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QFE Financial Expert Series: Asset-Liability Studies - Defined Benefit Retirement Plans

Summary: Definition, methodology, outcomes and evolution

Definition: Asset-Liability Studies (ALS) are comprehensive analyses conducted to assess the relationship between a retirement plan's assets (A) and its liabilities (L) over various time horizons, with the objective of ensuring the sustainability of the plan's sponsor(s) and fund over the short- to long-term. ALS are a risk management and strategic planning tool which, for retirement plans and their sponsors, provides insight to key trends impacting a plan's A and L, over the long-term, and their impact on the plan's sponsors. Plans are built to fund long-term L, given the 50- year life expectancy of participants and their beneficiaries, so ALS assess a range of input data values over a short- to 50+-year time horizon.

Methodology, Outcomes and Evolution: ALS begin by identifying input data related to A, L, macro-economic conditions, the plan's benefits and the plan sponsor, and establishing an assumed range of values for the data over time (Section I). The data is then put into ALS software to model stochastic (range) and deterministic stress/scenario (specific) A and L outcomes based on various strategic asset allocations (SAAs, Section II). With the models' outcomes, sponsors select an optimal SAA which meets sponsor and fund objectives (risk, return, liquidity and other components) to meet the plan's long-term asset growth requirements and the sponsor's plan-related policies (Section III). Optimally, ALS should clarify appropriate funding and risk appetite policies to be approved by the plan's sponsors, and result in an investment policy statement (IPS) which optimizes plan objectives and is approved by the plan's board. Conducting ALS every three-to-five years is a best-practice and regulatory recommendation, but increasingly sponsors conduct ALS more often with shifting assumptions and increased computing power (Section IV).

I. Input Data and Assumptions

ALS are somewhat distinctive in the breadth of data, stakeholders and time horizons considered, including benefit provisions, demographics, macroeconomic environment, financial/investment opportunities, plan assets and liabilities and legal/regulatory framework. Historical and current data is collected, and future trends assumed with impacts from internal and external forces. ALS assumptions (see list below) are modeled over short- to long-term time horizons due to

long participant/beneficiary life expectancies and consequent sponsor contracted obligations. The current and assumed future data impact the plan's A and L as well as the sponsor's financial and operating conditions.

- **Economic data assumptions** impact plan asset performance over time, defined benefit liability growth, and the rate at which cash flow accounting liabilities are discounted and impact the sponsor's FS. Key data include: i) interest rates across various maturities - future rates are forecast based on economic indicators, central bank policies, and market trends, with current yield curves suggesting changes over various time horizons; ii) inflation rates – historical trends are reviewed, while future rates are projected using econometric models, market rates for inflation-protected securities, and supply/demand projections; and iii) economic growth, both domestic and global – historical trends are reviewed, while projections of future growth are developed by assessing government policies, productivity and export/import trends, and prospects in key sectors.
- **Demographic data assumptions** impact the plan's long-term liability profile and are revealed in the plan's net cash flows (contributions minus benefit payments), captured in actuarial valuations. Key data include: i) mortality estimates, assessed through standard life tables adjusted by factors to reflect changing life expectancies; ii) retirement rates (required and projected) which affect the timing of payments, assessed through a review of historical trends, current participant surveys and legislative changes; iii) turnover rates, assessed through historical trends, current sponsor policies to encourage-discourage turnover, and predictive models.
- **Investment data assumptions** impact the plan's performance over short- through long-term horizons, including A, A-L and liquidity based on the permitted asset types, targets and ranges within the IPS SAA. Key data include: i) performance of SAA asset classes (AC), assessed through a review of historical trends, correlation to economic data both current and projected, and the definition of ACs within the SAA such as indices utilized, level of index-active management and degree of public-private securities; ii) volatility of asset returns, including standard deviation, drawdown and idiosyncratic risks, assessed through historical trends and current macroeconomic conditions; iii) correlation between different ACs, which influences diversification benefits, assessed by reviewing trends and impacted by current-projected economic scenarios; iv) A-L performance, assessed by comparing the SAAs' performance, volatility, correlation to that of the accounting Ls which tend to behave like the yield curve of high-grade corporate bonds; and v) fund liquidity, impacted by the amount of private/complex assets, assessed through trends and stress scenario drawdown experiences.
- **Plan-Specific data assumptions** impact the plan's liabilities and net cash flows over the long-term, largely through the plan's cash flow profile, captured in actuarial valuations. Plan data can be altered by plan re-design (benefit structure, eligibility, and/or inclusion of economic linkages such as inflation adjustments) as well as by sponsor policies to increase/decrease employment and retirement profiles. Key data include: i) contribution rates by sponsor and employees, assessed by reviewing plan requirements, historical patterns and sponsor budget and funding policies; ii) benefit payments, assessed by reviewing historical patterns, current or projected sponsor policies to accelerate or decelerate retirements, and benefit linkages to economic data; iii) administrative costs associated with managing the plan, assessed by reviewing historical administrative expenses (accounting, actuarial, legal and management), any changes to the permitted expenses assessed to the plan, and any changes linked to administrative operations, economic data (e.g. inflation) and/or AC shifts (which can impact legal and investment costs); and iv) participant choices around lump-sum distributions and annuities, high-low option insurance, existence of spouse and/or dependents, and nationality (which impacts tax payments by the sponsors).
- **Regulatory data assumptions** impact the plan's permitted operations, leading to changes in sponsor contribution policies, types of permitted investments, liquidity, among others. Regulatory changes tend to be idiosyncratic and thus are hard to model; it is critical to monitor existing laws and regulations and pending legislative changes. Prior examples of regulatory changes include required: i) sponsor contributions based on plans' A/L funded status (A divided by L); ii) updates to age-specific eligibility rules; iii) divestment from investing in certain countries; and iv) diversification out of sponsor securities.

II. ALS Modeling:

- **Stochastic modeling**, a statistical approach that uses random variables and probability distributions to represent systems or processes with inherent uncertainty, involves simulating a range of possible outcomes to assess their likelihood. This method is widely used in finance, insurance, and various scientific fields to make informed decisions under uncertainty.
- **Deterministic modeling or stress testing** describe mathematical approaches that use fixed, known inputs and parameters to predict outcomes with certainty. There is no randomness or variability in results - given the same initial conditions, the model will always produce the same results – thus the benefit in stress-testing outcome of severe negative or positive events - such as the global financial crisis, dot-com bubble, great depression, rising interest or inflation rates and/or pandemics – on a future condition of assets and liabilities. The predicted future outcomes provide worst/best case analyses of the plan's performance and impact on the sponsors, particularly useful in testing risk of hitting sponsor RA and LTF policy limits.
- **Modeling outputs and adjustments:** Several key results (outputs) are obtained through ALS modeling, each linked to the models' proposed SAAs: i) asset-only return and risk; ii) A/L return, risk and funded status; and iii) sponsor contribution rates. Modeling is usually run initially without major constraints, to determine the breadth of results available from all permitted ACs and the driving ACs for each output (i.e. equities expected to drive higher asset returns, fixed income expected to lower A/L risk, private assets expected to lower liquidity, etc.). Once modeling has identified the unconstrained opportunity set (unconstrained efficient frontier, EF), constraints are placed on permitted ACs to: i) comply with sponsor plan-related policy constraints (i.e. maximum A/L active risk, minimum real return, etc.); ii) incorporate the plan's preferred balance between public-private, return-hedging, index-active ACs; and iii) meet liquidity and other constraints. Modeling is re-run with added constraints to create a constrained EF which complies with plan sponsor, plan preference and other requirements.
- **Selection of optimal SAA:** Once the constrained EF has been identified, a range of SAAs near or on the EF are reviewed for the optimal combination of asset return and risk, A/L return and risk, and compliance with sponsor objectives (maximum A/L risk, minimum real return, worst-case contributions, etc.). The optimal SAA will help sponsors and plans meet long-term objectives at acceptable risk.
- **Updates to ALS:** It is an industry best practice to regularly review input data, evaluate how changes in assumptions affect the ALS' outcomes and identify potential risks. Beyond data updates, ALS should consider the practices of the plan and sponsor, including: i) portfolio rebalancing frequency, cost, liquidity; ii) changes to sponsor contribution policies; and/or iii) changes to sponsor risk appetite.

III. Implementation: Sponsor Policies and Policy-Compliant IPS

- **Key components of IPS** include: For a defined benefit retirement plan, the plan must be managed in the interest of beneficiaries, within the constraints of the plan sponsor. Key components include: background/purpose, other policies and documents governing the fund's investment and management, performance objectives (asset return and risk, A/L return and risk), investment benchmarks, rebalancing, SAA targets and ranges, time horizon, and required review and update of IPS linked to or independent of ALS.
- **Sponsor plan-related policies:** While plans are to be managed for the benefit of participants, the sponsor's plan-related policies should be referenced in the IPS as they are critical for setting the constrained EF. Among these policies are: i) maximum A/L risk, as level of and changes in A/L funded status impact the sponsor's FS; and ii) minimum real returns, which impacts the sponsor's contribution rates.

IV. ALS Evolution: 1960s to 2020s

Modern ALS began in the 1960s and have evolved through the past six decades as financial accounting standards, macroeconomic, regulatory, sustainability and technology components have shifted.

- **1960-70s:** Banks and insurance companies conducted ALS to manage their balance sheets in order to meet liabilities: banks largely hedged interest rate, credit and liquidity risk created by the mismatch in their assets (loans) and liabilities (deposits), while insurance companies utilized investment returns to hedge policyholder claims. ALS-driven IPS focused on stability, invested conservatively with an emphasis on high-quality fixed income.
- **1980-90s:** ALS evolved as companies responded to new financial accounting standards (FAS – notably in 1987, the requirement that sponsors note plans' assets and liabilities in their FS and discount liabilities with high-grade bond yields), incorporated more complex and volatile financial markets, and utilized expanded computing power. The growth in financial markets, computing power and impact of plans on sponsors' FS led to ALS using stochastic analyses to model future conditions, scenario/stress testing to prepare for specific outcomes, dynamic/tactical asset allocation strategies to adapt to changing environments, and more complex IPS. Additional regulation required sponsors to conduct ALS regularly and to ensure the participants' best interest in the plans' management.
- **2000s:** ALS techniques were further expanded as a consequence of regulatory changes, financial crises, further growth in market and computing power. Several key regulations were enacted in the early 2000s: Basel II and Solvency II require more stringent capital adequacy and risk management, rating agencies began to incorporate sponsors' plan policies in their assessments and, in the U.S., the Pension Protection Act required sponsors to list their plans' accounting assets and liabilities in their FS (rather than in the notes), elevating the impact of their divergent performance. Multiple financial crises (2000-03, 2008-09 and 2020) led to severe drops in assets and, from 2010 to 2022, also in interest rates which (given FAS87 discount requirements) caused surging accounting liabilities. Given enhanced computing power and financial market opportunities, ALS were utilized to assess and dynamically manage risk, stress test future outcomes, enhance interest rate management and align plans' assets with sponsors' capital adequacy and income management policies while serving the interest of participants. Some sponsors also adjusted plan benefits, developed funding and risk appetite policies, froze or terminated their plans in favor of defined contribution plans, and/or transferred plan risk (PRT).
- **2020s:** Expansion in regulations, geopolitical volatility and computing power drove continued ALS evolution. As global regulators expanded risk management and transparency requirements, and those in U.S. state and overseas require sustainability consideration, sponsors adjusted investments and enhanced reporting. The 2020 pandemic exacerbated and revealed the impact of geopolitical trends, heightening volatility and leading sponsors to enhance asset diversification and liquidity management. The arrival of artificial intelligence and machine learning has permitted sponsors to analyze larger datasets, assess and predict trends, and implement almost continual ALS.
- **Traditional to dynamic ALS:** While few sponsors have shifted from periodic ALS with fixed IPS and SAA outputs to dynamic/real-time ALS with adaptive IPS and SAAs, many are incorporating real-time analytics, big data and AI, and adaptive scenarios into their in-depth ALS processes. As retirement plans are invested for the long-term, there are benefits to retaining long-term, less liquid investments (particularly in private and complex assets), but incorporating continuous monitoring of input data (including demographic, economic, investment and regulatory) empowers sponsors to proactively manage risk and 'tilt' the fund's investments to benefit from trends. Coming decades are likely to see greater diversification, tactical asset allocation and real-time adjustment as demographic, economic, financial market and sponsor shifts occur.

The evolution of ALS practices reflects the dynamic nature of institutions' funding of liabilities, the evolution of inputs (demographic, economic, investment, participant, regulatory) and the importance of adapting to emerging challenges and opportunities. Organizations that embrace advanced analytical, financial, sustainability and technology resources will more effectively manage assets and liabilities to enhance long-term sustainability of plans and sponsors.