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Resources for ALM Practitioners What Questions Should You Ask?

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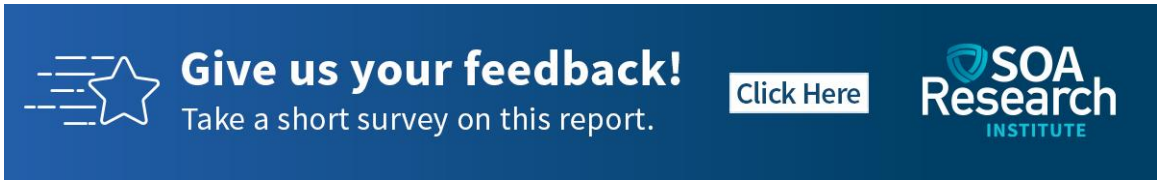

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Asset-Liability Management (ALM) is an important component of a life insurance company's enterprise risk management program. ALM evolved as products tied to equities were developed, but in terms of interest rates, ALM has not seen similar developments even as those interest rates moved toward zero. As part of regular ALM practice, it is useful to think about ALM from a first principles perspective and revisit assumptions to see if they still hold.

In 2004 the SOA Task Force on ALM Principles defined ALM as follows: "*Asset Liability Management is the on-going process of formulating, implementing, monitoring, and revising strategies related to assets and liabilities in an attempt to achieve financial objectives for a given set of risk tolerances and constraints.*"

This paper does not derive formulas or provide historical comparisons. It is meant as a resource for practitioners and regulators to understand current ALM processes and how they may be applied for specific purposes. This paper is also intended to help make decisions on how to apply an ALM process for a unique risk profile.

For this effort, a survey was developed that covered general ALM topics as well as those that are product specific. The resulting survey response rate was not high enough to be credible in its entirety. Survey results are provided in this paper when they provide insights into certain practices. As a result, the focus of this effort shifted to exploring the survey questions on their own and how to use them to think about what ALM questions an insurer should consider for various products.

Executive Summary

Following a brief introduction, Section 1 of the paper shares some basic ALM practices, sources for further reading, and some recent developments in the ALM space. Links have been provided where the referenced articles are publicly available, and readers can dive further into the material as desired. Section 2 introduces the ALM survey, splitting each major survey component into a brief review of the questions asked, survey results by product when applicable, and current considerations. It is important to note that this research paper is intended as a collection of resources for ALM practitioners. The paper is in no way intended to represent official recommendations or standards. Practitioners with different levels of expertise can use the survey questions as an additional resource to consider where an insurer may be at risk going forward or identify opportunities.

The major components of the survey include:

- Demographics
- Governance/objectives
- Product/asset detail
- Metrics
- IFRS 17
- Valuation metrics/discount rates
- Scenario testing
- Hedging
- Software

For products backed by general account assets, respondents reported a wide range of practices. Consensus included situating the ALM team in a centralized unit, calculating metrics such as duration and reporting them at least quarterly. Real world scenarios were used for the surveyed products, and most respondents felt comfortable with the interest rate generators they currently use.

Looking into the future for ALM outside of the survey, there may be additional scrutiny of an insurer's ALM program following the public challenges faced by some regional banks in 2023. Regulators and other stakeholders may ask for additional information in the near future to better ascertain the industry risk profile. Proactive life insurers may find it beneficial to carefully review the ALM programs they have in place and ensure they can use them, as applicable, to manage which risks they have knowingly accepted.

What should someone new to ALM take from this paper? In addition to the list of references and survey questions, readers can gain knowledge about how an ALM process cycle can be developed. Readers are encouraged to revisit the paper from time to time to further develop their understanding and knowledge as they work with ALM and encounter new product features for the first time. It is helpful for practitioners to pose new ideas and explain how these ideas would benefit the ALM process. Likewise, understanding how companies are reporting their ALM process and results will benefit regulators and other stakeholders.

Introduction

Asset-Liability Management is, at its core, a simple concept. Essentially, the primary objective is to make sure that the incoming cash flows (sources of funds) are large enough to pay the outgoing cash flows (uses of funds). For banks, these components are mostly deposits and investment income and withdrawals and expenses. For life insurers the sources are premiums and investment income and the uses are claims and expenses. Metrics include simple comparisons of cash in versus cash out, along with measures of interest rate sensitivity (e.g., duration) and liquidity.

As the ALM survey was developed (shared in its entirety in the file, ALM Full Survey.pdf), it became clear that there was overlap in the tools used for various products and asset classes but also some distinctions. For example, products with equity risk differed from general account products backed by typical asset classes. The survey was split between general demographic questions and then by product type; general account fixed products; general account assets backing indexed and variable products; and separate account assets backing variable products. The number of responding companies was not large enough to give generally credible results, so a focus in Section 2 is considering the questions themselves, along with a few specific or interesting results. In effect, the value of the survey is to share a set of questions that could be asked to develop an ALM process consistent with an insurer's risk culture and other metrics.

Section 3 summarizes the key takeaways and considers some follow-up projects.

Section 1 ALM Methodology Papers and Recent Events

Several papers, books, and articles have been published that provide various levels of detail about ALM. Some are general, providing building blocks, while others focus on interest rate, equity, basis, or other specific risks.

In what was likely the inaugural paper on ALM, Frank Redington's 1952 effort, *Review of the Principles of Life-Office Valuations,* introduced immunization, along with the duration and convexity metrics. By perfectly matching cash inflows and outflows the risk of an interest rate movement is eliminated. Redington's paper was recognized in the SOA monograph series associated with the organization's 50th anniversary and included in the Investment Section's book of landmark papers.[1]

1.1 GENERAL METHODOLOGIES

Many of the papers listed in this report provide a nested source to other articles and research, and the reader is encouraged to investigate them further. A few are discussed here, and more are listed in Appendix A.

1.1.1 INTERNATIONAL ACTUARIAL ASSOCIATION (IAA) – TECHNIQUES AND PRACTICES FOR INSURANCE COMPANIES

The International Actuarial Association (IAA) has created an online *Risk Book* about risk management that includes a chapter, published in 2016, on Asset Liability Management.[2] It describes how managing a life insurance company requires qualitative and quantitative measures of risk and return. Further, ALM is an important component of enterprise risk management (ERM) for both internal and external stakeholders. Some regulatory and accounting standards may provide challenges when a goal is to optimize ALM results, mainly due to independent assessment of assets and liabilities. Separate sections cover governance, metrics, and strategy execution, with products developed around interest rate and equity risks covered. The ALM chapter, written by Charles Gilbert in October 2016, addresses the ALM function broadly and is an excellent resource for anyone looking to review or enhance the benefit that might be obtained from ALM.

1.1.2 SOCIETY OF ACTUARIES PROFESSIONAL ACTUARIAL SPECIALTY GUIDE: ASSET-LIABILITY MANAGEMENT

This SOA report was published in 2003 but remains an excellent resource for those interested in a deeper dive on ALM topics.[3] In the years since then, a number of innovative products and strategies have been developed. A subset was included in Leo Tilman's compilation titled *Asset/Liability Management of Financial Institutions*[4] covering life insurance solutions. A 24-page sources document was published as a *Professional Actuarial Specialty Guide (AA-1-98)*.[5] It includes summaries and lists many papers for deeper learning across 13 topics and is a great place to start gaining ALM knowledge. The 13 topics are:

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[1] Society of Actuaries. *Review of the Principles of Life-Office Valuation*. 50th anniversary Investment Section Monograph. October 1999. Pages 1-40. https://www.soa.org/globalassets/assets/library/monographs/50th-anniversary/investment-section/1999/january/m-as99-2-01.pdf

[2] International Actuarial Association. *IAA Risk Book*. Chapter 13 – Asset-Liability Management. October 2016. https://actuaries.org/app/uploads/2025/04/IAARiskBook_AssetLiabilityMgmt_2016-10.pdf

[3] Society of Actuaries. *Professional Actuarial Specialty Guide – Asset-Liability Management (AA-1-98).* August 1, 1998. https://www.soa.org/library/professional-actuarial-specialty-guides/professional-actuarial-specialty-guides/2003/september/spg0308alm.pdf

[4] Tilman, Leo M. *Asset/Liability Management of Financial Institutions: Maximizing Shareholder Value through Risk-Conscious Investing*. Euromoney Books. 2003.

[5] Society of Actuaries. *Professional Actuarial Specialty Guide: Asset-Liability Management AA-1-98.* August 1998. https://www.soa.org/globalassets/assets/library/professional-actuarial-specialty-guides/professional-actuarial-specialty-guides/1998/august/spg9808alm.pdf

1. Introduction to ALM
2. Basics in Financial Economics Relevant to ALM
3. Immunization
4. Arbitrage-Free Interest Rate Models
5. The Efficient Frontier and Asset Allocation
6. Derivatives
7. Bank ALM and Value-at-Risk (VAR)
8. Corporate ALM
9. Performance Measurement and Benchmarking
10. ALM in Product Development
11. Market Value of Insurance Liabilities
12. Property and Casualty Insurance
13. Pension Plan ALM

The first two topics provide background, leaving immunization to be covered separately. Later sections focus on technical aspects and practical implications for actuaries.

1.2 ALM FOR BROADER FINANCIAL SERVICES

Asset-Liability management applies to a wide variety of entities that balance the cash flow needs of a contract against the cash flows created by assets and premiums that have been collected in advance. These can be banks, insurers, or shadow banks. The liabilities at banks include deposits and borrowings. For insurers, asset and liability cash flows interact in several different ways. Insurers are regulated by state governmental bodies with the National Association of Insurance Commissioners providing "tools and resources to help regulators set standards and best practices, provide regulatory support functions, and educate on U.S. state based insurance regulation."[6]

Beyond insurance regulations, financial regulations were developed by the SEC following the financial crisis of 2008 based on securities markets available at that time. Outside of these financial regulations from the SEC, other financial institutions, broadly referred to as shadow banks, are generally unregulated and do not have access to central bank borrowing facilities. From a historical perspective, financial instruments developed by unregulated financial organizations played a part in the boom period of the late 1920s, and similarities are worth monitoring today for potential contagion effects.[7]

1.2.1 ASSET AND LIABILITY MANAGEMENT FOR BANKS AND INSURANCE COMPANIES (CORLOSQUET-HABART, ET AL.)

Similar to the Tilman book listed earlier but including thoughts on Solvency II, Corlosquet-Habart et al. paint a broad brush of practical ALM practices in banks and insurance companies.[8] The book details how to use the Basel Framework, develops metrics (e.g., duration, convexity, cash flows), and discusses how to build internal models for banks and insurers.

[6] NAIC website https://content.naic.org/
[7] In the 1920s the Federal Reserve was not able to effectively slow borrowing as call loans (loans that are callable) were offered by shadow banks who were not regulated by the central bank. Higgins, Mark J. *Investing in U.S. Financial History: Understanding the Past to Forecast the Future*. 2024. Chp 15. Greenleaf Book Group Press.
[8] Corlosquet-Habart, M. et al. *Asset and Liability Management for Banks and Insurance Companies*. 2015. ISTE Ltd and John Wiley & Sons, Inc.

1.2.2 OCC COMPTROLLER'S HANDBOOK: SAFETY AND SOUNDNESS: INTEREST RATE RISK

The Office of the Comptroller of the Currency (OCC), responsible for supervising national banks (among others), developed material to use in examinations covering repricing risk, basis risk, yield curve risk and options risk as part of its Comptroller's Handbook.[9] This is written from a supervisor's perspective but many of the tools and metrics overlap. It is useful to read banking ALM techniques to compare against internal life insurance stress tests, including time horizon, different goals for banks and insurers, and between internal and regulatory purposes.

1.3 TECHNICAL PAPERS

ALM techniques can be treated like a pyramid, with some basic methods developed initially as a base and product designs using that base to measure product risk. The following are papers that focus on detailed methodology.

1.3.1 PARTIAL DURATION

Dr. Robert Reitano initially wrote about partial durations, where the modified duration metric is dissected into pieces based on non-parallel changes to the yield curve.[10] This theoretical approach leads to other techniques that are practitioner friendly including the key rate duration metric.

1.3.2 KEY RATE DURATION

Thomas Ho introduced the concept of key rate durations, decomposing the overall duration into components based on specific maturity points. He uses triangular shifts to the spot rate, so the sum of the key rates equals the overall metric.[11]

1.3.3 MARKET VALUE OF LIABILITIES

One question that challenged ALM practitioners was the multiple methodologies (option pricing, actuarial appraisal methods) to calculate a fair value equivalent to market value when a liability was not traded. In 2000 Luke Girard overcame this by showing that these methodologies were equivalent.[12] [13] In a 1998 article David Becker developed the metric OAVDE, Option Adjusted Value of Distributed Earnings.[14]

1.3.4 EQUITY GUARANTEES AND REGISTERED INDEX-LINKED (RILA) PRODUCTS

Guaranteed minimum benefits on variable annuities is a difficult subject, but a book with 20 chapters written by industry experts and edited by Tigran Kalberer and Kannoo Ravindran is useful for practitioners.[15] The concepts discussed can be extended to guaranteed minimum benefits on variable UL, equity index products, and registered indexed annuities. The book is divided into three sections which focus on environment, modelling, and risk

[9] Office of the Comptroller of the Currency. *Interest Rate Risk* Version 1.0. March 2020. https://www.occ.treas.gov/topics/supervision-and-examination/capital-markets/balance-sheet-management/interest-rate-risk/index-interest-rate-risk.html
[10] Reitano, Robert R. *Non-Parallel Yield Curve Shifts and Durational Leverage*. The Journal of Portfolio Management Summer 1990. https://www.academia.edu/107863781/Non_parallel_yield_curve_shifts_and_durational_leverage
[11] Ho, Thomas S.Y. *Key Rate Durations*. The Journal of Fixed Income Vol 2 Issue 2. Fall 1992. https://www.pm-research.com/content/iijfixinc/2/2/29
[12] Reitano, Robert R. *Two Paradigms for the Market Value of Liabilities.* North American Actuarial Journal. October 1997. https://www.soa.org/globalassets/assets/library/monographs/50th-anniversary/financial-reporting-section/1999/january/m-as99-1_xviii.pdf
[13] Girard, Luke. *Fair Valuation of Liabilities: Theoretical Considerations*. Society of Actuaries Risks and Rewards. February 2001. https://www.soa.org/globalassets/assets/library/newsletters/risks-and-rewards/2001/february/rar-2001-iss36-girard.pdf
[14] Becker, David N. *The Objective (Function) of Asset/Liability Management*. Society of Actuaries Risks and Rewards. March 1998. https://www.soa.org/globalassets/assets/library/newsletters/risks-and-rewards/1998/march/rar-1998-iss30-becker.pdf
[15] Edited by Tigran Kalberer and Kannoo Ravindran, *Non-traditional Life Insurance Products with Guarantees*, Risk Books. 2016.

management. Risk management techniques discussed include hedging (with extensive discussion of financial derivatives), reinsurance, and product design.

1.4 EXTENDING THE DURATION METRIC

Duration traditionally has compared the sensitivity of cash flows within a product or portfolio, including all of the assets and liabilities needed to support the product but not the surplus assets of the insurer. Historically, only assets with defined cash flows would back a product's reserve so asset classes like equities and venture capital were typically held in a surplus account, if at all. Stakeholders became interested in the equity, enterprise, or surplus duration of the insurer and were surprised at how sensitive to interest rates many insurers were. It becomes clear that a form of leverage where the market value of assets relative to the market value of surplus is high, combined with increasing the duration mismatch for products, can create a high degree of interest rate sensitivity. To gain further insight as it relates to ALM, it is useful for stakeholders to understand the impact of decisions made related to duration.

1.4.1 CASE STUDY FOR P/C INSURERS

In a 1991 AFIR Colloquium call for papers Karen Fireman builds ALM complexity in stages for a P/C insurer, starting with basics and adding inflation and impact on surplus but falling short of equity/enterprise duration.[16] Several well-regarded papers are referenced.

1.4.2 EQUITY DURATION

Extending duration beyond a product level metric has limitations but can provide valuable information.[17] [18] Referred to as equity, enterprise, or surplus duration, the calculation uses market values of cash flows in the calculation.

$$D_E = A/S \times (D_A - D_L) + D_L$$

where D_E is equity duration
D_A is asset duration
D_L is liability duration
A is market value of assets
S is market value of surplus

In simple terms, the equity duration is the leverage times mismatch plus the liability duration. If an insurer writes products that require little capital relative to the assets under management, a small mismatch can result in a large equity duration.

An algebraically equivalent formula is

$$D_E = (A \times D_A - L \times D_L)/S$$

Where L is market value of liabilities

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[16] Fireman, Karen. *Asset Liability Management: How Matched is this Company?* 2nd AFIR Colloquium 1991, 2: 39:56. https://www.actuaries.org/AFIR/colloquia/Brighton/Fireman.pdf

[17] Berkelaar, A. et al. *Portfolio Management for Institutional Investors*. Chp 20. Refresher Reading 2024 CFA Program Level 3.

[18] Staking, Kim B. and Babbel, David F. *The Relation Between Capital Structure, Interest Rate Sensitivity, and Market Value in the Property-Liability Insurance Industry*. The Journal of Risk and Insurance. 1995 Vol. 52, No. 4, pages 690-718. This paper introduced the concept of equity duration, focusing on insurance company implementation. https://www.jstor.org/stable/253591

Solving for an equity duration of 0 requires $A \times D_A = L \times D_L$

1.5 RECENT DEVELOPMENTS AND ALM IMPLICATIONS

Asset-liability management, until recently, has been a fairly stable practice area as interest rates have generally fallen since the early 1980s. During this period, many financial institutions have been focused on longer assets relative to liabilities in an effort to increase yields. The recent period of low interest rates that was present at the start of the pandemic era was followed by rising interest rates and highlighted some practices that assumed certain heuristics (rules of thumb) would continue to be applicable. As a result, some institutions may have challenges on their balance sheet that have yet to be realized as the trajectory of interest rates continues to evolve. Warren Buffett has a quote for such situations, "Only when the tide goes out do you discover who's been swimming naked." Rising rates represent the outgoing tide. Some additional interesting effects may yet be identified.

Some companies in the financial services industry were surprised in early 2023 when rates increased from generational lows, causing those with asset cash flows longer than their liability cash flows to have unrealized capital losses on their aggregated balance sheets. For some, a run-on-the-bank scenario developed, and intervention was needed to protect customers. This paper includes a short case study about Silicon Valley Bank and its ALM challenges. These challenges can be extrapolated to similar sized financial institutions.

What should these entities have considered in advance of this event? How could they have proactively prepared? A goal of this paper is to provide a resource to help understand these issues and how they relate to risk appetite policies. Regulators and other stakeholders can use this paper to better understand, in the context of ALM, the risks being accepted by financial institutions and mitigation strategies available to them. There are many useful resources available to manage risks created by recent products from first principles (see Appendix A), but few were created recently. A hoped-for byproduct of this paper is that it may stimulate practitioners to document and share case studies about recent products they have worked on and how the applicable risks were managed, including any newly developed metrics. Stress scenarios developed in advance that highlight ALM risks in today's economic ecosystem would be welcomed.

1.5.1 SILICON VALLEY BANK CASE STUDY

Quite a bit has been written about Silicon Valley Bank's (SVB) 2023 experience.[19] SVB became known during a recent bank mini-crisis that led to intervention by the FDIC (increased guaranteed levels) and Federal Reserve (deferred quantitative tightening and rate increases). SVB had a concentrated influx of funds from tech startups when rates were low and reached for yield by investing long and choosing to be exposed to an ALM mismatch. Others, including pension plans and insurers, invested in illiquid instruments during this period. Surprisingly, a mean reversion scenario where interest rates rose was not tested. Depositors with more than the FDIC guaranteed levels in checking accounts were among those who became concerned about losses in their accounts and withdrew their money when higher rates had created unrealized losses. This then turned them into realized losses and a threat to the bank's solvency. Government agencies bailed out the bank and depositors, and SVB lost its independence. A lesson from this is that transparency, consistency, and a strong risk culture are important features of an ALM process.

[19] Society of Actuaries. What Can Insurers and Pension Funds Learn from Bank Failures – Expert Panel Discussion. https://www.soa.org/resources/research-reports/2023/learn-from-bank-failures/

1.5.2 GENERAL ALM REGULATORY PERSPECITVE AND CURRENT CONSIDERATIONS FOR PRIVATE EQUITY COMPANIES[20]

Insurance regulation has a long history of protecting the public. Life insurance has been described as a "trust me" transaction, meaning that the industry has to continue to earn the trust of customers who pay premiums today for future payments that may only occur after the policy owner dies. Today, regulations are in place to ensure funds are available when needed, but historically that wasn't always the case. The State of New York, following the Armstrong Committee's investigation in 1905, increased supervision of the industry in what could be considered early ALM oversight. Regulations have evolved with product design, reserve setting, and capital requirements that aim for policyholders to be treated fairly and receive their contractual promises.

ALM is a key component of today's life insurance regulations, ensuring that cash outflows to pay claims and expenses are reasonably well-matched to the cash inflows provided by premiums and investments. Specific ALM considerations include liquidity, default, and mismatch (interest rates and equity returns) risk as well as ensuring that redundancies in margins result in appropriate funds set aside to protect policyholders through reserves and capital. Transparency using ALM metrics is important to allow stakeholders to confirm that protective tasks have been completed.

Periodically there are new arrangements and practices around products or asset classes that require updated regulatory guidance. The recent trend of private equity involvement in life insurance companies is one example of an area for updated regulatory guidance that may require new tools and metrics as it relates to ALM. For more information about current regulatory considerations for private equity and life insurance companies, readers may review the referenced sources from the NAIC, International Monetary Fund, and Bermuda Monetary Authority.

1.5.3 AAA PAPER ON REGULATORY ALM[21]

The American Academy of Actuaries (AAA), through its Asset Adequacy Testing Task Force, summarized current practice for asset adequacy testing in the pandemic year of 2020 using a survey format. Questions probed mortality assumptions, whether various assumptions should revert to "normal" and how long it would take, along with interpretation of scenarios that are beyond moderately adverse. Regulators provided guidance for 2020 that was temporary, including scenario definitions. This survey is very useful for its timing and reporting of current practice at that time. Asset adequacy testing provides regulators a glimpse into a life insurer's ALM practices with generally consistent methodologies.

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[20] This section is based on papers written by the NAIC, BMA, and IMF. *Regulatory Considerations Applicable (but not exclusive) to Private Equity (PE) owned insurers*. https://content.naic.org/sites/default/files/inline-files/List%20of%20MWG%20Considerations%20-%20PE%20Related%20and%20Other.pdf *Supervision and Regulation of Private Equity Insurers https*://www.bma.bm/news-and-press-releases/supervision-and-regulation-of-private-equity-insurers *Private Equity and Life Insurers* https://www.imf.org/en/Publications/global-financial-stability-notes/Issues/2023/12/13/Private-Equity-and-Life-Insurers-541437

[21] American Academy of Actuaries. Asset Adequacy Testing Considerations for Year-End 2020. December 2020. https://www.actuary.org/sites/default/files/2020-12/AAT_final.pdf

Section 2 The ALM Survey

2.1 OVERVIEW

The ALM Survey was developed as four modules; company, general account products, general account assets backing indexed and variable products, and separate account assets backing variable products. These were split so the product experts could complete the survey for their product lines and someone with overall company knowledge could complete the company module. Someone with knowledge of company practices was expected to be able to complete the survey in about 90 minutes.

Respondents were asked how long it took them to complete the survey as well as its difficulty. Over half (60%) completed survey components in an hour or less but many found it a challenging exercise.

As noted earlier, only results that reflect sufficient participation are shared in the following sections and more qualitative commentary on current issues, etc. is provided for additional context on the survey questions.

2.2 COMPANY SURVEY

The company module of the survey was designed to help someone developing, reviewing, or learning about an ALM program by asking thought-provoking questions and providing potential responses and an opportunity to add more. ALM is likely to evolve in the future, so the reader should be aware of additional options, but having a base of knowledge can help speed along the development and learning process. The reader can look at the options provided and think about why other respondents may have answered the question in a different way. This can provide valuable insight. This is a similar exercise to investors seeking to understand the thought process of the person on the other side of a trade.

Unfortunately, the number of company responses to the survey was limited. Actual survey results will only be shared when they provide useful insight. For the purposes of this report, the researcher will describe each section of the survey, excerpt any interesting components from the results, and summarize current practice considerations.

2.2.1 SECTION 1: DEMOGRAPHICS

As the section name implies, the survey collected general information about the company, products sold, general and separate account assets under management, ratings, and company structure.

Two credit ratings were requested. Most insurers carry an AM Best company rating. Smaller companies and those without complex products in particular may only have this rating. Some products require an additional company rating, often from Standard & Poor's (S&P), Moody's, or Fitch.

Companies may be structured in a variety of ways. The survey asked about the most common structures for insurers: public, mutual holding company, mutual, or fraternal.

2.2.1.1 DEMOGRAPHICS – RESULTS

Of the 40 companies who responded, 92% were based in the United States. They were asked separately about assets in the general and separate accounts sections, and company size splits occurred at $1, $5, and $20 billion. The median AM Best rating was A and for those with an S&P rating most were split between AA and A. The company structure of the survey respondents was very broad, with 30% responding "Other." This primarily reflected private ownership and subsidiaries.

2.2.1.2 DEMOGRAPHICS – CURRENT CONSIDERATIONS

It is useful to look at practices that are applicable across insurers rather than focusing only on one type of company structure. In this regard, it is helpful for ALM practices to consider first principles, especially during periods of change as was recently endured when interest rates fell to generational lows and then rose quickly. Asset classes evolve continuously, and it is prudent to consider what could go wrong as well as what could go right. Scenarios and stress tests can be developed based on long-term trends as well as recent events.

2.2.2 SECTION 2: ALM GOVERNANCE/OBJECTIVES

In Section 2 of the company survey, questions were asked about where in the organizational structure the ALM strategy is implemented and what holistic objective metrics are used to define success. Readers are encouraged to review all the options presented for these and other questions in the file, ALM Full Survey.pdf. Results will diverge based on a company's culture, ALM team skill set, and perspectives of specific personnel.

The ALM function can be embedded in the business units (decentralized) or located in a corporate unit (centralized). Responsibility for ALM, usually also acting as the ALM Committee Chair, could be a C-suite executive heading risk management, investments, actuarial, or finance. Other teams could be direct reports to the CEO or Board or report to individual business units.

The ALM implementation team may be the primary decision maker or provide input for goals and objectives tied to strategic planning, strategic asset allocation, performance attribution, stress testing, hedging, and total return analysis. They may also report metrics used for regulatory reporting.

Respondents were asked to share metrics they use to manage ALM as well as their methodology for aggregating results and whether the metrics are included in incentive compensation calculations. These could include statutory, GAAP (Generally Accepted Accounting Principles), IFRS (International Financial Reporting Standards), LICAT (Life Insurance Capital Adequacy Test—Canada), or economic measures.

Governance responsibility (board committees) can vary, as can ALCO (Asset Liability Committee) presence and location. Respondents described their interpretation of the three lines of defense. One current risk receiving more scrutiny is climate change and respondents were asked if their ALM strategy was evolving to reflect it.

2.2.2.1 GOVERNANCE – RESULTS

Governance functions related to implementation (89%) and oversight (83%) most often were preferred by a centralized, corporate unit approach to ALM. Some companies noted that responsibility for ALM falls to a small team or a combined effort involving investment and actuarial knowledge.

Survey results included that the Chief Actuary (31%) is most likely to be responsible for ALM and the Actuarial unit (31%) is most likely to implement the policy. Companies also use the Chief Risk Officer, Chief Financial Officer, Chief Investment Officer, or some combination of this group with shared responsibility for ALM.

The ALM team provides input for strategic items and the efficient frontier and is typically the primary decision maker for duration/convexity, stress testing, and regulatory capital modeling. The aggregated ALM focus was on duration mismatch, threat to solvency, surplus, and earnings volatility.

About half (46%) of the companies have an Asset Liability Committee (ALCO) and most have a reporting relationship below the Board level. ALM information is presented to the Board primarily at the aggregate level. Few include ALM metrics in their incentive plans or have changed their ALM strategy due to climate risk. Activities of the ALCO include reporting items like net investment income and responsibilities encompassing strategic asset allocation, developing and maintaining a consistent ALM policy, and an advisory role to ensure awareness and provide oversight. Market and liquidity risks are often managed here.

2.2.2.2 GOVERNANCE – CURRENT CONSIDERATIONS

As was seen in mid-sized banks in 2023, ALM mismatches can impact solvency, and stakeholders can benefit from additional information beyond regulatory requirements to anticipate market changes. Insurers are best served by an ALM process that anticipates markets developed from historical data as well as using foresight to model mean reversions and other risk events that have not been seen previously. This can be due to new liability products or asset classes, or concentrations in either that makes liquidity more important. Clear communication channels are needed to the Board, product teams, financial reporting team, and senior management. Insurer size and complexity matter and the ALM team should be right-sized to address these appropriately. Recent developments in asset classes with increased credit risk and reduced liquidity features, combined with wider mismatches in long-duration ALM targets can be a catalyst.

2.2.3 SECTION 3: PRODUCT/ASSET DETAIL

This section of the company survey provides additional background, asking about assets and liabilities managed in the general account, separate account, and surplus portfolios. Questions were also asked about alternative asset classes and yield enhancement strategies. An open-ended question asked insurers if they saw ALM practices that were not consistent with profitable long-term thinking, and about the impact of principle-based reserves on ALM strategies.

2.2.3.1 PRODUCT/ASSET DETAIL – RESULTS

The number of general account portfolios (these are informal and all assets back all liabilities in the general account) is often dictated by company size and sophistication of its products. Some marketing distributions are also kept separate. There is a wide dispersion by count, but almost all have some form of informal segmentation. A minority of respondents (28%) have no dedicated surplus portfolio while a few have more than one per legal entity to differentiate by asset class or multiple currencies. Size can be thought of in absolute or relative terms. A small firm may have a few billion dollars of an alternative asset class, but if this is a large percentage of their total asset portfolio then its importance becomes much greater.

The survey requested quite a bit of data on products and assets. Results are generally limited due to the small number of responses to any one question. The survey responses included:

- Reserve size. Results were categorized by product type, with tiers set at under $5 billion, $5-15 billion, and over $15 billion. Few companies reported more than a small immaterial level for general account life products, and very few reported any variable life products. The same is true for annuities and very few reported information about health products.
- Asset class size and percentage of total. Tiers were set at under $5 billion, $5-15 billion, and over $15 billion for size and 5% and 20% for concentration, split by various general account, separate account, and surplus holdings, and including alternative asset classes, private equity, and derivatives. The asset classes with over 20% book value in a general account backing product included investment grade bonds, commercial mortgages, collateralized loan obligations (CLOs), and below investment grade bonds. The asset classes represented in more than small amounts reflect a general conservatism in the investment strategies.
- Assets purchased to improve yields included private equity, commercial mortgages, and CLOs.

There is currently much discussion among insurers about the use of alternative asset classes and resulting ALM practices. For alternative asset classes, several insurers noted middle market loans while others added that they participate in asset classes such as credit tenant loans, joint ventures, private real estate loans, and general Schedule DA assets (short term investments).

Only a few responded, with some saying they were not aware of any, but some open-ended responses to practices inconsistent with profitable long-term thinking included the following (verbatim responses):

- *Offshore reinsurance of inforce blocks*
- *Duration matching. Asset market values often much larger than liability fair value.*
- *Pretending there is no interest risk in surplus*
- *Focus on body risk (e.g., duration) measures vs. tail risk*
- *Hedging GAAP accounting*
- *Regulations and accounting rules that have inconsistent market and book value treatment for different assets and liabilities, as well as one-sided reserve strengthening rules (such as treatment of IMR), create non-economic balance sheet issues that make ALM very difficult for U.S. insurance companies. Hedge accounting constraints are one of the largest factors that make duration management extremely difficult.*
- *Secondarily – ALM is not about increasing or maximizing profit vs. reducing risk to any changes in rates. Really the question should be about risk adjusted returns and not returns.*

Over half (76%) reported that Principle-based reserve (PBR) regulations had not impacted ALM practices. Examples of impacts were mostly indirect, such as making sure that changes in suggested allocations were tested using VM-20.

2.2.3.2 PRODUCT/ASSET DETAIL – CURRENT CONSIDERATIONS

Some liabilities (e.g., defined benefit pension plan, senior manager deferred compensation plans) have historically been left out of insurer ALM strategies. That can be important when devising aggregate metrics like equity/enterprise/surplus duration.

Taking a perspective of a risk focused exam, it is beneficial for the ALM team to be aware of the marginal impact of any strategic or tactical decisions. Changes or anticipated events can have scenarios designed to test new asset classes or products and how they might impact aggregate results. Many of the new asset classes are complex so the modeler needs full transparency with the asset manager.

2.2.4 SECTION 4: KEY METRICS

Respondents were asked how they defined mismatch and their methodology for aggregating asset classes with undefined duration. The survey asked how often metrics are calculated and how they are shared with senior management and the Board. Managing liquidity risk was a topic in the survey, with questions about metrics, tactics, and time horizons.

2.2.4.1 KEY METRICS – RESULTS

Duration is most commonly measured excluding surplus, with some including key rate/partial durations and others including surplus (equity duration). For asset classes with undefined duration a few respondents use weighted average life or an arbitrary estimate. Some respondents noted that what gets measured gets managed. Key metrics are calculated quarterly for half the respondents and more frequently for most of the rest. They are typically reported to the Board quarterly with a lag of one to three months.

The asset mix is often adjusted based on the metrics reported. Liquidity risk is measured using internally defined metrics over periods less than one month, two to 11 months, and one to three years.

2.2.4.2 KEY METRICS – CURRENT CONSIDERATIONS

Metrics can be reported at a point-in-time, but it is also useful to share the trends to show how results are evolving. Dashboards can move toward instantaneous reporting for hedges. For the metrics that are relatively new with little historical data this can be very helpful to become familiar with, whether it is the ALM team, product manager,

portfolio manager, or the Board. Examples would be equity duration and liquidity ratios. A transparent ALM policy with results shared among the key players, including breaches, is less inclined to surprise.

2.2.5 SECTION 5: IFRS 17 QUESTIONS

For companies where IFRS 17 (accounting for insurance contracts by the International Accounting Standards Board) is applicable, a combination of open-ended and multiple-choice questions were asked. Topics included perceived implementation challenges, inconsistencies between approaches, questions about discount rates, and practical questions being considered.

2.2.5.1 IFRS – RESULTS

Only a few companies responded to the IFRS questions, not enough to provide useful insights.

2.3 PRODUCTS SURVEY

Nearly identical questions were asked of companies writing a variety of products: general account fixed products, general account assets backing indexed and variable products, and separate account assets backing variable products. A total of 18 respondents completed this section of the survey for general account products, so only a limited number of aggregate results and highlights of additional comments are shared. Fewer completed questions about the other two products so qualitative differences and interesting comments are noted only if applicable. A very limited number completed the section for separate account products, and responses were consistent with the prior section, so no additional comments have been shared. This section provides details about how an ALM process might be presented and the options available. A good process should align with the pricing methodology and planning scenarios, with differences understood and noted.

2.3.1 SECTION 1: DEMOGRAPHICS

Much of ALM for general account products has been in place for many years, so this part of the survey was an opportunity to see how practice has evolved. Questions were asked about risks managed, ALM program goals, and details. Specific topics included methodology to credit interest to policy holders, allocating earned income, and how ALM risk tolerances were developed. Allocation of investment income incorporates a strategy about capital, diversification, and capital gains/IMR. It is useful to consider what others are doing to understand the nuances of your own choices.

One question asked was where in the duration calculation are premiums included, with options in the survey to either net against liability cash flows or to add to asset cash flows. Since duration is the change relative to value, if a product collects premiums in advance, like whole life insurance, the present value of future cash flows (premiums net of liability cash flows) is initially positive before turning negative. As the value approaches zero, the duration is calculated as approaching infinity, which does not provide logical guidance and is a limitation of duration as a metric when calculated in this way.

2.3.1.1 DEMOGRAPHICS RESULTS – GENERAL ACCOUNT FIXED PRODUCTS

Among respondents, internal product line hedges did not often play a role. Premiums are typically netted against liabilities when calculating duration and convexity. Products managed by the ALM team commonly included interest rate and liquidity risks. In addition to external requirements to regulators and rating agencies, internal goals included solvency, strategic, and managing earnings volatility. Portfolios were created based on the liability product, duration, closed block status, and investment strategy.

Investment income is allocated pro rata or based on the average reserve, but after that methods are not aligned and may not be consistent with pricing and business plans. Investment expenses are developed by asset class or evenly

across all assets. Interest credited is generally based on the expected investment earnings but often includes competitive considerations.

2.3.1.2 DEMOGRAPHICS RESULTS – GENERAL ACCOUNT ASSETS BACKING INDEXED AND VARIABLE PRODUCTS

While the focus remains on the general account, the ALM process becomes more focused on managing earnings volatility, concentrating on economic value rather than statutory or GAAP.

2.3.1.3 DEMOGRAPHICS CURRENT CONSIDERATIONS

One way to align net investment income allocation is to think of it when used for attribution and incentive compensation. The book value of assets will never exactly match the comparable liability amount at the beginning and end of the period being measured (typically quarterly). Differences between pricing, annual plan, and reporting are useful when communicated in a transparent manner so the process can have consensus. Liquidity risks may not currently have a liquidity component to the asset spread required. If these risk strategies are not aligned before the product is sold there will be internal imbalances.

2.3.2 SECTION 2: VALUATION METHODS/DISCOUNT RATES

There are pros and cons to using risk neutral or real-world interest rates, and insurers vary about their use of deterministic or stochastic scenarios (or both). Discount rate and spread can vary by product and liability option values approximated or stochastically modeled.

2.3.2.1 VALUATION METHODS/DISCOUNT RATES RESULTS – GENERAL ACCOUNT FIXED PRODUCTS

Most of the respondents preferred real world scenarios over risk neutral scenarios for general account products. Those using real world scenarios tended to utilize the yield curve. Those using risk neutral scenarios tended to utilize the forward curve. Spreads used vary quite a bit, with most using some form of market rate or portfolio yield, but some use their own credit spread. Liability options are modeled stochastically or using approximations.

2.3.2.2 VALUATION METHODS/DISCOUNT RATES RESULTS – GENERAL ACCOUNT ASSETS BACKING INDEXED AND VARIABLE PRODUCTS

Practitioners with these products were more likely to model using risk neutral forward curves. Liability options were more likely to be modeled stochastically.

2.3.2.3 VALUATION METHODS/DISCOUNT RATES – CURRENT CONSIDERATIONS

Modelers often have a preference between real world and risk neutral scenarios. As part of the ALM process, the chosen methodology is communicated to stakeholders with reasoning for why it was chosen.

2.3.3 SECTION 3: SCENARIO TESTING

Scenario tests can be used to identify what can go right and what can go wrong within a block of assets and liabilities. The survey asked about insurer's use of deterministic and stochastic scenarios for hedging and ALM purposes, and if their existing stochastic generators were meeting their needs.

2.3.3.1 SCENARIO TESTING RESULTS – GENERAL ACCOUNT FIXED PRODUCTS

The results shared here, while useful, should be considered anecdotal due to the limited number of respondents. For deterministic scenarios, companies often had a specific process tied to the level of conservatism, mean reversion, and grading. Many were based on regulatory or internally developed adverse scenarios. A variety of assumptions were tested beyond interest rates and equity returns, including mortality, credit, and expenses. For stochastic scenarios, most felt their current generators met their needs. Many companies use the NAIC generator for pricing but often adjust it for mean reversion and VM-20 spreads.

2.3.3.2 SCENARIO TESTING RESULTS – GENERAL ACCOUNT ASSETS BACKING INDEXED AND VARIABLE PRODUCTS

Respondents with these products were more likely to use ALM scenario testing to identify positive outcomes and some use risk neutral scenarios for hedging (inner loop) and real-world scenarios for ALM (outer loop).

2.3.3.3 SCENARIO TESTING – CURRENT CONSIDERATIONS

Scenario testing is required for regulatory purposes, primarily Asset Adequacy Testing and ORSA compliance. Going beyond this can add strategic value and is easy to do incrementally. An insurer can run a stochastic set of scenarios and then present to the Board a few that did the worst, along with a few that provided positive results, sharing narratives driving positive and negative outcomes. Liquidity and capital ratios based on internal or external standards can be trended over time. Scenarios can be used for marginal analysis, adding a new product or annual sales targets to an existing block of business. Narrative scenarios can be developed, similar to the IPCC set based on climate risk, which combine a variety of assumptions into a scenario set easy to convey to stakeholders about how it would impact an insurer in aggregate or an individual block of business.

2.3.4 SECTION 4: METRICS

Metrics are the lifeblood of an ALM program. While there are often inconsistencies between companies, and specifics should be defined, insurers may look at duration, convexity, and the Greeks. The survey asked respondents to differentiate between the use of these metrics for measurement versus management of risk. Aggregate risks can be reviewed using value at risk (VaR) or conditional tail expectation (CTE) metrics or using attribution[22] to dissect the results.

2.3.4.1 METRICS RESULTS – GENERAL ACCOUNT FIXED PRODUCTS

The most popular duration metric among respondents for measuring interest rate risk was effective duration, but Macaulay, DV01, Modified and partial/key rate durations were all used by some, as was convexity. For measuring equity risk, delta was the top choice, with some using it for assets, liabilities, and surplus. Managing for interest rate risk is similar, with effective duration the top choice but with cash flow sufficiency also popular. Attribution factors for interest rate risk includes cash flow sufficiency, DV01, key rate duration, and effective duration. Attribution factors for equity risks included delta, gamma, and vega. ALM risk mitigation tools include internal diversification, reinsurance, and asset hedging. Real world rates are typically used for pricing, but most of the survey respondents did not integrate ALM into their pricing process.

2.3.4.2 METRICS RESULTS – GENERAL ACCOUNT ASSETS BACKING INDEXED AND VARIABLE PRODUCTS

Those writing these products were more likely to measure and manage interest rate risk using key rate duration and convexity, and equity risk using delta, gamma, and vega metrics. Some shared duration mismatch constraints of +/- 0.5 or 1.0, with others reporting that the constraint varies with the benchmark and could be a relative (%) rather than absolute (+/-) constraint. Value at Risk (VaR) over one year, and Conditional Tail Expectations (CTE) over the product lifetime time horizon, were calculated by only a few respondents.

2.3.4.3 METRICS – CURRENT CONSIDERATIONS

Life insurers writing products with interest rate optionality benefit from focusing on effective duration and convexity of both assets and liabilities. Equity duration and attribution can be measured by the ALM team to understand the

[22] The purpose of attribution analysis is to explain (or attribute) the changes in the values of the objective function that is measured and reported due to changes in the underlying factors (interest rate changes, credit spread changes, equity market changes, etc.). It can identify fast-emerging trends, explain asset movements from period to period, and serve as a control mechanism. It can measure the effectiveness of ALM and identify any issues that might require a change in ALM strategy.

aggregate impact of different product lines and asset classes, with resulting information provided to modelers. Communication of methodologies between pricing units and those modeling in-force blocks is also important.

2.3.5 SECTION 5: HEDGING

Hedging strategies are important processes and need to be predefined. Questions to consider include: How are exposures measured and modeled, is the process static or dynamic, what is the rebalancing strategy, what specific instruments and metrics are used, and how often are key metrics calculated?

2.3.5.1 HEDGING RESULTS – GENERAL ACCOUNT FIXED PRODUCTS

For survey respondents, when hedging is done it is static with full hedging using fair value. ALM metrics as applied to investments were calculated quarterly or weekly, with some as often as daily.

2.3.5.2 HEDGING RESULTS – GENERAL ACCOUNT ASSETS BACKING INDEXED AND VARIABLE PRODUCTS

Hedging is more sophisticated for these products and is focused on fair value. Hedges used include options, interest rate swaps, futures, and swaptions. Rebalancing occurs when tolerances are breached. Hedging metrics tend to be calculated daily by the ALM team.

2.3.5.3 HEDGING – CURRENT CONSIDERATIONS

As products sold by life insurers become more complex, hedging is becoming more important for some of these products. Being able to remain hedged nearly all the time allows an insurer to focus on other skill sets. The ALM team can seek to have at least a basic understanding of instruments used for hedging and stay informed as these tools evolve.

2.3.6 SECTION 6: SOFTWARE

Software used for ALM evolves over time as actuarial and investment programs grow in complexity and computer technology options expand. To avoid anti-trust issues, the survey did not ask about specific software packages. Some providers allow the source code to be transparent and modified. Insurers can use specialty investment software to model asset cash flows that they integrate using liability model software. This is often due to the complexity of some asset class optionality. Some software incorporates distributed processing that allows components of a modeled scenario to be run on multiple machines and then aggregated, improving run times overall. The survey asked respondents if their current software was meeting their needs.

2.3.6.1 SOFTWARE RESULTS – GENERAL ACCOUNT FIXED PRODUCTS

For the most part, the survey respondents do not participate in the most complex products. They all use commercial software and most reported integrating their asset and liability modeling. Most of the time the source code for asset modeling is not available, but in some cases the user can modify parts of the code. For liability modeling the source code is more accessible and more likely to allow modifications by the user. Most use distributed processing and find the software sufficient for their needs and do not plan to change in the next three years.

2.3.6.2 SOFTWARE RESULTS – GENERAL ACCOUNT ASSETS BACKING INDEXED AND VARIABLE PRODUCTS

The commercial software used is reported as being sufficient for most companies' needs.

2.3.6.3 SOFTWARE – CURRENT CONSIDERATIONS

Software conversions can be expensive, time consuming, and often end up with result discontinuities. Though conversions may present transition complexities, it is beneficial for the ALM team to be aware of the current state of software features in the marketplace and regularly update its own wish list of functionalities based on company preferences.

2.3.7 SECTION 7: GENERAL TOPICS

The remaining questions do not neatly fit under the other categories and seek to capture future plans regarding the ALM process and how ALM integrates with the incentive compensation scheme.

2.3.7.1 GENERAL TOPICS RESULTS

Most of the survey respondents plan to make their ALM process more sophisticated and detailed. For incentive compensation, actual earnings versus plan are compared. These results were similar across products.

2.3.7.2 GENERAL TOPICS – CURRENT CHALLENGES

ALM tools are updated infrequently, but recent interest rate movements and developments under regulatory consideration concerning some ALM practices add to the ALM team's strategic importance. The team should stay up to date on developments and keep senior managers and the Board aware of any developments that may impact the insurer.

Section 3 Key Takeaways and Going Forward

3.1 PRACTICAL LEARNINGS

What should someone new to ALM take from this paper? In addition to the list of references and general discussion points, the primary value is the questions in the survey. It may be useful to read through the file, ALM Full Survey.pdf and revisit it periodically. As with any actuarial endeavors, it is good practice to consider different methodologies including those that may differ from your own. It is helpful to spend the time thinking about these different practices to determine if a different path is warranted and why. Of particular importance is to consider the needs of various stakeholders. Do ALM practices meet their needs and is it transparent enough so they can understand it?

3.2 WHAT HAS CHANGED – UNKNOWN KNOWNS

Calculating cash flows and metrics like duration and market value requires the analyst to periodically revisit both their process and assumptions. What rules of thumb are no longer appropriate and need to be updated using first principles? There are a number of drivers that have resulted in a set of historical data that is not predictive—what is sometimes referred to as "the unknown knowns." These include the impact of climate risk, demographics of an aging population, the effects of diet and pharmaceuticals, and a faster pace of technological change.

3.3 FUTURE RESEARCH OPPORTUNITIES

Future research can consider alternative ways to collect information from ALM practitioners. The intent would be to increase company participation, perhaps by partnering with a rating agency or regulator. Other possible future research could include a call for essays about risks in today's products that have not been recognized for ALM purposes and generally ways to improve processes.

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Appendix A: Additional Papers

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