

## IFRS 17 Series

### Author

Steven Morrison

Senior Director-Research

### Contact Us

#### Americas

+1.212.553.1658

clientservices@moodys.com

#### Europe

+44.20.7772.5454

clientservices.emea@moodys.com

#### Asia (Excluding Japan)

+852.2916.1121

clientservices.asia@moodys.co

#### Japan

+81.3.5408.4100

clientservices.japan@moodys.com

## Implementing IFRS 17 Discount Curves: Theoretical and Practical Challenges

### Introduction

IFRS 17 requires liability cash flows to be discounted at rates that reflect the characteristics of the cash flows including their liquidity. As a principles-based standard, IFRS 17 does not specify liability discount rates and entities must develop their own assumptions. Such assumptions are important as they could have significant implications for the IFRS 17 balance sheet, future profits, and volatility.<sup>1</sup> This has reignited the classical actuarial debate of how to estimate the illiquidity premium, a topic which has occupied actuaries since the introduction of market-consistent reporting in the early 2000s. Recently, significant thought and effort have gone into the specification of IFRS 17 discount rates allowing for liquidity.<sup>2</sup>

The challenge of incorporating the illiquidity premium extends beyond estimating its size. For example, the insurer might apply the illiquidity premium to products where stochastic models are used for valuation. This presents its own set of challenges, both theoretical and practical, to which insurers are now turning their attention. In this paper, we compare two potential approaches.

### Valuation of contracts with participation features under IFRS 17

IFRS 17 does not prescribe the methodology for valuation of contracts with participation features, in particular contracts with embedded guarantees. However, a standard approach adopted in other contexts (such as calculation of Best Estimate Liabilities under Solvency II) is to use stochastic modeling techniques with scenarios generated using a risk-neutral Economic Scenario Generator (ESG).

Discount rates are used in two separate parts of this calculation:

- » To discount liability cash flows.
- » To calculate returns on underlying items. In a risk-neutral ESG, the expected returns on all assets are equal to the assumed “risk-free” interest-rate.

Now, it seems consistent with the principles of the standard that (stochastic) liability cash flows are discounted using a rate that reflects the liquidity characteristics of those cash flows. What is less clear is whether expected returns on the underlying items should be equal (on average) to the liability discount rate, or some other rate?

1 *Profit Emergence Under IFRS 9 and IFRS 17: The impact of choice of liability discount rate*, Gavin Conn & Steven Morrison  
<https://www.moodysanalytics.com/-/media/article/2019/profit-emergence-under-ifs9-ifs17-the-impact-of-choice-of-liability-discount-rate.pdf>

2 *A cost of capital approach to estimating credit risk premia*, Alasdair Thompson & Nick Jessop  
<https://www.moodysanalytics.com/-/media/article/2018/a-cost-of-capital-approach-to-estimating-credit-risk-premium.pdf>

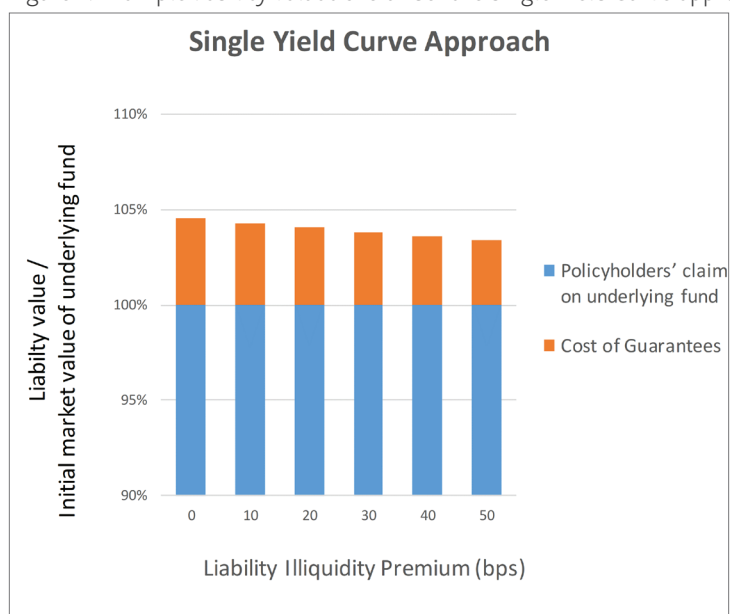
## The Single Yield Curve approach

There is a precedent for this question. The Solvency II Volatility Adjustment (VA) is an adjustment to risk-free interest rates that can be interpreted as allowing for the illiquidity of liabilities in the calculation of the Best Estimate Liabilities (BEL). In our experience, insurers using stochastic modeling techniques to calculate the Solvency II BEL have typically incorporated the VA both in the rate used to discount liability cash flows *and* in the rate used to calculate average returns on assets.<sup>3</sup> We call this approach the Single Yield Curve approach since a single yield curve is used both for calculating returns on assets and for discounting.

To illustrate, suppose that we have a contract where the policyholder receives the value of an underlying fund in 10 years' time, subject to a minimum guarantee equal to the initial market value of the assets in the fund. We assume no charges for simplicity.

Figure 1 shows how the value of this liability, as a proportion of the initial market value of the underlying fund, varies depending on the assumed illiquidity premium on the liabilities.<sup>4</sup> The value is broken down into two components: (1) the value of the policyholders' claim on the underlying fund; (2) the value of any guarantee shortfalls (the Cost of Guarantees).

Figure 1: Example liability valuations under the Single Yield Curve approach



We note that the Cost of Guarantees decreases with increasing illiquidity premium, partly because the cash flows are being discounted at a higher rate, but also because the average return on the fund is assumed to increase with the illiquidity premium and so the guarantee is less likely to bite. We also see that the main component of the liability, the value of the policyholders' claim to the underlying fund, is always equal to 100% of the initial market value of the assets in the fund and does not depend on the illiquidity premium. The rate used to discount is exactly equal to the average return on the underlying fund and so cancels out in the valuation.

<sup>3</sup> Such an approach is proposed in *Practical application of Liquidity Premium to the valuation of insurance liabilities and determination of capital requirements*, CRO Forum (2011), which suggests "a proportion of the liquidity premium should be added to the swap curve for both the accumulation and discount rate."

<sup>4</sup> Valuations assume a Black-Scholes model with a "risk-free" rate of 2% (+ illiquidity premium) and fund implied volatility of 10%.

From an implementation point of view, the single yield curve approach simply involves replacing the risk-free yield curve in the ESG with the liability discount curve. We note, however, two potential issues with the approach, the first practical and the second theoretical:

- » When you change the risk-free yield curve in an ESG, it typically has a knock-on effect on asset prices that are calculated in the ESG. Risk-free bond prices obviously change, as do corporate bond prices, and option prices.

Some insurers have tried to adjust for such impacts by recalibrating other parameters in the ESG to compensate for these changes. In particular, if the liability discount curve incorporates an illiquidity premium (and so risk-free rates are higher than those implied from risk-free assets in the market), the insurer can recalibrate the ESG credit spread model to ensure that the model still recovers market corporate bond yields. This is achieved by assuming that model credit spreads are lower than market spreads to offset the assumed illiquidity premium. However, this approach has its limits: where corporate bond prices are trading at a spread that is lower than the assumed illiquidity premium,<sup>5</sup> these prices cannot be matched by the model unless it permits negative spreads.

More importantly, such changes to risk-free rates and credit spreads could (depending on the choice of ESG models) result in changes to volatility of asset returns, which in turn result in changes to prices of options on those assets. Though such changes could be allowed for in recalibration of other model parameters, this creates an additional calibration effort which could be significant.

The calibration issues can be avoided by applying the illiquidity premium as an adjustment to ESG outputs, such as asset returns and discount factors, rather than adjusting the ESG's input risk-free yield curve (and other calibration parameters). However, application of such adjustments is likely to require implementation effort within the ESG and/or cash flow model.

- » If you assume an illiquidity premium on liability discount rates, it seems natural to expect a corresponding illiquidity *discount* in liability valuations. Using the Single Yield Curve approach, we observe this behavior in the valuation of the Cost of Guarantees. However, we do not see it in the valuation of the policyholders' claim to the underlying fund, which is always equal to the market value of the underlying fund regardless of the assumed illiquidity premium. If we expect to see that the illiquidity premium is reflected in the valuation of the policyholders' claim to the underlying fund, we need a different approach.

## The Dual Yield Curve approach

An alternative approach is to use two different rates:

1. Rate used to discount liability cash flows = risk-free rate + liability illiquidity premium.
2. Expected return on underlying items = risk-free rate + asset illiquidity premium.<sup>6</sup>

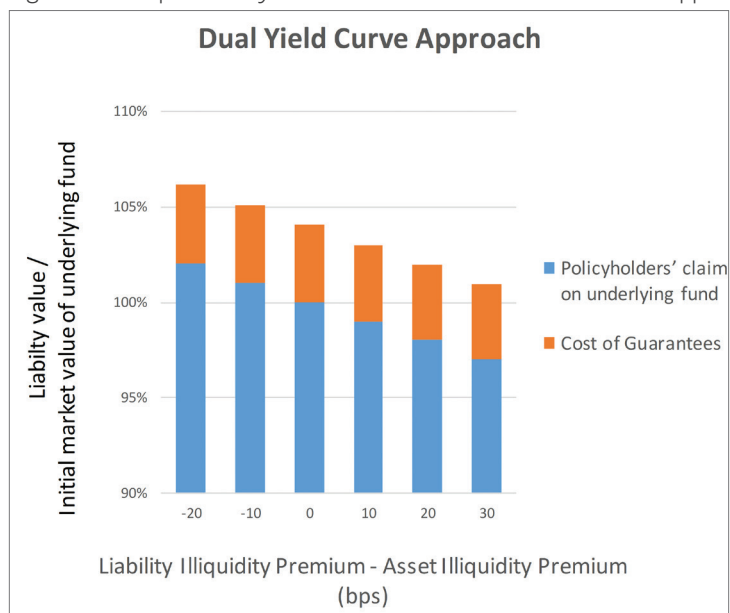
We call this approach the Dual Yield Curve approach.

Figure 2 shows how the value of the example contract varies with the liability illiquidity premium under the Dual Yield Curve approach. Here we assume an asset illiquidity premium of 20 bps, and the liability illiquidity premium is expressed in terms of its difference relative to the assumed asset illiquidity premium.

<sup>5</sup> For example, this could be the case for bonds with a higher credit quality than the average rating of the bonds in the reference portfolio used to derive the illiquidity premium.

<sup>6</sup> Strictly speaking, expected returns on each individual asset class are adjusted for their specific illiquidity premia.

Figure 2: Example liability valuations under the Dual Yield Curve approach



As with the Single Yield Curve approach, the Cost of Guarantees decreases with increasing illiquidity premium because the cash flows are being discounted at a higher rate. However, the effect is less than in the Single Yield Curve approach (as under the Single Yield Curve approach there is an additional effect due to the liability illiquidity premium impacting on the expected return on assets).

More significantly, the value of the policyholders' claim to the underlying fund is only equal to the market value of the underlying fund in the case where liability and asset illiquidity premia are the same. If the liability illiquidity premium is greater than that on the underlying assets, the policyholders' claim to the underlying fund is valued at a discount to the market value of the fund, reflecting that the policyholder has given up some liquidity by accessing the fund through an insurance "wrapper" (rather than buying the fund assets directly). On the other hand, if the liability illiquidity premium is less than that on the underlying assets, the policyholders' claim to the underlying fund is valued at a premium to the market value of the underlying assets, reflecting that the insurance wrapper provides additional liquidity in this case (relative to buying the fund assets directly).<sup>7</sup>

In terms of practical implementation within an ESG, both the Single Yield Curve and Dual Yield Curve approaches assume that the expected return on assets includes an illiquidity premium relative to the risk-free rate, with the liability illiquidity premium being used in the former case and the asset illiquidity premium being used in the latter. As noted in the discussion of the Single Yield Curve approach in the previous section, the implementation of an illiquidity premium as an adjustment to the risk-free curve can create issues related to calibration of other ESG assumptions, in the event that the liability illiquidity premium exceeds the market spread on assets. The Dual Curve approach should avoid this problem, as the assumed asset illiquidity premium should never exceed the asset's market spread. Alternatively, the asset illiquidity premium can be implemented as an adjustment to ESG output asset returns, rather than adjusting the ESG's input risk-free yield curve. Either way, the liability illiquidity premium would be applied as an adjustment to output discount factors.

<sup>7</sup> Similar differences are observed in closed-end funds, which often trade at a discount or premium to the underlying Net Asset Value. This "puzzle" is sometimes (at least partly) attributed to relative liquidity differences between the underlying assets and the closed-end fund.

## What is the 'right' approach?

As far as we are aware, there is no standard accepted theory of valuation incorporating illiquidity. In particular, the classic option pricing literature is based on a dynamic replication argument that makes no allowance for the illiquidity characteristics of the cash flows being replicated, nor those of the replicating portfolio. So what is the “right” approach?

Unfortunately, the standard itself does not provide a definitive answer. As IFRS 17 does not prescribe the methodology and assumptions to be used in valuing liabilities, insurers need to use judgment as to the appropriate approach given their views on illiquidity, and be able to justify such assumptions to auditors. In particular, the incorporation of illiquidity premia into existing stochastic modeling approaches could result in changes to the interpretation of standard accepted tests of appropriateness (in particular “martingale” or “1=1” tests), requiring careful communication with auditors.

## CONTACT DETAILS

Visit us at [moodyanalytics.com](https://www.moodyanalytics.com) or contact us at a location below.

### AMERICAS

+1.212.553.1653

[clientservices@moody.com](mailto:clientservices@moody.com)

### EMEA

+44.20.7772.5454

[clientservices.emea@moody.com](mailto:clientservices.emea@moody.com)

### ASIA (EXCLUDING JAPAN)

+852.3551.3077

[clientservices.asia@moody.com](mailto:clientservices.asia@moody.com)

### JAPAN

+81.3.5408.4100

[clientservices.japan@moody.com](mailto:clientservices.japan@moody.com)

© 2019 Moody's Corporation, Moody's Investors Service, Inc., Moody's Analytics, Inc. and/or their licensors and affiliates (collectively, "MOODY'S"). All rights reserved.

CREDIT RATINGS ISSUED BY MOODY'S INVESTORS SERVICE, INC. AND ITS RATINGS AFFILIATES ("MIS") ARE MOODY'S CURRENT OPINIONS OF THE RELATIVE FUTURE CREDIT RISK OF ENTITIES, CREDIT COMMITMENTS, OR DEBT OR DEBT-LIKE SECURITIES, AND MOODY'S PUBLICATIONS MAY INCLUDE MOODY'S CURRENT OPINIONS OF THE RELATIVE FUTURE CREDIT RISK OF ENTITIES, CREDIT COMMITMENTS, OR DEBT OR DEBT-LIKE SECURITIES. MOODY'S DEFINES CREDIT RISK AS THE RISK THAT AN ENTITY MAY NOT MEET ITS CONTRACTUAL FINANCIAL OBLIGATIONS AS THEY COME DUE AND ANY ESTIMATED FINANCIAL LOSS IN THE EVENT OF DEFAULT OR IMPAIRMENT. SEE MOODY'S RATING SYMBOLS AND DEFINITIONS PUBLICATION FOR INFORMATION ON THE TYPES OF CONTRACTUAL FINANCIAL OBLIGATIONS ADDRESSED BY MOODY'S RATINGS. CREDIT RATINGS DO NOT ADDRESS ANY OTHER RISK, INCLUDING BUT NOT LIMITED TO: LIQUIDITY RISK, MARKET VALUE RISK, OR PRICE VOLATILITY. CREDIT RATINGS AND MOODY'S OPINIONS INCLUDED IN MOODY'S PUBLICATIONS ARE NOT STATEMENTS OF CURRENT OR HISTORICAL FACT. MOODY'S PUBLICATIONS MAY ALSO INCLUDE QUANTITATIVE MODEL-BASED ESTIMATES OF CREDIT RISK AND RELATED OPINIONS OR COMMENTARY PUBLISHED BY MOODY'S ANALYTICS, INC. CREDIT RATINGS AND MOODY'S PUBLICATIONS DO NOT CONSTITUTE OR PROVIDE INVESTMENT OR FINANCIAL ADVICE, AND CREDIT RATINGS AND MOODY'S PUBLICATIONS ARE NOT AND DO NOT PROVIDE RECOMMENDATIONS TO PURCHASE, SELL, OR HOLD PARTICULAR SECURITIES. NEITHER CREDIT RATINGS NOR MOODY'S PUBLICATIONS COMMENT ON THE SUITABILITY OF AN INVESTMENT FOR ANY PARTICULAR INVESTOR. MOODY'S ISSUES ITS CREDIT RATINGS AND PUBLISHES MOODY'S PUBLICATIONS WITH THE EXPECTATION AND UNDERSTANDING THAT EACH INVESTOR WILL, WITH DUE CARE, MAKE ITS OWN STUDY AND EVALUATION OF EACH SECURITY THAT IS UNDER CONSIDERATION FOR PURCHASE, HOLDING, OR SALE.

MOODY'S CREDIT RATINGS AND MOODY'S PUBLICATIONS ARE NOT INTENDED FOR USE BY RETAIL INVESTORS AND IT WOULD BE RECKLESS AND INAPPROPRIATE FOR RETAIL INVESTORS TO USE MOODY'S CREDIT RATINGS OR MOODY'S PUBLICATIONS WHEN MAKING AN INVESTMENT DECISION. IF IN DOUBT YOU SHOULD CONTACT YOUR FINANCIAL OR OTHER PROFESSIONAL ADVISER.

ALL INFORMATION CONTAINED HEREIN IS PROTECTED BY LAW, INCLUDING BUT NOT LIMITED TO, COPYRIGHT LAW, AND NONE OF SUCH INFORMATION MAY BE COPIED OR OTHERWISE REPRODUCED, REPACKAGED, FURTHER TRANSMITTED, TRANSFERRED, DISSEMINATED, REDISTRIBUTED OR RESOLD, OR STORED FOR SUBSEQUENT USE FOR ANY SUCH PURPOSE, IN WHOLE OR IN PART, IN ANY FORM OR MANNER OR BY ANY MEANS WHATSOEVER, BY ANY PERSON WITHOUT MOODY'S PRIOR WRITTEN CONSENT.

CREDIT RATINGS AND MOODY'S PUBLICATIONS ARE NOT INTENDED FOR USE BY ANY PERSON AS A BENCHMARK AS THAT TERM IS DEFINED FOR REGULATORY PURPOSES AND MUST NOT BE USED IN ANY WAY THAT COULD RESULT IN THEM BEING CONSIDERED A BENCHMARK.

All information contained herein is obtained by MOODY'S from sources believed by it to be accurate and reliable. Because of the possibility of human or mechanical error as well as other factors, however, all information contained herein is provided "AS IS" without warranty of any kind. MOODY'S adopts all necessary measures so that the information it uses in assigning a credit rating is of sufficient quality and from sources MOODY'S considers to be reliable including, when appropriate, independent third-party sources. However, MOODY'S is not an auditor and cannot in every instance independently verify or validate information received in the rating process or in preparing the Moody's publications.

To the extent permitted by law, MOODY'S and its directors, officers, employees, agents, representatives, licensors and suppliers disclaim liability to any person or entity for any indirect, special, consequential, or incidental losses or damages whatsoever arising from or in connection with the information contained herein or the use of or inability to use any such information, even if MOODY'S or any of its directors, officers, employees, agents, representatives, licensors or suppliers is advised in advance of the possibility of such losses or damages, including but not limited to: (a) any loss of present or prospective profits or (b) any loss or damage arising where the relevant financial instrument is not the subject of a particular credit rating assigned by MOODY'S.

To the extent permitted by law, MOODY'S and its directors, officers, employees, agents, representatives, licensors and suppliers disclaim liability for any direct or compensatory losses or damages caused to any person or entity, including but not limited to by any negligence (but excluding fraud, willful misconduct or any other type of liability that, for the avoidance of doubt, by law cannot be excluded) on the part of, or any contingency within or beyond the control of, MOODY'S or any of its directors, officers, employees, agents, representatives, licensors or suppliers, arising from or in connection with the information contained herein or the use of or inability to use any such information.

NO WARRANTY, EXPRESS OR IMPLIED, AS TO THE ACCURACY, TIMELINESS, COMPLETENESS, MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE OF ANY CREDIT RATING OR OTHER OPINION OR INFORMATION IS GIVEN OR MADE BY MOODY'S IN ANY FORM OR MANNER WHATSOEVER.

Moody's Investors Service, Inc., a wholly-owned credit rating agency subsidiary of Moody's Corporation ("MCO"), hereby discloses that most issuers of debt securities (including corporate and municipal bonds, debentures, notes and commercial paper) and preferred stock rated by Moody's Investors Service, Inc. have, prior to assignment of any rating, agreed to pay to Moody's Investors Service, Inc. for ratings opinions and services rendered by it fees ranging from \$1,000 to approximately \$2,700,000. MCO and MIS also maintain policies and procedures to address the independence of MIS's ratings and rating processes. Information regarding certain affiliations that may exist between directors of MCO and rated entities, and between entities who hold ratings from MIS and have also publicly reported to the SEC an ownership interest in MCO of more than 5%, is posted annually at [www.moody.com](http://www.moody.com) under the heading "Investor Relations — Corporate Governance — Director and Shareholder Affiliation Policy."

Additional terms for Australia only: Any publication into Australia of this document is pursuant to the Australian Financial Services License of MOODY'S affiliate, Moody's Investors Service Pty Limited ABN 61 003 399 657AFSL 336969 and/or Moody's Analytics Australia Pty Ltd ABN 94 105 136 972 AFSL 383569 (as applicable). This document is intended to be provided only to "wholesale clients" within the meaning of section 761G of the Corporations Act 2001. By continuing to access this document from within Australia, you represent to MOODY'S that you are, or are accessing the document as a representative of, a "wholesale client" and that neither you nor the entity you represent will directly or indirectly disseminate this document or its contents to "retail clients" within the meaning of section 761G of the Corporations Act 2001. MOODY'S credit rating is an opinion as to the creditworthiness of a debt obligation of the issuer, not on the equity securities of the issuer or any form of security that is available to retail investors.

Additional terms for Japan only: Moody's Japan K.K. ("MJKK") is a wholly-owned credit rating agency subsidiary of Moody's Group Japan G.K., which is wholly-owned by Moody's Overseas Holdings Inc., a wholly-owned subsidiary of MCO. Moody's SF Japan K.K. ("MSFJ") is a wholly-owned credit rating agency subsidiary of MJKK. MSFJ is not a Nationally Recognized Statistical Rating Organization ("NRSRO"). Therefore, credit ratings assigned by MSFJ are Non-NRSRO Credit Ratings. Non-NRSRO Credit Ratings are assigned by an entity that is not a NRSRO and, consequently, the rated obligation will not qualify for certain types of treatment under U.S. laws. MJKK and MSFJ are credit rating agencies registered with the Japan Financial Services Agency and their registration numbers are FSA Commissioner (Ratings) No. 2 and 3 respectively.

MJKK or MSFJ (as applicable) hereby disclose that most issuers of debt securities (including corporate and municipal bonds, debentures, notes and commercial paper) and preferred stock rated by MJKK or MSFJ (as applicable) have, prior to assignment of any rating, agreed to pay to MJKK or MSFJ (as applicable) for ratings opinions and services rendered by it fees ranging from JPY125,000 to approximately JPY250,000,000.

MJKK and MSFJ also maintain policies and procedures to address Japanese regulatory requirements.