

# **Bruin Actuarial Society**

## **12th Annual Case Competition**

Presented by Corebridge Financial

January 2024

## 1. Background

You are a pricing actuary at Sgt. Pepper Financial Group, a large insurance company offering retirement services in the state of California. Sgt. Pepper Financial Group has been the largest distributor of individual annuities in California since 1965. The Chief Product Officer at your company came across an article on *LockBusiness.com* about the growing number of companies in California that are beginning to offer Fixed Annuities (“FA”) due to the steady rise of interest rates over the last few years. To strengthen their leading position in the FA market, she considers launching a new FA product with the crediting strategy that fits the current interest rate environment and competitive landscape. Regarding pricing the new FA product, she is mostly concerned about the assumption table approach on lapse rates inside annuity pricing models which may not be flexible enough to deal with rapidly changing market and competitive situations. She wants to use this chance to revisit the lapse function and convert the assumption table driven approach to a formula driven approach for annuity pricing models.

Therefore, she emails the Chief Pricing Actuary for fixed annuities and your manager, the head of FA pricing, asking them to investigate this and provide solutions. A few weeks later, your manager informs you that there is a plan to propose an appropriate lapse rate formula which will be used within the FA pricing model to properly price the new product.

## 2. Case Study

Your manager asks you to investigate and propose a lapse rate formula that will be used to price the new product within the current FA pricing model. Below are some additional information and delivery requirements.

### Task 1: Evaluate and recommend 4 key factors which should be used for the lapse rate formula

Your manager reached out to the Experience Studies division which recommends the following 9 factors to be considered for the final lapse rate formula. Your manager notices their recommendation comes from a general approach, which is not specifically targeted towards the characteristics of FA products. Your manager asks you to further evaluate the 9 factors presented and to recommend 4 to be used for the FA lapse rate formula. The reason behind this is that some of the factors recommended won't impact lapse rates for FA products. **In addition, it is preferred to keep the formula simple and straightforward inside the pricing models.**

Factors for lapse rate formula to consider:

- Policy years
- Market value adjustments (MVA)
- Mortality rates
- Crediting rates
- 5-year treasury rates
- General account portfolio yields
- Statutory reserves
- 10-year treasury rates
- Surrender charges.

Your manager expects you to investigate and research to select 4 factors within the above list to be used for the lapse rate formula. You are also expected to provide reasoning for your choices and estimate how the factors will impact lapse rates.

*Task II: Propose lapse rate formula*

Your manager asks you to use the 4 factors you pick to propose the lapse rate formula for the new product pricing. Your manager also shares with you that the new product features are similar to a previously launched FA product. Given that, your manager expects the lapse behaviors of the new product to be similar to the previously launched product. Your manager provides you the historical lapse rates on the product for the last 30 years, which could be used to calibrate your lapse rate formula. This historical lapse rate data is grouped by policy issue year. Your proposed lapse rate formula should match or “fit” the historical lapse rates as much as possible.

Your manager expects you to deliver your proposed lapse rate formula with the evidence on how the calculated lapse rates fit the historical records.

*Task III: Lapse rate inputs for the new product pricing model*

Your manager asks you to use your proposed formula to predict the lapse rates into the future. The projected lapse rates will be applied in the pricing model to decide the appropriate crediting strategies and analyze the profitability of the new product.

Please use the template provided within the package, “UCLA Case Study Competition Lapse Rate Projection 2024.xlsx”, to complete the lapse rate projection.

*Task IV: Lapse formula enhancement for GLB (Guaranteed Living Benefit)*

Your manager also asks you to conduct further research to decide if other factor(s) will contribute to the lapse behaviors of the new product if a GLB feature will be added later.

Your manager expects you to suggest one or two additional factors, that are different from the factors listed in Task I, for the proposed lapse rate formula:

- Provide reasoning on why the additional factor(s) are necessary to be included. It is determined that these factors are not on the list provided by Experience Studies (listed in Task I).
- Explain how the additional factor(s) will impact policyholder lapse behavior. If possible, illustrate with examples.

### **3. Deliverables**

- 1) Excel Spreadsheet with formula illustration
- 2) The completed "UCLA Case Study Competition Lapse Rate Projection 2024.xlsx" spreadsheet.
- 3) Office Memo – Actuarial memos should include information covering: (1) Background / Purpose of Memo, (2) Information Sources, (3) Key Analysis and Methods, and (4) Results and Recommendation.
- 4) Presentation Slides

### **4. Provided Materials**

- 1) UCLA Case Study Competition Memo (this document, "UCLA Case Study Competition 2024.docx")
- 2) Historical lapse rates for the previously launched FA product (in Case Competition spreadsheet, "UCLA Case Study Competition Data 2024.xlsx")
- 3) Historical data of 9 factors recommended by Experience Study (in Case Competition spreadsheet, "UCLA Case Study Competition Data 2024.xlsx")
- 4) Lapse rate projection template spreadsheet (in Case Competition spreadsheet, "UCLA Case Study Competition Lapse Rate Projection 2024.xlsx")

**Appendix:**

[1] Previously Launched FA Product Specifications

<b>Product Name</b>	<b>Pepper Weight Fixed Annuity</b>
Launch Date	March 1975
Surrender charge period	8 years
Surrender charge schedule	9%, 8%, 7%, 6%, 5%, 4%, 3%, 2%
MVA interest rate period	15 years
Premium	Single
Guaranteed minimum crediting rate	0.70%
First available Annuitization date	15 years after issue
Free partial withdrawal	15%

[2] New Product Specifications

<b>Product Name</b>	<b>Pepper Back Fixed Annuity</b>
Target Launch Date	January 2023
Surrender charge period	8 years
Surrender charge schedule	12%, 10%, 10%, 7%, 5%, 4%, 3%, 2%
MVA interest rate period	15 years
Premium	Single
Guaranteed minimum crediting rate	1.50%
First available Annuitization date	15 years after issue
Free partial withdrawal	10%

[3] Key Terms

1. Lapse Rate – the portion of policyholders that have terminated their annuity contract.
2. First available annuitization date – earliest date a policyholder can start receiving annuity payments. It can also be considered as the earliest date a policyholder can end the accumulation phase of their policy.
3. Free Partial Withdrawal – Annual percentage of the policy account value that a policyholder can withdraw without incurring a penalty (surrender charge/MVA).
4. Market Value Adjustment (MVA) – An adjustment made to the policyholder’s account value upon a withdrawal. MVA depends on interest rates and can be negative or positive i.e., it can reduce or increase the account value depending on the interest rate environment.
5. Guaranteed Living Benefit (GLB) – a product feature that gives policyholders guaranteed income benefits for the duration of their lifetime.

#### [4] Lapse Formula Additional Information

- Lapse rates can be divided into two components:

- Base rate - the expected lapse rate when conditions are neutral. Base rates are constant.
- Dynamic rate - the additional lapse rate expected from changes in various factors.

**Additional Comments on the Case:**

[1] The new product issue year is 2023. Your projected lapse rates in Task III will be compared with “actual” lapse records after 15 years of the new product launch to evaluate how close the projected lapse rates are with the “actual.” We pretend we can fast forward to the future and the Committee will obtain the “actual” lapse rates for validation purpose.

[2] This Case Competition document won’t cover all the relevant information on FA products. It is up to you to conduct further research to benefit your project and deliverables.