Retirement System Risk Management

Implications of the New Regulatory Order

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Contents

3

Accounting-Based Asset Return Smoothing in Participating Life Annuities: Implications for Annuitants, Insurers, and Policymakers

Raimond Maurer, Olivia S. Mitchell, Ralph Rogalla, and Ivonne Siegelin

Insurance companies offering variable life annuity products have been permitted to report asset values in their income statements at historical cost instead of fair market values, under current accounting standards.[1] They are also allowed to report their liabilities using actuarial smoothing, rather than marking them to market. Little is known about the economic consequences of these practices, despite the fact that the accounting rules play a key role for understanding the life insurance industry. They are important since smoothing allows insurers to defer losses; of course when they sell assets to pay benefits, the losses must be realized, which can trigger large reductions in benefit payments. Smoothing also allows them to defer gains, such that when gains are realized, benefits can increase due to the firms having a contingency reserve.

These practices have come under criticism of late, in view of the persistent low interest rate environment and the loss of transparency that such practices imply (e.g., Jorgensen 2004; Bleck and Liu 2007; Ng and Schism 2010). Yet moving to fair market valuation of insurer assets and liabilities would introduce new volatility into the insurers' balance sheets, which could undermine profitability and decimate the appeal of retirement annuities. This chapter outlines the conditions under which smoothing can be beneficial for policyholders who hold *with-profit* or *participating payout life annuities* (PLAs). These are bought by retirees expecting to receive a guaranteed benefit for life, along with variable non-guaranteed payments that depend on investment returns and mortality experiences of the insurance pool (Maurer et al. 2013b). Our objective is to show how accounting smoothing affects the risk and return profiles of PLA payouts as well as insurer profitability. We investigate these patterns using a model of a participating life annuity that draws on the TIAA Traditional Annuity.[2] We demonstrate that such accounting techniques can actually be welfare-enhancing, since risk-averse consumers can benefit substantially when insurers smooth asset and longevity surprises.

A Brief Overview of Life Insurance Accounting Smoothing

Under US Generally Accepted Accounting Principles (US GAAP), company-held assets can be categorized as those held to maturity, those held for trading purposes, or assets available for sale (Herget et al. 2008). Assets held to maturity should be valued at amortized cost when acquired (historical cost valuation, or HCV); in this instance, asset price changes are recognized as gains or losses only when the instruments are sold. Assets held for trading purposes are to be reported at fair market value (FMV), so price changes immediately affect insurer profits (whether they are realized or not). Under US GAAP, this is the default for valuing stock holdings. Assets available for sale are also reported at FMV, but unrealized gains and losses resulting from market price fluctuations are not reported in the insurer's profit and loss statement (P&L). Instead, they are carried in a separate account on the liability side of the insurer's balance sheet, known as the Other Comprehensive Income account (OCI). When these assets are sold, the OCI account is reversed, and realized gains or losses are recorded in the P&L. This approach is the US GAAP default for the valuation of bond holdings.

Formally, under the simplifying assumption that assets can only be sold at the end of each period, investment gains $g_{t,t+1}$ over the period $[t, t+1]$ on an asset can be calculated according to:

$$g_{t,t+1}^{FMV} = n_t \cdot (S_{t+1} - S_t) + n_t \cdot D_{t,t+1} \tag{1}$$

when reporting at fair market value. Here, n_t represents the number of the assets held at time t, S_t refers to the assets' market price at time t, and $D_{t,t+1}$ is the cash distribution received per asset over the period $[t, t+1]$ (e.g., coupon or dividend payments). Under historic cost valuation, when assets are sold at time $t+1$ (i.e. $n_{t+1} \leq n_t$), investment gains are given by:

$$g_{t,t+1}^{HCV} = (n_t - n_{t+1}) \cdot (S_{t+1} - S_0) + n_t \cdot D_{t,t+1} \tag{2}$$

where S_0 represents the initial purchase price of the asset.

Most US life insurers do not follow US GAAP, however. Instead, they rely on the statutory accounting principles issued by the National Association of Insurance Commissioners (NAIC). These are specific accounting guidelines for insurers that permit the companies to value their bond portfolios in their annual statements using a historical cost approach.[3] This has been the preferred practice as it helps protect insurers' balance sheets and income statements against short-term capital market volatility. In the context of a participating life insurance product, this *accounting smoothing* has direct implications for the benefit stream received by the policyholders, since *surpluses* to be shared with the annuitants are conventionally computed only using *realized* gains and losses.

To illustrate the impact of accounting-based payout smoothing, we describe a stylized insurance provider offering single-premium participating life annuity contracts. The world in which this insurer operates includes capital market risk, systematic longevity risk, and idiosyncratic mortality risk. In such an environment, the insurer prices the annuity product using a specific mortality table along with an assumed interest rate for discounting benefits (also called the guaranteed interest rate). The company then generates surpluses in two ways: via investment returns and the annuitant pool actual mortality. If the company's return on the assets backing the liability is greater than the guaranteed interest rate, and/or if realized annuitant mortality exceeds what had been expected, the insurance company earns a surplus. The company can influence the expected risk and return profile of uncertain surplus payments by the choice of assets in its portfolio. The non-guaranteed or participating surplus is set each year by the insurer's Board of Trustees.

A Simple Model of a Participating Life Annuity

Our model of a realistically-calibrated company for a pool of PLA policyholders with uncertain capital markets and mortality dynamics incorporates the key institutional features outlined (more detail is provided in Maurer et al. 2014). Using this structure, we seek to examine how smoothing techniques affect benefit streams and the insurer's profitability and solvency. We assume that the insurance company sells PLA contracts paying constant guaranteed lifetime benefits *GB* per annum to a closed pool of annuitants, all of the same age. The liabilities resulting from the annuity promises are carried on the insurer's balance sheet as the Actuarial Reserve. In exchange for the promised benefit stream, the firm collects annuity premiums that are calculated based on the firm's guaranteed interest rate *GIR* and actuarial survival tables. The monies collected, which are carried on the insurer's balance sheet as the General Account, are then invested in a constant-mix portfolio of stocks and a bond fund. Furthermore, we assume that the insurer is equipped with a certain amount of equity in order to be able to cover potential losses from the annuity business. The corresponding assets are assumed to be held in a cash account. Table 3.1 summarizes the insurer's balance sheet.

TABLE 3.1. The insurer's balance sheet

Assets	Liabilities
General Account	Actuarial Reserve
► *Stocks*	
► *Bond Fund*	
	Equity
	► (*OCI*)
Cash	► *Reserves*

Note: General Account represents the PLA premiums collected. Actuarial Reserve represents the liabilities corresponding to the promised guaranteed lifelong benefit stream. OCI (Other Comprehensive Income) represents unrealized gains/losses, applicable only under OCI accounting.

Source: Authors' representation.

Every year, the insurer pays policyholders out of its asset income as well as from the sale of assets (sold at market prices). Annuitants receive the guaranteed benefit *GB* and, in addition to that, a positive participating surplus payment if the insurer's total stochastic investment return exceeds its guaranteed interest rate, and if realized mortality, which is stochastic in both mortality tables and individual mortality experience, exceeds expectation.

To assess how policyholders would value the stochastic PLA income stream *GB* depending on their risk aversion and time preferences, we use an expected utility framework. In particular we assume the consumer has a time additive constant relative risk aversion (CRRA) utility function:

$$U = E_0\left[\sum_t \beta^t \; {}_tp_x^P \frac{L_t^{1-\gamma}}{1-\gamma}\right] \tag{3}$$

where β represents the time preference factor, γ the degree of relative risk aversion, ${}_tp_x^P$ the individuals' (subjective) survival probability, and L_t the PLA benefit received at time t. We then convert the expected lifetime utility U from the PLA benefit stream into a utility-equivalent fixed life annuity *FLA* (following Maurer et al. 2013b). This can be thought of as the constant guaranteed lifetime income stream which will make the policyholder indifferent to the upside potential of a PLA with stochastic surpluses.

Calibration

We simulate 5,000 cases of the PLA sketched here for a pool of 10,000 equally aged males. The simulation starts with the annuity purchase at age

65 and continues until the last individual in the pool has died. For the illustration, we assume that the annuity pays a fixed guaranteed income stream *GB* of $10,000 for life, which, given sensible assumptions, requires the purchaser to put up a single premium of $163,400. In addition to the guaranteed annuity benefit, the insurer promises to share 90 percent of surpluses with the annuitants. The remaining 10 percent of surpluses are cashed in by the insurer and increase its equity, which we initially set to 4 percent of the Actuarial Reserve. In case the firm's equity is exhausted due to adverse capital market or mortality shocks, surplus payments to the annuitants are suspended until the equity has been replenished.

To model the stochastic returns on cash (i.e., the 1-year spot rate) and the bond fund (target duration: 10 years), we rely on a 3-factor CIR model as in Chen and Scott (1993), which we calibrate to US 3-month T-bill rates and US Treasury zero yields (with maturities 1 to 10 years) over the period 01/1988–12/2012. Excess returns on stocks over the short-term interest rate as well as dividend yields are based on S&P 500 data (12/1981–12/2012).

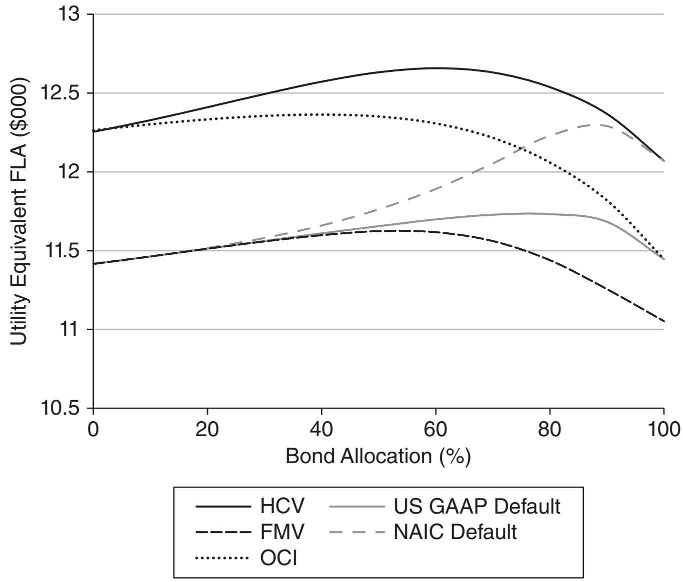
Annuitants are assumed to have identical time preference factors of $\beta = 0.96$ and coefficients of relative risk aversion of $\gamma = 5$. Survival probabilities ${}_tp_x^P$ are based on US mortality data as provided by the Human Mortality Database (2014), which we develop stochastically over time using the 2-factor model of Cairns et al. (2006). Based on these rates, Bernoulli experiments are conducted for each single individual in every period to determine if said individual remains in the PLA pool for another period.

To study the implications of accounting smoothing for annuitant well-being and firm profitability, we analyze 11 constant-mix asset allocations (0–100 percent bonds in 10 percent steps) under five accounting regimes: HCV only, FMV only, OCI only, US GAAP Default (Bond valuation: OCI; Stock valuation: FMV), and NAIC Default (Bond valuation: HCV; Stock valuation: FMV).

Key Results

To explore how alternative accounting regimes influence annuitant well-being, Panel A of Figure 3.1 depicts what benefits a fixed life annuity (FLA) would need to provide, if it were to produce annuitant utility equal to that of a PLA paying a fixed annual benefit of $10,000 plus a variable surplus given different investment strategies. The three black lines (solid, dashed, and dotted) illustrate what happens when all of the assets are evaluated according to a single valuation rule (HCV, FMV, OCI). The two gray lines (solid and dashed) indicate results when stocks are valued at FMV, and bonds according either to OCI (the US GAAP Default) or HCV (the NAIC Default).

Panel A



Panel B

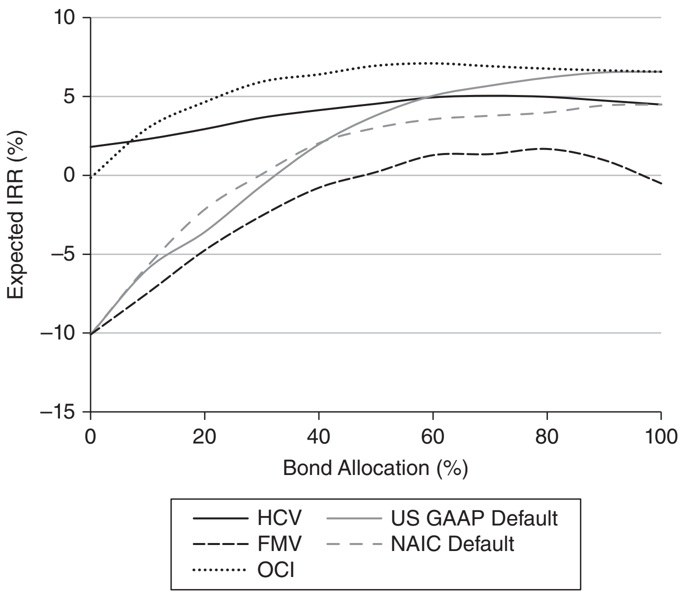


Figure 3.1 Effect of alternative valuation methods on PLA policyholder and insurer outcomes

Notes: Panel A shows the utility equivalent fixed life annuity (in $000) that generates the same utility as a Participating Lifetime Annuity (PLA) with guaranteed initial lifelong annual benefits of $10,000 based on a time-additive CRRA utility function for alternative valuation scenarios. Panel B shows the expected internal rate of return (IRR). FMV = fair market valuation, HCV = historical cost valuation, OCI refers to other comprehensive income valuation, US GAAP Default = bond valuation OCI and stock valuation FMV, NAIC Default = bond valuation HCV and stock valuation FMV. Calibration: Male age 65 in 2013; initial guaranteed PLA benefits: $10,000; time preference: $\beta=0.96$; relative risk aversion: $\gamma=5$; GIR: 3%; mortality table: "Annuity 2000" (PLA present value $163,400); bonds fund duration: 10 years; surplus allocation to annuitant: 90%.

Source: Authors' calculations; see text and Maurer et al. (2014).

When the insurer invests only in bonds, the FLA is worth 9 percent more under full HCV accounting (solid black line) than under the FMV method (dashed black line); $12,069 vs. $11,052). Similar utility increases are observed for other asset allocations. In other words, accounting smoothing through historical cost valuation dominates fair market valuation from the annuitant's perspective. Moreover, under both of these single valuation rules, the utility-maximizing bond fraction is about 50–60 percent—i.e., annuitants prefer a diversified portfolio allocation for the assets backing their PLA.

The fixed lifetime annuity under OCI (dotted black line) is worth more than with FMV, between 3.5 and 7.5 percent. Here, unrealized gains/losses do not directly affect the surplus under OCI, which results in lower undesired volatility in surplus payments. Despite that, unrealized losses do reduce the insurer's equity and through this channel may reduce the allocation of surplus to the annuitant. This explains why the utility-equivalent FLA is up to about 5.5 percent lower than under pure HCV (solid black line).

It is not surprising that under the two mixture approaches, the (gray) utility-equivalent value curves of the affected policyholder lie between the two extremes. As stocks are valued at FMV under US GAAP defaults, US GAAP (solid gray line) and FMV produce the same outcomes at low bond allocations. By contrast, for high bond fractions, US GAAP valuations are similar to those obtained with OCI. We observe similar results for NAIC valuation (dashed gray line): for a low bond allocation, results are similar to FMV, while at a high bond percent the pattern tracks that of the HCV approach. Moreover, the NAIC technique provides more value to the annuitant than the US GAAP methodology, because the former protects the policyholder from asset volatility with additional smoothing.

Next we take the insurer's perspective to study how alternative asset valuation methods impact the internal rate of return (IRR) on capital provided by the insurer's shareholders. Specifically, we compute the expected IRR over our 5,000 simulation paths, accounting for the initial equity investment, potential periodic dividend distributions to the shareholders over the lifetime of the annuity, and what the investors receive at the end of the product's lifespan, namely the value of equity capital and any actuarial reserves that remain when the last annuitant dies. The time horizon for each of the 5,000 simulation runs depends on the stochastic time of death of the last annuitant.

Panel B of Figure 3.1 plots the expected internal rates of return as a function of the insurer's asset allocation and the accounting regime in place. Again, the three black lines (solid, dashed, and dotted) describe the scenarios with a single valuation rule (HCV, FMV, OCI); the two gray lines refer the US GAAP (solid) and the NAIC (dashed) Default rules.

Comparing the solid and the dashed black lines, we see that insurers would prefer HCV over FMV for all portfolio compositions, due to higher expected internal rates of return. Moreover, IRRs under HCV are strictly positive, ranging from 3 to 4 percent depending on the asset allocation. By contrast, expected IRRs resulting from FMV are negative for both the all-stock and all-bond allocations (−10 and −0.5 percent, respectively), and only slightly positive for bond allocations of 50–90 percent. Under FMV, surpluses will be paid to the policyholders even if gains are unrealized. At the same time, unrealized losses will not be borne by the annuitants. This is in contrast to the HCV, where unrealized gains and losses may offset over time. The asymmetric impact of value fluctuations on payment streams also results in IRRs generally increasing with the bond share, as these generate less volatile asset returns.

Expected IRRs under OCI (dotted black line) generally exceed those under HCV (solid black line) for the majority of asset allocations, as unrealized losses can result in lower surplus payments. This increases the firm's potential to retain more returns and hence improves IRRs.

For the default valuation methods of US GAAP (solid gray line) and the NAIC (dashed gray line), expected IRRs represent weighted averages of the IRRs under FMV and OCI or under FMV and HCV. Overall, for realistic asset allocations, US GAAP Defaults will result in higher expected insurer profitability.

In summary, when looking at reasonable asset allocations, smoothing capital market return fluctuations via accounting techniques is attractive for PLA policyholders as well as for insurers. In particular, investing heavily in bonds combined with valuing assets based on historic costs produces stable returns, and, consequently, the costs for the guarantees embedded in the PLA contracts are low. Given a preference for stable PLA payouts over time, policyholders will approve of these conservative investment and valuation strategies.

Conclusion

As we have shown, policyholders seeking a guaranteed benefit plus some upside potential can benefit greatly from participating payout annuities, which help smooth some of the systematic shocks due to capital market uncertainty as well as systematic and idiosyncratic longevity risk. Our realistically-calibrated model of this product demonstrates how alternative accounting techniques influence policyholder welfare as well as insurer profitability and stability. Our findings indicate that smoothing in the case of participating life annuities is favorable to consumers and insurers. That is, it mitigates the potentially unduly large impact of short-term volatility on long-term contracts such as annuities. Therefore, smoothing is beneficial for risk-averse annuitants and profitable for insurers.

This implies that the current debate about whether to push insurance companies to undertake fair market valuation is not merely about rules—the answer to the question will have real financial impacts. As such, our work is related to the general discussion about advantages and disadvantages of HCV vs. FMV methods in the accounting literature (see, e.g., Busillo et al. 2016; Ellul et al. 2013; Laux and Leuz 2009, 2010).

Our chapter is also related to studies of household portfolio choice and annuitization which have primarily focused on fixed payout annuities, where capital market and mortality risks are solely borne by the insurer. Only a limited number of studies has examined unit-linked annuities which allow the insurer to share investment and longevity risk with the policyholder (see, e.g., Piggott et al. 2005; Denuit et al. 2011; Richter and Weber 2011; Maurer et al. 2013a). Based on those studies and our findings here, we believe that participating annuities offer retirees a favorable combination of access to the mortality credit and a smoothed payout stream for life.

Our results should be of interest to policymakers seeking to strengthen financial security in old age by optimizing the management of 401(k) plan drawdown, for example through stimulating growth in the annuity market.[4] Pushing annuity providers toward fair market valuation and away from the historic cost approach might improve information disclosure for the companies' current and future shareholders. Yet it could also reduce the attractiveness of PLA products for both policyholders and insurance companies.

Endnotes

1. This chapter draws on and simplifies our related study (Maurer et al. 2014).
2. TIAA-CREF in 2012 held 3.6 million annuity contracts and managed assets of $487B. The TIAA Traditional Annuity builds up capital during the accumulation phase, whereby contributions paid by policyholders earn a minimum guaranteed yearly interest rate (depending on the vintage when premiums are paid) plus a non-guaranteed surplus. Here we concentrate only on the liquidation phase of the product. In the European market, participating life annuity products are also on offer, comparable to the TIAA product outlined in the text; see Maurer et al. (2013b).
3. Lombardi (2009) offers additional information on valuation requirements. Also, under NAIC rules, insurers may discount the liabilities resulting from the guaranteed benefit with a fixed interest rate specified at the beginning of the contract (i.e., the guaranteed interest rate). See for instance TIAA-CREF (2011).
4. As the senior advisor to the US Secretary of the Treasury and Deputy Assistant Secretary for retirement and health policy, Mark Iwry, noted: 'One solution is to

provide for a predictable lifetime stream of income, such as an annuity provided under a retirement plan or IRA. By pooling those who live shorter and longer than average, everybody can essentially put away what's necessary to reach the average life expectancy, and those who live longer than average will be protected' (Steverman 2012).

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