MILLIMAN RESEARCH REPORT

The benefits of Solvency II unit matching

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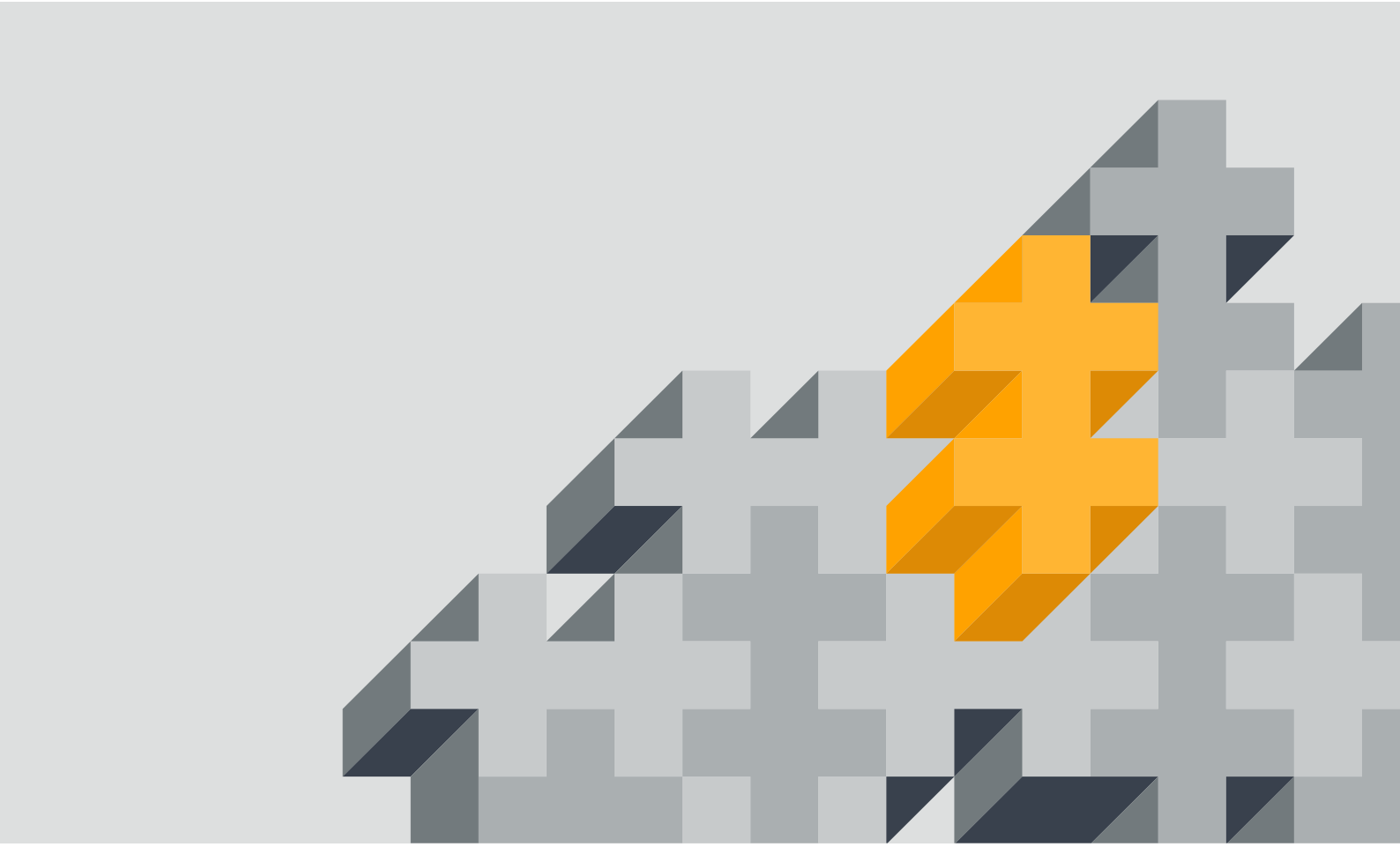

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INTRODUCTION

In 2015, Milliman published an initial white paper[1] covering Solvency II unit matching. Since then, insurers have invested significant resources to implement Solvency II and the processes of calculating and reporting the regulatory balance sheet are becoming business as usual. Insurers are now looking to get good value from the changes introduced by Solvency II and we increasingly see firms considering or implementing one-off changes or longer-term strategies that will improve capital efficiency and/or balance sheet stability.

The purpose of this paper is to demonstrate that Solvency II presents an opportunity for insurers with significant blocks of unit-linked business to dramatically improve their ability to use large amounts of previously constrained capital and to reduce market risk. This is achieved by only holding units necessary to cover the unit-linked part of the Technical Provisions (plus an appropriate 'buffer').

For the purposes of this paper, we refer to this process as Solvency II unit matching or unit matching. When implemented correctly, it can be beneficial to shareholders without any disadvantage to policyholders.

For readers who are unfamiliar with the concept or would like to better understand the process, Sections 1 and 2 below respectively provide an introduction and a description of the theory underlying Solvency II unit matching.

We are aware of (and have worked with) a number of UK insurance companies that have already implemented or are in the process of implementing Solvency II unit matching. These firms have recognised the potentially significant financial benefits from the approach, particularly improved liquidity, and their experience suggests that neither the practical implementation nor regulatory engagement should typically be barriers to successfully realising these benefits.

THE BENEFITS OF UNIT MATCHING

There are a number of potential benefits from unit matching, which collectively can be very significant, though some companies may have particular interests in specific benefits. The main benefits are:

- Significantly improved liquidity and investment freedom
- Lower capital requirements
- Reduced Own Funds volatility

Further information on these potential benefits and some practical considerations for implementing unit matching are given in Section 3.

SETTING THE LEVEL OF UNIT MATCHING

We conclude the paper in Section 4 by setting out a proposed framework for assessing an optimal level of unit matching.

1 Mitchell, S. et al. (28 January 2015). Unit-Linked Matching Considerations Under Solvency II. Milliman White Paper. Retrieved 5 July 2018 from http://uk.milliman.com/insight/2015/unit-linked-matching-considerations-under-solvency-II/.

1. What is Solvency II unit matching?

For a unit-linked policyholder, the benefit is determined by reference to the unit price of an investment fund (or funds) selected by the policyholder. Subject to any adjustments such as minimum guaranteed benefits or surrender penalties, the benefit payable will be the unit price (which depends on the value of the assets held in the investment fund) multiplied by the number of units attributed to the policyholder.

Prior to Solvency II, the Mathematical Reserves for unit-linked business had to be at least equal to the surrender value of the in-force contracts at the valuation date.[2] Further, the unit-linked element of those Mathematical Reserves had to be covered by unit-linked assets.[3] Hence companies had to hold unit-linked assets with a value at least equal to the surrender value of their unit-linked business.

Under Solvency II, the requirement to hold Mathematical Reserves has been replaced by the requirement to hold Technical Provisions. Further, companies are required to hold linked assets to cover the unit-linked component of these Technical Provisions. Crucially, the unit-linked Technical Provisions would normally be less than the surrender value of policies at the valuation date as credit can be taken for the expected value of future charges and there is no floor related to the surrender value specified in the rules.

Unit matching, while having no impact on policyholder benefits or security, can provide a number of benefits to insurers, which include improving their liquidity position, reducing the capital requirements associated with unit-linked business, reducing the volatility of Own Funds and reducing the impact of lapses under certain scenarios. However, companies will need to design and build a controlled environment to ensure that the implementation of new matching procedures and systems is well managed and integrated into reporting and risk management procedures.

2 Financial Conduct Authority. INSPRU 1.2: Mathematical reserves, rule INSPRU 1.2.62A. FCA Handbook. Retrieved 5 July 2018 from **https://www.handbook.fca.org.uk/handbook/INSPRU/1/2.html**.

3 Financial Conduct Authority. INSPRU 1.5: Internal-contagion risk, rule INSPRU 1.5.35. FCA Handbook. Retrieved 5 July 2018 from **https://www.handbook.fca.org.uk/handbook/INSPRU/1/5.html**.

2. The theory underlying unit matching

REGULATORY CONTEXT

The 'Investments' section of the Prudential Regulation Authority (PRA) Rulebook for Solvency II firms incorporates the Prudent Person Principle specified in the Solvency II Directive. The Principle includes a number of general provisions relating to how life insurance companies should invest their assets, as well as specific rules for assets covering linked long-term benefits. With respect to the latter, the rulebook states that:[4]

> "...the firm must cover its Technical Provisions in respect of its linked long-term liabilities as closely as possible with:
>
> 1. where the linked benefits are linked to the value of units, those units;
> 2. where the linked benefits are linked to the value of assets contained in an internal fund of the firm:
>   a. in a case where the internal fund is divided into notional units, the assets represented by those notional units; or
>   b. in a case where notional units are not established, those assets; and
> 3. where the linked benefits are linked to a share index or other reference value not mentioned in (1) or (2), assets of appropriate security and marketability which correspond as closely as possible to the assets on which the reference value is based."

The working assumption of this paper, which has also been made by firms in practice,[5] is that this requirement applies to Technical Provisions held in respect of linked benefits, rather than those held to cover all liabilities arising from linked contracts (such as administration expenses). This view is supported by:

- The definition of "linked long-term liabilities" provided in the PRA Handbook:

  > "...the insurance obligations in respect of linked benefits under a linked long-term contract of insurance."

- The wording of Article 132(3), the Prudent Person Principle, of the Solvency II Directive itself, which potentially provides clearer guidance:

  > "Where the **benefits provided by a contract are directly linked to the value of units** in an UCITS as defined in Directive 85/611/EEC, or to the value of assets contained in an internal fund held by the insurance undertakings, 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."

- And Article 132(2), the Prudent Person Principle, which states that:

  > "...a firm must ensure that assets held to cover its technical provisions shall also be invested in a manner appropriate to the nature and duration of the firm's insurance and reinsurance liabilities..."

Subject to a firm satisfying itself that any change in investment strategy is appropriate, the reduction in the value of Technical Provisions (relative to Solvency I Mathematical Reserves), and the above asset matching requirements that accompanied the change in regulatory regime, created a potential opportunity for firms to partially disinvest their holdings in unit-linked assets and use or invest this capital in more appropriate or attractive ways.

4 PRA. Prudent Person Principle: Additional Requirements for Assets Covering Linked Long-Term Liabilities. Retrieved 5 July 2018 from **http://www.prarulebook.co.uk/rulebook/Content/Chapter/212930/06-02-2018**.

5 We are aware that a number of UK insurers have either already implemented Solvency II unit matching or are actively considering it.

THE SCOPE FOR UNIT MATCHING

The extent to which a firm can disinvest from unit-linked assets by using this approach depends on the difference between the current amount of unit-linked asset holdings and the unit-linked part of the Technical Provisions.

Unit-linked Technical Provisions

Technical Provisions are composed of the Best Estimate Liability (BEL) and the Risk Margin and, for unit-linked business, both can (in theory) be split into unit-linked and non-linked components.

The unit-linked component of the BEL is equal to the current surrender value[6] (or unit-linked benefit) less the present value of expected future annual management charges (AMCs) on existing unit funds (i.e., excluding AMCs on units to be purchased by future expected premiums).[7] The present value of expected future AMCs is calculated using the probability of termination of the policy, which reflects the expected level of decrements (surrenders, deaths, maturities, etc.) at all future dates. It is only the unit-linked component of the BEL that needs to be covered with unit-linked assets, while non-linked liabilities (such as administration expenses) can be backed with alternative and perhaps more suitable investments.

For the Risk Margin, assuming the firm is first able to reliably allocate this to different lines of business, ideally the unit-linked business's share of the Risk Margin would be split between unit-linked and non-linked parts. Unit-linked assets could then be held to cover only the linked part of the Risk Margin. In practice, it may be difficult to split the Risk Margin into unit-linked and non-linked parts. A more pragmatic approach would be to include the whole of the Risk Margin within the definition of unit-linked Technical Provisions. In most cases, this will not lead to a material misstatement as lapse risk is typically the main component of the Risk Margin for unit-linked business and it is predominantly unit-linked (i.e., loss of future charges that would have been levied).

To summarise the preceding discussion, the table below sets our suggested approach to classifying the components of an insurer's Technical Provisions which should be covered with unit-linked assets.

COMPONENT OF TECHNICAL PROVISIONS	COVER WITH UNIT-LINKED ASSETS
Unit-linked BEL - Present value of unit-related cash flows	√
Non-linked BEL - Present value of non-unit-related cash flows (such as administration expenses)	×
Risk Margin - In practice, all of the Risk Margin is likely to be backed with unit-linked assets	√

Current amount of unit-linked assets

Under Solvency I, firms were required to hold unit-linked assets equal to the surrender value of their unit-linked business. Therefore, firms typically[8] held the full face value of the unit funds attributed to policyholders in unit-linked assets. However, if a lower amount of unit-linked assets is held, perhaps due to surrender penalties, the effect of unit matching will be reduced.

Excess unit-linked assets

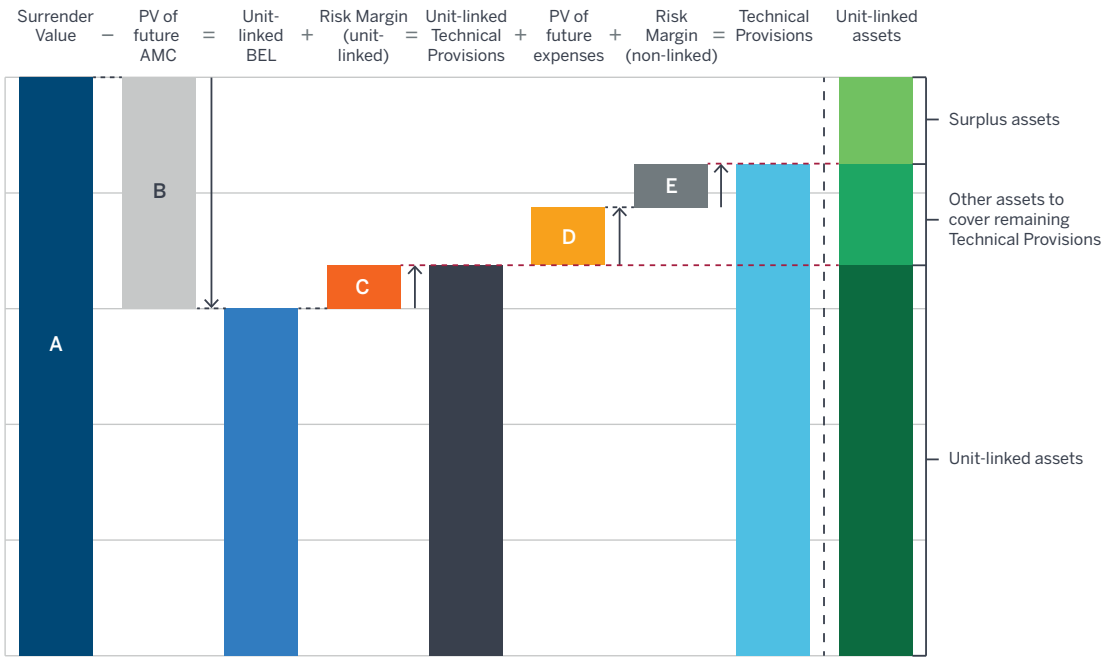
Figure 1 on page 6 shows the different components of the Technical Provisions for unit-linked business and the amount of surplus unit-linked assets that could be disinvested.

6 For simplicity we have assumed, for explanatory purposes, that the surrender penalty on the unit-linked business is constant.

7 Assuming for simplicity that there are no expenses related to the value of the unit funds.

8 Where surrender penalties reduced the surrender value, holding unit-linked assets below the full face value of unit funds attributed to policyholders was possible.

FIGURE 1: SURPLUS UNIT-LINKED ASSETS



Based on Figure 1, an optimal position is achieved by holding unit-linked assets to cover the unit-linked Technical Provisions, i.e., the surrender value (component A), less the present value (PV) of AMCs net of any unit-related expenses (component B)[9] plus the unit-linked part of the Risk Margin (component C).

The remaining parts of the Technical Provisions, the fixed or non-linked charges and expenses (component D) and any non-linked part of the Risk Margin (component E), are considered to be outside of the scope of the unit-linked Technical Provisions. Therefore, the firm can choose to cover these liabilities with assets (such as bonds) that offer a more appropriate match in terms of nature, duration, etc., using the same investment approach it applies to the Technical Provisions unrelated to unit-linked business.

The surplus assets (component B minus components C, D and E) arise from the removal of the surrender value floor discussed above. Holding unit-linked assets to cover only the value of the unit-linked Technical Provisions (component A minus component B plus component C) leads to the best match between the characteristics of the assets held to cover Technical Provisions and the Technical Provisions themselves, and (depending on how firms choose to reinvest the surplus unit-linked assets) potentially reduces shareholders' exposure to market risks.

For simplicity, the diagram in Figure 1 assumes the unit-linked product is single premium or paid-up. On a regular premium paying product, the classification of the unit-linked part of Technical Provisions should exclude the present value of AMCs expected to be earned on units yet to be purchased, i.e., from future premiums or contributions. The premiums have not yet been received and the future AMCs in respect of these premiums are not (yet) a unit-linked cash flow. The present values of such cash flows are therefore insensitive to today's unit prices, and this amount should not form part of the calculation of unit-linked technical provisions.

Maintaining the required asset coverage position at all times means that the value of the unit-linked Technical Provisions should be viewed as a floor to the level of unit-linked assets held rather than a target to match exactly. In other words, we would not expect firms to implement unit matching to the maximum amount possible, i.e., only holding unit-linked assets equal to this floor. This is primarily because, although unit price movements in isolation would not lead

9 Figure 1 is a simplification for illustrative purposes only. It assumes that future AMCs are the only unit-related cash flows and expenses are not unit-related. In practice certain expenses, e.g., fund management charges, could be linked to the unit fund size.

to the value of unit-linked assets falling below this floor, the interaction between wider market movements (for example changes in risk-free interest rates), surrenders and any assumptions that change the present value of future AMCs could have this effect. So holding the floor at a particular point in time could result in a company holding too few unit-linked assets to cover its unit-linked Technical Provisions in the near future. Maintaining a prudent margin or 'buffer' by investing more than is strictly required in unit-linked assets limits this risk and reduces the need for continuous monitoring and rebalancing.

In Section 4 below, we look at an approach for determining an appropriate level of unit matching that balances the benefits of improved liquidity, lower Own Funds volatility and lower capital requirements against the risk of breaching the asset requirements in respect of linked long-term liabilities.

Up until now we have only considered the assets held to cover Technical Provisions. However, it will also be the case that at least a proportion of the Solvency Capital Requirement (SCR) is also sensitive to changes in unit prices. Therefore, it will typically be appropriate for firms to consider what level of unit-linked assets should be additionally held in respect of the SCR. Further, a component of the capital buffer held in excess of the SCR to meet a firm's internal risk appetite would typically be considered cyclical or 'linked' and, in keeping with the aim of achieving an optimal matching position, firms may choose to also back this component with unit-linked assets.

Governance considerations

Subject to firms having appropriate governance and risk management processes in place to adequately implement and manage a unit matching investment strategy, we would expect regulators to be satisfied with firms adopting this approach. Indeed, there is already a precedent for this in the UK and in Ireland. When implementing a unit matching strategy, as a minimum we would expect firms to design and build a controlled environment to ensure that the implementation of new matching procedures and systems is well managed and integrated into reporting and risk management procedures.

Other constraints

Cost

As we shall discuss in further detail in Section 3 below, when implementing unit matching firms need to avoid material additional costs and operational risk in order to realise the maximum benefit of this strategy. In particular, resource requirements and operational complexity should be minimised by automating the process insofar as possible. Notwithstanding this, unit matching will only be justified where there is potential for material benefits, with this potential tending to increase in line with the amount of unit-linked assets which can be disinvested.

Amount of permitted disinvestment

The primary factor in determining the degree of permitted disinvestment from unit-linked assets is the size of the present value of future AMCs in excess of unit-related expenses (component B in Figure 1 above) relative to the corresponding unit-linked benefit on the in-force business. For firms where component B is relatively small, there will typically only be very limited scope for disinvestment and therefore less potential benefit from unit matching. This is likely to be the case for firms where the profit margin between charges and expenses linked to unit prices is small and/or because cash flows are only projected over a short period due to, for example, firms having a unilateral right to terminate their unit-linked contracts as mentioned earlier, or a high potential surrender rate (e.g., for institutional business). Additionally, where lapse experience has historically been very volatile or is difficult to predict and hence likely to be subject to revision, for example for new products or funds, the risk of unit-linked assets falling below the value of unit-linked Technical Provisions and the costs of rebalancing the matching position may outweigh the potential benefits.

Impact of surrender penalties

We mentioned earlier that it is worth considering the impact of surrender penalties on the level of unit-linked assets that firms held under Solvency I and, in the absence of Solvency II unit matching, continue to hold now. For products without, or with a low level of, surrender penalties, the unit-linked benefit will be very close to the full face value of units attributed to policyholders and the scope for disinvestment from unit-linked assets will be maximised, other things equal. This will also be the case where firms have, up to now, opted to hold unit-linked assets equal to the face value of units regardless of the level of surrender penalties. Where material surrender penalties apply and firms have historically reduced their holdings in unit-linked assets accordingly, however, the potential benefits from unit matching will also be reduced.

Firms will also likely need to carefully consider whether there are any constraints to adopting a unit matching investment strategy as a result of product features (such as loyalty units) or the content of policy terms and conditions or other policyholder materials (e.g., marketing material, financial reports, etc.).

Most suitable firms and product features

Based on the analysis above, examples of firms and product features for which unit matching is likely to yield the highest potential benefits include:

- Insurers with big blocks of in-force unit-linked business
- Large, growing unit funds
- Retail/individual business, rather than occupational/group business
- Products with low, or no, surrender penalties
- Products with stable experience
- Products with higher AMCs and margins

3. Benefits and challenges of Solvency II unit matching

For any insurer with a relatively large block of retail unit-linked business, implementing a Solvency II unit matching strategy (i.e., investing in unit-linked assets to match the unit-linked part of Technical Provisions) should provide a number of potentially material benefits. The relative attractiveness of the different benefits will be different for each insurer, but in our view the opportunity to access significant additional liquidity will typically be of greatest interest. In this section, we explore the main benefits available and also review the key factors that firms should consider and be aware of in relation to adopting the approach.

POTENTIAL BENEFITS OF SOLVENCY II UNIT MATCHING

Improved liquidity and investment freedom

Due to the requirements of the previous regulatory regime, firms will have long-established processes to ensure their holdings of unit-linked assets are equal to or exceed the surrender value of the in-force unit-linked policies. However, these processes are not necessarily designed for managing lower levels of unit holdings and firms may not be able to demonstrate compliance with the close matching requirements without additional monitoring and controls. This constrains the investment of the additional Own Funds (i.e., they remain invested in unit-linked assets rather than alternative investments that the shareholder may prefer) and the assets are effectively illiquid and so are unavailable for covering cash stresses on other lines of business or pursuing investment opportunities.

By implementing a Solvency II unit matching process, a large proportion of the surplus holding in unit-linked assets could safely be sold and so can be regarded as liquid assets (whether or not the unit-linked assets are actually sold in practice).

Whatever the intended use of the additional Own Funds, by adopting a Solvency II unit matching strategy and (potentially) disinvesting the holding of surplus unit-linked assets, the insurer is taking control of the investment strategy in respect of these assets. Without Solvency II unit matching, the insurer is unable to safely disinvest surplus units so is effectively outsourcing the investment strategy for a proportion of its Own Funds to its unit-linked policyholders.

The additional liquidity is available to use as the insurer considers to be most appropriate or beneficial. For example, the surplus unit-linked assets could be sold and the proceeds could then be:

- Retained as cash type assets to reduce market risk
- Used to purchase more liquid group assets (if applicable) to improve the amount of fungible capital and liquidity at the group level
- Reinvested, with the aim of purchasing higher-yielding assets with a favourable investment return
- Invested in line with the insurer's strategic objectives and business plan, e.g., new business, acquisitions, etc.

Alternatively, the unit-linked assets could be retained if this is consistent with the shareholder's investment objectives, but the improved liquidity could still be reflected in liquidity management monitoring.

If a firm does decide to spend or distribute some of the additional liquidity made available by Solvency II unit matching, then if actual experience is then worse than expected, e.g., higher administration costs, higher lapses, etc., the firm will have a lower level of Own Funds with which to absorb reduced profits on the unit-linked business. However, these risks are assessed within the calculation of the SCR and any firm would be expected to maintain sufficient capital to comply with its capital management policy. Therefore, there should not be any weakening in policyholder security as a result of adopting a Solvency II unit matching strategy.

Capital requirements

A further potential benefit from implementing a unit matching strategy will be a reduction in regulatory capital requirements, which arises from a reduction in the level at which Own Funds are invested in unit-linked assets. This benefit is, of course, dependent on the proceeds being invested in lower-risk assets or assets whose risk diversifies more effectively against the other remaining market risks.

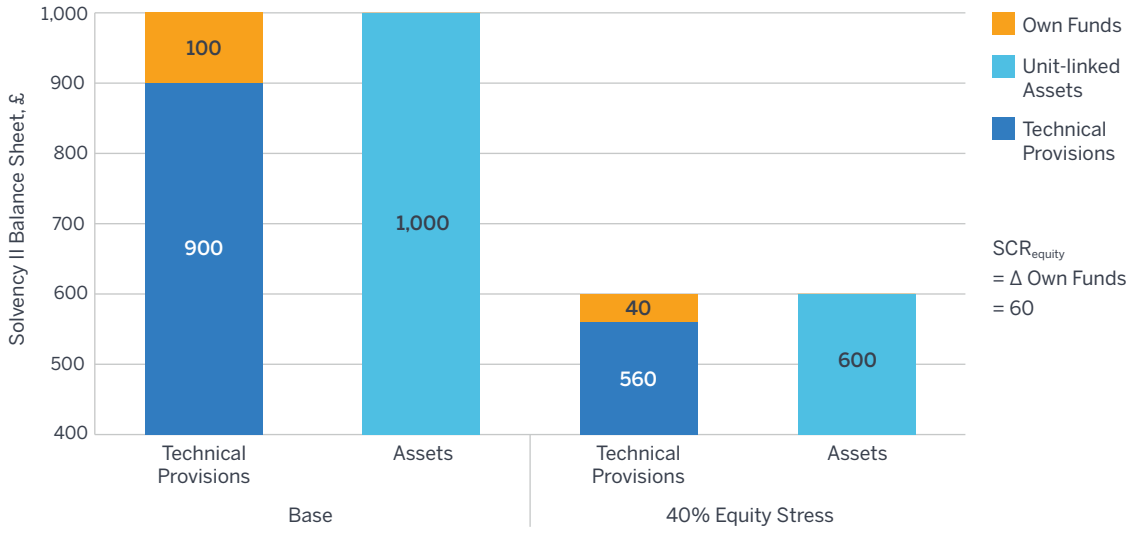
Reinvesting a proportion of the existing holding of unit-linked assets into lower-risk assets should reduce the insurer's exposure to certain market risks such as equity, credit spread and property risks, and should therefore also reduce the capital held in respect of those risks.

To illustrate, assume an insurer offers a single unit-linked investment fund that invests solely in Type 1 equity.[10] The current surrender value of the unit-linked benefit is £1,000, there are no guarantees, no surrender penalties and the insurer invests to fully match this current surrender value rather than the Technical Provisions. That is, the firm is holding £1,000 in unit-linked assets.

Assume also that the best-estimate present values of future AMCs and future administration expenses[11] are £150 and £50, respectively. Ignoring the Risk Margin, Technical Provisions in respect of the in-force unit-linked business are therefore £900[12] and Own Funds are £100.

Under the Standard Formula Type 1 equity stress, which for simplicity we assume currently corresponds to an instantaneous 40% reduction in equity prices,[13] the value of both the surrender value and unit-linked asset holding falls to £600. Under the stress, the present value of future AMCs falls from £150 to £90, but the present value of future administration expenses is unchanged. Own Funds therefore fall from £100 to £40, and the undiversified equity risk capital requirement (SCR_{equity}) is £60. Figure 2 illustrates the impact on the balance sheet of the instantaneous equity stress and the resulting capital requirements.

FIGURE 2: EQUITY RISK CAPITAL (UNITS HELD TO COVER SURRENDER VALUE)



10 Type 1 equities are equities listed in regulated markets in countries that are members of the European Economic Area (EEA) or Organisation for Economic Co-operation and Development (OECD). This assumption simplifies the equity stress in the subsequent analysis.

11 For simplicity we assume all expenses are non-linked. However, in practice, certain expenses such as investment management costs could be linked to the value of funds under management.

12 In our worked example, we assume the BEL = Current Surrender Value - PV future AMCs + PV of future expenses, and that the Risk Margin = 0 so that Technical Provisions = BEL.

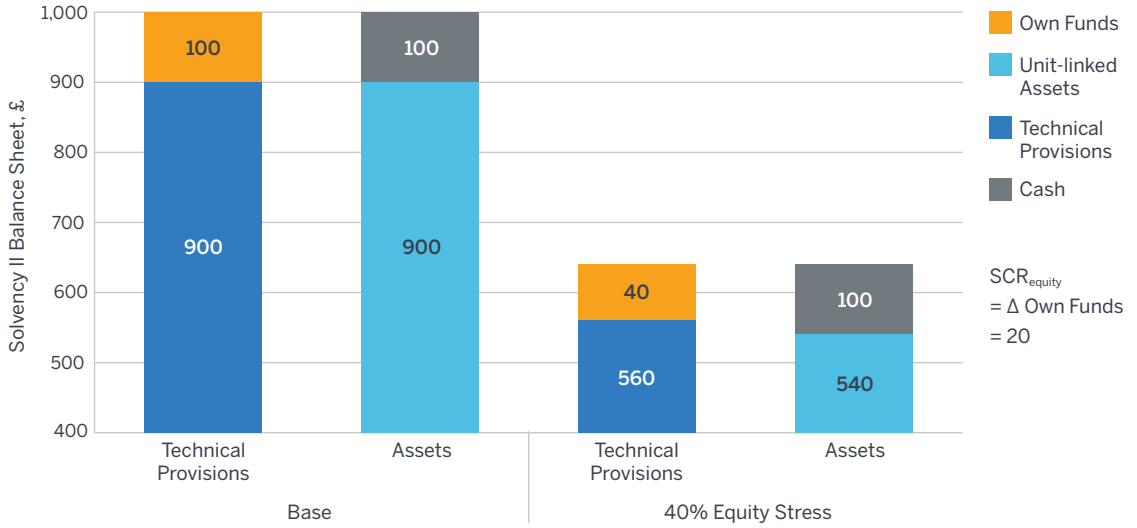
13 That is, a 39% standard stress level with a -1% symmetric adjustment.

As an alternative, suppose the insurer adopts a Solvency II unit matching strategy by reducing its holding in unit-linked assets to £900 and investing the £100 proceeds from the sale of the assets in cash.[14] In effect, the insurer sells £100 of units that are expected to accrue to the insurer in the future in the form of AMCs and reinvests the monies in cash.

Under the Standard Formula equity risk stress, the surrender value falls to £600 and the present value of future AMCs once again falls by £60. So the Technical Provisions reduce to £560—the same stress result as for the initial scenario in which the insurer invests wholly in unit-linked assets. However, the assets now only reduce to £640 due to the reduced holding in equity price-sensitive assets.[15] Own Funds under the stress now only fall from £100 to £80 (= £640 - £560), meaning the SCR_{equity} is £20, a significant reduction in equity risk capital.

Figure 3 illustrates the impact on the Solvency II balance sheet of the instantaneous equity stress and the resulting capital requirements under a Solvency II unit matching strategy.

FIGURE 3: EQUITY RISK CAPITAL (SOLVENCY II UNIT MATCHING)



For the purpose of simplification, the example assumes that the unit investment fund is solely invested in equity. In practice many of the unit-linked investment funds offered by insurance companies will also have a significant level of investment in equity. For firms with significant blocks of unit-linked business, equity risk capital will therefore typically be one of the main constituents of the aggregate SCR. Accordingly, adopting a Solvency II unit matching strategy has the potential to materially reduce a firm's regulatory capital requirements.

Incidentally, the reduction in the level of equity risk capital can also have the additional benefit of making the insurer's SCR less sensitive to changes in the symmetric adjustment. The symmetric adjustment (which adjusts the level of the equity stress in response to recent equity price movements) is viewed by some insurers as an unwelcome and unnecessary source of volatility in respect of both the SCR and the Solvency Ratio.

More generally, if Solvency II unit matching is implemented in such a way that the assets held in place of the unit-linked assets are less risky (at least in terms of how they are assessed for regulatory capital purposes), then the potential capital benefits from the approach also apply to non-equity unit investment funds (e.g., corporate bond or property funds) and mixed asset class funds.

14 As described in Section 2 above, a company could alternatively invest some of the proceeds in gilts or other fixed interest assets, for example. Assuming the proceeds are all invested in cash simplifies the market risk stresses as the cash does not change in value under these stresses.

15 £900 of unit-linked assets falls in value to £540 and £100 of cash is unchanged.

In the worked example (in which a proportion of unit-linked equity fund investment is swapped for cash), it is important to note that any reduction in the aggregate SCR from lower equity risk capital will be partially offset by:

- Additional counterparty default risk capital associated with an increased cash holding
- A potential increase in the level of capital held in respect of other risks, such as expense risk and operational risk, which might increase as a consequence—although we would not expect this to be significant
- For firms using an internal model or a partial internal model, any risk capital contribution from an allowance within the internal model for a combined stress scenario in which equity prices rise and lapses increase—however, if such an allowance is made, we would not expect it to be material

The overall capital benefit from Solvency II unit matching would have been reduced if it had instead been assumed that the proceeds from the sale of the unit-linked assets had been invested in a different asset class (e.g., bonds, property, etc.)—because most other asset classes will have higher capital requirements than cash.

Under most shareholder asset investment strategies, it is reasonable to assume that the overall level of required capital held in respect of market risks will (when considered in isolation) reduce under a Solvency II unit matching approach. Whilst this will also lead to a corresponding reduction in the overall amount of required capital, the effect at an aggregate level may be dampened by the loss of diversification between market risk and the insurer's other risk classes. As well as this offsetting effect in terms of the amount of required capital, the loss of diversification will (by definition) increase the prominence of non-market risks in terms of their contribution to required capital.

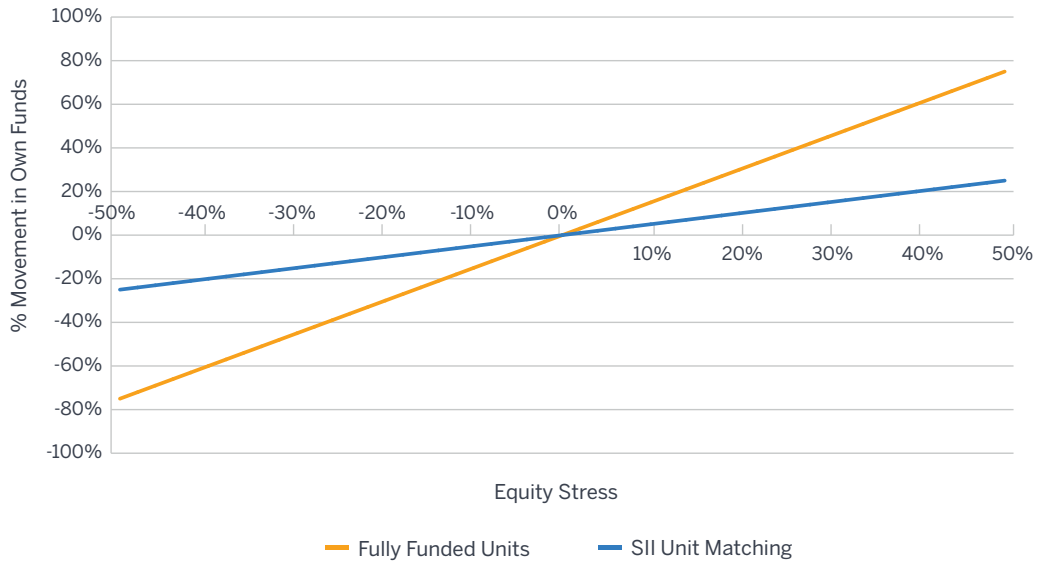
Own Funds volatility

Solvency II unit matching allows insurers to (at least partially) disinvest the Own Funds which are invested in unit-linked assets. In addition to the reduction in required capital discussed previously, this reinvestment into different (less risky) asset classes should improve the ongoing stability of the insurer's Own Funds.

Without Solvency II unit matching, the asset side of the balance sheet is more sensitive (in absolute terms) to market movements than the liability side, because the unit-linked assets held will in most cases exceed the value of the corresponding unit-related Technical Provisions (i.e., the component of Technical Provisions that is sensitive to changes in unit prices). By holding a lower level of unit-linked assets and investing the surplus in less volatile or less correlated asset classes, the amount by which the asset side of the balance sheet will move in response to market volatility will reduce. Day-to-day movements in market prices should have a smaller effect on the Own Funds position, because the value of the assets and Technical Provisions should move more in line with each other, i.e., the amount by which they increase (or decrease) in value should be closer.

Using the same simplified balance sheet (i.e., £1,000 unit-linked benefit and best-estimate present values of future AMCs and future administration expenses are £150 and £50, respectively), Figure 4 illustrates the movement in Own Funds, in response to changes in equity prices ranging from -50% to +50%, under the 'fully funded' strategy (i.e., where units are held equal to the current surrender value) and the Solvency II unit matching strategy (where £100 is held in cash rather than in units).

FIGURE 4: OWN FUNDS SENSITIVITY TO EQUITY PRICES



As Figure 4 shows, in our simple example, Solvency II unit matching considerably reduces the percentage range over which the Own Funds varies in response to equity price movements considered in isolation. The range reduces from (-75%, 75%) under the fully funded scenario to (-25%, 25%) under the Solvency II unit matching scenario.

Surrender behaviour following market movements

Relative to a fully funded strategy, the use of Solvency II unit matching can absorb some of the balance sheet impact of an increase in surrenders following a fall in market prices.

If an insurer chooses to fully cover the surrender value with a holding in the corresponding unit-linked assets then, following a fall in the value of the underlying assets held in the linked investment funds due to market movements, the surrender value and the assets covering this liability will fall by the same amount. The same is equally true if there is a one-off "mass" lapse[16] — the surrender value and the company's assets will both fall by the same amount in line with the level of unit-linked business lost. In both scenarios, these two movements net each other off, and the Own Funds impact is driven solely by the reduction in the present value of future AMCs (partially offset by a reduction in the Risk Margin and any variable component of the expenses). The same logic applies if a mass lapse immediately follows a fall in market prices but this time the fall in Own Funds is caused by both lower unit prices and the loss of a proportion of the in-force business.

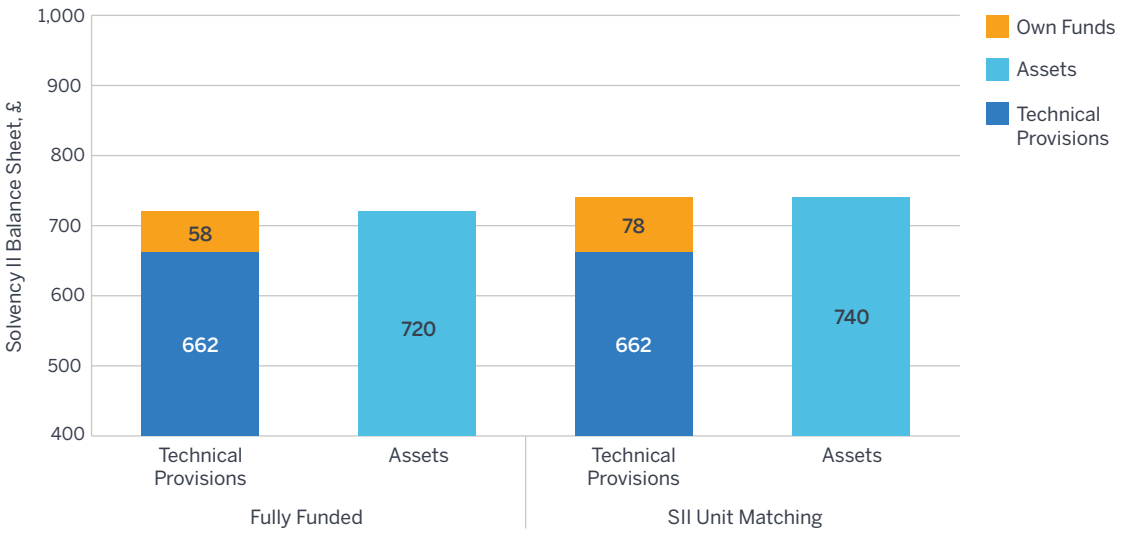
As we have already discussed, under a Solvency II unit matching strategy, if we assume that the insurer has elected to invest the proceeds from the disinvested unit-linked assets into a less risky asset class (e.g., cash, as in our simple example) then, if market prices fall, the insurer's assets will not fall in value by the same amount as the surrender value on the in-force business. This has the effect of dampening (or offsetting) the impact from a reduction in the present value of future AMCs. If a mass lapse then follows, the insurer will pay the surrender benefits based on the current unit price (i.e., post the market fall) and thereby retains the benefit of de-risking its asset portfolio, rather than passing this to the surrendering policyholders.

So in a combined market fall and mass lapse scenario, the Own Funds will fall whether the insurer is using a fully funded or a Solvency II unit matching strategy, but under the latter strategy the reduction in Own Funds is lower.

16 A mass lapse scenario is one involving an instantaneous loss of a significant proportion of the in-force business.

Figure 5 illustrates the result using our simple model (which ignores the Risk Margin), where we have assumed that a 20% fall in unit prices is immediately followed by a mass surrender of 10% of the in-force unit-linked business.[17] Under both strategies, Own Funds fall from the initial value of £100 (to £58 under a fully funded strategy and to £78 under a unit matching strategy), but under the Solvency II unit matching strategy Own Funds are £20 higher (= £78 - £58) than they would have been under a fully funded strategy. This £20 can be thought of as the benefit realised from reinvesting £100 of surplus unit-linked assets into cash and thereby avoiding suffering a 20% (£100 x 20% = £20) fall in these assets as a result of adverse market movements.

FIGURE 5: OWN FUNDS IMPACT OF LAPSE EVENT FOLLOWING MARKET FALL



The dynamic reverses if we see a mass lapse immediately following a rise in market prices. Under a Solvency II unit matching strategy, the insurer's assets will not benefit from the market price rise to the same extent as under a fully funded approach. The change in the present value of future AMCs is the same in either case.[18] However, with a Solvency II unit matching strategy the insurer's Own Funds will also be impacted due to the overall change in the value of the insurer's assets less the value of the Technical Provisions in respect of the linked long-term liabilities.

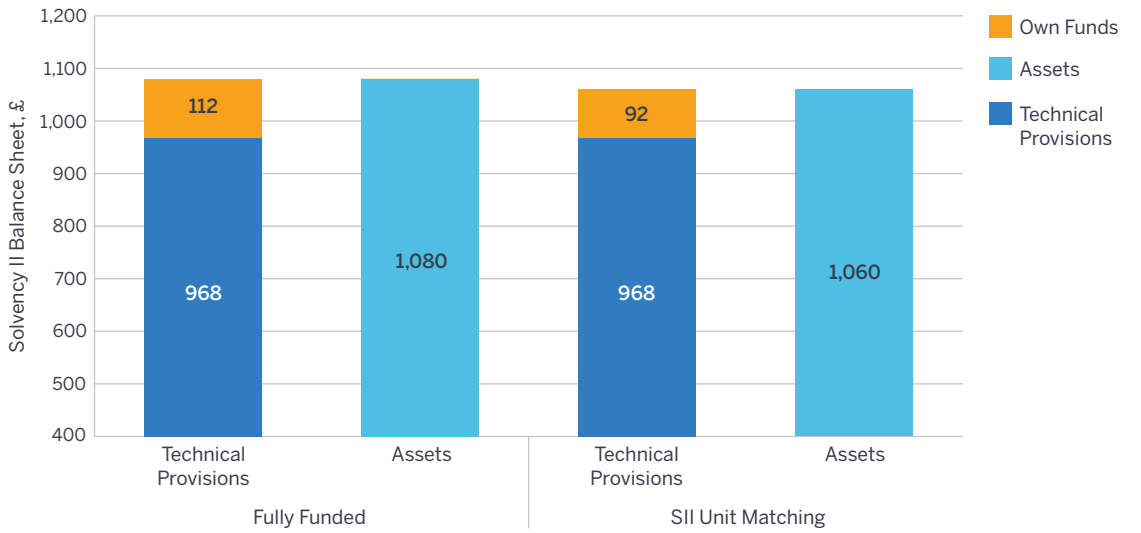
Figure 6 illustrates these different outcomes, where we have assumed that a 20% increase in unit prices is immediately followed by a mass surrender of 10% of the in-force unit-linked business. Under a fully funded strategy, Own Funds increase (the rise in market prices is sufficient to offset the loss of in-force business), whereas under the Solvency II unit matching strategy Own Funds decrease.

Whether or not this change in the dynamics of the insurer's Own Funds, in respect of its exposure to combined market and lapse risk events, is considered a positive aspect of adopting Solvency II unit matching will depend on a firm's view with respect to the relationship between market performance and policyholder behaviour. However, we anticipate that most firms would consider that a temporary spike in surrenders is more likely to follow a fall in unit prices rather than a rise in unit prices, consistent with a view that positive market movements and increased lapses are negatively correlated.

17 The choice of scenarios in this section in which unit prices fall or rise by 20% and there is a 10% mass surrender has been done for illustration purposes only, and the calibration of the scenarios is otherwise purely arbitrary.

18 The change in present value of future AMCs could be either positive or negative depending on the relative increase in market prices compared to the percentage of business lost via the mass lapse.

FIGURE 6: OWN FUNDS IMPACT OF LAPSE EVENT FOLLOWING MARKET RISE



It should be noted that dynamic policyholder behaviour is a notoriously difficult area to reliably predict, and the response to significant one-off or sustained movements in unit prices will be driven by a wide range of factors including a policyholder's financial position, the relative performance compared to competitor insurance companies, expectations regarding future performance (e.g., further growth, recovery, market crash, etc.), length of investment horizon and investment objectives. So even if firms consider it unlikely that policyholders will surrender in response to unit price rises, the need to consider this scenario more carefully—for example via the firm's Own Risk and Solvency Assessment (ORSA) analysis—will be greater if a Solvency II unit matching strategy is adopted.

In terms of regulatory capital, the Solvency II Standard Formula approach to the SCR does not allow for the risk of higher-than-expected lapses following market price rises. So if a firm does consider this a plausible and severe scenario at the 99.5th percentile over one year, it may consider it necessary to implement a partial or full internal model, which would allow it to reflect this risk scenario within its regulatory capital. The potential need for an internal model would be a significant factor for any firm when deciding whether or not to proceed with a Solvency II unit matching approach. As noted previously, we would not expect any capital held in respect of this risk scenario to be significant, particularly in the context of the significant downside equity risk that would remain on the retained unit-linked assets which are held in excess of the level required to support the unit-linked Technical Provisions.

To the extent that adopting Solvency II unit matching creates an adverse exposure to a combined price rise and lapse increase scenario, this risk should be considered in the context of the other changes to the insurer's risk profile. For example, we would expect the reduced exposure to market price falls (as already discussed above), to be viewed as having a more significant impact on the overall risk profile.

POSSIBLE DOWNSIDES AND IMPLEMENTATION CHALLENGES

Solvency Ratio dynamics

Solvency II unit matching has the potential to improve the stability of an insurer's Own Funds.[19] However, from a Solvency Ratio perspective it potentially has unwanted side effects. Specifically, depending on the significance of the unit-linked business, the insurer's Solvency Ratio may:

- Be more sensitive to changes in unit prices when a Solvency II unit matching approach is used
- Decline following an increase in unit prices under a Solvency II unit matching approach, whereas it improved when the units were fully funded

19 In response to changes in the market prices of the underlying assets held by the unit-linked investment funds.

However, any changes in the behaviour of the Solvency Ratio in response to changes in unit prices can largely be mitigated by investing in additional unit-linked assets, over the amount needed to exactly cover the linked part of the insurer's Technical Provisions. By holding unit-linked assets equal to not only the value of the linked part of the Technical Provisions but also the part of the SCR that is sensitive to unit prices, the movement in the Own Funds and the SCR in response to changes in unit prices should be closely aligned. Holding additional unit-linked assets, above the minimum level required to satisfy the Solvency II matching requirements (under the Prudent Person Principle), also reduces the risk of being adversely affected by a combined scenario of a unit price rise followed by a mass surrender. This approach will reduce the extent of the benefits discussed previously, i.e., improved liquidity, lower capital requirements and more stable Own Funds, but an insurer may consider this an acceptable trade-off.

Without an appropriate buffer (or margin) of an additional holding in unit-linked assets, the insurer might experience two changes in the ongoing behaviour of its Solvency Ratio.

1. **Greater level of sensitivity to unit price changes**

The Solvency Ratio may now be more exposed to changes in the value of the assets held by the unit-linked investment funds, i.e., more volatile. When unit prices change, the value of both the Own Funds and SCR will also change. Typically they will move in the same direction, e.g., when unit prices increase, the Own Funds and the SCR will both increase. These movements have offsetting effects on the Solvency Ratio—an increase in Own Funds will increase the Solvency Ratio, but an increase in the SCR will reduce the Solvency Ratio.

Under a Solvency II unit matching strategy, the relative movement in the Own Funds following a change in unit prices can be reduced considerably (compared to a fully funded approach). However, the sensitivity of the SCR is unlikely to be affected by anywhere near the same degree. This is because certain components of the SCR, such as lapse risk capital (which can be material on unit-linked business), are unaffected by the use of Solvency II unit matching. The relative movements in the Own Funds and SCR are therefore less consistent, resulting in a more volatile Solvency Ratio.

2. **Change in the direction of the sensitivity to unit price changes**

The second impact is that the direction in which the Solvency Ratio moves following a change in unit prices may change. Consider a fully funded scenario, in which the dynamics of the company's balance sheet are such that Own Funds increase by more than the SCR following an increase in unit prices. As such, the company's Solvency Ratio improves in response to the change in unit prices. However, under Solvency II unit matching, the Own Funds will now increase by a much smaller amount, and the corresponding increase in the SCR (which is less affected by Solvency II unit matching) may now be sufficient to more than offset the change in Own Funds, leading to a reduction in the Solvency Ratio.

Any insurer implementing a Solvency II unit matching approach is unlikely to have an appetite for such changes, and therefore a key part of the process will be identifying and maintaining an appropriate additional level of unit-linked assets to hold.

Asset rebalancing

In our view there is a strict limit on the extent to which an insurer's holding in unit-linked assets should be reduced using Solvency II unit matching. As discussed in Section 2 above, to be consistent with the asset coverage requirements in relation to Technical Provisions, insurers should hold unit-linked assets at least equal to the total value of the unit-related part of the BEL and the corresponding contribution to the Risk Margin.[20]

The values of the BEL and Risk Margin will change over time due to changes in unit prices, premium payment, lapse experience, valuation assumptions, etc., and therefore the minimum level of unit-linked assets which must be held will also change. In order to ensure continuous compliance

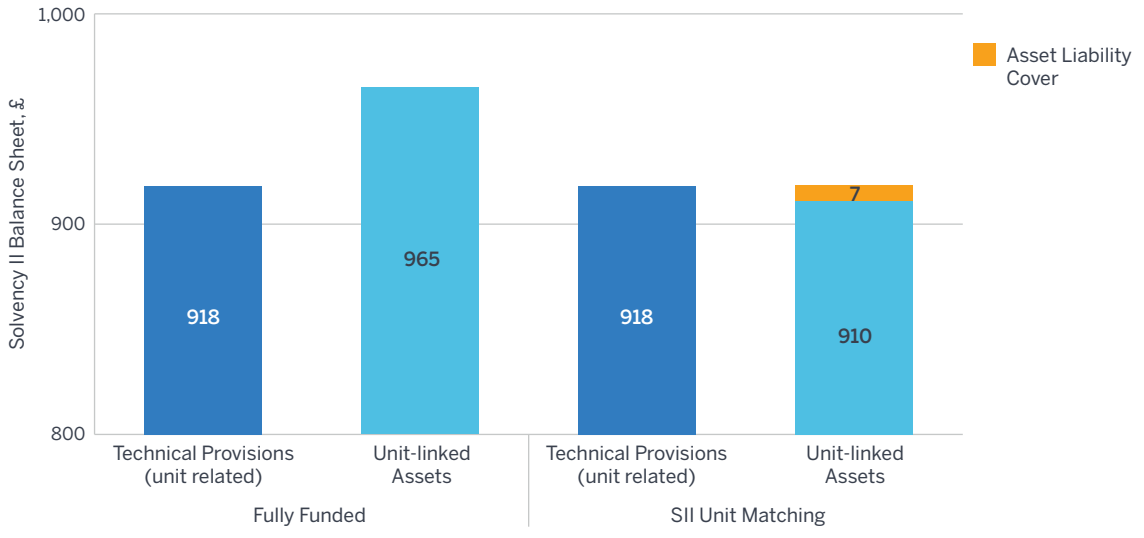
20 Either just the unit-related part of the Risk Margin or, for reasons of computational simplicity, the whole of the Risk Margin in respect of the unit-linked business.

with the asset coverage requirements, firms therefore need to monitor their 'matching position,' i.e., the extent to which unit-linked assets cover the unit-related Technical Provisions, and rebalance their portfolios (by buying or selling unit-linked assets) as necessary.

The closer a firm's holding in unit-linked assets is to the minimum threshold, the more likely it is that the assets and liabilities will become unmatched and the insurer will need to purchase additional unit-linked assets to ensure that cover of the Technical Provisions in relation to the linked long-term liabilities is maintained. A more aggressive matching approach also means that the monitoring of the matching position needs to be more frequent and the triggers for an ad hoc assessment of the matching position need to be linked, for example, to a narrower change in lapse experience (relative to expectations).

Figure 7 illustrates the relative position of the unit-linked technical provisions and unit-linked assets, assuming they are 100% equity investments, after an equity price rise of 20% immediately followed by a mass surrender of 10% of the in-force business. In our simple model, before the scenario is applied, the value of the unit-related Technical Provisions is £850 (the £1,000 current surrender value less the £150 present value of future AMCs and ignoring the Risk Margin). In the partial Solvency II unit matching position the unit-linked asset holding is reduced to £900 and under the combined equity price rise and mass lapse scenario the matching position is maintained. That is, the unit-linked assets continue to exceed the value of the unit-related Technical Provisions. However, if the insurer implements Solvency II unit matching to the maximum permissible level, by reducing the holding in unit-linked assets to equal the unit-linked Technical Provisions of £850, then following the equity price rise and mass lapse it no longer has sufficient unit-linked assets to cover its unit-related Technical Provisions. The insurer must therefore purchase additional unit-linked assets to restore cover. For this reason, firms adopting a Solvency II unit matching approach might choose to apply a liquidity restriction on the investments into which surplus unit-linked assets may be reinvested.

FIGURE 7: UNIT-LINKED TECHNICAL PROVISIONS COVERAGE AFTER LAPSE EVENT FOLLOWING MARKET RISE



Furthermore, if the insurer invested the proceeds from the disinvestment from unit-linked assets into a lower-return asset class (such as cash), then these assets are unlikely to grow by as much as the unit-linked assets and the insurer will incur an economic cost when purchasing the additional unit-linked assets to restore the matching position. Under very extreme scenarios, where there is a very sharp increase in unit prices and a severe mass surrender, the insurer could find it has insufficient assets to pay policyholder benefits. However, such an outcome would only be reached in scenarios that exhaust the assets held to cover the SCR (plus any additional capital buffer in line with the insurer's risk appetite), i.e., scenarios that are beyond a 1-in-200-year level.

As discussed earlier in this section, one approach to implementing Solvency II unit matching is to maintain an additional holding (or buffer) of unit-linked assets (above the minimum level needed to ensure appropriate coverage of the Technical Provisions) equal to the value of the part of the SCR which is sensitive to unit-linked prices. Use of such a buffer allows modest changes in experience or valuation assumptions to be absorbed, avoiding the need for special or ad hoc activity to readjust the level of unit-linked assets held. An appropriately set buffer should reduce the frequency with which the matching position needs to be monitored.

Practical aspects of implementation

To be successful from a practical perspective, Solvency II unit matching needs to be implemented in a way that minimises any increase in the operational effort and complexity associated with managing the in-force unit-linked business. Therefore, one of the key objectives when implementing a Solvency II unit matching process should be to minimise any additional activity specifically associated with the process or the need for any significant system changes.

For example, in our experience, any rebalancing activity associated with ensuring that a unit matching position is maintained should typically be relatively immaterial (compared to the other transactions on the unit-linked funds) and it should therefore be reasonably straightforward to manage within the existing framework, e.g., via box management. With respect to changes that may necessitate a more significant rebalancing adjustment, such as a change in best-estimate experience assumptions, insurers should give consideration to the expected inflows and outflows on the unit-linked funds when deciding whether any additional transactions on the funds are required.

As with any new process, firms will have to satisfy themselves that they have the operational capability and technical expertise necessary to implement Solvency II unit matching successfully. To the extent that the approach does require a degree of systems development and/or upgrade work, as well as the introduction of new processes and policies, this will involve a cost and a resource commitment, and also some level of business or project risk. The implementation process should therefore be subject to proper project governance. This should include internal training at various levels of the organisation, so that relevant staff understand the operational changes and the board and senior management understand the capital, liquidity and risk implications.

The complexity of implementing a Solvency II unit matching strategy will be influenced by how diverse the underlying unit-linked business is. Where there is a fairly homogeneous portfolio (in terms of annual management charge rate, products, etc.), the unit matching position can be safely monitored at the level of funds that have the same (or very similar) asset mix. However, insurers should not rule out the potential need for more granular monitoring particularly where the in-force book is more diverse. Companies with a very diverse set of unit-linked investment funds (in terms of asset mix) may therefore find the monitoring requirements more extensive. However, if these funds are all managed on the same systems platform, this may not be an issue for an automated process. Where there are multiple systems managing unit pricing there may be a need to focus on the systems that deliver the greatest opportunity to limit the information technology (IT) development required.

Other challenges

- The use of Solvency II unit matching may give rise to additional accounting profits (or losses) in reported results other than Solvency II and Embedded Value, in response to market movements. Adopting the approach may therefore increase the volatility of the insurer's profit and loss account. However, unless market prices or surrenders increase (or decrease) very significantly, this additional volatility should not materially distort the overall income result.
- Firms will want to consider whether there are any reputational issues or risks associated with the use of Solvency II unit matching, particularly if the process is not well established in the local insurance market. For example, in the UK a number of large insurers have already implemented or are in the process of implementing a Solvency II unit matching process, so this should be less of a concern for other UK firms considering the approach.

Appropriate governance and risk management should mitigate any adverse reputational impacts, but firms will still need to carefully consider whether the investment strategy runs counter to any expectations that policyholders or other stakeholders (e.g., shareholders, market analysts, regulators, etc.) may have. It is likely that most companies and their boards will need reassurance that the risk of a significant adverse financial impact from any related operational issue is likely to be minimal or limited, so that the impact on capital requirements is small and also so that policyholders (in particular) are unlikely to be impacted by this shareholder-driven change.

- Although formal regulatory approval is not required to implement Solvency II unit matching, firms may wish to inform their supervisors that they are planning to do so. As part of this notification, firms should be able to demonstrate that they have thought carefully about the unit matching process and the governance around it.
- Companies will need to ensure that there is no external communication (e.g., policyholder mailings, marketing material, etc.) that may limit management's ability to implement this approach.

4. Implementing unit matching

DECIDING THE STRATEGY

The decisions on whether to adopt a Solvency II unit matching strategy and, if so, the extent to which additional unit-linked assets should be held above the level required to match the linked part of the Technical Provisions will be different for each firm. Factors affecting these decisions will include:

- The perceived value of the benefits to be obtained from closer unit matching, e.g., enhanced liquidity, lower capital requirements, etc.
- The type and nature of the insurer's unit-linked products, e.g., retail or institutional business, the level of annual management charges, the duration in-force, etc.
- The insurer's appetite and capacity to accept the changes in its risk profile associated with Solvency II unit matching
- The insurer's intentions regarding how it will use or manage the proceeds from partially disinvesting from the unit-linked assets

As we have already discussed earlier in this paper, Solvency II unit matching may be less suitable or more challenging for firms for which:

- The present value of future AMCs recognised on the Solvency II balance sheet is small relative to the current surrender value of the in-force business, because this will typically mean the scope for unit matching is very limited and as such the benefits to be gained will also be limited
- The lapse experience on the in-force unit-linked business has historically been very volatile or is difficult to predict going forward, e.g., on group or institutional business, because this is likely to increase the risk of having insufficient unit-linked assets (to cover the linked part of Technical Provisions) leading to incurring the costs of rebalancing
- There is limited capacity to invest in the systems, resources and processes necessary to adequately manage Solvency II unit matching, particularly in terms of the initial up-front development cost

SETTING A UNIT MATCHING BUFFER

As discussed earlier in this white paper, we would not recommend implementing Solvency II unit matching to the maximum potential level calculated at a particular valuation date. Daily variations in experience on the unit-linked portfolio (compared to best-estimate assumptions at the time of the unit matching valuation) could cause the portfolio to be mismatched in terms of the level of unit-linked assets held to cover the linked part of Technical Provisions. Therefore, to maintain continuous compliance with the asset coverage requirements but remove (or at least reduce) the need for daily monitoring and rebalancing, it is necessary to hold an additional level of unit-linked assets—the 'unit matching buffer.'

The level of the unit matching buffer could be set using the following process:[21]

1. Calculate the minimum level of unit-linked assets required to match the linked part of the Technical Provisions, using the approach suggested in Section 2 above, at a suitable valuation date and with the latest set of best-estimate assumptions.
2. Determine the additional (i.e., buffer) level of unit-linked assets sufficient to ensure that under potential adverse events the insurer still complies with regulatory matching requirements. Market movements alone should not lead to the insurer failing to meet these requirements. Adverse lapse experience is likely to be the most significant driver of the need for such a buffer.
3. Increase the level of the buffer to allow for the maximum possible estimation error in determining the minimum level (per Step 1) across the in-scope unit-linked investment funds.

21 This could be determined on a policy-by-policy basis, but this is likely to be onerous so a simplified approach operated at the level of each investment fund is likely to be appropriate.

As discussed in Section 3 above, in addition to holding unit-linked assets to cover the linked part of Technical Provisions (as required to meet the Solvency II asset coverage requirements) it may also be desirable for firms to hold further unit-linked assets in respect of the linked part of the SCR (i.e., the amount of the SCR that is sensitive to changes in unit prices). If the value of the linked part of the SCR exceeds the value of the proposed unit matching buffer, then it may be sufficient to increase the buffer to cover the matching requirement for the SCR.

The process for setting the buffer should be thoroughly documented and reviewed, and the level of the unit matching buffer should be reviewed and updated (if necessary) at least annually or following a material change in the profile of the unit-linked business or the insurer's risk appetite. The changes which would trigger a review of the unit matching buffer should be set out within the process documentation.

It may also be appropriate to introduce a formal written unit matching policy, which sets out the governance and controls in place, with clearly defined roles, responsibilities, and escalation procedures.

As part of the implementing process, the unit matching position and the risk associated with the strategy should be explored within the firm's risk management framework. For example, scenario analysis consistent within the firm's Own Risk and Solvency Assessment should look at the impact on the unit matching position. This scenario analysis can be very helpful in building management's understanding of the process and the risks introduced. After implementation, regular risk management information (MI) should include key metrics relevant to Solvency II unit matching.

The implementation of the strategy requires careful consideration to ensure that processes do not adversely impact policyholders, particularly in relation to the performance of the unit-linked investment funds. In particular, the board, any internal or external committee overseeing unit fund management and the insurer's regulators will need reassurance that policyholders will not be adversely affected and that processes exist to confirm the reassurance given.

How we can help

SOLVENCY II UNIT MATCHING

The combined experience of Milliman and P Turnbull Financial Management in the implementation of this strategy makes us well placed to guide firms through the technical and practical aspects of implementing and embedding a Solvency II unit matching strategy. Our services and advice include:

- Carrying out an initial feasibility study
- Developing practical solutions that recognise systems constraints
- Supporting engagement of key stakeholders, board committees and regulators
- Assisting with implementing the strategy, in terms of the actuarial, risk management and governance, treating customers fairly and operational aspects

WIDER UNIT-LINKED EXPERIENCE

Milliman consultants have extensive experience working with both insurance companies with unit-linked business and asset and investment managers. Our work on unit-linked business includes cash flow modelling, balance sheet forecasting, stress and scenario testing, wider ORSA analysis and the development of risk management and governance frameworks, as well as fulfilling regulatory roles and transaction work.

Milliman

Milliman is among the world's largest providers of actuarial and related products and services. The firm has consulting practices in life insurance and financial services, property & casualty insurance, healthcare, and employee benefits. Founded in 1947, Milliman is an independent firm with offices in major cities around the globe.

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