IFRS 17 Insight Series

Author
Nick Jessop
Senior Director
Research

Contact Us
Americas
+1.212.553.1653
Europe
+44.20.7772.5454
Asia-Pacific
+852.3551.3077
Japan
+81.3.5408.4100

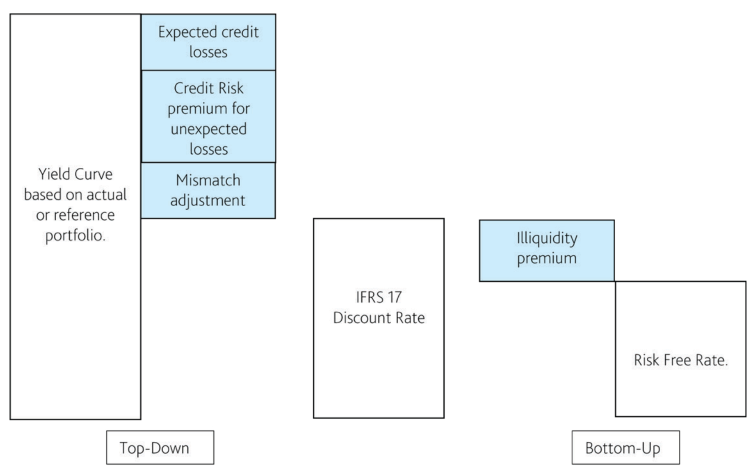
Permitted approaches for constructing IFRS 17 Discount Rates

Introduction

IFRS 17 introduces a requirement for insurers to use fair value and market-consistent approaches to liability valuations as the basis for reporting their accounts. Insurers face a significant challenge in clearly differentiating between the separate components of their balance sheet, and in doing so without introducing artificial noise or volatility into their reporting.

There is likely to be significant scope for accounting mismatches arising from the varied treatment of different aspects of their business. These accounting mismatches, in theory are minimal when assets are measured using fair value options (as opposed to amortized costs[1]). However, careful consideration has to be made of the approach to constructing the discount rates for the insurance contracts to ensure that the net finance results clearly (and exclusively) reflect changes in economic conditions. IFRS 17 allows for two different approaches to yield curve construction and discounting, which in theory, although not necessarily in practice, produce equivalent results. The two approaches are referred to as 'top-down' or 'bottom-up', and are shown in Figure 1.

Figure 1: IFRS 17 yield curve constructing approaches



This paper outlines the key considerations to be addressed when using each approach.

1. Given that the IFRS 17 regulation specifies fair value & market-consistent treatment of liabilities, there is a strong incentive for insurers to use the option of reporting fair value through OCI for assets, even when they are classified as 'held to maturity'. This is in order to avoid accounting mismatches leading to significant volatility in the net financial results (e.g. investment income from assets plus insurance finance expenses from liabilities).

The Bottom-Up Method

Defining a Basis for the Risk-Free rate

A fully liquid risk free yield curve is the foundation for the 'bottom-up' approach outlined in Figure 1. The IFRS 17 standard does not explicitly define the basis for deriving a risk free yield curve. However, it references traded instruments which contain negligible levels of credit risk, are highly liquid, with reliable prices, and cover a broad range of maturities, including longer dated durations and terms. The most common two bases for defining risk free curves used by insurers are either government bond markets, or inter-bank swap rates. However, several alternative bases could potentially be used. Overnight interest rate swaps (OIS swaps) have become increasingly standard in the banking sector. Other options include treasury futures, which are traded over exchanges in increasing volumes, CDS insured government debt, or even low risk (secured) corporate bonds.

In, Europe the two regulatory regimes of Solvency II (SII) and the Swiss Solvency Test (SST) specify swaps and government bonds respectively. For many insurers operating in these regions, consistency might prove a critical consideration in their choice of risk free basis. In other markets, like Canada and the Asia Pacific region, available instruments and market transparency might prove more significant, and industry approaches might be more heterogeneous.

Unlike SII and the SST, where the risk-free or risk-neutral valuation bases are prescribed, there might be scope to use different approaches, or even combine approaches across different portfolios, given that the liquidity adjustment can be estimated relative to different risk-free bases.

Constructing (Fitting) the Risk-Free Curve

The method for fitting the risk-free curve is not explicitly defined in the IFRS standards. Several non-parametric approaches to curve fitting are potentially available, including bootstrapping and fitting cubic or quadratic splines. These approaches do not necessarily guarantee smooth curves, particularly when there is a requirement for the forward rates to be smoothed. But they can be adapted to this purpose when, and if, it is considered appropriate. Fitting a curve through each and every government bond, in particular, can lead to spurious yield curve 'kinks' when there are many different issuances grouped close together in maturity. Parametric approaches to fitting the curves are also possible, of which the most common are variants of the Nelson-Seigel model and the Smith-Wilson technique, which was the curve fitting approach adopted for SII and International Capital Standards.

Adjustments To The Risk-Free Curve

The most common adjustment applied to curves is likely to be a credit adjustment, for example, when it is clear that the instruments being used carry some level of credit risk, as with high-quality corporate bonds or lower quality sovereigns. Simple adjustments like removing a small number of basis points from all maturities to account for credit risk are relatively common, as in the SII credit adjustment. More sophisticated adjustments might include using historical databases on probability of default (PD), transitions and loss given default (LGD), or structural models forecasting term structure for PD and LGD. Another approach could involve using CDS spreads to adjust the curve to represent 'default insured' bonds. These approaches are discussed at further length in the relevant section on the top-down approach.

Estimating Illiquidity Premium for the Liabilities

The most challenging aspect of the bottom-up approach is most likely to be calculating the illiquidity premium adjustment. At a superficial level, the adjustment looks similar to the SII volatility and matching adjustments, known as VA and MA adjustments respectively. However, these adjustments are essentially illiquidity premia estimated for asset portfolios and then carried over, or transferred to the liabilities discount curve. The fundamental approach in IFRS 17 is more explicitly defined. It is an illiquidity adjustment appropriate for the liabilities, while the mechanism for calculation and justification is much more open to interpretation.

In practice, we would expect the problem to be broken down into two steps:

» First, assess, and quantify the degree of liability illiquidity in a contract or group of contracts.

» Second, calibrate the illiquidity premia to a market estimate of liquidity premia.

Estimates of the degree of liability illiquidity should be based on the features of the portfolio of contracts under consideration. For example, how easy and likely is it that the contracts surrendered? While the calibration of the level of the illiquidity adjustment could be inferred from asset portfolios, which are most likely fixed income due to the predictability of their cash flows.

Assuming this approach is used, the market calibration of illiquidity level has significant scope to borrow/leverage from the top-down methods. Unlike Solvency II's Matching Adjustment, where business is defined as matched or not, the degree of liquidity is important. The degree of liability illiquidity might end up being banded: for example, fully liquid or illiquid, 25% or 50% illiquid contract portfolios. This would mean that a single term structure of illiquidity levels estimated from market data could be applied across a range of different portfolios of contracts with different illiquidity characteristics.

The Top-Down Method

Defining a Yield Curve Based on Actual or Reference Portfolio

At first glance, calculating the starting point for the top-down approach might seem a straightforward technical task. Assuming the backing assets for a particular portfolio of contracts are clearly defined, then it should be relatively straightforward to obtain a market price for the portfolio as a whole by building up the constituent holdings. Similarly, it would then be possible to infer the effective portfolio yield using an internal rate of return calculation applied to contractual cash flows. However, usually a flat discount curve is not likely to be suitable or acceptable for IFRS 17 discounting. Constructing the term structure of a yield curve based on a diverse portfolio of holdings is not as simple or straightforward as fitting a risk-free curve. Determining spread curves for a universe of credit risky bonds is a closely analogous exercise. While it is possible to source these types of curves from data vendors like Bloomberg, and from broker-dealers or trading desks, the techniques applied can be as diverse as the resulting curves. For the IFRS 17 application, a key consideration is that the yield curve should ideally replicate the overall price of the portfolio when applied to the assets. It does not, necessarily, however, need to replicate prices of the individual holdings. This distinction is important to avoid accounting mismatches and volatility arising between assets which are marked directly to market and contract liabilities, which are discounted using curves.

At the moment, we are not aware of a standardized and effective method which insurers can use for this part of the curve construction. Insurers are likely to leverage existing methods which might not be ideal for the purpose at hand. This part of yield curve construction is ripe for improvement and a focus for industry-wide research and development.

Estimating Expected Credit Loss and Adjusting for Unexpected Losses (Credit Risk Premia)

Having defined the asset portfolio yield curve, the components of credit risk need to be removed. This can be done in two steps – first estimating expected losses due to default, and then adjusting for unexpected losses (for example, the associated credit risk premium).

The five most common approaches which might be applied are:

1. Using structural modeling techniques (for example, Merton, Kealhoffer- Vasicek or similar). Moody's Analytics EDF™ (Expected Default Frequency) is a widely used industry standard. If estimates for probability of default (PD) and loss given default (LGD) are combined, estimates of credit risk premia[2] (allowing for liquidity and other non-credit contributors to spread netted off) could form the basis of the credit adjustment. Two key advantages of choosing this approach would be broad sector coverage (for example, spanning well beyond rated issuances) and issuer-specific estimates of credit risk (rather than generic proxies).
2. Historical analysis. Many historical databases of default, transitions, and LGD exist, including some produced by rating agencies like our sister company, Moody's Investors Service (for example, the Moody's Investors Service historical default database). This approach is the basis for the SII Volatility and Matching Adjustment estimates and so might be preferred by insurers in Europe. Adjusting for credit risk premia again needs to be done and might be based on expected losses in the tail. One downside of this technique is that the databases tend to be available for only a narrow range of credit sectors, for example, corporate bonds. In addition, there may be questions over the representativeness of the data for forward looking forecasts, and the adjustments tend to be through-the-cycle, for example, not adjusted to the current market or economic environment.

2. The use of a risk premia to explain market prices can be somewhat unintuitive to those used to the strictly risk-neutral valuation framework widely used in option and derivative pricing work. However, the use of risk premia to explain market prices (for example, market spreads) remains relatively common in credit and has its roots in the original Merton (1974) credit model. Some researchers are tempted to argue that the use of risk-premia in pricing the credit default option relies on somewhat weak justification relating to the difficulty in hedging the underlying asset risk. That said, it avoids the need to introduce another (more ad-hoc) explanatory variable, namely the 'implied volatility' concept used broadly in option pricing. Note that a more heuristic derivation (following say the lines of Taleb 2017) leveraging put-call parity cannot really be used as the underlying firm asset value does not trade independently (rather firm equity and debt are priced separately by markets).

3. Market-based methods. Credit Default Swaps might potentially be used to estimate credit risk, as might spreads on highly liquid bonds. One significant problem with this technique is that these markets can be as susceptible to pricing effects like illiquidity as the reference asset portfolio itself. As a result, these techniques might have issues in terms of overstating the credit adjustment or not being adequately representative of credit risk in the portfolio.
4. Simpler proxy techniques. Given the difficulties in estimating and isolating the credit risk premia, it is relatively common to apply simple scaling relationships to the spread levels themselves. For example, one could take away several basis points and then multiply the remaining spread by a multiplier less than 1. The SII VA and MA methodologies apply these types of adjustment as a conservative backstop to the historical analysis without much in the way of explanation. While a simple proxy is easy to implement and to apply, the techniques are highly subjective and do not easily lend themselves to rigorous justification, even if they can be robustly validated and tested.
5. Regression-based estimates of either credit losses or liquidity premia as a function of other explanatory variables. For example, Van Loon et al (2015) estimate liquidity premia as a function of standard bond characteristics including credit quality, sector and maturity.

Asset-Liability Mismatch Adjustments

Having determined the credit adjustment, the insurer must then make an adjustment for asset-liability mismatches. To do so, they must first calculate duration mismatches, or key rate duration mismatches, and higher-order effects like convexity mismatches. These economic risk exposures can then be converted into a mismatch adjustment by estimating probabilistic tail losses that then result from adverse yield curve moves.

Scope for Methodological Consistency and Standardization.

Most aspects of the two yield curve construction approaches are specific to one approach or another. One area ripe for the emergence of an industry-standard consistent approach might be around the method for constructing a yield curve based on a (potentially diverse) actual or reference portfolio. This step in the top-down approach is likely to be important in the context of eliminating accounting mismatches. Other aspects of the discount curve approaches are inevitably liability-specific.

Calculations of the mismatch adjustments, and the degree of illiquidity in liabilities are inevitably done by insurers on a portfolio-by-portfolio basis.

While the corrections for credit losses and credit risk adjustments are associated with the top-down approach, the need to estimate the level of illiquidity premia for bottom-up adjustments could leverage similar underlying modeling approaches. Insurers who choose to use a combination of bottom-up and top-down, in particular, might prefer consistent methodological approaches. Across the industry, there is significant scope for divergence of approach in these areas and a lack of industry consensus/standard. Modeling of expected defaults and losses given default is an area of expertise for Moody's Analytics, and we can supply both standard and customized solutions.

Considerations Common to Either Approach

General Principles

There are some core principles used in constructing yield curves. For yield curve fits we would generally consider the following points:

- Accuracy: liquid markets should be accurately priced
- Continuity: the forward curve should be continuous
- Smoothness: the forward curve should be smooth, for instance, the first derivative should be continuous
- Neutrality where data is missing: avoid extrapolating or interpolating spurious features or views, such as oscillations, humps, or bumps

While not all these points are explicitly stated in the IFRS 17 standard, we believe they must be considered carefully when developing a yield curve method.

Inflation-Linked Liabilities (Including Different Types of Inflation)

When cash flows are not specified in nominal terms, but rather as more than inflation, it is appropriate to use real yield curves for discounting. Market instruments used to construct these curves would typically be government-issued inflation linked bonds, or inflation swaps. In most markets, government bonds are likely to be more liquid, although there can be exceptions in countries like the UK and Netherlands, where defined benefit pension funds are frequent traders in the inflation swap markets. Most of these market instruments are linked to CPI or RPI measures. It is directly relevant for many annuity contracts, but most general insurance contracts might be more closely linked to other inflationary measures, leading to a need to adjust the curves or expected cash flows accordingly.

Yield Curve Extrapolation

One problem specific to long dated contracts like annuities, is extrapolation of yield curves well beyond the longest dated liquid market maturities. Having defined a 'Last Liquid Point' for market quotes there are several possible approaches to use for longer maturities - extrapolating 'flat' based on last liquid spot or forward rate or extrapolating to an 'ultimate' spot or forward rate. The latter approach has become the most common and is the basis for the SII EIOPA specified yield curves. Using this approach, it is necessary to set both an ultimate forward rate level and an extrapolation method. The ultimate forward rate level is based on economic expectations for long term real and inflation rates, possibly including higher order term premia and convexity adjustments. The extrapolation technique is parametric, with Nelson Seigel and Smith Wilson being two examples. As noted previously, Smith Wilson has been adopted for SII.

One point which might well require methodological innovation is extrapolation for the top-down basis. Given the challenges inherent in fitting a curve to an asset portfolio (one which Smith Wilson, for example, is likely not well suited to), it is probable that the extrapolation needs to be explicitly separated from the method used to fit market data.

Incorporation in Stochastic Scenarios

For a portfolio of contracts which must be addressed using the variable fee approach, several different options for contract valuation are needed, including simple analytical approximations and the use of replicating portfolios. One of the most flexible solutions is the use of stochastic market-consistent scenarios generated using an Economic Scenario Generator (ESG). The IFRS 17 standard states that insurers can choose to divide the cash flows generated by variable fee business into separate deterministic cash flows (which can be modeled using yield curves defined as in the 'standard approach'), and stochastic market linked cash flows which must be modeled using option-based valuation techniques. An alternative and possibly more parsimonious approach might be to produce customized IFRS ESG calibrations which embed the IFRS valuation curves as the 'risk-free' basis for valuation. Given the scope for proliferation of different curves for different portfolios of business, this approach might lead to a requirement for many different ESG calibrations. Automation of the process could prove important.

Discussion and Conclusions

The IFRS 17 discount rates (yield curves) are an important component of the new standard. The discount curves affect the values which are shown on the balance sheet: both present value of fulfillment cash flows and contract service margin. They also affect profit and loss and other comprehensive income (OCI), determining the level of insurance finance expenses. The methods applied for yield curve are therefore an important consideration for all insurers following the guidelines.

With IFRS 17, insurers are required to clearly separate out profit and loss or OCI from assets (investment portfolios held) and liabilities (contracts issued). They are also required to report the effect of changes in economic market conditions which lead to changes in market yield curves, on both investment income and insurance financial expenses. For insurers who closely match their asset portfolios to their liability exposures, it should be expected that these separate lines largely net out. However, the extent to which the residual market risk exposures represent the results of true economic mismatches, rather than accounting mismatches (arising from discrepancies in methodology applied to the contract liabilities), depends in no small way on the methods used for yield curve construction.

Our assessment of the different components and options of the yield curve methods lead us to recommend that insurers think carefully about the following points:

» Construction of yield curves for associated (or reference) asset portfolios.

» Estimate of credit risks and especially the associated credit risk premia.

» Estimate of illiquidity (both the degree of liability illiquidity and market price or illiquidity).

Given the requirements for granular modeling of different portfolios of contracts, practical considerations such as proliferation of yield curves, reusability of analytics produced in each step of the calculation, data availability, and suitability and ease of automation (particularly where a correction has to be made specific to a particular line and cohort of business) are also important.

References

IFRS 17 Insurance Contracts – the accounting model in one page - http://www.ifrs.org/-/media/project/insurance-contracts/ifrs-standard/ifrs-17-accounting-model-a3-jan-2018.pdf

IFRS Insurance Contracts – project summary - http://www.ifrs.org/-/media/project/insurance-contracts/ifrs-standard/ifrs-17-project-summary.pdf

EIOPA, Risk Free Interest Rate Term Structures, https://eiopa.europa.eu/regulation-supervision/insurance/solvency-ii-technical-information/risk-free-interest-rate-term-structures

Merton, R. C. (1974), "On the Pricing of Corporate Debt", Journal of Finance, Volume 29, No. 2

Taleb, N. (2015), "Unique Option Pricing Measure Without Dynamic Hedging or Complete Markets', European Financial Management, Volume 21, Issue 2

Van Loon, P., Cairns, A, McNeil, A, Veys, A. (2015), "Modeling the liquidity premium on corporate bonds", Annals of Actuarial Science, Volume 9, Issue 2

Moody's Analytics articles on Yield Curve Fitting:

Antonio, D., and Roseburgh, D. (2008) "Fitting the yield curve: Spline interpolation and Nelson-Siegel extrapolation", Article 2008-1165

Sorensen, S. (2010) "Interest Rate Calibration: How to Set Long-Term Interest Rates in the Absence of Market Prices", Article 2010-1838

Isted, G., Voynovski, S. (2016) Long-Term Interest Rates and the Ultimate Forward Rate Assumption Update 2016

CONTACT DETAILS

Visit us at **moodysanalytics.com** or contact us at a location below.

AMERICAS
+1.212.553.1653
clientservices@moodys.com

EMEA
+44.20.7772.5454
clientservices.emea@moodys.com

ASIA (EXCLUDING JAPAN)
+852.3551.3077
clientservices.asia@moodys.com

JAPAN
+81.3.5408.4100
clientservices.japan@moodys.com

SP51415