# Unit-linked matching considerations under Solvency II

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**This latest article in our series on capital solutions for life insurers explores the opportunity for significant capital benefits for unit-linked portfolios under Solvency II. In particular, we focus on the opportunities relating to the matching requirements for unit-linked assets and liabilities, which offer the possibility to both stabilise the economic balance sheet and enhance the solvency position.**

## INTRODUCTION

As the insurance industry finalises its implementation plans for the introduction of Solvency II in 2016, insurers are increasingly focusing attention on the capital management and strategic implications of the new regime.

One emerging area of importance for life insurers relates to the asset-liability matching requirements for unit-linked portfolios. The Solvency II regulation has opened up an opportunity for life insurers to enhance the capital position of unit-linked portfolios, at the same time as stabilising economic balance sheets.

Perhaps not surprisingly, such benefits come at a price, and insurers will have to decide whether the capital savings are sufficient to offset the operational complexities and a more volatile solvency coverage ratio.

Regular readers of this series may recall that we originally commentated on this topic in our research paper of July 2014, 'Capital management in a Solvency II world'. Since then, industry discussion—particularly in the UK and Ireland—has gathered momentum, with several major UK insurers conducting detailed investigations into the potential capital benefits on offer.

Reflecting the importance of the topic, the Institute and Faculty of Actuaries in the UK set up a working party in 2012 to explore the implications of unit-linked matching under Solvency II.

In this short paper, we explore the key considerations for life insurers to take advantage of the possible opportunities.

## BACKGROUND TO THE REGULATORY TEXT

Article 23(1) of the European Communities Third Life Assurance Directive[1] states that:

> *Where the benefits provided by a contract are directly linked to the value of units in an UCITS[2] 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 the unit-linked liability to policyholders 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.*

[1] 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).

[2] Undertakings for Collective Investments in Transferable Securities.

This is the same wording as the current regulations. However, under Solvency II, the definition of technical provisions includes the Best Estimate Liability (BEL)[3] and the risk margin, although the prudent person principle specifically refers to the technical provisions 'in respect of [unit-linked] *benefits*.'

This reference to 'benefits' 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 the Solvency II text is interpreted, it is likely that the technical provisions in respect of the unit-linked benefits (referred hereafter as the 'unit-linked technical provisions') 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.

## IMPLICATIONS FOR UNIT-LINKED MATCHING UNDER SOLVENCY II

The implications of these matching requirements appear to be that unit-linked assets only need to be held to match the unit-linked technical provisions, rather than the face value of unit-linked liabilities. Any 'excess unit-linked assets' can be invested in other ways. This means that undertakings can choose to make other investment choices that could improve capital efficiency, instead of fully matching the face value of the unit-linked liabilities with unit-linked assets. We refer to the situation where an undertaking does not fully match the face value of unit linked liabilities as 'under-funding'.

In the remainder of this article, we assume that the excess unit-linked assets are equal to the value of the PVFP, though this is something of a simplification.

## CONSIDERATIONS FOR BALANCE SHEET AND CAPITAL OPTIMISATION

In selecting an investment strategy, undertakings may be faced with a conflict between stabilising the net asset value (NAV) and stabilising the solvency 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 PFVP 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 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 PVFP will fall, and vice versa if the fund price rises.

This means that the total 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 solvency capital requirement (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 stress scenarios.

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.

## ILLUSTRATIVE BENEFITS OF UNDER-FUNDING

To illustrate the potential benefits of under-funding of unit-linked liabilities, we consider here a simple example of a unit-linked undertaking with the following characteristics:

- Unit-linked assets of 1,000.
- Unit-linked technical provisions (or BEL) of 950, consisting of unit-linked liabilities of 1,000 and a negative PVFP of 50.
- PVFP purely consists of the discounted value of future fund related management charges.
- For simplicity, the risk margin has been ignored in this example.

Below we assess the balance sheet and capital impacts of two alternative investment strategies, namely (1) fully matched assets and liabilities and (2) fully matched assets and unit-linked technical provisions.

### Strategy 1: Fully matched unit-linked assets and unit-linked liabilities

Under this strategy, we assume that the company continues to match the excess unit-linked liabilities with unit-linked assets. Figure 1 summarises the balance sheet and capital position under alternative market conditions.

[3] The BEL can be calculated as the discounted value of future cash flows associated with the unit-linked business or the sum of the face value of unit-linked liabilities plus the present value of future profits (PVFP) of the unit-linked business, where the PVFP is generally a negative liability for profitable contracts.

| Figure 1: Fully matched unit-linked assets and unit-linked liabilities | Prices -20% | Base | Prices +20% |
|---|---|---|---|
| **Unit Price** | 0.80 | 1.00 | 1.20 |
| **Unit-linked Assets** | 800 | 1,000 | 1,200 |
| **Cash** | - | - | - |
| **Total Assets (A)** | 800 | 1,000 | 1,200 |
| **Unit-linked Liabilities** | 800 | 1,000 | 1,200 |
| **Present Value of Future Profits** | (40) | (50) | (60) |
| **Total Unit-linked Technical Provisions/ BEL (B)** | 760 | 950 | 1,140 |
| **NAV (A - B)** | 40 | 50 | 60 |
| **SCR** | 16 | 20 | 24 |
| **Coverage Ratio** | 250% | 250% | 250% |

| Figure 2: Fully matched unit-linked assets and unit-linked technical provisions | Prices -20% | Base | Prices +20% |
|---|---|---|---|
| **Unit Price** | 0.80 | 1.00 | 1.20 |
| **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 |
| **Present Value of Future Profits** | (40) | (50) | (60) |
| **Total Unit-linked Technical Provisions/ BEL (B)** | 760 | 950 | 1,140 |
| **NAV (A - B)** | 50 | 50 | 50 |
| **SCR** | 8 | 10 | 12 |
| **Coverage Ratio** | 625% | 500% | 417% |

As highlighted in Figure 1, the NAV is sensitive to price movements. If the unit price falls by 20%, both the BEL and the NAV also decrease by 20%, and vice versa if the unit price increases.

However, the SCR is calculated based on the value of the NAV in stressed scenarios and is therefore also sensitive to price movements. In this simplified example, the SCR and the NAV both move in the same way. As a result, the solvency coverage ratio remains stable following the price movements, as highlighted in orange in Figure 1. Note that there will be elements of both the SCR and BEL which would not be expected to move in line with unit price movements, and hence such a stable coverage ratio would not be achieved in practice.

### Strategy 2: Fully matched unit-linked assets and unit-linked technical provisions

Now consider the situation when the undertaking chooses not to match the full value of unit-linked liabilities with unit-linked assets (i.e., an 'under-funded' position is adopted).

Taking our simple example again, we assume that the company invests 50 in cash. By reducing the unit-linked assets to the amount of technical provisions, we have assumed a 'fully under-funded' position. In this situation, the undertaking has immunised the NAV against price movements. The cash investment will not fluctuate in value with unit price movements so this will stabilise the NAV to a certain degree. The trade-off, however, is a more volatile solvency ratio, as illustrated in Figure 2.

Ignoring any new risks introduced by the cash holding (e.g., counterparty risk), the SCR is also likely to reduce, which is a key benefit of the strategy, in turn leading to an enhancement in solvency ratio. This is a direct consequence of the cash assets being less sensitive to market shocks than unit-linked assets.

Although the NAV under this strategy does not change with unit prices, readers will note that the SCR does change. This may seem counter-intuitive, but it is important to note that the lapse component of the standard formula SCR will typically vary directly with unit prices, and will not be affected by the level of under-funding. In an extreme situation, therefore, it may be possible for the SCR lapse component to increase with unit prices to such an extent that it exceeds the (unchanging) NAV. To mitigate this risk, it may be advisable to treat the SCR lapse component as if it were a unit-linked liability in determining the appropriate level of under-funding.

Similarly, while the simplified example ignores the risk margin, it is notable that there may be elements of the risk margin that move in line with changes in unit-prices (particularly the element of the risk margin that relates to lapse risk). It may therefore be advisable to treat this as a unit-linked liability for matching purposes.

The interaction of lapses and under-funding is an important consideration from a risk and capital management perspective, and we consider this issue in more detail below.

In this simple example, Strategy 2 results in a lower SCR and a more stable NAV. However, note the relative volatility in the solvency ratio, caused by the fact that the movements in NAV and SCR will be less aligned than under a fully matched scenario.

In summary, we observe from our example the following main effects from a fully under-funded position:

- Significantly reduced capital requirements
- More stable Solvency II balance sheet that is less sensitive to market movements
- More volatile solvency ratio

It should be noted that, while moving away from a fully matched position acts as a hedge on NAV by reducing downside market risk, such an approach will also reduce the potential upside of market growth.

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 that consider an under-funded strategy are likely to look for a compromise between the two extremes.

The above example is an obvious over-simplification of the dynamics of most, if not all, unit-linked portfolios. Below we explore in more detail the practicalities facing real-life portfolios.

## REGULATORY VIEW

It should be noted that, at the time of writing, the regulatory interpretation of the Solvency II matching requirements remains unclear. We are unaware of any public feedback provided by the supervisory authorities on this aspect. As such, there remains uncertainty surrounding the extent to which insurers can apply discretion when interpreting the text, and indeed the level of matching that regulators may enforce.

There is also a possibility for different regulators to adopt different views, potentially paving the way for an uneven competitive landscape for unit-linked writers across different territories.

Arguably, given the potential for under-funding to be used to reduce a company's exposure to market risk, it might be considered unlikely that a regulator would prohibit this approach in the context of a best estimate framework. However, it is likely that regulators would expect companies to be able to demonstrate the risk management benefits, including the mitigation of any additional risks that under-funding might introduce.

## LAPSES AND UNDER-FUNDING

The interaction of policyholder behaviour and under-funding is worth additional consideration.

As the standard formula lapse shock at any point in time is not dependent on how the company's assets are invested, the SCR for lapse risk is unaffected by any decision to under-fund. In the absence of surrender penalties and/or an actuarially funded product structure, an under-funded position can therefore expose an insurer to increased financial losses from lapses following price rises.

However, there are nuances to the interaction of lapses and under-funding that merit further thought. The Solvency I perspective that under-funding leaves a company exposed to a combination of price increases and lapses has perhaps become ingrained in the unit-linked mindset. Whilst this perspective is still valid under Solvency II, there are additional considerations.

In particular, the economic balance sheet under Solvency II highlights that a unit-linked company is already more directly exposed to movements in unit prices than indicated under a Solvency I view of the balance sheet. Ignoring under-funding for a moment, increases in unit prices will typically be good news under Solvency II and decreases in unit prices will have a negative impact.

It should therefore be possible, depending on the circumstances of an individual company, to determine a level of under-funding that significantly mitigates the negative impact of a fall in unit-prices, whilst dampening the positive impact of an increase in prices.

This could still leave a company exposed to an increase in unit prices followed by an extreme lapse event. This risk will not be reflected in the SCR (as measured under the standard formula approach). However, it is possible to choose a level of under-funding whereby the combination of the standard formula 1-in-200 lapse shock and any increase in unit prices would be more positive for the company than the lapse shock alone.

In this situation the company would still be exposed to a higher lapse shock than might be anticipated under the standard formula. Undertakings that adopt an internal model may choose to incorporate this risk interaction. Standard formula companies should aim to capture such risks in the Own Risk and Solvency Assessment (ORSA).

## PRACTICAL CONSIDERATIONS

There are a number of practical and operational considerations when choosing an under-funded approach. In particular, the level of excess unit-linked liability will change frequently with a combination of market movements and variance in non-market factors.

In order to comply with the regulation and ensure that the unit-linked technical provisions are continuously matched by unit-linked assets, undertakings will need to monitor the value of the BEL, risk margin and SCR and rebalance accordingly. Depending on the specific circumstances, such rebalancing may need to occur daily.

Rebalancing will also be a necessary tool for managing the increased policyholder behaviour risk described above that stems from a mismatched position.

Increased transaction costs are an obvious consequence of frequent asset rebalancing, but there are also other drawbacks, including small trade sizes and increased operational risk. It might therefore 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 an 'optimal' portion of excess unit-linked assets to release such that the unit-linked technical provisions (perhaps including the SCR lapse component and the related risk margin elements) 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 on some funds, or significant levels of policyholder surrendering or switching. The optimal level will vary depending on an insurer's specific circumstances, including the main objectives of under-funding, the actual unit-linked funds and the manner in which the excess assets are invested.

In addition to the operational issues around continuous matching of liabilities, there may be other practical issues to consider, including:

- Some insurers may be limited by system capabilities.
- In addition, under-funding is likely to have significant implications for the models that feed into an undertaking's forecasting, business planning, ORSA calculations etc.
- 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. Policy documentation may also limit the approach that can be adopted.
- There are likely to be accounting implications which are considered in more detail in a later section.
- There may be tax implications depending on the tax treatment of the unit-linked investments.

Despite the practical issues related to under-funding, the benefits of greater capital efficiency may be sufficient reward to make it an attractive option. Furthermore, the effort and overheads involved in achieving material benefits perhaps favour larger portfolios that have the necessary scale to benefit more in absolute terms.

As mentioned earlier, the regulatory view will also influence how much companies can capitalise on the opportunity and undertakings should seek clarity from their local regulator before embarking on any particular strategy.

## CONTRACT BOUNDARIES

The implications of contract boundaries merit some discussion here. Contract boundaries will have a bearing on what contracts/cash flows are included in the BEL, potentially limiting the economic value that will be reflected on the Solvency II balance sheet. In particular, the economic value associated with the Expected Profits in Future Premiums (EPIFP), or at least a portion thereof, will not be reflected when contract boundary restrictions apply.

Contract boundary restrictions are likely to be an issue for certain types of regular premium unit-linked contracts.

Whether the contract boundary influences the level of under-funding that an undertaking can target is perhaps open to interpretation. In particular, it is arguable whether future premiums are related to unit-linked 'benefits', as specified by the prudent person principle, until they are actually received and invested. Nevertheless, on a best estimate basis, future premiums that are within the contract boundary form part of expected future benefits and will be included in the determination of BEL.

To the extent that future premiums are deemed to be unit-linked 'benefits', the contract boundary may have a bearing on the level of technical provisions that need to be funded.

It will be important for undertakings to form a clear view on the treatment of future premiums for each type of regular premium unit-linked contract, in order to understand the implications for the matching strategy and capital requirements.

## ACCOUNTING IMPLICATIONS

While accounting should not normally impact the underlying economics of the portfolio, it remains a driver of an undertaking's share price and, consequently, a driver of management actions.

A key issue arising for some insurers will be the accounting volatility that potentially arises due to the mismatch between unit-linked assets and liabilities in its financial statements. The issue arises because many accounting frameworks will not fully recognise the BEL component—while some insurers account for unit-linked liabilities on an economic basis (e.g., some UK insurers have adopted the ICA balance sheet for accounting purposes), most European insurers' accounting balance sheets do not reflect the full economic value. Having said this, some accounting frameworks, such as US GAAP or IFRS, may partially recognise the BEL through a deferred acquisition costs (DAC) item, although this may depend upon how the unit-linked contract has been classified under the accounting framework.

To the extent that BEL is not fully recognised in the accounting framework, an under-funded position will lead to different movements in reported assets and liabilities following a movement in market prices during the accounting period. This will act as a deterrent for some insurers in adopting an under-funded position.

The planned introduction of IFRS 4 Phase II for Insurance (IFRS Phase II) adds a further layer of complexity to the accounting implications. Generally speaking, the expected future profits can be held as an asset on the IFRS Phase II balance sheet. However the 'contractual service margin' under IFRS Phase II will act as the mechanism to control profit emergence over time. As a consequence, insurers may find themselves in the unusual position where the accounting balance sheet acts as the driver of capital flow (i.e., dividends), depending on the relative magnitude of the contractual service margin under IFRS Phase II and the SCR under Solvency II. In other words, the accounting balance sheet may be more prudent than the regulatory solvency position, potentially resulting in IFRS influencing the underlying economics of insurance business through higher capital requirements.

The interaction between the various accounting frameworks and Solvency II is not straightforward. As IFRS Phase II develops, an in-depth analysis will be required to aid understanding and ensure management decisions are appropriate from both an economic and an accounting perspective. The impact will vary depending on an insurer's specific circumstances, including its current accounting methodology (e.g., contract classification, DAC methodology, etc.), specific product features, and the level of profitability inherent in the contracts. Given the complexity, it will be important for undertakings to involve their auditors in order to understand the accounting impacts.

## ALTERNATIVE SOLUTIONS

An insurer's decision to under-fund its unit-linked liabilities should be considered in the broader context of alternative capital solutions for unit-linked portfolios that can offer similar or overlapping benefits.

We briefly highlight two such solutions below:

### AMC hedging

Similar to under-funding, AMC hedging can help to reduce balance sheet volatility and may also bring potential reductions in SCR. In the case of dynamic hedging strategies, however, an internal model may be required to fully reflect the hedging strategy in the SCR calculation.

Companies would need to decide how much basis risk they are willing to accept when designing an AMC hedge program.

### VIF monetisation

Perhaps a less operationally intensive option than under-funding or AMC hedging would be to fully monetise the value of in-force (VIF) (including the AMC) to lock in the balance sheet value. VIF monetisation avoids the need for an ongoing hedge or rebalancing program, as well as the associated operational risks of such programs. Instead, undertakings can implement a reinsurance contract which up-fronts and secures the economic value without much ongoing effort.

Where contract boundary restrictions apply, VIF monetisation can offer the added benefit of recognising a portion of the economic value associated with the EPIFP asset, potentially resulting in a significant uplift in balance sheet value and solvency coverage.

For more detailed discussion of both AMC hedging and VIF monetisation, please refer to our research report from July 2014, 'Capital management in a Solvency II world'.

## CONCLUSIONS

The potential capital benefits arising from under-funding of unit-linked liabilities represent a significant opportunity for life insurers.

For companies who are interested to explore the benefits further, a natural step is to undertake a feasibility study to assess the potential benefits, costs and challenges of under-funding. To form a complete view of the optimal strategy, such a study should also include an assessment of the relative impacts of other capital solutions, either as an alternative to or in conjunction with under-funding.

The ultimate treatment of under-funding remains subject to regulatory interpretation of the relevant Solvency II text. We continue to watch with interest as the regulatory view evolves.

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