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Projections of Investment-Related Discretionary Elements

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Many products sold by life insurers in the United States include benefits that can adapt, within limits, to changing conditions via elements that can be set using discretion. Examples with links to capital markets include crediting rates in universal life or fixed deferred annuities, and cap or participation rates in indexed products.

One practice for setting crediting rates, if guarantees allow, is to set them equal to the book yield on an underlying portfolio less provisions for credit losses, investment management fees and a targeted product spread. This article describes this practice in more detail and suggests one approach for modeling credited rates in a risk-neutral context. The approach can be generalized to allow projections of other variables such as cap rates or dynamic lapses driven by competitor credited rates.

This article lays conceptual foundations associated with projecting investment-related discretionary elements of various life insurance and annuity products. It outlines potential implementation approaches that may be appropriate when calculations are performed in a risk-neutral setting, such as in market-consistent valuation frameworks like IFRS 17. Specifically, the article concludes that crediting rates in risk-neutral models can be projected as in real-world models, except that the modeled provision for expected credit losses should be modified to equal real-world expected losses initially, but over the projection reflect management's evolving expectation, moving ultimately to risk neutral expected losses.

CREDITING RATE DETERMINATION IN PRACTICE

Discretionary crediting rates are usually set with the goal of achieving a targeted difference between the net investment income generated by the underlying assets and the liability growth. This can be expressed more formally as:

$$\text{Crediting Rate} = \max(\text{Guaranteed Minimum Crediting Rate}, \text{Book Yield} - \text{Provision for Expected Credit Losses} - \text{Investment Management Fees} - \text{Product Spread})$$

This formula is commonly not applied rigidly, but it is used as a general guide along with a number of other factors, such as providing customers with a stable rate, maintaining a competitive position relative to peer companies or avoiding large-scale disintermediation. In this article we will ignore the latter concerns and assume the crediting rates are set mechanically on the basis of the preceding calculation.

The Guaranteed Minimum Crediting Rate is contractually set at policy issue.

The Book Yield is usually a snapshot yield at the time of the rate reset and represents the gross book yield on a portfolio of assets on either an IFRS or a statutory basis. Because this metric is driven by historic cost accounting, it tends to evolve quite slowly and predictably.

The Provision for Expected Credit Losses is equivalent to the expected credit losses used in many actuarial projections. Expectations of default frequency and severity are often based on historical data, and observed variability in any one year's data is usually interpreted as being driven more by the credit cycle rather than signifying a fundamental change in long-run creditworthiness, especially as actuarial projections are typically over time spans that are long enough to encompass a fair number of credit cycles. The Provision for Expected Credit Losses does not aim to offset this year's credit losses within the credited rate; rather, its goal is to cover those losses on average over the life of the business.

The Investment Management Fees reflects investment management expenses.

The Product Spread is determined at the time the product is originally priced and usually remains unchanged in practice thereafter. Product parameters such as the product spread, cost of insurance charges and per-unit loads are chosen to deliver appropriate profitability after covering the product's benefits, commission payments and administrative expenses. One important factor in determining "appropriate profitability" is receiving a return on the capital that the company is required to hold to cover the risks associated with managing this product. If an especially credit-risky underlying portfolio is envisioned, then the product spread will be increased to help produce the necessary returns on the relatively large required capital, essentially pricing for the risk associated with "unexpected defaults."

CREDITING RATE DETERMINATION IN REAL-WORLD PROJECTIONS

In the current IFRS reporting environment, the calculations of deferred acquisition costs or loss recognition sufficiency involve projecting the profitability of a block of business in the future in

a best estimate scenario. Products with discretionary crediting rates require a projection of those rates, which is accomplished by projecting each of the terms in the crediting rate formula already given. The Guaranteed Minimum Crediting Rate is contractually defined, the Product Spread is typically projected to follow the targeted spread determined during product pricing, and the Investment Management Fees and Provision for Expected Credit Losses are often assumed to remain constant, matching the parameters used in real-life rate setting at the model start date.

The Book Yield is usually projected by explicitly modeling asset portfolio behavior, recognizing complicated dynamics such as asset maturities, purchases and sales. Newly purchased securities can be projected to have a yield consisting of a risk-free asset rate (e.g., a U.S. Treasury bond) plus a gross credit spread that is class-, quality- and tenor-specific. Note that the gross credit spreads used here are typically well in excess of expected credit losses. A large portion of the difference is made up of compensation for uncertainty in how actual credit losses will relate to expected credit losses (sometimes referred to as “unexpected credit losses”), while the remaining difference is taken to be an illiquidity premium.

IFRS 17 RISK NEUTRALITY

With the introduction of IFRS 17, the International Accounting Standards Board (IASB) attempts to more accurately reflect the underlying financial position of contracts with long-term and complex insurance risks.¹

One of the key principles in IFRS 17 is that an entity “(d) recognises and measures groups of insurance contracts at: (i) a risk-adjusted present value of the future cash flows ... that incorporates all of the available information ... in a way that is consistent with observable market information.”² The estimates of these cash flows may “reflect the perspective of the entity, provided that the estimates of any relevant market variables are consistent with observable market prices for those variables.”³

Furthermore, paragraph B48 emphasizes that “the technique used must result in the measurement of any options and guarantees included in the insurance contracts being consistent with observable market prices (if any) for such options and guarantees.”⁴ This requirement is expected to be satisfied by adopting a risk-neutral economic scenario set.

CREDITING RATE DETERMINATION IN RISK-NEUTRAL PROJECTIONS

The question now arises on how to incorporate company and customer behavior in a risk-neutral context. In popular derivatives theories, the value of an option is equal to the present value of the expected payoff under a risk-neutral random walk.⁵



Complexities with real-world valuation, such as determining real-world probabilities and a utility function, are eliminated in risk-neutral valuation.⁶

Girsanov’s theorem formally defines the concept of changing a probability measure from the real world to an equivalent risk-neutral measure. Here equivalency describes two measures that have the same sample space and the same set of possible outcomes. Probabilities for each outcome can differ, but the two measures must agree on what is possible.⁷

It follows that each outcome, or scenario, is not inherently real world or risk neutral; rather, it is the probability measure under which a model is operating that determines the framework. This insight suggests that risk-neutral models should project company and customer behavior in exactly the same way as real-world models.⁸

While actuarial models typically view a “scenario” as a specified path for interest rates, it should instead be viewed as a specified path for the full economy. That is, credit spreads and losses (as well as other relevant economic variables, such as inflation or equity returns) should be explicitly and stochastically modeled. Models are often simplified by assuming that using the average value for each of these non-risk-free-rate variables will give the same result as the average result across the stochastic random

variables. While the appropriateness of this simplification may at times be in doubt, for the purposes of this article we assume that this simplification will be employed. Note that when an average is taken across risk-neutral scenarios, the average credit loss equals expected credit losses (across a real-world probability measure) plus unexpected credit losses (the compensation for this variability).

Continuing to model Guaranteed Minimum Crediting Rate, Product Spread and Investment Management Fees as deterministic parameters seems reasonable and uncontroversial. Projecting the portfolio Book Yield and the Provision for Expected Credit Losses in a risk-neutral setting is more complicated.

The risk-neutral projection of Book Yield should conceptually follow the same outline as in real-world models. The modeled gross yield of any newly purchased asset is determined by the sum of a risk-free rate and a credit spread, with the latter matching the forward spread, determined by the model date's term structure of credit spreads. The difficult question is whether one should project portfolio management behavior to change, in particular buying less credit-risky assets over time in a scenario where credit risk is not well rewarded (because average credit losses are higher than originally anticipated). There are a number of reasons to continue projecting the same target for asset allocations in a risk-neutral model:

- A portfolio cannot move all the way to a credit risk-free investment strategy without also sacrificing the illiquidity premium.
- If a company moved to a lower risk (but still credit-risky) portfolio, that company would need to consider reducing the Product Spread as well, largely offsetting the effect on the crediting rate, which is the metric of concern here.
- It is the simplest approach and so is advisable unless there is another clearly superior alternative.

Real-world models often assume that the future Provision for Expected Credit Losses matches that used as of the model start date. This is consistent with the view that today's Provision for Expected Credit Losses is set based on an average of prior credit loss experience and that modeled credit losses match those expectations. In this case, there is no reason for the Provision for Expected Credit Losses to change. This contrasts with the situation in a risk-neutral model, where credit losses emerge higher than originally envisioned (on average, they match the sum of expected and unexpected credit losses). In a risk-neutral model, the Provision for Expected Credit Losses grades from time zero expectations to the sum of expected and

unexpected credit losses as, in this setting, experience consistently plays out following the larger amount. The projection of the Provision for Expected Credit Losses is of management's evolving expectation. A single year or two of new adverse data has little effect on a long historical data set and is likely to be interpreted as a difficult and temporary portion of the credit cycle, which is how many insurers viewed the 2008–09 period. However, as the model continues, it may be appropriate to begin applying disproportionate credibility to subsequent credit behavior.

CONCLUSION

The conclusions above can be summarized simply for the sake of implementation: crediting rates in risk-neutral models can be projected as in real-world models, except that the Provision for Expected Credit Losses term should be modified over the course of the projection. The projected Provision for Expected Credit Losses should initially equal real-world expected losses. Then, over a period of time, it should incorporate unexpected losses such that it ultimately equals the sum of the two in agreement with full recognition of a new credit loss environment. ■



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ENDNOTES

- 1 IASB. 2017. *IFRS 17 Insurance Contracts*, section IN4.
- 2 Ibid, section IN6.
- 3 Ibid, paragraph 33(b).
- 4 Ibid, paragraph B48.
- 5 Wilcott, Paul. 2009. *Frequently Asked Questions in Quantitative Finance*. 2nd ed. Chichester, UK: Wiley and Sons, Ltd., 143.
- 6 Ibid, 160–61.
- 7 Ibid, 113–14.
- 8 Hatfield, Gary. 2009. "A Note Regarding 'Risk Neutral' and 'Real World' Scenarios—Dispelling a Common Misconception." *Product Matters!*, no. 73: 13–14.