Use of Margins in Life Insurance Modeling

Much of the work that actuaries perform deals with the future. Exactly what will happen in the future is unknown, so actuaries deal with several assumptions. Depending on the work done, margins need to be added to the best estimate assumption. However, what is a reasonable margin?

Note that the American Academy of Actuaries has recently published a discussion brief on credibility, also developed by the Life Experience Committee. The level of credibility can influence the margins that should be used.

The NAIC Valuation Manual states that "The term 'margin' means an amount included in the assumptions used to determine the modeled reserve that incorporates conservatism in the calculated value. … It is intended to provide for estimation error and adverse deviation."

Unless prescribed, there is no single way by which margins in life insurance should be calculated. However, there are some good sources of information for the actuary to consider in setting margins.

Sources of Information

Actuarial Standard of Practice (ASOP) No. 54, *Pricing of Life Insurance and Annuity Products*

All actuaries practicing in the U.S. are subject to actuarial standards of practices. One ASOP that provides some information on margins is ASOP No. 54 on pricing of life insurance and annuity products. Particularly relevant to a discussion on margins is section 3.4.2 on assumption margins.

Source of Information:
http://www.actuarialstandardsboard.org/asops/pricing-of-life-insurance-and-annuity-products

Regulatory Requirements

The actuary should be aware of any regulatory requirements when performing analysis. For example, the New York Department of Financial Services (NYDFS) publishes a Special Considerations Letter each year regarding reserves and other solvency issues that need to be followed for actuaries filing opinions in New York. NYDFS does require that each material assumption include an explicit margin. The link for the 2022 Special Considerations letter is given below.

Source of Information:
https://www.dfs.ny.gov/system/files/documents/2022/10/spec_con_2022.pdf

American Academy of Actuaries: Asset Adequacy Analysis Practice Note, Life Principle-Based Reserves (PBR) Assumptions Resource Manual

The American Academy of Actuaries has been publishing an *Asset Adequacy Analysis* practice note since many life actuaries became responsible for providing actuarial opinions on asset adequacy in the 1990s. The latest version of this practice note was published in September 2017. In it, there are several references to when margins should be considered, and when it makes sense for those margins to be increased or decreased (for example, larger margins may be needed for stand-alone testing versus aggregate testing).

In addition, as more actuaries needed to understand how to determine assumptions, specifically for PBR, a PBR Assumptions Resource Manual Work Group was formed. The resulting *Assumptions Resource Manual*, published in January 2019, provides a framework for setting, updating, and governing life insurance assumptions. Section IV of this manual is on determining margins. There are also case studies on lapse margins. The Appendix also provides further resources. This manual is considered a "go-to" manual for many actuaries.

Sources of Information:
https://www.actuary.org/sites/default/files/files/publications/Asset_Adequacy_PN_092517.pdf

https://www.actuary.org/sites/default/files/files/publications/PBR_Assumptions_Resource_Manual_012919.pdf

Society of Actuaries (SOA) Research Paper: Determining Margins for Uncertainty

The SOA published a research paper in 2009 titled *Analysis of Methods for Determining Margins for Uncertainty under a Principle-Based Framework of Life Insurance and Annuity Products*. The aim of this paper was to provide assistance for those who would set margins under PBR. It discusses different methods for establishing margins and discusses approaches to be used by assumption (mortality, expenses, policyholder behavior, etc.).

Source of Information:
https://www.soa.org/globalassets/assets/files/research/projects/research-analysis-life-annuity.pdf

U.K. Paper on Prudential Margins

An easy-to-read paper on margins is a one from the U.K.'s 1993 General Insurance Convention on Prudential Margins. It discusses the reasons for margins in reserving, including the margins are the result of a reserving philosophy (how strong the reserves should be).

Source of Information:
https://www.actuaries.org.uk/system/files/documents/pdf/0127-0149_0.pdf

American Academy of Actuaries Life Experience Committee
Donna Claire, MAAA, FSA, CERA—*Chairperson*; Robert Astleford, MAAA, FSA; Lori Helge, MAAA, FSA; Jeff Johnson, MAAA, FSA; Len Mangini, MAAA, FSA; Maambo Mujala, MAAA, FSA; Craig Morrow, MAAA, FSA; Melissa Miller, MAAA, FSA; Alan Routhenstein, MAAA, FSA; Mary Simmons, MAAA, FSA; Sheldon Summers, MAAA, FSA; Connie Tang, MAAA, FSA; Kyle Wan, MAAA, FSA.

Canadian Institute of Actuaries (CIA) Educational Notes

The CIA Educational Note *Margins for Adverse Deviations* was published in November 2006. It was prepared to clarify the use of margins for adverse deviations in the CIA Standards of Practice. Although it specifically relates to the Canadian Standards of Practice, much of the information in this note is useful for actuaries outside of Canada, as it details issues that an actuary might consider when setting margins for assumptions such as lapses, mortality, and morbidity.

Another CIA Educational Note also published in November 2006 is *Use of Actuarial Judgment in Setting Assumptions and Margins for Adverse Deviations*. This note specifically focuses on what to do when there is a lot of uncertainty in what should be chosen for a margin.

Sources of Information:
https://www.cia-ica.ca/docs/default-source/2006/206132e.pdf

https://www.cia-ica.ca/docs/default-source/2006/206147e.pdf

Pricing Margins

A source of information on pricing margins is from the *Record* of the Society of Actuaries' Colorado Spring Meeting in May 2002. The particular session is titled "Profit Measures in Pricing: Their Use and Interpretation." The discussion centered on profit measures, which include considerations of profit margins.

Source of Information:
https://www.soa.org/Library/proceedings/record-of-the-society-of-actuaries/2000-09/2002/january/rsa02v28n195ts.pdf

Margin Considerations in Property and Casualty Insurance

Of interest is the use of margins in related fields, such as property and casualty insurance.

One paper, published by the Casualty Actuarial Society (CAS), is *Accounting for Risk Margins*, by Stephen W. Philbrick. It discusses types of risk margins and types of risks.

A weighty tome is a paper written for the 29th International Congress of Actuaries in March 2010 titled *A Practical Approach to Risk Margins in the Measurement of Insurance Liabilities for Property and Casualty Insurance (General Insurance) under Developing International Financial Reporting Standards*. It can also be found on the CAS's website. This paper focuses on applying risk margins for post-claim insurance liabilities.

Sources of Information:
https://www.casact.org/pubs/forum/94spforum/94spf001.pdf

https://www.casact.org/sites/default/files/2021-02/2011-robert_miccolis_david_heppen.pdf

International Papers Regarding Risk Margins and Solvency II

One source of information is an article written by Paul Huber and Nick Kinrade, "Margins for Error." This was originally published in *The Actuary* in January 2018. It is specifically aimed at risk margins used in Solvency II and International Financial Reporting Standards (IFRS), explaining how they should be understood and calculated. This paper is an easy read—and how can one protest an article starting with "One topic that is hotly debated is the cost of a pint of beer"?

A second, weightier tome is the Institute and Faculty of Actuaries' (IFoA) *A review of the risk margin – Solvency II and beyond*. This paper, written by the IFoA's Risk Margin Working Party and published on September 9, 2019, discusses overall risk margins and discusses pros and cons of their use.

A third source of information is "Considerations on the Discount Rate in the Cost of Capital Method for the Risk Margin." This article, by Hans Wasnink, goes into the mathematics as to why the cost of capital rate, as opposed to the risk-free rate, should be used in setting the risk margin.

Sources of Information:

https://www.theactuary.com/features/2018/01/2018/02/05/margins-error

https://www.actuaries.org.uk/documents/review-risk-margin-solvency-ii-and-beyond

https://www.actuaries.org/ASTIN/Colloquia/Hague/Papers/Waszink.pdf

Summary

There is no right answer as to what methodology to use to determine margins. The actuary setting the margins used in modeling must consider the use of the modeling and the audience for the results of the modeling—and, depending on the type of modeling, they may be constrained by various regulatory requirements.

If you have any feedback on this document, please contact the Academy's life policy analyst, Amanda Barry-Moilanen, at barrymoilanen@actuary.org.

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