Bruin Actuarial Society

9th Annual Case Competition

Presented by Pacific Life

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Background

Luvalle Life Insurance Company was established in 1919 to sell life insurance policies to the original graduating class of UCLA. Luvalle grew quickly into a national insurer and decided to expand into the annuity business in the early 2000s to diversify its product portfolio. Below are some quick descriptions[1] of key products currently sold by Luvalle:

Term Life Insurance – The simplest form of life insurance, which protects the death of an insured over a specified number of years (the "term"). The most common form of term insurance pays a flat death benefit upon death of the insured, with level premiums paid over the life of the policy. While the most popular contract form has a 20-year term, Luvalle also sells a 10-year variant. Term life insurance typically has very few assets backing the liability reserves, as the ongoing premiums received cover a majority, if not all, of the death benefits.

Indexed Universal Life Insurance (IUL) – A permanent life insurance product combining investment growth with death protection. The premiums paid go into an account residing within the policy. From this account, credited interest increases the account value and various charges are assessed, which decrease the account value (e.g., maintenance fees, Cost of Insurance charges). The "Indexed" term comes from the availability of investment funds which can be indexed to equity markets. The most common form of an indexed fund is one with a 0% floor and a declared cap (the cap limits upside growth in order to protect the policyholder from downside losses).

Single Premium Immediate Annuity (SPIA) – As the simplest form of annuity, a SPIA policy provides retirement protection by paying level benefits until the death of an annuitant. SPIA policies are funded with a single upfront premium, often coming from all or a portion of someone's 401k upon retirement.

Variable Annuity (VA) – A deferred annuity product with an account that varies based on investment performance. Unlike indexed products, variable contracts are directly invested in the investment funds, which means that the value of the contract can rise and fall over time. All VA policies sold at Luvalle come with a **Guaranteed Minimum Withdrawal Benefit (GMWB)**, which protects the policyholder by guaranteeing a minimum amount of monthly benefits (like a SPIA) even if the account value goes below 0. VA policies are almost always funded with a single premium. The annuity is "deferred", as withdrawals are often taken only after the account value has grown for a number of years.

[1] If seeking further clarification, Investopedia is a great resource for Life Insurance and Annuity product descriptions.

Part 1 – Liability Sensitivities

You are an actuarial analyst in the Annuity Division of Luvalle Life Insurance Company. While the company has performed well in recent years, the Chief Risk Officer (CRO) recently returned from an actuarial conference and shared concerns that the company may not be performing enough sensitivity analysis to adequately monitor its risk profile. Because you have been seeking out opportunities beyond your normal Valuation responsibilities, your manager has decided that she wants you to take ownership of this initiative for the SPIA block. The email is included below.

From: Jacobs, Susan <Susan.Jacobs@LuvalleLife.com>
Subject: FWD: Sensitivity Testing for SPIA

See email below from Heather. After our discussion last week, I think this is a great project for you to help with now that quarter end is mostly over. I believe Jeff already started setting up the model for the various sensitivity runs, but he's been asked to help test the new GAAP model for LDTI, so I need you to pick up where he left off. Let's run everything as of year end - I'd have to check my notes, but I believe I saw expectations that the Best Estimate Present Value of Benefits for the SPIA block was somewhere around $332m to $333m at year end.

I included a quick draft of some tasks I thought were appropriate. Please prepare a presentation with the following to go over next week with Heather. As with any actuarial work, it is your responsibility to do some review of the data and model before using – be sure to communicate and/or correct any issues or concerns. I recommend reviewing sections 3.5 and 3.8 of ASOP 23. While you might not have heard of these yet, the Actuarial Standards of Practice are vital to the self-regulation of the actuarial industry and it would be a great to get some familiarity with them this early in your career.

1. Data Quality

    a. Individually, go through each of the fields in the dataset from the admin system and determine whether there are any obvious data issues or inconsistencies.
    b. Based on what you know about the product, describe some possible relationships between the fields and use these relationships to check for data quality issues that may not be obvious at the individual level. Note that a check that leads to no issues is still important to communicate, as it reassures the integrity of the data.
    c. For obvious data quality issues, make changes as appropriate and save a clean copy of your inforce file, which will feed into the projection model. Be sure to include one or two summary slides for data quality at the beginning of your presentation and mention additional details in the appendix.

2. Sensitivities

    a. It's important to set expectations on how the results will be impacted by each sensitivity before starting on model runs (don't let the results drive the discussion, let the discussion drive the results) – this allows for an immediate sense of accuracy once you actually run the model. Before running any results, comment on what is expected for each of the sensitivities. While I know you haven't worked heavily with this type of work, try to relate it back to what you know about the product.

b. Run the model to get the sensitivity results. In the presentation, include a slide showing the sensitivity results in a digestible manner and compare the results with your expectations. Provide some quantitative and qualitative commentary on the results.
c. Beyond setting upfront expectations, comment on other ways to validate results. You don't need to run anything, but it may be good to comment on so Heather can decide what's necessary before sharing results with other areas.

Looking forward to the presentation – I think it will be very insightful!

Sue

From: Munoz, Heather <Heather.Munoz@LuvalleLife.com>
Subject: Sensitivity Testing for SPIA

Hey Sue –

I just got out of a discussion with the CRO and she wants at least one product from each area to be tested quickly – I'm thinking SPIA is the best place to start for us, since we don't need any asset runs to get liability sensitivities (like we would for VA). Here's a list of runs I'd like to see:

- Best Estimate
- 10% Base Mortality & Mortality Improvement shocks
- 1% Interest Rate shocks (Up/Down)
- 0% Interest Rate

I'm hoping to see results before the financial review meeting – would you be able to set something up for next week? Also, I know we had some data issues that delayed last quarter's reserves, so please make sure we spend some extra time checking for data issues.

Thanks,

Heather Muñoz, FSA, MAAA
VP Actuarial – Annuities
Luvalle Life Insurance Co.

Part 2 – SPIA Asset Portfolio

A few days before the presentation, the Investments team reached out to Heather and Sue to discuss the low interest rate environment. As a result of the meeting, Heather decided to expand the scope of the presentation, including some comments on asset sensitivities. Refer to the email below for instructions.

From: Jacobs, Susan <Susan.Jacobs@LuvalleLife.com>
Subject: SPIA Asset Portfolio

As I briefly mentioned in our 1-on-1 yesterday, Heather wants to expand the scope of the sensitivity analysis presentation you've been putting together. It sounds like the Investments team is concerned about continuing to invest in long-term assets in this low rate environment. Each of the portfolios consists fully of investment-grade corporate bonds (as required by our investment guidelines). Here's a brief description of each:

> **Current:** The current investment portfolio consists of $73.1m 5y AA, $129.5m 10y A, and $140.1m 20y A-rated corporate bonds. The duration of the portfolio is 10.1.
>
> **Alternate 1:** Drop each investment by a full credit rating and shift toward slightly shorter tenors. The new portfolio would be composed of 30% 5y A, 50% 10y BBB, and 20% 20y BBB. The duration of this portfolio is 8.9.
>
> **Alternate 2:** Maintain the credit ratings and shift toward much shorter tenors. The new portfolio would be composed of 50% 5y AA, 40% 10y A, and 10% 20y A. The duration of this portfolio is 7.5.

I found this short summary of sensitivity runs based on the same 1% rate shocks that we ran for SPIA, but I noticed they didn't run a 0% rate shock. Can you estimate this for each portfolio? Nothing exact is needed – just be sure to explain your thought process and comment on possible reasons why the estimate may not be completely accurate. The baseline yields for the respective portfolios are 2.1%, 2.25%, and 1.8%.

Interest Rate Sensitivities ($m)		
Portfolio	**Up 1%**	**Dn 1%**
Current	310.37	380.07
Alt 1	314.09	375.12
Alt 2	318.18	370.01

Also, please add one or two slides to the presentation for Heather providing commentary of the appropriateness of each portfolio to back the SPIA liability. Discuss some other sensitivities that could be important before making a final decision going forward.

Susan Jacobs, FSA, CERA, MAAA
Director, Fixed Annuity Projections
Susan.Jacobs@LuvalleLife.com

Part 3 – Enterprise View

Heather was very pleased with the initial presentation and thought that it was something the CRO would want to see, as she had brought it up in a couple different meetings since attending the conference. Wanting to appeal to the CRO, Heather suggested slight changes to the presentation to improve the enterprise view of the project.

From: Munoz, Heather <Heather.Munoz@LuvalleLife.com>
Subject: CRO Presentation

Great work on the presentation last week! I brought up parts of our discussion with the CRO in the hallway this week and she mentioned that she'd be interested in seeing what you put together. I don't want you to spend too much time making adjustments (I know we threw the asset request at you without much notice last week), but I was hoping you could add some introductory slides to add an enterprise-wide perspective on the sensitivity analysis project. Primarily, I'd like you to summarize the key risks that should be analyzed for each of the main product lines. Be sure not to just provide lists but also to describe the risks in your own words.

Thanks,

Heather Muñoz, FSA, MAAA
VP Actuarial – Annuities
Luvalle Life Insurance Co.