To accelerate the process, undertakings might consider acquiring diversifying blocks of business, although this needs to be balanced with the integration challenges associated with potentially new and unfamiliar lines of business.

Reinsurers may be better positioned than direct writers in that it may be easier for them to quickly build a diversified portfolio of risks. For example, some reinsurers already have extensive portfolios of mortality risk and will need to hold capital against this risk unless it can be mitigated in some

way. Instead of retroceding the mortality risk to another party, a viable option might be to take on longevity risk. This acts to some extent as a natural hedge against the existing mortality risk, leading to improved capital efficiency. Some of the benefits of this capital efficiency may then be reflected in the price being offered for longevity reinsurance to direct writers, giving rise to enhanced price competition as well as improving the overall attractiveness of this option to direct writers.

There may also be diversification benefits to be gained, at a group level, across the various categories of insurance business. For example, there is no correlation between life underwriting risk and non-life underwriting risk under the standard formula correlation matrix. Therefore, a life insurance group undertaking may be able to efficiently reduce capital requirements at the group level through the establishment or acquisition of a non-life undertaking.

6.3. MERGERS AND ACQUISITIONS

Solvency II is a potential driver of merger and acquisition (M&A) activity as undertakings seek to improve capital efficiency by merging with, or acquiring, another undertaking (or book of business) in order to capture the expected risk diversification benefits associated with varied books of business. We have already mentioned how natural hedges can be created, for example, if an undertaking has a large book of annuity business, it could consider acquiring a large book of term assurance business to gain additional diversification benefits. In addition, the capital requirements may be lower for a composite reinsurance undertaking than for separate life and non-life undertakings so we may see a number of mergers in this space. Capital efficiency could also be improved due to the increased economies of scale as a result of mergers and acquisitions.

Alternatively, some undertakings may improve their capital efficiency by selling some lines of business, in particular capital intensive non-core lines of business. Among other recent examples, Aviva sold its book of US life and annuity business in late 2012. John McFarlane, chairman of Aviva plc, said that 'the sale of Aviva USA is an important step forward in the delivery of our strategic plan. It considerably strengthens Aviva's financial position, increases group liquidity and improves our economic capital surplus whilst also reducing its volatility.' To the extent that Aviva's economic capital surplus is a proxy for its Solvency II capital surplus, we can infer that this sale is also likely to improve Aviva's solvency position under Solvency II. We have seen, and may continue to see, other large European insurance undertakings dispose of their US operations as the capital requirements under Solvency II may put them at a competitive disadvantage against US competitors, in particular if the US is not eventually considered to be equivalent under the third country equivalence rules. We discuss these rules in more detail below.

Increasingly, we also see a re-emerging trend across Europe of acquiring blocks of insurance business via reinsurance, with similar economic benefits as a full sale. A key difference, however, is that management control is retained by the insurer under the reinsurance approach, which offers benefits relating to customer and portfolio management. The reinsurance process can be less onerous and time-consuming than a full M&A process and, as a result, might become more prevalent in certain situations.

6.4. PORTFOLIO MANAGEMENT

In addition to portfolio restructuring and M&A activity, undertakings could also consider reshaping their existing portfolio of business.

If Solvency II is expected to have a negative effect on an undertaking's balance sheet, management could consider re-pricing the existing business to allow for the new capital requirements. Undertakings would need to have the contractual right to review premiums or charges (such as fund charges or mortality charges) in these circumstances though. Indexation could also be applied to charges if the undertaking has the right to do so. The competitive or commercial impacts of re-pricing should be considered if undertakings choose to go down this route, as well as policyholders' reasonable expectations (PRE) or treating customers fairly (TCF).

Undertakings could also consider retention management techniques to retain existing books of business. Such techniques might be employed in the case where there is a natural hedge between two blocks of business, for example term assurance and annuity business. Retention management may be particularly important if there is a risk that the total capital requirement may increase, due to reduced diversification benefits, if one of the blocks of business runs off at a faster rate than the other. Additionally, undertakings may employ different strategies in order to retain profitable

books of business and run off loss-making business. If Solvency II resulted in a significant increase in capital requirements for a certain block of business, undertakings could look to 'buying out' the policyholders or offering policyholders the option to move to a different policy so long as such actions did not result in any PRE/TCF issues.

Portfolio management strategies may have different impacts depending on whether they are applied retrospectively to the existing book of business or to new business only. The effect of both approaches should be considered by undertakings, as well as the possible risk of lapse and re-entry if the new business terms are more favourable for the policyholder than the existing business terms.

6.4.1. Contract boundaries

Contract boundaries may also act as a catalyst for undertakings to change the existing book of business. The definition of a contract boundary determines the contracts and cash flows to be included in the technical provisions and, consequently, the capital requirements calculations. There has been much debate surrounding the definition of contract boundaries to date. It is expected that the final definition of contract boundaries will be based on the undertaking's 'unilateral rights' to renew or extend the scope of the contract. The boundary exists where the undertaking has the unilateral right to terminate the contract, reject premiums or amend premiums or benefits paid under the contract to fully reflect the risks, and where neither the policyholder nor any third party can restrict the exercise of that right. If the contract has no future insurance event or does not offer a financial guarantee then all future premiums (and related obligations) are excluded from the contract. Future insurance events or financial guarantees which do not have a significant effect on the economic value of the contract are to be ignored.

Any premiums or obligations that do not lie within the definition of contract boundaries cannot be factored into the calculation of the technical provisions. This could have a significant impact on the technical provisions of some undertakings. In particular, where contracts are profitable, undertakings may not be able to allow for expected profits in future premiums (EPIFP) as a negative liability (i.e. an asset) on the balance sheet, e.g. for certain regular premium unit-linked contracts. In this case, undertakings could look to alternative approaches to take credit for this asset, for example through monetising the EPIFP, commonly referred to as 'VIF monetisation.' As discussed further in section 4.4, by monetising the expected future profits that are not recognised due to contract boundaries, undertakings could recognise an additional asset on the balance sheet that would otherwise be excluded under Solvency II.

The definition of contract boundaries can also lead to companies having to make decisions on product design, especially with respect to the trade-off between the non-recognition of epifp and potential increased volatility in the solvency coverage ratio when future premiums are included. Undertakings may consider changing policyholder terms and conditions on profitable lines of business to lengthen the term to the contract boundary. Under the definition of contract boundaries, if the contract has no significant future insurance event or does not offer a significant financial guarantee then all future premiums (and related obligations) are excluded from the contract and cannot be accounted for in the technical provisions. This restriction may result in some strange behaviour, for example undertakings may consider adding discernable guarantees to contracts in order to generate lower technical provisions under solvency ii even though the contracts would ultimately be riskier. However, this may be contrary to good risk management practices.

6.5. THIRD COUNTRY EQUIVALENCE

The proposed rules surrounding third country equivalence may result in corporate restructuring for undertakings with operations in countries that are not deemed to be equivalent under Solvency II. Currently only Bermuda, Switzerland and Japan (for reinsurance only) have been determined to be equivalent under the new rules, with Australia, Chile, Hong Kong, Israel, Mexico, Singapore and South Africa to be assessed in the second wave of assessments. Under the Solvency II rules, third country equivalence is considered in three different circumstances:

- Supervision of an EEA parent undertaking with a subsidiary undertaking in a third country
- Supervision of a subsidiary undertaking in the EEA with a parent undertaking in a third country
- Supervision of EEA undertakings with reinsurance arrangements in a third country

If a third country is determined to be equivalent, then there will be no additional requirements under Solvency II over and above the requirements already in place in that country. However, if a third country is not determined to be equivalent, then additional requirements may apply such as:

- EEA parent undertakings may have to recalculate the SCR and own funds of third country subsidiaries based on the Solvency II rules and include these in the aggregated group calculations even if this is stricter than the local rules in the third country.
- Third-party parent companies may have to hold eligible own funds to meet the SCR calculated on a Solvency II basis for the whole group, including the parent company, or alternatively they may be required to set up an EEA holding company.
- Reinsurers based on a third country may be required to post collateral in relation to the risks they reinsure into the EEA.

Due to concerns regarding the competitive disadvantage of European Groups compared to domestic insurers in jurisdictions that were not deemed to be 'equivalent', some transitional measures have been introduced in relation to third-party equivalence. These include 'temporary' equivalence and 'provisional' equivalence.

Countries may be deemed to have temporary equivalence status for up to six years in relation to the supervision of subsidiary undertakings in the EEA with a parent undertaking in a third country and the supervision of EEA undertakings with reinsurance arrangements in a third country. This is based on certain criteria, including a commitment by the third country to put in place a regime that can be assessed as equivalent before the end of the transitional period. Countries may be deemed to have provisional equivalence status for 10 years in relation to the supervision of an EEA parent undertaking with a subsidiary undertaking in a third country. It seems that this status can be renewed for a further 10 years and while certain criteria needs to be met, there is no requirement on the third country to commit to put in place an equivalent regime by the end of the transitional period (if at all). The provisional equivalence is particularly important for European groups that have subsidiaries in the US and Canada, as it will allow them to compete in these markets on the same terms as domestic firms.

It remains to be seen what effect these rules will have on multinational insurance groups, in particular as member states themselves have some flexibility over how to implement these rules. If national supervisors do not implement the transitional measures in a consistent format, some EEA groups may find that their subsidiaries in non-equivalent third countries face competitive disadvantages relative to the other insurers operating in these markets, in particular if the local regime is not as strict as Solvency II. As a result, European groups may consider selling subsidiaries in non-equivalent third countries if they cannot compete in these markets or we may see European groups restructuring and moving their headquarters to member states where the national supervisor has implemented the transitional measures in full.

In addition, large insurance groups with head offices outside the EEA may want to split their operations between the EEA and the rest of the world through the use of holding companies as a result of these rules. This may result in additional cost but may be preferable to having Solvency II applied to the whole group.

Furthermore, while it is common for undertakings to require non-related reinsurance entities to post collateral when counterparty risk is significant, some undertakings may choose to restructure reinsurance arrangements to focus on reinsurers within the EEA or equivalent third countries as requiring reinsurers to post collateral could have a significant impact on the cost of reinsurance.

6.6. BANK-OWNED INSURERS AND THE INTERACTION WITH BASEL III

Insurance undertakings that are owned by banks will have additional considerations relating to the interaction of insurance capital and the Basel III capital standards for banks. While a discussion of Basel III implications is beyond the scope of this paper, we have seen, and expect to see, increased activity in this area from bank-owned insurers, for example corporate restructuring, including the sale of a full or partial stake in the insurance entity, and capital restructuring, such as debt restructuring.

In some recent cases, most notably publicly announced VIF monetisation transactions in Spain and Portugal, activity has been accelerated by the banking crisis and the need to recognise capital at the parent company level. Recent transactions include:

- July 2012: Santander/Deutsche Bank/Abbey Life (€490 million, 100% quota-share)
- November 2012: CaixaBank/Berkshire Hathaway (€600 million, 100% quota-share)
- March 2013: BBVA/SCOR (€630 million, 90% quota-share)
- June 2013: Banco Espírito Santo/NewRe¹⁵ (40 bps increase to Core Tier 1 ratio, 100% quota-share)
- September 2013: Eurovida¹⁶/SCOR (€28 million, 95% quota-share)
- March 2014: Banco Sabadell (CAM)¹⁷ /SCOR (€82 million)

6.7. TREATMENT OF DEFINED BENEFIT SCHEMES UNDER SOLVENCY II

The treatment of undertakings' defined benefit schemes¹⁸ under Solvency II has been the subject of some discussion to date. In general, there seems to be a lack of clarity on how exactly defined benefit schemes should be treated under Solvency II and as a result, it seems that a consistent approach is not currently being adopted in practice. In relation to capital management, the valuation basis of the pension scheme liabilities and whether or not such liabilities are included in the SCR calculation and the risk margin, will impact on an undertaking's capital position. Given that the current text is not clear, there may be changes made to the principles underlying the valuation of defined benefits schemes in the final versions of the Solvency II text.

Alternatively we may see different national supervisors adopt different approaches in relation to the valuation of defined benefit schemes. This uncertainty can pose risks to undertakings from a capital management point of view. As a result we may see some undertakings choosing to de-risk for example, immediately through bulk annuity buy outs or more slowly through closing the defined benefit scheme to new entrants. Appendix 3 provides some background on the issues in relation to the proposed valuation basis for defined benefit schemes.

¹⁵ New Re is part of the Munich Re group

¹⁶ Eurovida is a 100% Portuguese subsidiary of Spanish financial group Banco Popular.

¹⁷ CAM is a savings bank subsidiary of Banco Sabadell bank.

¹⁸ Pension schemes for the benefit of the employees of an insurer or reinsurer that are held on the balance sheet of that insurer or reinsurer.

7. OTHER POTENTIAL SOLUTIONS

In the previous sections we have explored different methods by which undertakings can manage their capital under Solvency II ranging from complicated ALM techniques to corporate restructuring. Of course there are many other ways in which undertakings can reduce their vulnerability to risk, for example through the use of controls and monitoring or by gaining a better understanding of the underlying risk exposures and how to model them. While this is not an exhaustive list, we explore some of these options in this section. Individual undertakings would need to examine their own specific risks in detail in order to identify opportunities to gain capital efficiencies that suit their particular circumstances.

7.1. OPERATIONAL RISK

Most insurance undertakings have a good understanding of the risks to which they are exposed and are good at managing and mitigating these risks in a capital efficient manner. However, some areas of risk management are still considered to be relatively new fields for insurance undertakings. While operational risk has been assessed and quantified for many years in the banking industry, it is a relatively new area of focus for insurers, particularly when it comes to calculating risk-based capital requirements.

Undertakings can take the first step to fully understanding their operational risk exposures by putting specific controls and procedures in place. For example, undertakings can develop operational risk registers and risk matrices to monitor and assess the risks they are exposed to at an operational level. A key benefit of such risk management tools is that they enable undertakings to identify and mitigate the key operational risks to which they are exposed in the first instance, before allowing them to measure the risks associated with such operational events. In addition to looking at operational events that occurred in the past, undertakings should also seek to identify new operational risks that they could be exposed to in the future.

Once these processes and procedures are in place, undertakings can use them to develop a robust operational risk model, which can be used to calculate operational risk capital requirements. In most cases, this would be preferable to the standard formula capital charge for operational risk, as the standard formula uses a simple formulaic approach essentially based on business volumes in most cases. This rather crude calculation does not allow for the fact that undertakings may have effective risk management processes and controls in place in respect of operational risk, i.e. it is not really a risk-based capital charge. Instead of using the standard formula, an internal model (or partial internal model) could be calibrated to capture the true operational risk profile of the undertaking, which may lead to capital efficiencies. We discuss the benefits of operational risk modelling further in section 8.4.

7.2. CREDIT RISK

Simple risk management techniques such as controls and monitoring can also be used to manage credit risk exposure, with the added benefit of reducing capital requirements and thereby improving capital efficiency. Under the standard formula, the capital charge for credit risk is calculated in the counterparty risk module. This should reflect possible losses due to unexpected default or deterioration in the credit standing of any counterparties and debtors over the forthcoming twelve months. Some of the controls and procedures that undertakings can use to manage counterparty risk exposure include the following:

- Vetting all potential counterparties to reduce the risk of entering into arrangements with counterparties that have higher probabilities of default
- Monitoring any changes to the credit worthiness of current counterparties and reconsidering the arrangements if the credit worthiness falls below certain predefined limits
- Ensuring that receivables from intermediaries are settled within specific timelines, for example receivables due for longer than three months are subject to a higher capital charge under the standard formula counterparty risk sub-module
- Ensuring that collateral is pledged as part of all reinsurance arrangements and securitisations as this will reduce the potential loss to the undertaking if a default occurs and will result in a lower capital charge than arrangements with no collateral
- Monitoring the levels of diversification across various counterparties as diversification can materially reduce the capital requirement for counterparty risk

Many insurers may already have such processes in place as part of a robust risk management framework. For undertakings using a (partial) internal model, the calculation of the credit risk capital charge will depend on the specific calibration and modelling techniques used in the internal model. However, some of the processes outlined above may also result in a reduction in the credit risk capital charge for undertakings using such models.

7.3. EXPENSE, CLAIMS AND TAX RISK

Undertakings will also want to reduce their exposure to expense, claims and tax risk. This risk cannot be easily transferred to reinsurers or capital markets or hedged using financial derivatives. However, undertakings can put controls and procedures in place to monitor their exposures to these risks, for example by regularly producing key performance indicators and monitoring actual expense, claims and tax experience relative to budget projections. While it may not seem that these risks have a direct link to capital management, losses incurred as a result of these risks will affect the undertakings profit and loss result, which in turn will reduce available assets and result in a worsening of the undertakings capital position.

Exposure to expense risk can be limited by including clauses in product terms and conditions to allow for increases in charges, for example in line with consumer price indices. Such clauses can also be used to reduce capital requirements for expense risk in the life underwriting risk module as the latest technical specification allows undertakings to take account of realistic management actions in relation to expense loadings for policies with adjustable loadings.

A lot of risk management processes have been built around claims risk. We do not intend to delve into the detail here but rather to briefly mention this important area and some of the methods that may be used to effectively manage risk (and, consequently, capital requirements). Exposure to claims risk can be reduced through, for example, efficient claims underwriting, which amongst other things, can be used to reduce the risk of paying out on fraudulent claims. Undertakings are also exposed to the risk of lapse/surrender claims on profitable lines of business. This exposure could be reduced through the introduction of retention management techniques aimed at retaining existing books of business. Such techniques are discussed further in section 6.2.

All undertakings, not just insurance undertakings, are exposed to the risk of changes in tax rules in the country in which they operate. While it is difficult to reduce this risk exposure, undertakings should monitor developments in government policy closely to ensure they are kept abreast of any proposed changes to tax legislation. Changes in corporation tax rates will directly affect insurance undertakings. This exposure can be limited to some degree by setting up head offices in countries with stable political, and economic, environments. Changes to income tax rates and tax relief on pension's savings or insurance premiums will directly affect policyholders which in turn will affect insurers. This exposure can be limited through effective lobbying by trade bodies to ensure that governments are aware of the effect of such changes on the insurance industry.

7.4. RISK RETENTION

Undertakings may also choose to retain their current risk exposure and simply hold the required amount of capital to support their technical provisions and cover their SCR. The decision to retain risk will depend on a number of factors including the type of undertaking and the nature and scale of its risk exposure. For example, longevity protection is often difficult and expensive to obtain on a small scale and, where it is available, could introduce significant basis risk. Therefore, it might be more efficient overall for smaller players to retain longevity risk rather than transfer it to the capital markets. Some undertakings may be able to easily absorb the high capital charges under Solvency II without having to employ additional risk management techniques if they have a high level of own funds. For example, undertakings that have a profitable book of in-force business will benefit from an increase in the value of own funds once the value of that business can be included on the balance sheet. Other undertakings may choose to retain some risks and use risk management techniques to reduce their exposure to other, perhaps more significant, risks.

Undertakings choosing to retain risk should continue to monitor and analyse their risk exposure on a regular basis. Any risk retention should remain aligned with the undertaking's risk appetite and the undertaking would need to ensure that it has capital of a sufficient amount and quality to cover the technical provisions and the SCR on a continuous basis.

It is also worth bearing in mind that sometimes the retention of a given risk is not the preferred course of action—however, it may be the only course of action, for example due to limitations on the risk management solutions available.

8. RISK MODELLING

In this section we have included some detail on the use of risk modelling techniques from a capital management perspective, in particular with regard to the calculation of technical provisions and capital requirements under Solvency II and how enhanced modelling can support a more effective capital management process.

8.1. STANDARD FORMULA VERSUS INTERNAL MODEL

While the standard formula has a number of advantages, including the fact that it is relatively easy to understand and implement and does not require regulatory approval, it also has a number of shortcomings, some of which we touch on in a number of sections in this paper. In some cases, an internal model (or partial internal model) may be more suitable as it may provide a better reflection of the specific risk profile of the undertaking, which may lead to capital efficiencies. Furthermore, additional risks can be covered in the internal model beyond those covered in the standard formula and the internal model can adopt a more granular (and possibly more appropriate) aggregation method.

An internal model should allow for enhanced capital management relative to the standard formula under Solvency II as the calculated capital requirement should be more aligned to the risks that are actually being borne by the undertaking. It is no surprise that the Quantitative Impact Study 5 (QIS5) results¹⁹ showed that the majority of undertakings intending to use internal models are large groups, seeking to better align their capital requirements with their risk profiles. Of course, internal models are more complex in nature and as a result, more costly and time consuming to develop and insurers also need to seek regulatory approval to use such models. Furthermore, even if an insurer is using an internal model to calculate its SCR it will still need to calculate capital requirements under the standard formula approach in order to meet the Own Risk and Solvency Assessment (ORSA) requirements, resulting in an increased workload.

An alternative to a full internal model would be to use a partial internal model to calculate the capital requirement for some risks. This could be considered as an attractive option in some situations where the standard formula capital charge is particularly onerous for a given risk module due to the undertaking's specific circumstances. For example, insurers that have dynamic hedging strategies in place may consider developing a partial internal model to calculate the market risk capital charges allowing for the full benefits of such hedging strategies. However, regulators are wary of the risk of 'cherry-picking' when it comes to partial internal models and as a result, partial internal models are also subject to a formal approval process. Article 113 of the Solvency II Directive includes some specific requirements in relation to the partial internal model approval process. Under this article the reason for the limited scope of the partial internal model must be properly justified and the SCR calculated using the partial internal model must reflect the risk profile of the undertaking more appropriately than the standard formula. The partial internal model SCR must comply with the general provisions for the SCR as outlined in the directive and the design of the partial internal model must also be consistent with these general provisions. As part of the approval process, supervisory authorities may require undertakings to submit a realistic transitional plan to extend the scope of the model where the use of a partial internal model only covers certain sub-modules of a specific risk module, or some of the business units with respect to a specific risk module, or parts of both.

8.2. MODELLING MANAGEMENT ACTIONS

Undertakings are allowed to take future management actions into account in the calculation of the technical provisions and, by association, the calculation of the SCR, if these actions meet certain criteria. More sophisticated and representative modelling of management actions can help to release value and free up capital. Examples of future management actions include increasing unit-linked charges or adjusting discretionary benefits to reflect experience, making the decision to close to new business if certain events occur, or introducing a hedging strategy or reinsurance arrangement to manage risk. Management actions generally serve to reduce the technical provisions but in some cases can result in an increase in technical provisions (which could occur, for example, in the event of an increase in bonus rates on with-profits business). Undertakings can formulate management actions and then use these in their calculation of the technical provisions to improve capital efficiency.

19 As reported in the EIOPA Report on the fifth Quantitative Impact Study (QIS5) for Solvency II.

In the UK, this step was formalised with the earlier introduction on the Individual Capital Assessment (ICA) regime and also the development of the 'Principles and Practices of Financial Management' (PPFM), which is a regulatory document outlining how management would act in alternative scenarios. The document must be endorsed by management as being a reasonable reflection of reality. The PPFM document forms the basis for how actuarial models are coded to reflect management actions in alternative scenarios.

If management were to exercise certain actions it is clear that they should do so with the objective of treating their customers fairly, in the context of any expectations that may have been formed by policyholders either through the sales process or having observed the extent and impact of management actions in the past. Consequently, the Solvency II Directive requires that future management actions are determined in an objective manner and that they are realistic and consistent with the undertaking's current business practice and strategy. In addition, assumed future management actions should be consistent with one another and verifiable through comparison with management actions taken previously by the undertaking. Undertakings should also consider the time delays and expenses incurred in implementing management actions and any restrictions based on policy documentation and marketing literature.

Undertakings must also have a comprehensive future management actions plan in place which has been approved by the board. This plan should identify future management actions that are relevant for the calculation of the technical provisions and the specific circumstances in which these management actions would reasonably be expected to be carried out. It should also recognise any circumstances in which it might not be possible to carry out the planned management actions. The future management actions plan should also include details of applicable governance requirements and other considerations in relation to management actions such as the order in which any such actions would be carried out. If future management actions are considered in the calculation of the BEL then undertakings must assess the quantitative impact on the BEL of the future management actions included in its calculation.

As with most risk mitigants, there are limits to the extent of the application and effectiveness of management actions, in particular in relation to charge increases or benefit reductions. For example, in the case of many products offering guaranteed maturity benefits, increasing charges will just increase the likelihood that the maturity guarantee will bite, thereby reducing the effectiveness of the measure when it comes to calculating the BEL or SCR. Such actions may also inflict a certain amount of reputational damage on the undertaking, as well as possibly contributing to legal risks, and so should be used sparingly.

The QIS5 results suggest that undertakings in some countries have not yet considered the full potential of management actions in the calculation of the BEL. Overall, the impact of management actions was generally reported to be less than 2% of the technical provisions, although in some countries as many as 30% of undertakings reported an impact exceeding 5%.²⁰ Some insurers did not take management actions into consideration in the QIS5 calculations but acknowledged that they may have some impact on the technical provisions, whereas others did not see them having any impact at all. In the same report, EIOPA stated that '*undertakings reported taking into account the following future management actions in their internal models:*

- *changes in asset allocation;*
- *changes in future bonus rates;*
- *changes in product charges or expense charges;*
- *changes in their reinsurance programme;*
- *dynamic hedging; and*
- *run-off decisions'.*

20 As reported in the EIOPA Report on the fifth Quantitative Impact Study (QIS5) for Solvency II.

As mentioned above, management actions may also be used in calculating the SCR, although their application is limited under the standard formula approach due to the instantaneous nature of the shocks. However, it may be necessary to reassess the value of the technical provisions after the stress and assumptions about future management actions may be taken into account at this stage.²¹ Future management actions are also allowed for in the calculation of the loss-absorbing capacity of technical provisions where undertakings have the discretion to vary future discretionary benefits or future bonus rates.

Undertakings using an internal model or a partial internal model do not face the same limitations as the standard formula with regard to future management actions, as the stresses are applied over the course of a year, rather than instantaneously, which would provide management with sufficient time to react to the stressed environment. In order to assume management actions in the calculation of the SCR, the same requirements apply as for the BEL, i.e. that the management actions are objective, realistic and verifiable and that the actions have been documented in a comprehensive future management actions plan that has been signed off by the board.

Practically speaking, in order to take credit for management actions in the technical provisions and/or the SCR, whether through the standard formula approach or the use of an internal model, undertakings will need to develop a model with the capability to determine the impact of such actions. This can be challenging in practice and may require sophisticated modelling techniques. For example the model may need to include complicated decision trees in order to assess what action will be taken by the board given the circumstances applying at the time. It may also be challenging to develop formulae that correctly portray the outcomes of the management actions. If an undertaking were to decrease future bonus rates, for example, there may be an increase in policyholder lapses. In addition, undertakings will also need to consider how to model management actions that would only be taken in extreme scenarios. If an undertaking is currently well capitalised it might not be modelling management actions that would only be considered in the case where its solvency was threatened, i.e. closure to new business. However, modelling management actions accurately could materially improve an undertaking's capital position and aid the strengthening of governance structures. The first step though for any undertaking is to consider and document the potential management actions that they could realistically consider as part of a future management actions plan as required under the Solvency II Directive.

8.3. PROXY MODELLING TECHNIQUES AND AUTOMATED MODELLING PROCESSES

The frequency with which liability and capital calculations will need to be performed will be driven by, amongst other things, the level of efficiency of capital management that the management of the undertaking wishes to achieve. If capital use and investment needs to be monitored closely then this will mean more regular liability valuations and capital calculations. Depending on the complexity of the business and its risk profile, this can quickly become an onerous and expensive task. This is where proxy modelling techniques can help. Proxy models aim to take the place of liability cash flow models at interim (sometimes daily) valuation dates and allow these models to be used only at the main valuation dates (monthly or quarterly). These proxy models are much faster at generating updated valuations and capital calculations, as well as supporting hedge programmes. However, there is inevitably some small loss of accuracy in achieving this efficiency. Examples of proxy modelling techniques include Least Squares Monte Carlo,²² curve-fitting, cluster modelling and replicating portfolios.

Proxy techniques are not only useful for the purposes of point-in-time calculations but also offer similar advantages when it comes to projection of the balance sheet and capital requirements over time (as required for ORSA and FLAOR). They may also prove useful for frequent point-in-time solvency calculations in instances where management wants to assess solvency coverage between successive valuation dates in order to ensure continuous compliance with solvency requirements. Such techniques can aid quick, yet reliable, decision-making and significantly reduce demands on computational resources, thereby helping the organisation to achieve its capital management objectives.

²¹ As stated in SCR1.8. of EIOPA's Technical Specification for the Preparatory Phase (Part I).

²² For more information see Milliman's 2013 research paper titled An application of Monte Carlo proxy techniques to variable annuity business: A case study.

Alongside proxy modelling techniques, an undertaking might also consider improvements in modelling processes, such as increased automation or cloud computing, to further enhance its capital management decision-making process.

8.4. OPERATIONAL RISK MODELLING

As mentioned already, the capital charge for operational risk is calculated rather crudely using the standard formula approach—essentially based on business volumes in the majority of cases. Whilst this has the benefit of providing a simple method of calculation for the purposes of applying a capital charge, it is unlikely to reflect the actual operational risk exposure of the undertaking. In this case, an internal model could be used to better capture the specific true risk profile of the undertaking, which may lead to capital efficiencies. Internal models can also aid undertakings in gaining a better understanding of the risks to which they are exposed.

A recent study carried out in the UK by Milliman found that the majority of undertakings were using the standard formula to calculate the operational risk component of the SCR. Even where undertakings were using internal models, many were still using the standard formula approach to calculate the operational risk capital charge. This was primarily due to the lack of credible data and incomplete Pillar II infrastructures. For most undertakings, an internal model or partial internal model could better reflect the undertaking's actual exposure to operational risk resulting in a closer connection between the operational risk capital charge and the actual operational risks that the undertaking faces.

However, modelling operational risk may prove difficult in practice as these risks are generally characterised as having heavy tailed distributions with a large number of small losses and a small number of extreme losses. As a result, total operational losses tend to be highly skewed and dominated by high-severity, low-frequency events. This means that parameter estimates and statistical characteristics such as the mean and value-at-risk (VaR) can be quite volatile as they can be very sensitive to a single event. In addition, it is unlikely that undertakings will have access to a sufficient amount of data to properly model the tail distributions.

Combinations of scenario and statistical modelling approaches, such as the loss distribution approach (LDA) are commonly used by global banks under the Basel III framework. Using the LDA approach, the severity and frequency of operational loss risks are modelled separately and then combined through Monte Carlo simulation techniques to generate an aggregate loss distribution. However, such models have their limitations, in particular, due to a disconnection between the modelled loss outcomes and the undertaking's actual operational risk drivers which constantly adapt and change over time. These limitations were highlighted in the banking sector during the recent financial crisis as the models failed to respond to the changing operational risk levels of banks. Emerging practice in the operational risk field has indicated a move towards structural or causal-based models in recent years. These models link outcomes directly to the drivers of operational risk, usually achieved through the use of Bayesian networks.

However, such models can prove to be quite complex to develop. As a result, for certain smaller undertakings the development of a robust operational risk calculation engine through an internal model or partial internal model may be considered expensive relative to the savings that can be achieved by the reduced capital charges. A relatively simple approach to operational risk modelling would be to use the Basel III operational risk scenarios as a starting point. Using this framework, undertakings could carry out an operational risk business assessment with the key business owners to consider the expected losses for each of the risk scenarios due to 1 in 10 and 1 in 30 year events, for example. By simply assuming that the risks follow the lognormal distribution and allowing for high-level correlation factors (i.e. assuming only low, medium and high correlations), undertakings may be able to quantify their operational risk exposures at a high level. Once this approach is embedded in the organisation, it could be refreshed on an annual basis to ensure that the risk scenarios, assumptions and expected losses are still relevant. Even a relatively simple operational risk model would not only integrate the management and modelling of operational risk but would also generate insights into the complexity of these risks, allowing undertakings to employ appropriate risk mitigation techniques which could result in significant savings in the long term. Such a model could also be used to calculate an operational risk capital charge that is more reflective of the risks the undertaking actually faces, subject to regulatory approval.

8.5. DATA QUALITY

The quality and reliability of model outputs is heavily dependent on the inputs to the process. Data is a key area. All undertakings, though especially those interested in active capital management, need to ensure that they have sufficient data quality assurance and validation processes in place. In the case of undertakings making ongoing decisions (and taking actions on the basis of those decisions) to rebalance asset portfolios or enter into risk mitigation strategies, for example, it is extremely important to be able to have confidence in the basis for such actions.

Undertakings planning to use an internal model may have a slight advantage over those using the standard formula approach in that there are specific requirements to be met in relation to data quality in order to gain internal model approval.²³ This discipline is likely to result in such undertakings being in a stronger position (or at least reaching this point earlier on) than their standard formula counterparts. Data quality requirements will extend beyond the data used in the assumption-setting process to include all asset and liability data and the more granular the detail that can be captured the better.

²³ As outlined in Article 121 of the Solvency II Directive.

9. PILLAR II AND PILLAR III CAPITAL MANAGEMENT CONSIDERATIONS

Under Solvency II's three pillar approach, the measurements of assets, liabilities and capital are captured under Pillar I. However, there are some aspects of Pillar II and Pillar III that are relevant from a capital management perspective. We have included some details on these in this section of the paper.

9.1. PILLAR II

In its interim measures consultation on systems of governance, EIOPA introduced a number of Pillar II requirements relating to capital management. In themselves, these requirements may not materially alter the way in which firms manage their available capital or their solvency capital requirements. However, they are still likely to enhance governance in this area and encourage best practice capital management. The two requirements are captured by the System of Governance guidelines (numbers 38 and 39) of Set 1 of the Solvency II Guidelines issued for public consultation in June 2014.

The proposed guidelines require national supervisors to ensure that firms are developing a capital management policy which includes procedures to ensure that their own funds items satisfy (at issue and subsequently) the applicable capital regime. The policy should include controls on issuance of new capital instruments and set out the approach to managing dividends and distributions.

The development of a medium-term capital management plan is also in the scope of the guidelines. This plan should include consideration of the output from both the risk management system and the forward looking assessment of the undertaking's own risks (based on the ORSA principles).

Specifically, the wording of Guideline 38 (concerning the capital management policy) is as follows:

The undertaking develop [sic] a capital management policy which includes a description of the procedures to:

- a) ensure that own fund items, both at issue and subsequently, are classified according to the features in [Articles 59, 61, 63, 65, and 67] of the draft implementing measures;*
- b) monitor tier by tier the issuance of own fund items according to the medium term capital management plan, and ensure before issuance of any own fund item that it satisfies the criteria for the appropriate tier on a continuous basis;*
- c) monitor that own funds items are not encumbered by the existence of any agreements or connected transactions, or as a consequence of a group structure, which would undermine their efficacy as capital;*
- d) ensure that the actions required or permitted under the contractual, statutory or legal provisions governing an item are initiated and completed in a timely manner;*
- e) ensure that ancillary own fund items can be and are called in a timely manner when necessary;*
- f) ensure that any arrangement, legislation or products that give rise to ring-fenced funds are identified and documented and appropriate calculations and adjustments in the determination of the SCR and own funds;*
- g) ensure that the terms and conditions of any own fund item are clear and unambiguous in relation to the criteria;*
- h) ensure that any policy or statement in respect of ordinary share dividends is taken into account in consideration of the capital position;*
- i) identify and document instances in which distributions on an own funds item are expected to be deferred or cancelled;*
- j) ensure that the extent to which the undertaking relies on own fund items subject to transitional provisions and the manner in which these operate in times of stress, and in particular how the items absorb losses, are identified and assessed and, if necessary, taken into account in the ORSA.*

EIOPA's wording on the requirements associated with the medium-term capital management plan is as follows:

- The undertaking should develop a medium-term capital management plan which is to be monitored by the AMSB of the undertaking and which includes at least considerations of:*
- a) any planned capital issuance;
 - b) the maturity, incorporating both the contractual maturity and any earlier opportunity to repay or redeem, relating to the undertaking's own fund items;
 - c) the result of the projections made in the ORSA;
 - d) how any issuance, redemption or repayment of, or other variation in the valuation of an own funds item affects the application of the limits on tiers;
 - e) the application of the distribution policy;
 - f) the impact of the end of the transitional period.

The ORSA process²⁴ should aid in embedding robust capital management techniques into the organisation. If firms already have an efficient capital management policy in place, these requirements may not impact the way in which firms organise themselves other than adding some additional structure and rigour to decisions involving capital management. However, for undertakings that do not have such governance processes already in place the Pillar II requirements should result in an overall improvement in standards.

9.2. PILLAR III

Under Pillar III, undertakings need to publicly disclose their Solvency and Financial Condition Report (SFCR) on an annual basis. In addition, they need to prepare a Regular Supervisory Report (RSR) for the regulator on an annual basis and submit Quantitative Reporting Templates (QRTs) on an annual and quarterly basis. Undertakings will ultimately have 14 weeks to prepare and publish the SFCR. It is expected that this will be phased over the first four years of Solvency II implementation, starting with 20 weeks and reducing by two weeks per year for three years. The deadlines for the RSR will be the same as the SFCR.

The Level II Delegated Acts will provide detail on the information required to be included in each of these reports. It is expected that undertakings will need to disclose the following information in respect of capital management:

- Details of how the capital management activities and risk management system interact with each other
- Detailed information on own funds, including an analysis of each tier of own funds compared to the previous reporting period, the eligible amount of own funds to cover the SCR and MCR, the nature and amount of each basic own fund item that is subject to transitional arrangements, detailed information on material ancillary own funds and details of any item of own funds deduction, e.g. due to ring-fenced funds
- Detailed information on capital requirements, including the amount of the SCR and MCR, the SCR split by risk modules or risk categories, information on the inputs used to calculate the MCR and an analysis of any material change to the SCR or MCR over the reporting period
- Specific information required for undertakings using internal models, including the purpose and scope of internal model, a description of the methodology used in the internal model including a comparison of the methodologies and underlying assumptions with those used in the standard formula and a description of the nature and appropriateness of the data used in the internal model

²⁴ For more information on the ORSA process please see Milliman's recent research paper titled ORSA – An International Requirement.

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- Regarding any incidents of non-compliance with the SCR or MCR, the period and maximum amount of each non-compliance with the MCR or SCR during the reporting period, an explanation of its origin, consequences and details of any remedial measures taken and the effects of such remedial measures, or where non-compliance has not been resolved, the amount of non-compliance at the reporting date
 - Detailed information on the LTG measures used in the valuation, including quantifying the impact of not using the LTG measures
 - Any other material information regarding their capital management

In addition, more detailed information will be required in the RSR, although this will not need to be publicly disclosed. It is expected that the following information will be required to be included in the RSR:

- Additional quantitative information, including the material terms and conditions of the main items of own funds, the undertaking's plans on how to replace basic own fund items that are subject to the transitional arrangements and quantitative information on the undertaking's SCR split by risk modules or by risk categories
- The expected development of the undertaking's own funds, MCR and SCR over its business planning time horizon given the undertaking's business strategy, including appropriately stressed capital plans allowing for any plans to repay or redeem any own fund item or to raise additional own funds
- For undertakings using an internal model, an estimate of the undertaking's SCR determined in accordance with the standard formula, analysis of the causes and sources of profits and losses for each major business unit, information on the risk profile of the undertaking compared to the assumptions used in the internal model and information about future management actions used in the calculation of the SCR
- Details of any reasonably foreseeable risk of non-compliance with the MCR or SCR, and the plans for ensuring that compliance with each is maintained

It is likely that the level of detail required in the SFCR and the RSR extends far beyond what undertakings are currently publicly disclosing or reporting to the regulator in respect of capital management. Therefore, undertakings should consider how they will meet these requirements once Solvency II is implemented. However, the reporting requirements should, at the very least, provide undertakings with a good starting point as regards the different considerations that should be taken into account in relation to capital management under Solvency II.

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APPENDIX 1: LONG TERM GUARANTEES PACKAGE

The treatment of long-term guarantees has been a key issue in the development and implementation of Solvency II. The Trilogue (the European Parliament, Council of the European Union and the European Commission) was concerned that Solvency II could lead to artificial volatility and procyclicality without the introduction of some measures to address the valuation of LTGs. Without such measures, Solvency II could give rise to a range of unintended adverse social and economic impacts such as:

- A significant switch from longer-term to shorter-term assets
- A move away from insurance undertakings offering LTG products
- The cost of excessive capital requirements in respect of LTGs being passed on to customers
- Limiting insurers' traditional role as investors in the European economy
- Reducing insurers' traditional role as a stabiliser of systemic risk and market volatility

In November 2013, the Trilogue agreed on the Omnibus II LTG package which includes the following measures: yield curve extrapolation, a matching adjustment, a volatility adjustment and transitional measures. The main aim of the LTG package is to reduce balance sheet volatility. Therefore, these measures should aid insurers from a capital management perspective. However, applying adjustments to the risk-free yield curve can create issues for undertakings, in particular where market-based hedging strategies are used to manage guarantees.

Article 77(f) of the Omnibus II text states that EIOPA must report to the Trilogue on the LTG package for the five years following full Solvency II implementation. This suggests that these measures and their effectiveness will be kept under review, initially at least.

Extrapolation

The risk-free yield curve, for Solvency II purposes, is intended to be based on markets that are deep, liquid and transparent. However, in accordance with Solvency II, beyond a certain duration there are no assets that satisfy these requirements and, as a result, the yield curve must be extrapolated, as set out in Article 77a of the Omnibus II text.

The starting point for the extrapolated curve is the risk-free swap curve after an adjustment for credit risk²⁵ and the volatility adjustment (see below), where applicable. The duration beyond which markets fail to be sufficiently deep, liquid and transparent occurs at the last liquid point, which is the starting point of the extrapolation. In the case of the Euro risk-free yield curve, for example, this is deemed to occur 20 years from the valuation date. The Euro-area risk-free yield curve should converge to the ultimate forward rate (UFR) 40 years after the starting point of the extrapolation. For the Euro, the UFR rate is currently proposed to be 4.20%.²⁶ For other currencies, the characteristics of the local bond and swap markets will be taken into account when determining both the starting point of the extrapolation and the appropriate convergence period to the UFR. The UFR is also expected to vary across markets. The starting point and convergence period for the Euro yield curve are set out in recitals to the Omnibus II Directive as opposed to the directive itself so there is a possibility that they may be subject to change in the future.

The Omnibus II text does not specify the methodology to be used in extrapolating the yield curve. However, some experts have suggested that the language in the text implies that the Smith-Wilson technique should be used. This technique was used in extrapolating the yield curve for EIOPA's 'Technical Specification for the Preparatory Phase' although EIOPA has clearly stated that the assumptions used in this technical specification are not final. It is expected that the methodology to be used for extrapolation will be more clearly outlined by EIOPA in due course.

²⁵ The adjustment in respect of credit risk will be defined in due course.

²⁶ Based on EIOPA's Technical Specifications for the Solvency II Preparatory Phase - Part II.

Figure 1.A and Figure 1.B show examples of the application of extrapolation for the Euro-area risk-free curve,²⁷ assuming a credit risk adjustment of, say, 0.35% and assuming no allowance for the volatility adjustment. These graphs show an upward sloping yield curve due to the current low interest rate environment (relative to the UFR). However, if interest rates were to rise in the future this could become a downwards sloping curve. This was raised as a point of concern during the Trilogue discussions and it remains to be seen whether or not a mechanism will be put in place whereby the UFR would be revised in the future if interest rates rise. The latest version of the draft Delegated Acts suggest that although the UFR should be stable over time, it may change as a result of changes in long-term expectations.

FIGURE 1.A: EXTRAPOLATION: EXAMPLE OF ADJUSTMENT FOR CREDIT RISK

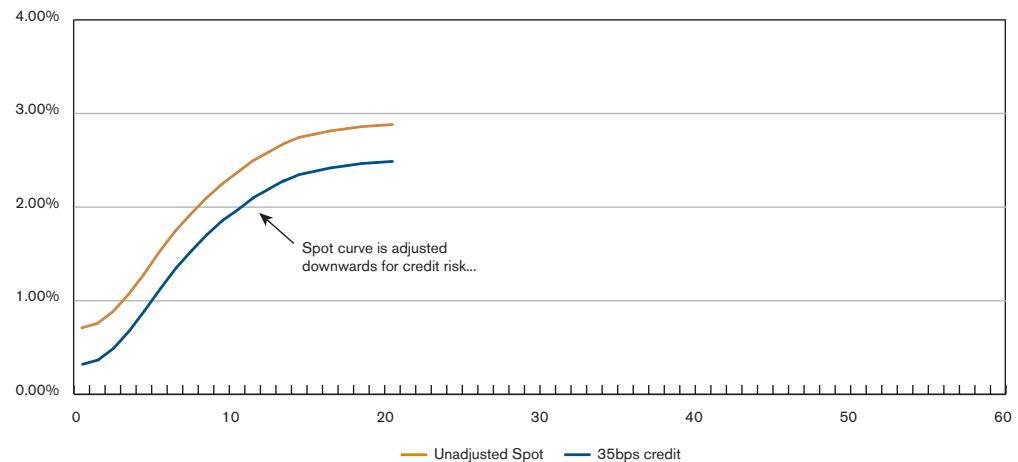
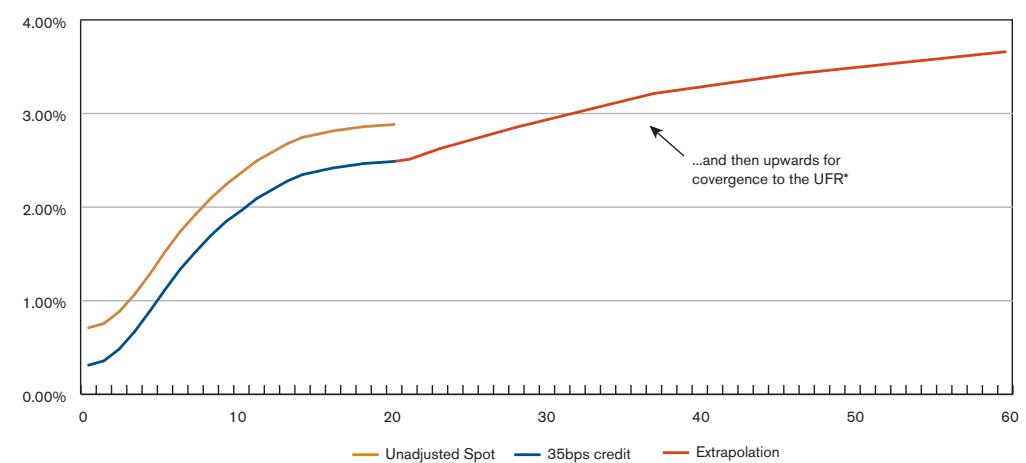


FIGURE 1.B: EXTRAPOLATION: EXAMPLE OF CONVERGENCE TO UFR



* The yield curve in the graph above is a spot curve rather than a forward rate curve; therefore, it does not reach the Euro Ultimate Forward Rate of 4.20%.

27 Note that rates have been held constant after year 40 in these examples.

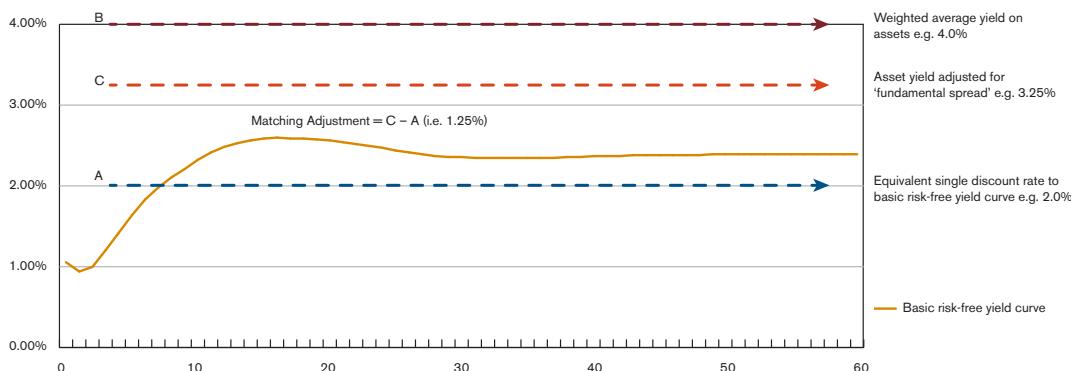
Matching Adjustment

The matching adjustment is a permanent adjustment to the risk-free rate curve used to value liabilities where a matching 'ring-fenced'²⁸ portfolio of assets is held that satisfies certain strict criteria. The application of the matching adjustment is set out in Article 77b of the Omnibus II text. The aim of the matching adjustment is to allow for the fact that insurers are not fully exposed to the impact of asset price fluctuations caused by short-term changes in spreads on bonds, or other similar assets, when they hold those assets to maturity and where there is a significant degree of matching between the asset and liability cash flows. As a result, in certain circumstances, insurers will be allowed to adjust the risk-free yield curve for the calculation of the BEL in order to avoid a change in spread impacting on their own funds. This adjustment is of particular importance to the UK annuity industry, and for long-term guaranteed products in Spain.

The adjustment is based on the difference between the yield of the actual assets held and the risk-free rate, excluding an allowance for a 'fundamental spread' in respect of the expected default and downgrade risk associated with the asset. To aid the calculation of this adjustment, EIOPA will publish details of the fundamental spread for relevant asset classes, durations and credit quality steps on at least a quarterly basis. The fundamental spread is subject to a floor of 30% of the long-term average spread on government bonds and 35% of the long-term average spread on corporate bonds.

Figure 1.C sets out how the adjustment should be calculated in practice. In calculating the matching adjustment for a specific portfolio of insurance obligations, the undertaking must first calculate the BEL for that portfolio of insurance obligations using the basic risk-free yield curve²⁹ in order to solve for the 'equivalent single discount rate.' The equivalent single discount rate is calculated as the single discount rate that, when applied to the cash flows of the portfolio of insurance obligations, results in a value that is equal to the BEL of the portfolio of insurance obligations calculated using the unadjusted risk-free yield curve. The equivalent single discount rate is shown as 2.00% (A) in the example below. The next step is to calculate the weighted average yield on the ring-fenced assets adjusted for fundamental spread. In the example below, the weighted average yield on the assets is 4.00% (B) and an effective fundamental spread of 0.75%.³⁰ Therefore, in calculating the matching adjustment the undertaking can only take account of an average yield of 3.25% (C). The matching adjustment is calculated as the difference between the weighted average yield on assets after excluding the fundamental spread (C) and the equivalent single discount rate (A). In the example below, the matching adjustment is calculated as 1.25% [3.25% - 2.00% = 1.25%].

FIGURE 1.C: EXAMPLE OF MATCHING ADJUSTMENT



²⁸ The ring-fenced requirement is understood in an economic sense and is not intended to limit the application of the matching adjustment in countries where there is no legal concept of a ring-fenced fund in national legislation.

²⁹ The basic risk-free yield curve is derived from the market swap rates after allowing for credit risk.

³⁰ Note that the methodology to adjust for fundamental spread set out in the Technical Specifications for the Preparatory Phase is different to that used in the 2013 LTG Assessment. A curve (risk-free rate plus fundamental spread) is now provided by issuer type (government, corporate), asset quality and currency. Each curve has associated probabilities that are applied to the asset cash flows in order to calculate the yield on assets adjusted for fundamental spread.

Undertakings cannot apply the matching adjustment to insurance obligations where the volatility adjustment (see below) or the transitional measures (see below) are already being applied. In addition, the matching adjustment is subject to regulatory approval and can only be applied to insurance contracts, including annuities stemming from non-life insurance contracts, if all of the following conditions are met:

- The undertaking has assigned a portfolio of assets, consisting of bonds and/or other similar assets, to cover the BEL of the underlying insurance contracts.
- The contracts and portfolio of assets are identified, organised and managed separately from other activities of the undertaking and the assets cannot be used to cover losses arising from other activities (i.e. they are ring-fenced).
- The undertaking intends to hold these assets until maturity (except in the case where the expected future cash-flows have materially changed and the portfolio of assets needs to be updated to maintain a matched position).
- The asset cash flows are fixed (or inflation linked to match inflation linked liabilities) and cannot be changed by the issuers of the assets or any third parties.
- The expected cash flows of the portfolio of assets match the expected liability cash flows in terms of currency and any mismatch that exists does not result in any material risk exposure relative to the other risks associated with the contract.
- The contracts do not have any future premium payments.
- The contracts are only exposed to the following underwriting risks: longevity risk, expense risk, revision risk and mortality risk.
- The BEL of any contract with mortality risk exposure does not increase by more than 5% under a mortality shock.
- The contracts do not include any policyholder options (except for surrender options where the surrender value does not exceed the value of the assets held).
- The obligations included in the portfolio of contracts do not include any unbundled benefits.

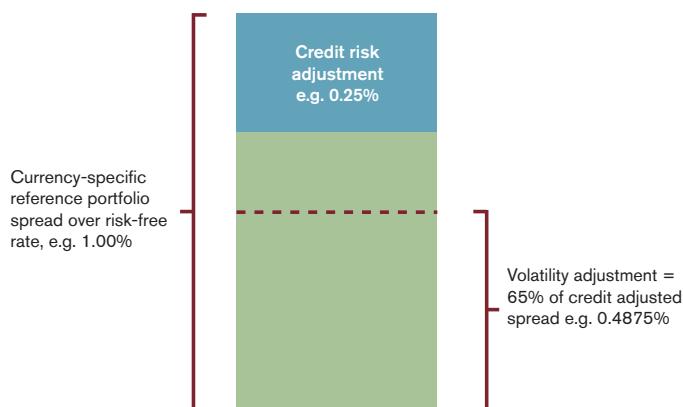
In practice these conditions limit the application of the matching adjustment such that it can only really be applied to quite a narrow range of products, such as immediate annuities in the UK and single premium deferred annuities in Spain. Undertakings that intend to use the matching adjustment should identify, organise and manage the relevant portfolio of assets and obligations separately from other parts of the business. The recitals to the Omnibus II Directive state that undertakings applying the matching adjustment may not be allowed to use the assigned portfolio of assets to meet risks arising elsewhere in the business. Therefore, the reduced transferability and scope for diversification between the assigned portfolio and the remainder of the undertaking needs to be reflected in adjustments to own funds and the SCR for the purposes of applying the matching adjustment.

Volatility Adjustment

The volatility adjustment has been introduced to replace the illiquidity premium and counter cyclical premium tested in previous Quantitative Impact Study (QIS) exercises. The volatility adjustment is expected to be a reasonably predictable adjustment to risk-free rates, calculated at a currency level. An additional country-specific adjustment may apply to the volatility adjustment if certain market conditions exist as described below. The application of the volatility adjustment is set out in Article 77d of the Omnibus II text.

A currency-specific reference portfolio will be used to determine the spread difference to the relevant risk-free rate less the portion related to default or credit risk (although it is not yet clear how this will be determined). The risk-free rate would then be adjusted by 65%³¹ of the calculated spread after allowing for credit risk (the 'credit adjusted spread'). Figure 1.D summarises how this would be calculated in practice:

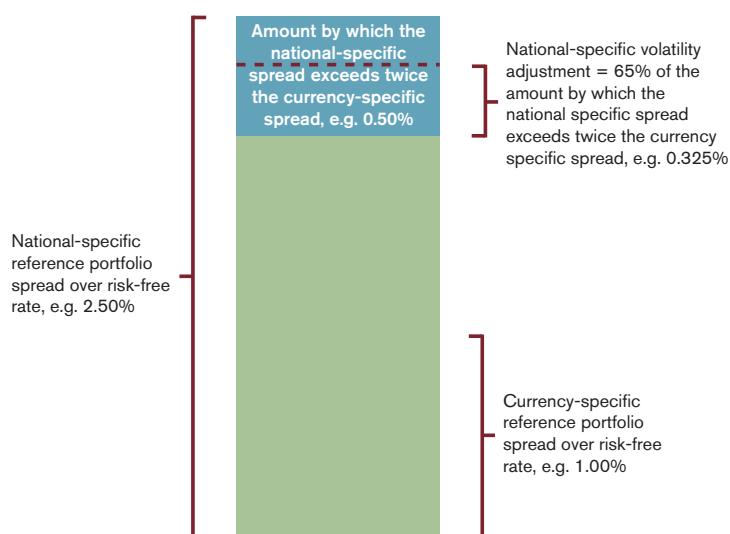
FIGURE 1.D: VOLATILITY ADJUSTMENT: CURRENCY SPECIFIC ADJUSTMENT (EXAMPLE)



For example, if the spread of a currency-specific reference portfolio above the risk-free rate was 1.00%, of which 0.25% was related to credit risk, the credit adjusted spread would be 0.75% [1.00% - 0.25%]. The undertaking would be able to allow for 65% of this as a volatility adjustment. Therefore, in this case, the undertaking would be able to add 0.4875% to the risk-free rate [0.75% * 65%].

In addition, where the spread of a national-specific reference portfolio is at least 100bps above the risk-free rate and exceeds twice the spread of the currency-specific reference portfolio, then the volatility adjustment would be increased for products sold into that market (on a freedom of services or freedom of establishment basis). The increase is set to equal 65% of the excess of the national spread over twice the currency spread. Figure 1.E summarises how this would be calculated in practice:

FIGURE 1.E: VOLATILITY ADJUSTMENT: NATIONAL-SPECIFIC ADJUSTMENT (EXAMPLE)



³¹ As mentioned above, the volatility adjustment has replaced the illiquidity premium and counter cyclical premium. These adjustments were used in earlier versions of the Solvency II text to reduce volatility. The earlier versions of the text included an explicit capital charge in the standard formula SCR calculation in respect of these adjustments. It is expected that there will be no explicit capital charge for the volatility adjustment included in the standard formula calibration. Instead, the 65% ratio is intended to make an implicit allowance for the capital charge on the volatility adjustment.

For example, if the spread of a currency-specific reference portfolio above the risk-free rate was 1.00% as above and the national-specific reference portfolio had a spread above the risk-free rate of 2.50%, the national-specific rate would meet both of the requirements outlined above. That is, it would be more than 100bps above the risk-free rate and the spread would be more than twice the spread on the currency-specific reference portfolio. In this case, the amount by which the national-specific spread exceeds twice the currency-specific spread is 0.50% [2.50% - (1.00% * 2)]. Therefore, in this case, the undertaking would be able to add an additional national-specific volatility adjustment of 0.325% to the risk-free rate [0.50% * 65%]. In this example, the total volatility adjustment would be 0.8125% [0.4875% + 0.325%].

The volatility adjustment is not a permanent positive addition to the risk-free rates. The adjustment should be close to zero under normal market conditions and will be symmetric in nature, meaning that the adjustment could turn negative when markets are excessively optimistic (i.e. when the observed spread is lower than the fundamental spread). EIOPA will publish the volatility adjustment for each relevant national insurance market on a quarterly basis (and possibly more frequently). The risk-free yield curve can only be adjusted for the volatility adjustment up to the point of extrapolation.

Transitional measures

Transitional measures will be introduced in relation to the risk-free yield curve for business written prior to the implementation date. There are two different transitional measures in respect of LTGs outlined in Article 308c and Article 308d of the Omnibus II text – the risk-free interest rate transitional measure (the ‘dynamic transitional measure’) and the technical provisions transitional measure (the ‘static transitional measure’). The aim of these transitional measures is to implement the change in valuation methodology gradually over a period of 16 years.

The dynamic transitional measure will allow undertakings to essentially use a weighted average yield curve for valuing technical provisions and calculating capital requirements for existing liabilities (i.e. those held on the balance sheet at the date of Solvency II implementation) for a 16 year period. The yield curve will be the weighted average of the Solvency II yield curve and the Solvency I discount rate. The weightings will gradually change over the transition period such that the yield curve will be more heavily weighted towards the Solvency I discount rate at the start of the transition period and more heavily weighted towards the Solvency II yield curve towards the end of the transition period.

The static transitional measure will allow undertakings to deduct a portion of the difference between Solvency II and Solvency I technical provisions for year end 2015 from the technical provisions calculated on a Solvency II basis for a 16 year period. The portion will change each year such that the full amount to be deducted will reduce linearly over the transition period. The supervisor may allow undertakings to recalculate the Solvency I and Solvency II technical provisions (including updating the volatility adjustment used in calculating the Solvency II technical provisions where applicable) every 24 months or if there is a material change in an undertaking’s risk profile. The adjustment may be limited by the supervisor if it were to improve the undertaking’s financial position compared to Solvency I.

Undertakings will only be able to make use of one of these transitional measures when Solvency II is introduced and these transitional measures cannot be applied where the matching adjustment has been applied. In addition the transitional measures are subject to regulatory approval and undertakings must publically disclose that they have availed of these measures, if such is the case.

APPENDIX 2: TIERING OF OWN FUNDS

At a high level, unrestricted Tier 1 basic own funds include paid-in ordinary share capital, paid-in initial funds, members' contributions (or the equivalent basis own fund item for mutual or mutual-type undertakings), the reconciliation reserve and surplus funds that meet certain criteria (as defined under Article 91(2) of the Solvency II Directive). Restricted Tier 1 own funds include Tier 1 own funds items which are not suitable to be classified as unrestricted Tier 1 own funds, such as subordinated preference shares or members' contributions and paid-in subordinated liabilities.

There have been some additional requirements introduced for Tier 1 own funds with respect to loss absorption. In particular, it is expected that redemption/repayment or distributions in relation to Tier 1 items will be restricted if the SCR is breached, until such a time as the undertaking complies with the SCR. In addition, redemptions/repayments or distribution payments cannot be made if the payment itself would lead to a breach of the SCR. Insurers may need to update legal and contractual agreements prior to the implementation of Solvency II to ensure that these restrictions are captured in the agreements. Otherwise, some forms of capital that would otherwise be eligible may not be able to be classified as Tier 1 due to these requirements. In respect of distributions, changes to national legislation may need to be made in order to capture these restrictions. Undertakings will need to monitor developments in this space.

The criteria to be classified as Tier 1 basic own funds can be summarised as follows:

TABLE 2.A: REQUIREMENTS FOR INCLUSION IN SOLVENCY II TIER 1 BASIC OWN FUNDS

Feature	Requirement
Ranking in the event of a wind-up	Can only rank ahead of ordinary share capital and associated share premium account. Subordinate to all other liabilities.
Features causing or accelerating insolvency	Not allowed
Availability to absorb losses	Must be fully paid up. Must at a minimum absorb losses in the event of non-compliance with SCR.
Features hindering recapitalisation	Not allowed
Step-ups/other incentives to repay early	Not allowed
Regulatory approval to redeem or repay	Needed
Duration	Undated
First Call Date	First option to repay at least 5 years after issue
Suspension of repayments/redemption	Yes – on non-compliance with SCR/MCR
Cancellation of coupons	Yes – on non-compliance with SCR/MCR (cancelled until compliance achieved)
Freedom from encumbrances	Required

Tier 2 own funds are defined as basic own funds items that do not fulfil all of the criteria for unrestricted or restricted Tier 1 own funds. This includes cumulative preference shares, called-up share capital and sub-ordinated liabilities with shorter durations. In many cases the criteria for classification as Tier 2 own funds are the same as in respect of Tier 1 own funds. However, there are certain areas where the criteria for inclusion in Tier 2 own funds differ somewhat from the Tier 1 criteria. For example, under Set 1 of the Level 3 Guidelines submitted for public consultation in June 2014 limited incentives to repay will be allowable under Tier 2 own funds, with limited coupon step-ups allowed, but only if they do not occur in the first 10 years after issue. In addition, a limited coupon step-up would consist of a step-up of up to 100 basis points or 50% of the initial credit spread (if higher).

Any basic own funds that do not meet the requirements to be categorised as Tier 1 or Tier 2 own funds were, at one stage, to be categorised as Tier 3 basic own funds. This included subordinated mutual member accounts, share premium account, preference shares and net deferred tax assets.

Ancillary own funds are items of capital other than basic own funds that can be called up to absorb losses. They include unpaid share capital, letters of credit and guarantees and other legally binding agreements received by the undertaking. Ancillary own funds are subject to regulatory approval and it is expected that the Level II Delegated Acts will include some additional information on the approval process.

There is no Tier 1 classification for ancillary own funds. Items that would be classified as Tier 1 basic own funds if they were called upon can be classified as Tier 2 ancillary own funds. Ancillary own funds that do not meet this criteria are classified as Tier 3 ancillary own funds. Ancillary own funds cannot be used to back the MCR but they can be used to back the SCR, subject to the eligibility limits outlined below. This provides undertakings with some additional sources of capital over and above what is allowed under the current solvency regime. It remains to be seen whether the introduction of Solvency II will impact the cost of capital instruments that can be classified as ancillary own funds. If the cost of such forms of capital falls, they may become an attractive form of capital for insurers who have sufficient basic own funds to cover their MCR.

APPENDIX 3: TREATMENT OF DEFINED BENEFIT SCHEMES UNDER SOLVENCY II

In relation to the valuation basis for defined benefit schemes, Article 75 of the Solvency II Directive states that assets and liabilities '*shall be valued at the amount for which they could be transferred, or settled, between knowledgeable willing parties in an arm's length transaction.*' The draft Delegated Acts point to international accounting standards in relation to the valuation of assets and liabilities other than technical provisions. The preparatory phase technical specifications go a step further and state that International Accounting Standard 19 (IAS 19)³² is an appropriate basis for the valuation of pension scheme liabilities, including defined benefit schemes under Solvency II. Under IAS 19 the pension scheme should be valued on a going concern basis based on the accrued benefits to date, allowing for any '*constructive obligations*'³³ in respect of discretionary benefit increases based on past practice.

However, industry has some concerns about using IAS 19 to value pension scheme liabilities under Solvency II. In particular, IAS 19 allows for the recognition of a surplus within a pension scheme even though this may not be considered by all to be an appropriate asset to include on the undertaking's solvency balance sheet, as these surplus funds may not be accessible to the undertaking in stressed conditions.

In addition, there are some inconsistencies between IAS 19 and the Article 75 of the Directive. For example, IAS 19 considers the valuation of the pension fund for an undertaking operating on a going concern basis but Article 75 of the Directive states that liabilities should be valued at '*the amount for which they could be transferred, or settled, between knowledgeable willing parties in an arm's length transaction.*' The value on a going concern basis could, in certain cases, be quite different to the value based on an '*arm's length transaction.*' Also, the discount rates that would be applied under IAS 19 may not be consistent with the risk-free discount rates that would be used under Solvency II. The draft Delegated Acts give precedent to Article 75 of the Solvency II Directive in valuing assets and liabilities where the IAS is inconsistent with Article 75. The Delegated acts still need to be finalised so it remains to be seen how EIOPA will respond to any feedback it receives in relation to this point.

As regards the calculation of the SCR, it appears that the Solvency II text requires undertakings to consider pension scheme liabilities in the market risk module and the counterparty default risk module, as these risk modules apply to all assets and liabilities.³⁴ The preparatory phase technical specifications state that undertakings should take account of the nature of the benefits and, where relevant, the nature of any contractual arrangements with institutions for occupational retirement provisions or other insurance undertakings in respect of these benefits. If the management of the assets covering the employee benefits liabilities is outsourced, the undertaking acting as a sponsor should take them into account in the calculation of the counterparty default risk and market risk modules, provided that the undertaking is liable for any loss in the value of assets under the scheme. This will depend on the scheme's individual trust deed and rules.

³² IAS 19 (Revised 2011).

³³ A constructive obligation is an informal practise undertaken by the insurance undertaking even though it has no legal obligation to do so, for example historically increasing benefits for former employees to keep pace with inflation. IAS19 states that an example of a constructive obligation is '*where a change in the entity's informal practices would cause unacceptable damage to its relationship with employees.*'

³⁴ Article 105(5) of the Solvency II Directive states that '*the market risk module shall reflect the risk arising from the level or volatility of market prices of financial instruments which have an impact upon the value of the assets and liabilities of the undertaking.*'

If the employees' benefits are required to be shocked under the SCR calculations, it would be appropriate for the calculations to consider the rules of the individual trust deed and in particular whether the trust deed allows for the trustees to serve a contribution demand notice on the employer if the scheme funding is insufficient (in which case the sponsoring undertaking would be liable for the full funding shortfall). If the undertaking is not bound to meet a contribution demand then management actions may be taken in stressed scenarios to alter the terms of the defined benefits pension scheme. However, the use of management actions is limited in the standard formula SCR calculations such that management actions can only be allowed for in the recalculation of the technical provisions in stressed scenarios (and the definition of the technical provisions does not include pension scheme liabilities of the type being discussed in this section). Undertakings would need to calculate the SCR using an internal model or partial internal model in order to take credit for such management actions. Again, it remains to be seen whether or not this will change in the final text. If the text is not changed we may see undertakings with particularly large defined benefit schemes look to de-risk, as mentioned above, in order to avoid large capital charges in respect of these liabilities.



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