When is a hedge not a hedge? ALM under Solvency II

Solvency II increases the focus on the sourcing and calibration of accurate and representative discount curves. Alterations to discount curves may change optimal hedges and necessitate re-hedging. Here we use a simple educational example to demonstrate this with UBS Delta, using both a UK Solvency I approach for an annuity provider and a Solvency II (QIS 5) liquidity premium approach. We also illustrate the volatility of the relative asset liability mismatch under the different approaches using our historic value-at-risk (VaR) model, which applies historic simulations to revalue the asset and liability values

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Discount curves

For a UK annuity provider, the Solvency II (QIS 5) curve with liquidity premium is determined as the GBP swap curve less 10 basis points (bp) plus a liquidity premium for the first 30 years, and with a long-term extrapolation, which is based on an ultimate forward rate of 4.2%.

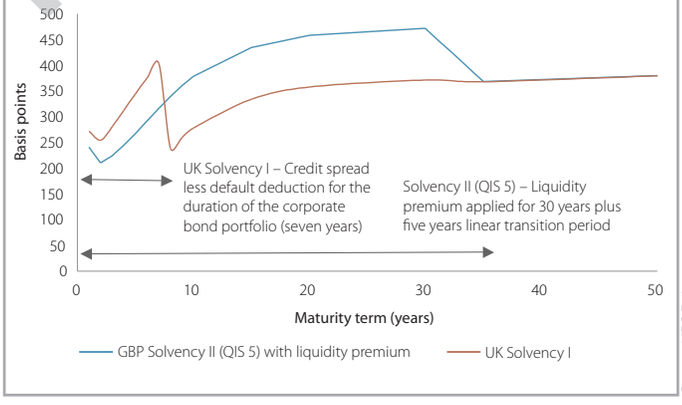
The liquidity premium is determined as 50% x (iBoxx Corporate Spread – 40bp). The discount curve is independent of the assets held in the underlying portfolio. (For example, an insurer would use the same curve regardless of whether the portfolio held is invested in government bonds or corporate bonds.)

It is worth noting that the period for which liquidity premium applies is fixed at 30 years under the Solvency II (QIS 5) curve.

Under the UK Solvency I approach, which is also known as Pillar I, various methods exist and, for annuity providers, it can be interpreted as the credit spread less a default deduction for the duration of the corporate bond portfolio and a reinvestment assumption of swap – 10bp.

The discount curve is linked to the yield of the underlying asset portfolio and, in this example, the period for which the additional credit spread applies is set to the duration of the corporate bond portfolio at seven years. Figure 1 provides a comparison of the two discount curve approaches using UBS Delta.

1. Liability zero-coupon discount curves, August 17, 2011



Source: UBS Delta

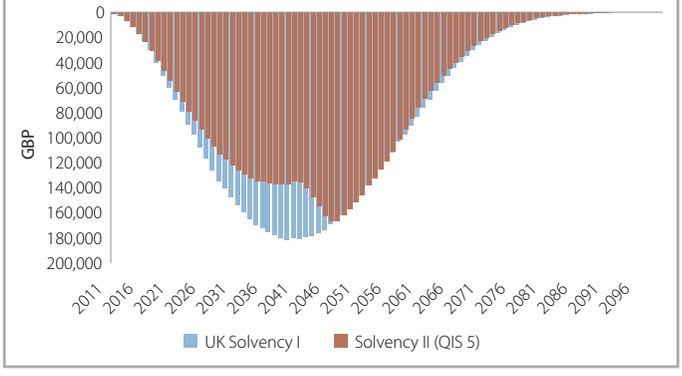
Example

To illustrate this, we create a sample asset portfolio (based on iBoxx GBP corporate bonds with seven-year duration) and liability stream in UBS Delta. A swap overlay has been added to match the interest rate sensitivity of the assets and liabilities on a UK Solvency I basis.

Interest rate risk (PV01) sensitivity analysis

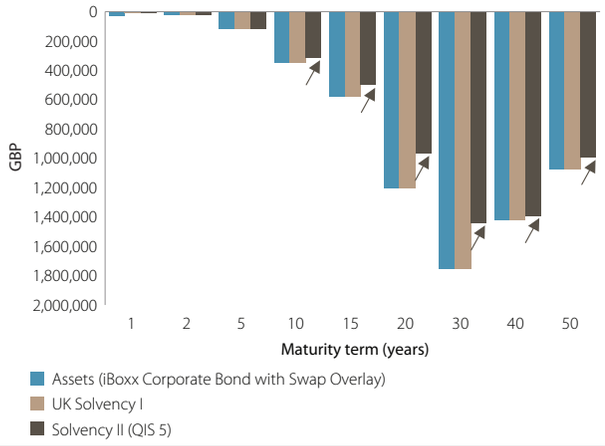
Using UBS Delta, we have generated a PV01 profile to compare the interest rate sensitivity under the two approaches. (PV01 is the change in present value caused by a 1bp (0.01%) parallel move in the yield curve. It is a measure of the sensitivity of the asset's price to interest rate movements.)

2. Liability PV01 profile



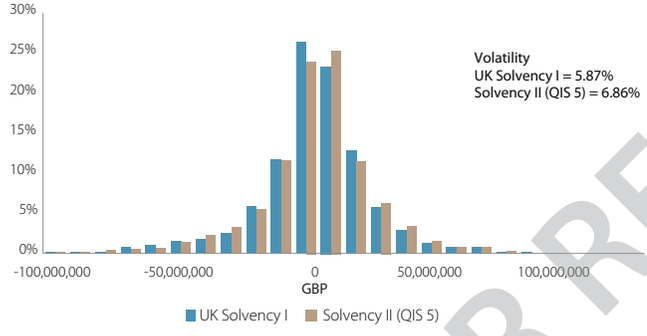
Source: UBS Delta

3. Asset and liability PV01 profile



Source: UBS Delta

4. Distribution of the relative asset liabilty values using historic value-at-risk



Source: UBS Delta

Discounting the liabilities in our example using the Solvency II curve in figure 1 has changed the total interest rate sensitivity of the liabilities, particularly between the seven- and 30-year maturity tenor. The transition effect of the liquidity premium from maturity tenor of 30–35 years can also be observed (see figure 2).

Assessing hedging impact

By bucketing the annual PV01 into maturity term buckets, it can be seen that partial unwinding of the swaps is required at 10-year, 15-year, 20-year, 30-year, 40-year and 50-year tenor points in order to re-hedge the portfolio under a Solvency II (QIS 5) basis. The original hedge is now not the optimal hedge (see figure 3).

Assessing mismatch volatility using a historic VaR model

While the PV01 analysis is effective in assessing the mismatch of assets and liabilities at a particular point in time, the UBS Delta historic VaR model can be used to assess how the portfolio (including the corresponding hedge) would have performed over a historic period (see figure 4).

As expected, the change of curve used to discount the liabilities has reduced the hedge effectiveness, shown by the increase in the relative asset liability mismatch volatility.

Summary

While the Solvency II regulations are being finalised, the ability to perform what-if analyses on liabilities and assets, using calibrated curve data and pre-Solvency II analytics (as found in UBS Delta) can be extremely valuable.

UBS Delta can also be used to compare the values of assets and liabilities under Solvency I discounting regimes for other European countries. An in-depth analysis is available for client portfolios on request.

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About UBS Delta

UBS Delta is UBS's award-winning portfolio analysis and risk management system. Clients use UBS Delta to measure and manage risk, attribute performance and optimise portfolios across asset classes. Risk measures include sensitivities, deltas and other greeks, VaR using both analytic and historic approaches, full revaluation scenario analysis as well as liquidity scoring and anticipated Solvency II capital charge for for multi-asset portfolios.

UBS Delta builds around 5,000 cleaned market, index, issuer, Libor, government and inflation curves every day, as well as supporting more than 200,000 bonds in over 35 currencies, credit default swaps on more than 4,500 entities, CDX/iTraxx indexes and about 150,000 equity names across various exchanges.

We run regular education sessions, helping our clients to make best use of the system's functionality, including sessions on Solvency II analytics.

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