

# Rethinking Fixed Deferred Annuities: Applying a Risk-Based Economic Value Approach

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## 1. Risk-Based Economic Value Framework

Actuaries have traditionally recognized the links between risk and value, and in recent years have begun to incorporate aspects of modern financial economic theory into their traditional valuation and risk management approaches. As a result, there has been an increasing trend in the incorporation of explicit market-based risk adjustments into valuations, whether for internal or external purposes. The use of market-based metrics to reflect risk in valuations is becoming increasingly widespread—in fact, major external standard setters, including FASB, IASB, CFO Forum and the various parties setting standards for Solvency II, have prescribed varying levels of use of market-based metrics to measure risk in valuations.

While the details may differ across uses, the central principle of the valuation is the same: cash flows should be valued in line with the prices of similar cash flows that are traded on the open market. This leads to two main requirements:

1. The principle of no-arbitrage must be maintained.
2. The valuation must be performed in a manner that will reproduce observable prices for traded instruments.

Market-based approaches present a number of benefits in comparison to traditional valuation approaches, including:

- Assets and liabilities are valued based on underlying economic principles and so are not subject to potential distortions from traditional rules-based regulatory and financial reporting valuations. This ensures that a consistent economic view of the net capital position, i.e., assets less liabilities, is portrayed. This economic view also allows for a direct comparison of products and lines of business across different regulatory and financial reporting jurisdictions.
- Risk is incorporated explicitly based on observable market prices, thus providing an objective assessment of the risks inherent in the product. As above, this also makes it easier to compare the risk-adjusted values for different products and lines of business.
- Market-based approaches provide information on the cost of hedging and transferring risks. This is useful information for risk management purposes, particularly where many risk management options available to insurers involve market-based transactions.

It should be noted that market-consistent approaches make no judgment on the appropriateness of different asset strategies; this is a management decision. However, market-consistent approaches do not allow any arbitrage between investment strategies and asset valuation and hence do not anticipate outperformance of more risky asset classes. This is in line with the way assets are valued in capital markets, but is frequently at odds with management's long-term views.

## 1.1 Market-Consistent Valuation

Conceptually, the market-consistent value of an insurer's existing business is the excess of the market-consistent value of assets less the market-consistent value of liabilities, i.e., the surplus of assets over liabilities on a market-consistent, or economic, balance sheet. Throughout this paper, this is referred to generally as the market-consistent embedded value (MCEV).

Note that, in practice, there are differences in specific definitions depending on the purposes for which the market-consistent valuation is being performed (e.g., MCEV reporting, Solvency II, IFRS financial reporting). This paper focuses more on the key concepts and does not attempt to address these detailed differences. In particular, note that the use of MCEV in this paper should not be interpreted as implying compliance with the CFO Forum's MCEV Principles.<sup>1</sup>

The market-consistent value of assets is generally equal to the observed market value of assets, where available, and a mark-to-model approach where the market value of assets is not available.

The market-consistent value of liabilities is generally developed as the sum of:

- The best-estimate liability (BEL)
- The market value margin (MVM)

The BEL represents the value of the liability cash flows, incorporating all risks readily valued in capital markets. The MVM is an allowance for additional risks not valued in the BEL. The intent is that, in aggregate, all risks are incorporated into the valuation on a market value basis.

Most companies have now adopted the use of market-based metrics for variable annuities for risk management and financial reporting purposes (e.g., SFAS 133/157 in US GAAP). This reflects the increased use of hedging for these products (which are market value based) and hence the need to manage and measure the business on a market value basis. However, there has been some resistance to their use for fixed deferred annuities (FDAs). This paper attempts to address the application of these techniques to FDAs from a risk management perspective.

It should be noted that while we strongly support an increased emphasis on market-consistent methodologies to support risk management of FDAs, we do not believe that companies should abandon traditional actuarial methodologies. Rather, we believe that the two should be used in conjunction, with each providing insight necessary to manage this business effectively.

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## 2. High Level Analysis of Risks Inherent in Fixed Deferred Annuity Products

FDAs are investment products that offer accumulation inside an insurance product wrapper (in the form of guaranteed annuity purchase rates). Generally, the customers make a deposit or series of deposits, and receive a promised return on their deposit(s), subject to a guaranteed floor. Several forms of FDAs are available in the marketplace, with the main variations occurring based on:

- Deposit pattern: Contracts may be single-pay or allow for recurring deposits.
- Load structure: Most contracts are front-end-loaded or back-end-loaded, or some combination of the two. Some contracts have no front-end or back-end loads.
- Credited rate: Contracts may offer credited rates that are indexed or non-indexed, and may offer multiyear or single-year guarantees. Note, this paper does not explicitly consider indexed annuities. Some contracts may offer tiered crediting rates, where different rates apply depending on the size of the contract. Most products contain an underlying minimum guaranteed credited rate (which in some cases can be zero).
- Liquidity features: Contracts generally offer the ability to surrender the contract at any time, at either book or market value (via a market value adjustment), and possibly subject to surrender charges. Many contracts offer the ability to surrender up to 10 percent of the value without penalty.

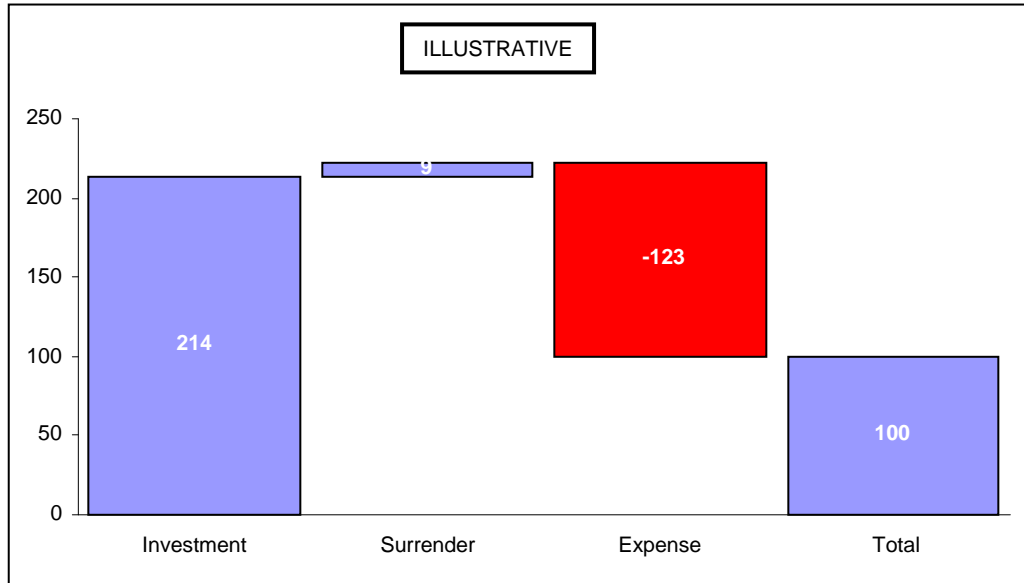
For most FDAs, the most significant source of earnings expected by management (and typically reflected in pricing) comes from the investment returns expected to be earned over and above amounts credited to policyholders. To illustrate this, we considered a simple single premium deferred annuity (SPDA), where the customer deposits a single premium and receives a return based on a prospectively declared annual rate.

The sources of insurance company earnings for this SPDA product are:

- Investment margins, equal to the investment return earned less the interest credited to the policyholder;
- Surrender margins, equal to surrender charges collected in the event of surrender;
- Expense margins, equal to any expense loads collected (which for newer products are typically small if not zero) less expenses.

Using typical “real-world” management expectations, the most significant source of earnings to the company for this SPDA over the life of the product is the investment margin, as illustrated in Figure 1.

**Figure 1**  
**SPDA Gains by Source**



The traditional mechanics of an FDA are as follows:

- The insurer develops an initial credited rate to offer prospective customers. This rate is typically in excess of the FDA’s long-term guaranteed credited interest rate.
- The customer makes a deposit (or series of deposits) with the insurer.
- The insurer invests these assets in accordance with a particular investment strategy. These assets will generally be invested in a combination of credit risky assets over several maturities.
- At the end of the crediting period, the insurer declares the credited rate for the next period. This determination is legally only constrained by the guaranteed minimum credited interest rate, but in practice is bound by several commercial considerations.
- At any time, the policyholder has the option of either surrendering the policy or allowing the policy to continue. There are also other reasons for termination of the contract (including death).

As is discussed in more detail later in this paper, a key feature of market-consistent valuations is that, unlike traditional real-world approaches, market risk margins are not capitalized. The implication for FDAs is that market-based valuations can result in significantly lower values being placed on the investment margins, and hence the product overall, when compared to traditional valuation approaches.

## 2.1 Key Risks Inherent in Fixed Annuities

As with most products sold by life insurers, FDAs are exposed to a wide range of risks. However, this paper focuses on the following three risks:

- Credit risk
- Investment risk
- Liquidity risk.

These three risks are often among the most significant and are of particular relevance when this business is evaluated on a market-consistent basis. These are discussed in more detail below. While FDAs are subject to other risks (e.g., mortality risk, operational risk, expense risk), these are beyond the scope of this paper and not discussed further.

### 2.1.1 Credit Risk

Credit risk is the risk of loss as a result of asset defaults (the closely related credit spread risk is discussed below with investment risk). The level of credit risk introduced is based on the assets selected by the insurance company to support the liabilities (the insurer's own credit risk is discussed separately). As noted above, insurers typically invest proceeds obtained from issuing liabilities in a portfolio of credit risky assets (e.g., corporate bonds).

Consider a further simplified version of the SPDA contract discussed previously where the policyholder is unable to surrender for the duration of the contract, and there is one credited rate over the entire contract. Thus the policyholder makes a deposit, and receives a guaranteed rate of return for the life of the contract (note that this is effectively a U.S.-style guaranteed investment contract). This contract can be deconstructed as follows (ignoring expenses and profit margins):

- A passthrough return to the policyholder, based on the portfolio of assets supporting the liabilities
- A credit derivative, where the policyholder pays a premium to the insurer (equal to the spread between the insurer's return and the policyholder's return) in exchange for protection from credit events on the underlying portfolio.

This is effectively selling credit protection to the policyholder (equivalent to being short a credit default swap). While the complexity will increase, this conceptual view of the product can also be applied more broadly to other FDAs.

It is worth noting that, if necessary, the insurer could reduce this risk by increasing its investment in risk-free assets, but this would impose significant commercial limitations. Insurers can also attempt to mitigate credit risk by passing some of it on to policyholders via reduced policyholder credited rates. In practice, though, their ability to do this is likewise constrained by competitive concerns as well as minimum interest rate guarantees.

### **2.1.2 Investment Risk**

Investment risk for FDAs is the risk of loss as a result of movements in interest rate curves (risk-free and credit risky curves) and so comprises both interest rate risk and credit spread risk. It arises in the following ways:

- Any asset-liability mismatch, which arises from differences in size and timing of asset and liability cash flows. This incorporates potential reinvestment risk.
- The policyholder's option to surrender at book value. As interest rates rise, policyholders are more likely to surrender their existing contracts in order to reinvest at higher rates. Conversely, when rates are low, policyholders are less likely to surrender. This is closely linked to liquidity risk, which is discussed in the next subsection.

As noted above, the insurer is exposed to movements in risk-free rates and movements in credit spreads. As clearly demonstrated in the recent financial crisis, it is the total change in credit curves that affects asset values. The option to surrender at book value can then be considered a type of put option on a family of interest rate curves, including both the interest rates available to the policyholder and the interest rates used to value the underlying asset and liability portfolio. The presence of the underlying interest rate guarantee provides a higher strike price for this option and hence increases the value of the put to the policyholder.

Investment risk is primarily managed through product design (e.g., through market value adjustment features) and investment strategy (e.g., through active asset-liability management to match the duration and convexity of assets and liabilities).

### **2.1.3 Liquidity Risk**

Liquidity risk is the risk of loss due to the inability to meet cash requirements. An asset is said to be liquid if it can readily be sold without a material effect on the value of the asset. In contrast, there is no generally accepted definition of a liquid liability. The CFO Forum defines a liability as liquid if the liability cash flows are not reasonably predictable.<sup>2</sup>

Due to their inherent optionality, many FDA products may be considered liquid, at least to a degree. The extent to which an FDA product may be considered liquid will depend on a number of factors, most notably its product design and how this influences the predictability of the liability cash flows.

Liquidity risk is often assumed to be negligible. However, as demonstrated by the recent financial crisis, liquidity risk may at times be significant.

We note that the liquidity risk is primarily mitigated through product design, (e.g., by the presence of surrender charges or the use of market value adjustment features). In addition, the practice of backing FDA liabilities with liquid assets can help to mitigate liquidity risk.

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## 2.2 Risk Management Levers

There are three basic tools available to manage risks related to FDAs:

1. Product design (e.g., minimum interest rate guarantees and market value adjustments on surrender)
2. Investment strategy (e.g., the degree of credit risk undertaken)
3. Crediting strategy (i.e., the ability to adjust credited rates).

Risk management begins with the design of the product. The lower the interest rate guarantee and the more frequently a company can change credited rates, the better its ability to manage adverse experience. In addition, a properly designed market value adjustment upon surrender can help manage risks by changing the surrender value based on changes in asset yields.

Adjusting the investment strategy can reduce the insurer's exposure to market risks, but management needs to balance these decisions with the desire to seek higher returns (so that it can offer competitive products to policyholders and/or increased returns to shareholders).

The ability to manage credited rates is a key management lever that can allow a company to decrease the value of the liability in adverse scenarios. While various types of crediting strategies are employed in practice, these can primarily be divided into two basic strategies.

1. Crediting strategies where credited rates are based on past investment experience.
2. Crediting strategies where credited rates are based on anticipated risky asset yields the company expects to earn. This is sometimes referred to as a prospective crediting strategy in this paper.

In evaluating risk-reward decisions, management needs information that provides an economic picture of the various alternatives. We believe this need is best met by using market-based metrics in combination with more traditional actuarial metrics. In particular, when considering the relative impact on shareholder value of different decisions, market-consistent values adjust for risk based on the market price of the different risks and so provide information that is objective and consistent across alternatives and in many cases relates directly to many risk management options.

It is important that the valuation models used to provide management with this market-based information be developed with sound underlying methodology and assumptions. In particular, it is important that these models allow appropriately for the key underlying risks and the three basic risk management tools discussed above. These issues are discussed further in Section 3.



### **3. Methodology and Modeling Issues**

Section 2 outlined three significant risks related to FDAs and the main tools used to manage them. The first step in the risk management process is the measurement of risk. As discussed in Section 1, there are a number of benefits to using market-based approaches, including the fact that the business is measured based on underlying economic principles, with risk incorporated explicitly based on market observable prices, thus providing an objective assessment of the risks inherent in the product. In addition, market-based approaches provide information on the cost of hedging and transferring risks. Therefore, a market-consistent valuation is well suited to measure the risks related to FDAs.

Fundamentally, the key issues that need to be considered in modeling FDAs on a market-consistent basis are no different from those required in more traditional real-world modeling approaches. That being said, modeling FDAs on a market-consistent basis tends to pose more challenges for many companies.

These additional challenges usually stem from the fact that in a market-consistent valuation, no assets—on average—earn market returns in excess of risk-free (assuming a risk-neutral valuation approach is followed). In addition, the behavior of policyholders, competitors and management is all closely interrelated and can all have a significant impact on the projected cash flows which drive the value of the business.

The remainder of this section considers some of these significant methodological issues and also looks at possible theoretical and practical approaches to capture them in a market-consistent valuation model. All models are an abstraction of reality and, as with any model, it is important when considering a market-consistent valuation model to understand where modeling decisions have been made because they are a direct representation of what is expected to happen versus those involving approximations because of a desire to maintain model simplicity. This is frequently an issue for FDAs, where explicit guidelines regarding market-consistent valuations for these products do not exist and there continues to be a considerable degree of unfamiliarity in the industry.

Much of this uncertainty and potential for confusion relates to the modeling of the insurer's crediting strategy. Most of this section of the paper focuses on this particular aspect of the modeling. There is also some discussion on two aspects related to the selection of an appropriate discount rate in valuing FDAs on a market-consistent basis.

It should be noted that for many of the areas discussed in this section, there is not yet universal agreement among industry experts, and industry practice continues to evolve.

#### **3.1 Crediting Strategy**

Once the product has been sold, management's ability to set credited rates is one of the fundamental areas (along with the investment strategy) where management has discretion to manage the risk-reward profile for this business. Because it is discretionary in nature involving

considerable judgment, it can be challenging to determine exactly what a company's strategy is, let alone model it.

Given its significance in determining the overall risk-reward profile of an FDA product, it is vital that an insurer's crediting strategy be accurately reflected in any financial projection and valuation model. Among the model development challenges are determining: (a) what action management would take (i.e., with respect to setting credited rates) in a particular scenario; and (b) how to model that behavior so that it can be captured across a wide range of possible scenarios in a parsimonious way.

The starting point for (a) and (b) above is the projected scenarios themselves. For market-consistent valuations, nonmarket risks are typically projected on a deterministic basis since the profit profile for different outcomes is usually materially symmetrical (e.g., the additional profit from better-than-average mortality scenarios is offset by the additional loss from worse-than-average scenarios). Where the profit profile for nonmarket risks is not symmetrical, then an additional allowance is often made in the MVM. However, the presence of minimum guarantee floors and the nature of crediting strategy and related dynamics mean that, for market risks, significant asymmetries are usually present in FDA products, necessitating the use of stochastic simulation approaches to determine the value.

Simply put, these risk asymmetries mean that losses experienced by the insurer's shareholders in "bad" scenarios are not fully offset by gains in "good" scenarios—for example, shareholders will absorb 100 percent of losses related to investment returns below the minimum guaranteed rate, but the benefits of above average investment returns will be shared between shareholders and policyholders.

These asymmetric payoff functions imply that the investment and credit risks should be modeled stochastically. However, in practice many insurers' models (and associated economic scenario generators) only model risk-free interest rates stochastically with credit spread and default risk being modeled deterministically. From a modeling perspective, this can present challenges in developing accurate representations of an insurer's crediting strategy. Since valuations using this approach will not explicitly reflect the additional volatility relating to credit exposures, this is less than ideal from a risk management perspective.

We see this as a significant modeling shortcoming—credit spread and default risk are among the most significant risks undertaken by FDA writers, yet most model them in a relatively simple, deterministic manner. This shortcoming is a general observation about modeling of FDA products and not specific to market-consistent modeling. However, a market-consistent modeling approach often highlights this as an issue due to a market-consistent approach requiring a more explicit consideration of these risks.

### **3.1.1 Asset Returns**

Broadly speaking, there are two possible approaches to stochastic simulation that can be used to model market-consistent values. One involves the use of state-price deflators, and the

other uses risk-neutral principles. The latter of these is the most common in the North American market and the one explicitly discussed in this paper.

In a risk-neutral projection, all assets earn risk-free returns on average. In developing a projection model, this frequently gives rise to the question of whether future expected returns for purposes of determining projected credited rates (where a prospective approach is being modeled) should be based upon current realistic assumptions or on an assumption of risk-free. An important point to understand in answering this question is that assets earn risk-free returns *on average*, i.e., across a range of possible scenarios, but “reality” only occurs along one (deterministic) path. Expected management behavior should consider only what has actually occurred along that particular scenario path to date. Thus, for example, a scenario path in which there were consistently poor returns may be expected to lead to an adjustment of management’s forward-looking expectations; whereas a path closer to their current best estimate views would be less likely to lead to a change in future expectations. As discussed in the previous subsection, the challenge here is first to understand how management’s behavior may change under different circumstances, and second to describe this in a relatively structured way that can easily be captured in a stochastic simulation model.

Note that the above process should be followed regardless of whether the projection model is risk-neutral or real-world. Indeed, from a model design perspective, there is no fundamental difference between a scenario that occurs in a risk-neutral projection from one that occurs in a real-world one—the only difference is that a given scenario will have a different probability of occurring depending on whether it is part of a risk-neutral or real-world scenario set. Management behavior (along with policyholder and competitor behavior) needs to be considered based on the path taken up to that point, and not based on some omniscient view. This is consistent with the most recent MCEV Basis for Conclusions issued by the CFO Forum,<sup>3</sup> which states (extract of paragraph 68 under Principle 7): “Models for the choices management and policyholders will make at future projection periods should consider the conditions at a given period and the path taken to get there, but with no special knowledge of what path will be taken after that.”

A practical challenge for many FDA writers is that in practice most FDA business is currently managed on a book value basis, with pricing, profitability and credited rates being driven (at least in part) by book returns. Thus when looking to develop an economic view on this business, insurers need to be able to project market and book returns consistently within the same model. Depending on an insurer’s current modeling infrastructure, this may necessitate further model enhancements.

### **3.1.2 Credit Spreads and Defaults**

As described above, the approach to modeling crediting strategy in risk-neutral and real-world projections should theoretically be the same. However, in practice, modeling approximations mean that different approaches are often found. Some of these approximations in

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<sup>3</sup> Market Consistent Embedded Value Basis for Conclusions (October 2009), Copyright © Stichting CFO Forum Foundation 2009.

developing the crediting strategy stem from approximations made in the projection of asset-related returns in the economic scenario generators—as noted earlier, while many FDA writers model interest rates on a stochastic basis, relatively few adopt a stochastic approach to modeling credit spreads and/or credit defaults. This makes it challenging to develop an accurate model of certain crediting strategies. In particular, where an insurer’s crediting strategy is based on actual or expected returns of a credit risky portfolio, it is not possible to model this accurately where only risk-free interest rates have been modeled stochastically.

One method in use by insurers is to develop a liability model where the earned rate is assumed to be equal to the risk-free rate. This is effectively the same as assuming that the portfolio is comprised entirely of risk-free assets purchased at the valuation date. This approach is not consistent with the existing asset portfolio, and due to the interaction between assets and liabilities, results in a distortion of the value of the liability.

A second method in use is to develop the earned rate as the risk-free rate, plus applicable credit spreads, less an expected default assumption. In order to ensure risk-neutrality, the default assumption is calibrated across scenarios such that the average return is equal to the risk-free return. This leads to individual scenarios that appear to be highly implausible, and poses challenges in the interpretation of management and policyholder behavior algorithms.

The problem here is that with both these approaches, the additional cost to shareholders of risk asymmetry relating to credit spread and default risk will not be reflected. Thus, whatever approach insurers follow in developing their models, unless credit risk is captured explicitly, further adjustments and approximations would be needed to estimate the economic value of the business.

Improving their models to address shortcomings in the area of credit risk can be a significant undertaking for companies. This will usually include insurers needing a more sophisticated economic scenario generator so they have the ability to generate market-consistent scenarios for all the economic risks needed by the enhanced valuation model. This can be a significant challenge— in order to make a reasonable determination of what management’s response to different scenarios will be, insurers need to have the ability to generate plausible scenarios that capture relevant aspects of investment and credit risks. However, most insurers do not have economic scenario generators with the necessary level of sophistication.

While our view is that projecting credit spreads and defaults stochastically is the most robust approach, this may be impractical to implement for many companies. In this case, we prefer deterministic approaches to setting defaults where the term structure of credit spreads is maintained. For example, if the term structure of credit spreads is upward sloping, then projected defaults would also increase by duration, but would be constant for all scenarios. In our view, this approach is superior to other approaches where default assumptions do not vary by duration.

### **3.1.3 Target Spread**

Once the earned or prospective returns have been determined in a particular scenario, the target spread determines how that earned or expected return is shared between policyholders and

shareholders, so has a direct link to the expected profitability of the product. In most FDA valuation models, this is set at a product level and assumed to be constant in all scenarios (although the rate ultimately credited will also be influenced in given scenarios by minimum interest rate guarantees and anticipated competitor behavior so the actual spread will vary).

It is common for the target spread for a given product to tie back to pricing assumptions and be based on long-term earned rate assumptions at that point. The target spread may be revisited from time to time and possibly adjusted based on one or more factors (e.g., an increased level of target surplus may lead to an increased target spread). A question that subsequently arises in developing market-consistent models is whether this target spread should be adjusted to reflect the fact that management's long-term assumptions will not be borne out in the market-consistent projection.

This is fundamentally the same issue as that discussed in the previous subsections. As before, each scenario path should be considered in isolation from all others when management's actions are being modeled, so that in principle no change should be needed just because, when averaged across all scenarios, no assets will earn above risk-free. Thus there could be scenarios where management would look to increase the target spread and others where they may need to reduce it. As before, this requires a clear understanding of management's strategy – faced with lower returns, would management be willing to reduce its earned spread to avoid lowering credit rates too much (driven by competitive concerns), or would they be inclined to reduce credited rates to maintain a higher spread (and run the risk of higher lapses as policyholders seek higher returns elsewhere)?

In practice, the modeled constant target spread may be viewed as representing the average amount management would target across a range of scenarios—when viewed in this way there may be an argument to adjust this to account for the fact that the range of scenarios in the market-consistent projection may differ from those envisaged in pricing the product (i.e., if pricing was not done on a market-consistent basis). Adjusting the target spread assumption is one way in which insurers can try to address the shortcomings identified in the previous subsections so that the result gives a good estimate of the economic value.

### **3.1.4 Policyholder and Competitor Behavior**

As discussed in Section 2, expected policyholder behavior and competitor concerns have an influence on management's crediting strategy, with management wanting to ensure that the rates credited are high enough to continue to attract new business as well as ensure existing policyholders do not surrender their policies. Consequently, the insurer's valuation model also needs to reflect these appropriately.

It is typical for returns on competitor products to be assumed to be closely linked to (or the same as) new money returns (since only new business rates are available to policyholders that are considering surrendering their FDA contracts) and thus face the same market-consistent modeling challenges as identified before. In particular, where credit risk is modeled deterministically, the question arises as to whether competitor returns should simply be assumed to be based on risk-free or whether they should be assumed to be based on earning a spread

above risk-free. This can give rise to interesting discussions around defining exactly who are an FDA writer's competitors (e.g., are they limited to other fixed annuity (FA) writers, or do they more broadly also include other fixed income investments including those issued by banks and governments?).

When considering competitor and policyholder behavior for purposes of developing a market-consistent model, the same principles as discussed above should be applied—i.e., in any given scenario, behavior should be based on that particular scenario path with neither competitors nor policyholders assumed to have access to more information about future returns than they (or the insurer) would have in practice.

In thinking about how competitors will behave, two common schools of thought have emerged:

- All competitors will move to a market-consistent approach to valuing FDA business and hence will begin to credit lower rates to reflect the lack of credit spreads expected to be earned in a market-consistent model, either immediately or over some period of time. This implies that in the models, competitor rates will tend to be reduced (immediately or graded in) relative to current real-world projection models. To the extent competitor rates are assumed to decrease, there is an argument that competitor rates should be floored at (or slightly below) the risk-free rate (since policyholders could simply choose to invest in government securities directly); or
- Some competitors will continue to value and credit new business using traditional actuarial techniques assuming credit spreads will be earned (on average) in the future. This implies that in the models, competitor rates are fundamentally unchanged from current real-world projection models. In the projections, this would then lead insurers to raise their credited rates to remain competitive or result in an increase in policyholder lapses as a result of the relatively uncompetitive rates being credited.

Most insurers' models already incorporate dynamic policyholder behavior, with the decision to surrender assumed to be determined by the size of the insurer's credited rate relative to competitor rates. Assuming the policyholder behavior algorithms are appropriate, there is no need to change them just because a market-consistent valuation is now being considered. However, on a practical level, some of the tail scenarios under a market-consistent scenario set will be more extreme than would usually have been considered by the insurer in coding the dynamic policyholder behavior. Consequently, insurers may need to test their dynamic policyholder behavior algorithms under a sufficiently extreme level of scenarios and adjust as appropriate to ensure they continue to work as intended.

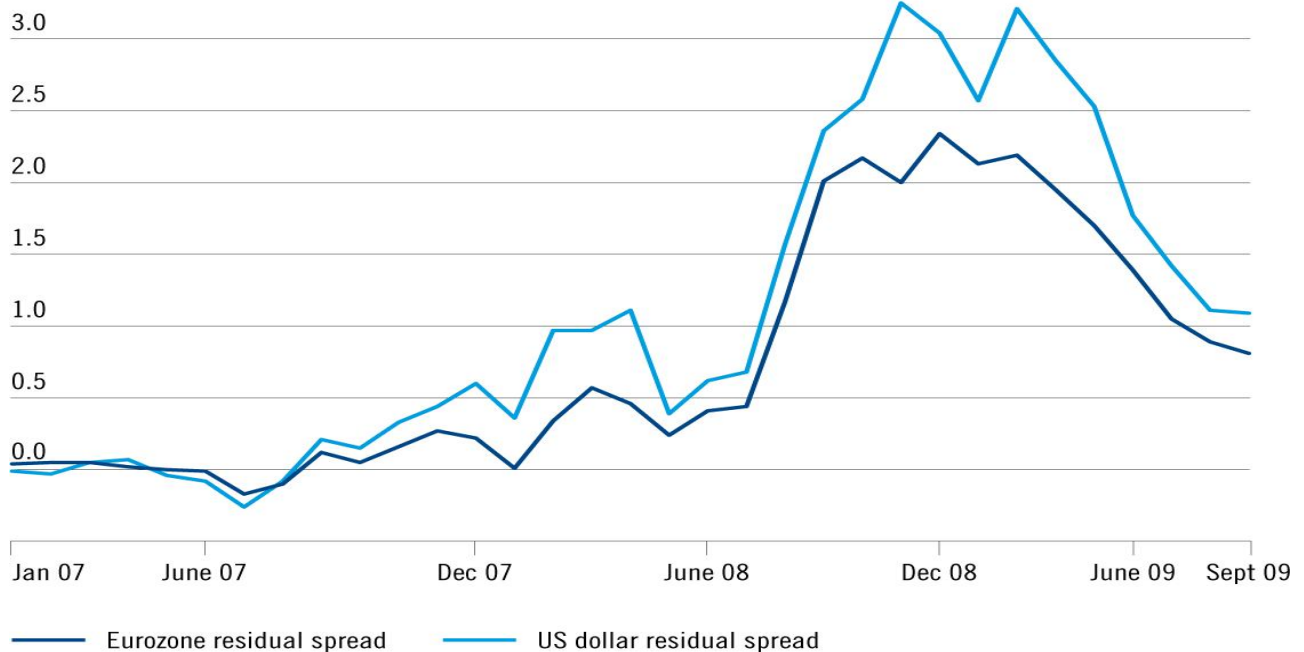
### 3.2 Liability Discount Rate

As with any valuation of a long-term product, the choice of discount rate(s) is critical to the result of a market-consistent valuation. While a detailed discussion on this broad topic is beyond the scope of this paper, a high level discussion on two aspects with particular relevance to FDAs is included below. Both of these are currently quite topical, with their increased relevance being brought about by the recent financial crisis.

#### 3.2.1 Liquidity Premiums

The liquidity premium is the additional return investors require for holding illiquid assets. Figure 2 below shows corporate bond yields less credit default swap spreads less the swap yield curve from January 2007 to September 2009 for the Eurozone and the U.S. markets. Generally, these two portfolios should be expected to have the same price (i.e., yield the same return). Figure 2 indicates that the returns diverged significantly during the crisis (in the Eurozone and U.S. markets), and this can be interpreted as evidence that significant liquidity premiums emerged during the credit crisis.

**Figure 2**  
**Eurozone and US Dollar Residual Spreads Over Swaps**  
**(Average up to 10 Years)**



Source: Towers Perrin analysis of Bloomberg and Markit data

While views differ, there is an argument that the insurer can benefit from the liquidity premium to the extent it is able to hold less liquid assets. In these cases, there may be a justification to increase the discount rate used to value the liabilities by the amount of the liquidity premium (or some portion thereof), thus resulting in a lower value of liabilities (and equivalently a higher shareholder value of the business). However, if the liability cash flows are less predictable, then there is an increased likelihood that it will need to trade the investments and the insurer will thus be affected by market value fluctuations and not obtain the benefit from the liquidity premium.

This issue ties back directly to the liquidity risk discussion in Section 2. As discussed earlier, the degree to which an FDA is considered liquid depends to a large extent on the product design and the extent to which management is able to predict or manage the exposure to the policyholder option to surrender the policy at book value. Generally speaking, the lower the insurer's exposure, the stronger the argument for increasing the discount rate to include a liquidity premium, since the insurer is less likely to have to sell assets at unexpected times and hence has greater opportunities to take advantage of liquidity premiums available in the market.

In the years prior to the recent financial crisis, these liquidity premiums were very small and so this issue was more of a theoretical than practical one. However, as shown in Figure 2, this picture changed dramatically during 2008, turning this issue into a very significant one for insurers using market-consistent values.

In October 2009, the CFO Forum published updated MCEV Principles that explicitly addressed this issue. In particular, Principle 14 of the MCEV Principles states that where the liabilities are not liquid, the reference rate (i.e., discount rate) should include a liquidity premium, as appropriate.<sup>4</sup> However, it should be noted that industry views are still evolving on this topic.

### **3.2.2 Own Credit Risk**

In most MCEV implementations, all liabilities are valued as if the issuer is absolutely certain to meet them in all circumstances due to the use of the risk-free rate in the valuation. In reality, there is some chance that any firm will default on its obligations and this could theoretically reduce the value of the liabilities held. Note that the appropriateness of allowing for own credit risk in valuing a block of business could vary depending on the purpose of the valuation. For example, making some allowance for an insurer's own credit risk is appropriate when evaluating the shareholder value in the business—this can be viewed as placing a value on the option shareholders have to walk away from the business and default on its liabilities (commonly referred to as the limited liability put option). However, the value of this option is not always recognized for external reporting purposes.

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<sup>4</sup> Market Consistent Embedded Value Principles (October 2009), Copyright © Stichting CFO Forum Foundation 2009.



The most common way to include an allowance for own credit risk in the valuation is to increase the discount rate to include a spread above risk-free reflecting the insurer's credit risk (as it relates to meeting its policyholder liability obligations).

As with the liquidity premium issue, until recently, the impact of including or excluding this allowance was small for most well-capitalized highly-rated insurers. However, in current economic conditions, the economic impact of allowing for own credit risk can be significant for some insurers.

It should be noted that there is an upper bound for an own credit risk adjustment. Since policyholders rank above debt holders in the event of default, the own credit risk adjustment should not be higher than the spread on debt issued by the insurer.

Allowing for own credit risk is consistent with how many insurers in the United States view credit spread business.

## **4. Bringing It All Together**

While MCEV results for FDA products will depend on many factors, including the crediting rate strategy (and how it is reflected in the insurer's model), the minimum guaranteed interest rate, and the level of liquidity premiums and own credit risk assumed, many FDA products available today would result in a negative MCEV. That is, many companies appear to be undercharging for the risks undertaken, relative to the market prices of those risks. Said another way, the value of the deposits received to support these liabilities is less than the value of the assets that would be required to hedge these liabilities. Because most companies manage their FDA products on a book value basis, companies are often not aware of the magnitude of this discrepancy.

By contrast, variable annuity guarantees are often managed, at least in part, on a market value basis. It is true that some variable annuity products did not fare well during the financial crisis, but this was because these variable annuity products were not perfectly hedged. Ultimately, many companies derisked their variable annuity products. Will a similar scenario play out for FDA products?

### **4.1 The Importance of Asset Risk**

In our view, credit spread and default risk are key risks for insurance companies writing spread-based products such as FDAs, where the competitiveness of the product is usually determined by the credited rate. An insurer seeking to be competitive in the FDA market will typically offer attractive credited rates. Higher credited rates are usually the result of lower profitability targets or, more commonly, higher assumed asset yields. But, higher assumed asset yields are usually obtained by investing in riskier portfolios with greater volatility of market returns and higher probabilities of default.

Opponents of market-consistent valuations often make the point that historical default experience has been lower than credit spreads would suggest and that insurers have been selling FDA products for several decades and have generally enjoyed profitable results. Which point of view is correct?

While credit spread and default risks are important for FDA products, many companies do not have a good handle on the amount of credit risk they are taking on. Deterministic assumptions are typically used for market spread levels and the probabilities of asset default based on historical averages (as opposed to the current market price of risk). Given the importance of credit risk for FDA products, we view this as an area where there is scope for improvement.

A small number of companies have refined their models to model credit risk stochastically in a market-consistent context. As a result, they are developing a better understanding of the credit risk they are taking. We believe that this is a best practice. Investment risk is often captured in current models to a large extent, but often at values inconsistent with market prices. The degree of asset-liability mismatch is often unclear due to the prevalence of book value measures in projections. For example, asset-related assumptions in

cash flow testing models are often based on historical experience or judgment rather than market prices. Also, as discussed earlier, it is usually only volatility associated with movements in risk-free rates that is captured rather than that associated with the credit risky assets contained in most insurers' underlying portfolios.

Similarly, liquidity risk is often mis-valued in traditional approaches to modeling FDAs. However, the use of a market-consistent framework, including consideration of liquidity premiums, incorporates the market view of liquidity. Within a market-consistent framework, the presence of product features that decrease liquidity risk will be reflected explicitly via a reduction in market values for liabilities.

## **4.2 Benefits of Using Market-Consistent Approaches**

We believe that there are several benefits to looking at FDAs using market-consistent techniques.

Going through the process of calculating a market-consistent value for a liability allows companies to better understand the risks they are undertaking, particularly asset risks, using an objective methodology. The relatively unsophisticated manner in which assets are currently modeled suggests companies are not fully aware of the asset risks they are taking on.

Market-consistent techniques also enable companies to better understand the degree of asset-liability mismatch on a market value basis.

In addition, going through the process of calculating a market-consistent value for a liability highlights how companies would manage their risks in various scenarios, particularly adverse scenarios. Would they decrease credited rates? What would be the resulting impact on lapses? How might competitors react? Some companies that have gone through the process of calculating market-consistent values have made changes to their products, such as changing their credited rate strategies (which has usually led to lower credited rates), decreasing interest rate guarantees or changing the product design altogether to give themselves more management levers to pull in adverse market conditions.

Finally, companies that look at their business using market-consistent techniques will be better prepared for IFRS Phase II when it becomes effective.

## **4.3 Risk Management**

While companies need to strike a balance between risk management and competitiveness, we think that companies should take a closer look at their risk management strategies for FDAs. In particular, there are many approaches to setting credited rates that result in various levels of risk to the insurance company. Evaluating these crediting rate strategies in a market-consistent context would highlight the various levels of risk and provide valuable insight to management. Likewise, when evaluating product design decisions, market value metrics provide useful information about potential risk exposures of different product features that other metrics do not.

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