

# The Art and Science of Annuity Portfolio Management

**F**IXED ANNUITIES CONTINUE TO BE POPULAR AND DURABLE insurance industry products in this country. Consider the statistics: In 2007, over \$60 billion in deposits was made into these contracts, and as of year-end 2007, a total of \$2.0 trillion in annuity assets was under management in the United States, according to LIMRA, an association of life insurance and financial services companies. This amount includes both well-known variable annuities and less popular fixed annuities. By comparison, 401(k) account balances totaled \$3.0 trillion, according to the Investment Company Institute, while defined benefit pension assets amounted to about \$3.5 trillion.

Surprisingly, while much academic and practitioner literature has been devoted to the portfolio and risk management of 401(k) and pension assets, relatively little practitioner attention has been paid to annuities. Yet, there are unique challenges that attend the management of fixed deferred annuities, particularly in the rich cross talk between assets and liabilities that is the defining hallmark of these products.



distributed not just to the annuitant but also to the sales agent, insurance company employees, the Internal Revenue Service, and, with luck, the shareholder. Whether the coupons actually arrive on time and in the promised amount is altogether another matter and the subject of keen attention on the part of company asset/

liability management practitioners. Capital and insurance market forces heavily influence the new-money credited-rate operative at time of deposit. A departure too far from the market results in disappointing sales results. The art and science of running an annuity company depend on a methodical and coherent approach to the coordination of annuity assets and liabilities, giving due regard to the understandings and responses that all parties have under the deal.

## Nature of the Deal

A fixed deferred annuity is a tax-favored retirement accumulation device under which periodic deposits made by the annuitant accumulate with periodic interest credits administered by the insurer. Annuitants possess surrender rights typically adjusted by surrender penalties but usually not by market-value adjustments. A deferred-annuity company is akin to a leveraged hedge fund, albeit one subject to the many and peculiar constraints imposed by the insurance regulatory regime. Here I define this regulatory regime to include not just the laws governing contracts but also the relevant capital, accounting, and tax treatments applied. Deferred annuities operate according to some loosely held understandings on the parts of the insurer and the annuitant. These understandings relate to the ongoing management of the annuity by both parties. As a result, the dynamics of an annuity can sometimes resemble a game-theory exercise conducted under the unique conditions that pertain in the annuity marketplace.

The raw materials that an insurer uses to play this game are the coupon payments from bonds it purchases with annuity deposits. These coupons are artfully dissected and

## A Congruence of Assets and Liabilities

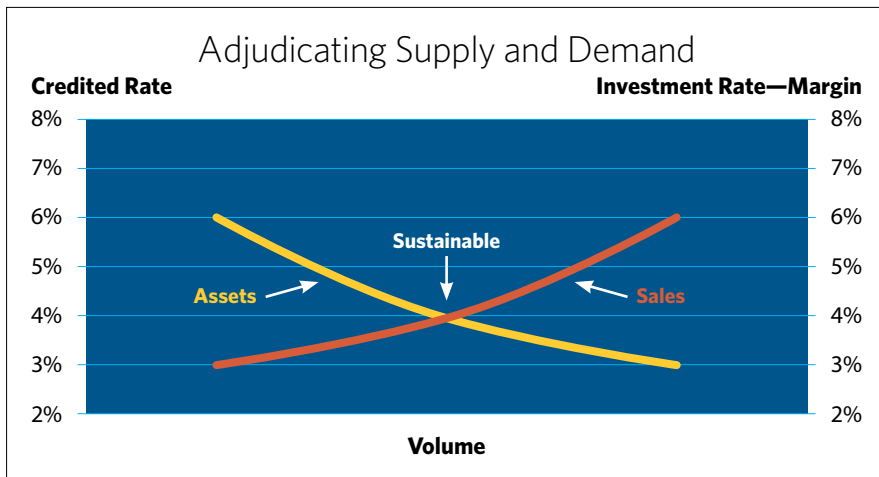
While multiple considerations affect how insurers sell and manage deferred annuities, my cardinal rule of annuity management is straightforward: Make sure that product sales are large enough to suitably cover fixed administrative costs but not so large that they outstrip investment supply lines.

In offering annuities, insurers act as intermediaries between the capital markets and the insurance markets, hammering bonds into annuities. Achieving congruence between the size of the insurer's product-sales and asset-gathering organizations helps ensure its ability to enjoy a long-lasting and enjoyable presence in the annuity marketplace.

As mentioned, prevailing market conditions strongly affect the economics of deferred annuities and the credited rates that companies are able to offer. These dynamics dictate that only assets with certain risk characteristics can result in favorable pricing economics. For deferred annuities, it's generally the case that bonds of longer maturity than liabilities and at the lower end of the investment-

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### Dissecting Sources and Uses

From	5.50% Bond	To
Alpha →	0.50	0.40 ← Shareholder
Credit Spread →	0.75	0.20 ← IRS
Two-Year Mismatch	0.25	0.20 ← Employee
		1.20 ← Distributor
Immunizing Treasury	4.00	3.50 ← Policyholder

grade risk spectrum serve as the best raw materials. And it's usually not possible to utilize plain-vanilla public bonds for this purpose, as public-bond yield spreads will typically be insufficient to satisfy all the constituents to the deal. As a result, companies focus heavily on spread products like private-placement bonds, commercial mortgages, and structured assets in an attempt to avoid drill-through into more generic and lower-yielding public bonds.

Similar dynamics pertain in the annuity marketplace. Companies long ago discovered that sales success depends inextricably on their ability to post competitive credited rates. Annuities in the marketplace are now similar enough in their basic design that a high degree of commoditization now prevails. For example, analysis of competitive market information reveals that the industry standard deviation (a statistical

measure of dispersion) of credited rates for a representative high-volume product was only a handful of basis points.

Taken together, the supply/demand curves of annuity assets and liabilities are not materially different from those of other industries operating with limited resources. The above chart shows the resulting dynamics and illustrates where sustainable volumes can be found. Note how asset yields decline with increasing volume as investment managers exhaust more attractive bonds and resort to more generic ones. At the same time, increased annuity volumes can be had but at the cost of increased credited-rate service. The key question for company management surrounds the profitability potential at the sustainability point: Unfavorable profitability indicates poor congruence between the company's asset and liability organizations.

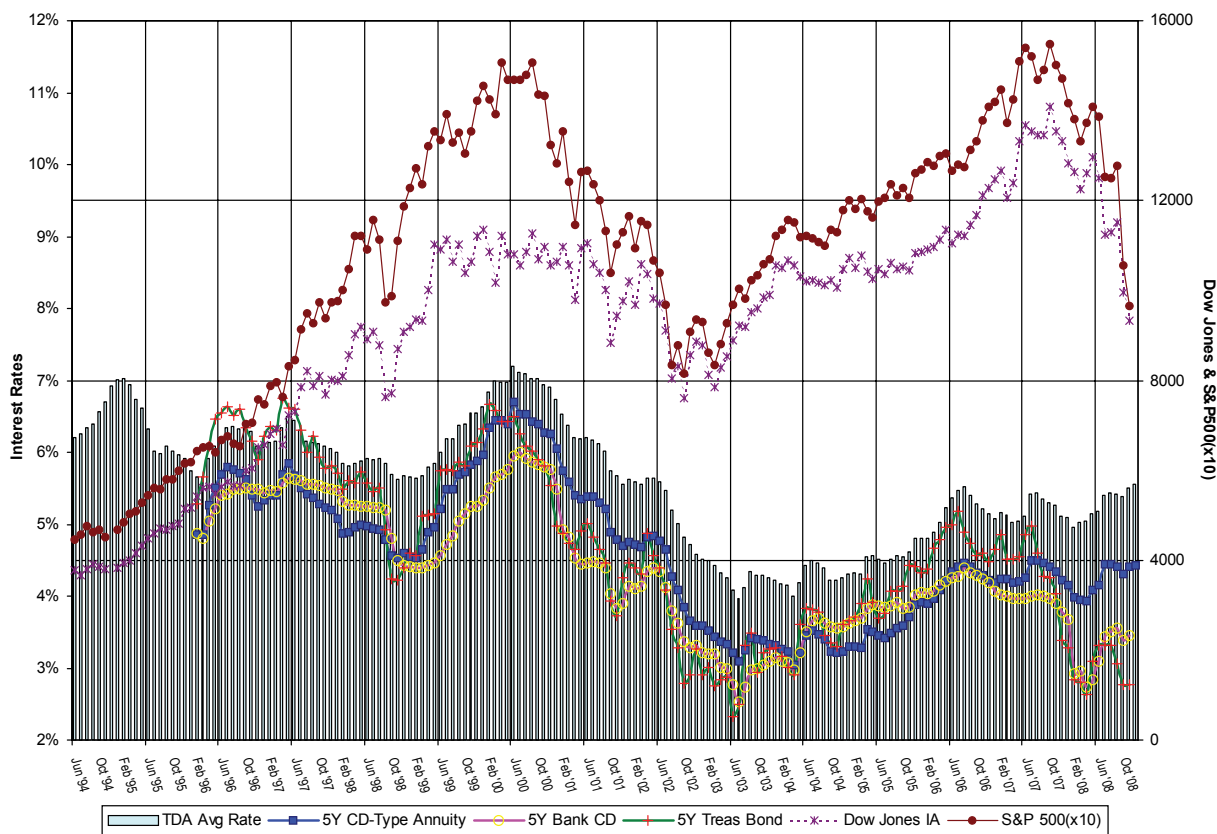
Other important dynamics enter into play. Companies that decide to reduce sales volumes in an attempt to improve returns quickly learn the impact upon market presence. Lower sales volumes can harm a company's ability to preserve its ongoing access to dealers of spread-rich bonds. Lower sales volumes also threaten the permanence of annuity distribution relationships that, after all, have their pick of highly commoditized product offerings. Finally, annuity sales decisions must consider the realities of the insurer's cost structure and its ability to handle reduced sales volumes.

### The Microstructure of Annuity Pricing

The artful dissection of bond coupons to interested constituents isn't a static exercise. Company managements must not just consider whether the sum of the dissected pieces equals the whole but how each constituent responds to the economic proposition involved. Administered credited rates not only affect sales success and renewal persistency but also send signals to all constituents about the company's strength of commitment to the business. With regard to renewal credited rates (those that pertain after the initial deposit), the company treads a fine line. Crediting more interest than an annuitant needs to remain a satisfied customer commandeers coupon slices from other constituents and can suboptimize the entire system. Conversely, crediting too little can lead to disgruntlement and premature annuity surrender, resulting in possible capital loss and dangling acquisition costs.

Important risk issues also surround coupon dissection. As mentioned, annuity market dynamics impel insurers to extend bond purchases further out on the yield curve than a risk-neutral position may justify. Insurers can ask shareholders to accept the market risk, hedge it internally with other products exhibiting orthogonal risk profiles, or seek external risk protection through the reinsurance or derivatives markets. In any case, risk is being transferred to others, and the correct

### Tax-Deferred Annuity Rate History with Five-Year Instruments—Rate Comparison



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cost of this transfer must be ascertained and financed.

Coupon dissection can best be illustrated visually. The chart on Page 42 depicts the components of a hypothetical 5.50 percent bond coupon, including the underlying risk-free rate, a risk spread for extending on the yield curve, a risk spread for assuming credit-default risk, and an alpha-like spread that captures the idiosyncratic efforts of the investing professionals. The bond coupon is, in turn, parceled out to key stakeholders in the deal: the policyholder, the distributor, the administering insurance employees, the tax authorities, and, finally, the shareholder.

#### Marketplace Efficiency

The fixed-annuity marketplace is highly competitive. New-money rates (the initial credited rate on deposits) for competing companies are visible to both the sales agent and the sales prospect. They, along with agent compensation and a company's claims-paying rating, as assigned by the

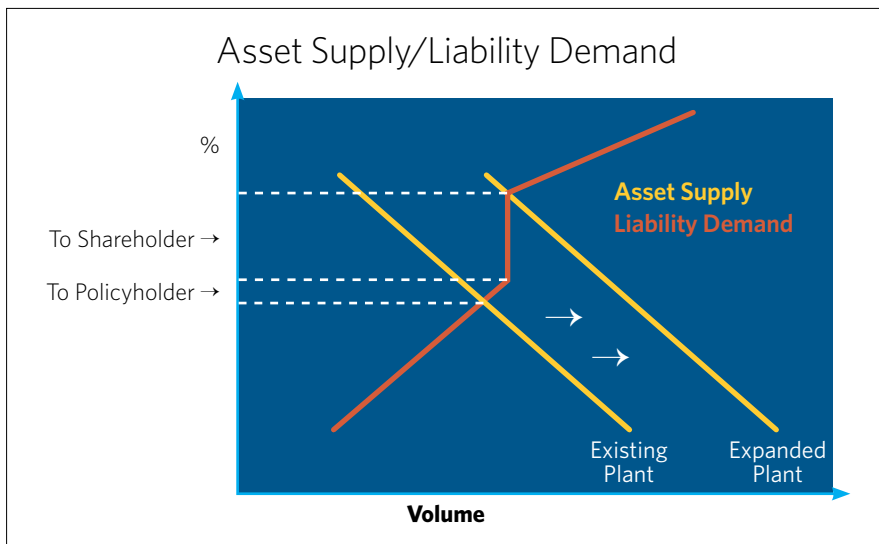
major ratings agencies, are primary considerations driving sales placement. Other considerations include the schedule of surrender penalties. Companies may subsidize (via bonus interest) new-money rates with the expectation of recouping subsidies through subsequent inforce management.

Services exist that track and publish new-money rates by company, and these services maintain indexes that summarize rates across companies. It's interesting to examine the relationship between these indexes of new-money rates and movements in the general bond market. This can provide valuable insight into market efficiency. Statistical analyses that compare annuity indexes against an array of bond-market rates confirm the close relationship between the two. Typical analyses of this kind exhibit very high (>95 percent) measures of association. General market movements in interest rates appear to get transmitted into annuity credited rates with great speed and efficiency, as depicted above.

These high levels of market efficiency

in both assets and liabilities lead inexorably to certain investment management practices if an insurer is to be successful in the annuity business. In particular, an investment manager's ability to generate alpha becomes highly prized. (While many definitions exist, alpha can best be thought of as the product of talent-based investing, resulting from the skill, intuition, and hard work of investment professionals.) If changes in overall bond-market rates and spreads become rapidly and fully impounded into annuity credited rates and passed along to annuitants, then the ability to outperform the market becomes a key source of shareholder returns. An alpha-centric investing paradigm encourages bond traders to identify and capture opportunities, wherever they may lie, that are demonstrably cheap to the market. Then, derivatives overlays that involve interest-rate and credit-default contracts can be used to reshape overall risk profiles to management's liking.

Expanding the asset plant of alpha-rich



bond opportunities can create valuable managerial flexibility for the insurer. If the supply curve is shifted to the right, as depicted above, companies can deploy incremental alpha to expand sales volumes through more attractive annuity pricing. Incremental alpha can also be directed to the shareholder (depicted via the vertical line segment), either through return enhancement or through risk attenuation efforts that strengthen shareholder capital.

**Management of Assets**

As mentioned above, alpha generation is a critical investing activity for deferred-annuity companies. Of equal importance is the optimal management of a company's beta positions, like duration, the proportional response to an interest-rate change. The combination of debt alpha and beta management is necessary to attain superior financial performance and risk control. Indeed, some observers have commented that annuity marketplace economics are such that these products are priced below full profitability with the hope that profitability can be recouped through adroit management of beta positions.

Annuity markets unfortunately won't permit insurers to assume a risk-free position, where asset and liability durations are matched. Insurers do possess significant leeway to actively manage duration positions in response to changing capital and insurance-market conditions. A system for methodically identifying and attaining optimal duration positions in response to

(or even in anticipation of) relevant macroeconomic market and monetary events is one that can result in an informed and coherent approach to risk settings.

One effective approach is to base company appetite for interest-rate risk on analysis of the dynamics of monetary aggregates and management activities of the Federal Reserve. For example, by establishing a fair value for the 10-year Treasury bond, companies can gain valuable understanding of how asset duration positions might be set. The fair value might be arrived at as follows:

$$\begin{aligned} & \text{Fed's avowed inflation limit (from} \\ & \text{Beige Book} \\ & + \text{Real interest rate (from TIPs prices)} \\ & + \text{10-year liquidity premium (from} \\ & \text{Treasury-bond prices)} \\ & = \text{Fair value for 10-year Treasury bond} \end{aligned}$$

Other approaches recognize the mean-reverting nature of the capital markets to form interest-rate and credit-default management positions from statistical measures of how far current market readings have strayed from normalcy. Economies are thought to include powerful self-adjusting forces that act to restore

equilibrium conditions.

Companies lacking the wherewithal to make these analytic determinations can find guidance from external sources. For example, Barclay's (*nee* Lehman) publishes Monday-morning duration recommendations that can be successfully adapted to the annuity setting. Duration settings for assets can be related to the duration requirement of the benchmark liabilities, as adjusted. (See box below.)

Many companies may find it more convenient, effective, and timely to effectuate these duration adjustments through the use of compact and transparent derivatives overlays that leave hard-won alpha-rich bonds undisturbed. The optimal active risk position will also take close account of operative accounting, capital, and earnings imperatives.

**Dealing with Disintermediation**

The phenomenon of disintermediation occurs when an annuitant is lured away to another company by the more appealing rates and features of a competing product (often with the calculating involvement of the sales agent), leaving behind lower-yielding bonds and un-defrayed acquisition costs. This happens when interest rates have risen and an annuitant rolls money into a competitor's higher-yielding annuity. The original insurer is forced either constructively or actually to liquidate the orphaned bonds to pay the departing customer and sustains a capital loss in doing so. This kind of disintermediation is the primary business risk associated with involvement in the deferred-annuity markets.

Disintermediation introduces the element of convexity into the picture. Convexity is the mathematical expression of disintermediation and measures how

$$D(A) = (D(L) + 1.2) \times \text{Lehman posture}$$

Duration objective

Duration of liabilities

Normal gap

From Barclay's Relative Value summary recommendation

duration becomes deformed by annuitant behavior. By matching the durations and convexities of assets with liabilities, insurers theoretically could immunize themselves against disintermediation risk. Unfortunately, marketplace economics usually disallow this convenient solution. Instead, annuity risk managers combat disintermediation through thoughtful, market-responsive management of duration positions.

For example, at bond-market peaks, with interest rates nearing cyclical lows, companies could try to shorten duration (typically through the use of the aforementioned derivatives overlays). A shorter asset duration lessens the bond portfolio's sensitivity to price drops as rates rebound, providing valuable wherewithal to fund the cash surrender values of departing annuitants. Then, as rates approach a peak, durations will be let out to lock in desirable exposure to oversold bonds. These micro-adjustments to duration typically take place within the operative policy ranges that govern a company's actions in the deferred-annuity business.

**Management of Liabilities**

How companies reset credited rates in renewal years reflects a complex interplay of competing forces. From a balance-sheet perspective, a company can optimize the value of its annuity business by judiciously adjusting renewal rates. Since the market value of balance-sheet assets is outside management's control, this exercise is equivalent to choosing renewal rates that act to restrain the economic value of liabilities by affecting the incidence and amount of future liquidation values (i.e., cash surrenders and annuity benefits). In this way, economic net worth is enhanced, as will be future reported earnings.

However, in setting renewal rates, a fine line pertains. A high renewal rate dampens immediate surrender activity but at the cost of elevating ultimate liability liquidation values and reducing insurer profit. A low renewal rate accelerates liquidation but at commensurably lower values (perhaps further reduced by surrender penalties). Rules of thumb

based on interest-margin considerations can guide renewal-rate-setting decisions but may not prove optimal (i.e., maximize economic value). Such decisions are intertemporal in nature, meaning that actions taken today have future-period consequences. Renewal-rate decisions must be gauged not just against narrow current-period performance expectations but within a framework that also reflects the future economic consequences of such decisions. In some cases, counterintuitive renewal-rate actions may be indicated depending on the economic particulars pertaining at renewal time. For example, it may prove profitable to subsidize the renewal rates of selected annuities in order to defuse immediate surrender pressure with the expectation that conserving the business would create conditions for future gains.

The annuitant's decision to surrender or not depends on the renewal rate posted by the insurer (suitably modified by the deterrent effect of applicable surrender penalties). Each outcome has different economic consequences for the insurer. A surrender outcome forces the insurer to pay the annuitant the cash surrender value (CSV) of the contract with the current market value of accumulated assets (MV(A)). A no-surrender outcome means that the company preserves the long-term economic value (EV) potential embedded in the annuity and lives to fight another day.

In this framework, the company's management objective becomes:

$$\text{Max } [(1 - \text{Surrender Rate}) (EV) + (\text{Surrender Rate})(MV(A) - CSV)],$$

and its renewal rate decision carefully considers how annuitant surrender decisions (and, thereby, company embedded value) respond to its actions.

**The Effects of Operating Income**

While I have thus far focused on the economic consequences of managing a fixed deferred-annuity business, accounting-based considerations have important effects. In the insurance industry, it's commonplace for managers and analysts to refer to operating income, a non-GAAP

measure that removes realized capital gains and losses and certain unusual items from income. Some believe that operating income best reveals underlying directionality in business fundamentals, since realized gains and losses are difficult to predict, are thought to average out over time, and are partly under management's control. However, the use of operating income can motivate unbecoming behavior on the part of managers if used as a performance incentive. For instance, since realized capital losses are excluded, investment managers may be tempted to pursue bonds with high coupons that show up in operating income but with commensurably higher credit losses that, conveniently, will not.

Operating income can also have perverse portfolio turnover effects. In a rising-rate environment, an operating-income mentality acts to methodically replace portfolio bonds with current-coupon issues, even though no economic value is created in this process. Companies pursuing this approach will produce a more attractive earnings profile than companies that don't. When rates decline, portfolio turnover ceases. Thus, companies following an operating-income approach have a handy way of exiling pesky capital losses right out of earnings. Investment managers focused on operating income can also find themselves in a perverse buy-high, sell-low quandary. Instead of applying best efforts toward the acquisition of bonds that will increase in value, they find themselves rooting for bond prices to drop so they can trade into higher coupons.

Clearly, fixed deferred annuities occupy a special wing of the insurance market. They demand an intense degree of managerial effort and a unique blend of disciplines involving capital markets, actuarial science, behavioral dynamics, and financial economics. ●

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