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The Evolution of Asset/Liability Management

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What Is Asset/Liability Management (ALM)?

The objective of most institutions in the United States with assets to invest is to fund some sort of liability, (banks, insurance companies, pension funds, etc.). As a result, asset/liability management (ALM) should be the investment focus and strategy for these institutions.

Banks and insurance companies have maintained this focus because it is required by the regulations under which they operate. The IAIS Standard No. 13 (2006), which is the basis for insurance company regulation in the United States, defines asset/liability management (ALM) as the practice of managing a business so that decisions and actions taken with respect to assets and liabilities are coordinated.¹ Oracle Financial Services (2008), in its white paper “Asset Liability Management: An Overview,” defines ALM for banks as a mechanism to address the risk faced by a bank because of a mismatch between assets and liabilities resulting from either differences in liquidity or changes in interest rates.

Indeed, as banks and insurance companies have practiced it, ALM is the management of assets so that asset cash flows are as similar as possible to that of the liability cash flows. Exley, Mehta, and Smith (1997) conclude in their paper “The Financial Theory of Defined Benefit Pension Schemes” that financial theory offers no good reason why ALM as practiced by pensions should differ from ALM by banks. They emphasize that the time has come to stop treating pensions as anything special. Pension liabilities are the same as any other liability. In a special LDI (liability-driven investing) issue of *aiCIO Magazine*, McDaniel (2011)

¹IAIS is the [International Association of Insurance Supervisors](http://www.iaisweb.com). See <http://www.iaisweb.com>.

provides a well-documented history of LDI theory in his column “LDI’s Founding Document,” concluding that pension liabilities should be treated in the same way as bank and insurance liabilities, giving each a proper ALM focus.

The focus of this review will be the evolution of ALM for pensions. Pensions have no regulations requiring asset/liability management or the matching of assets cash flows to liability cash flows. This lack of regulation may be the most important cause of the spiraling pension deficits and decline of defined benefit plans since 1999.

Prehistory: Insurance Company Management of Pension Funds

In the decades before pension plan sponsors began to manage pension assets as quasi-independent investment organizations, it was typical for pension plan sponsors to simply pay an insurance company to assume the liabilities of the pension plan. The insurance company was then responsible for investing the assets while complying with then-current insurance regulations. By regulations, the insurance companies invested most of these assets in fixed-income securities, matching the cash flows from the assets to the cash required to be paid to the pension beneficiaries. This trend has existed from roughly 1875 when the first U.S. corporate pension plan (American Express) was established to today.

In the Beginning: Dedication

Dedication was the earliest form of ALM practiced by pension plans as quasi-independent investment organizations. It was in vogue during the historically high-interest-rate environment of the 1970s and early 1980s. Marty Leibowitz was the first to refer to cash flow matching as “dedication” because it required matching a stream of cash inflows (assets) to a stream of cash outflows (liabilities); each cash inflow was “dedicated” to paying a particular outflow. His work was initially published by Salomon Brothers in the 1970s, where he was managing director, and then (1986) as a series in the *Financial Analysts Journal* under the title “The Dedicated Bond Portfolio in Pension Funds.” Many authors have written about the pros and cons of dedication. Perhaps the most complete set of writings is offered by Frank Fabozzi (2005) in *Dedicated Bond Portfolios* in ***The Handbook of Fixed Income Securities***.

As interest rates rose in a long secular trend, the financial industry began to pay attention. Realizing that the high interest rates would allow them to lock in unprecedented rates of return, defined benefit pension fund managers embraced the concepts of dedication and then later immunization. Wall Street

broker/dealers, especially Salomon Brothers, with Marty Leibowitz as its intellectual leader, provided the complicated software models needed to execute dedication and immunization effectively. Many papers promoting and critiquing ALM strategies were written by quantitative scholars during this time. Times were also good for broker/dealers who could execute very large dedication and immunization portfolios. Perhaps the largest bond trades ever recorded were those done for dedication and immunization.

The dedication model assumed a 100% bond portfolio held to maturity. The quest was to find the least expensive collection of bonds that provided the needed cash flows over the time horizon of the liabilities to be funded. Dedication had several distinct advantages:

1. Simple asset allocation (100% bonds)
2. Mitigates interest rate risk since it is funding future values
3. Specificity (asset cash flows must match liability cash flows)
4. Predictable cash flows (when the bonds are held to maturity)
5. Structured management (more certain returns with lower fees)
6. Reduction of risk (interest rates, reinvestment, inflation, and liquidity)

Immunization Introduced as an ALM Strategy

In the 1980s when interest rates started a secular decline immunization became popular, which focuses on matching the interest rate movement of liabilities in present value dollars. The idea is to minimize the volatility of the surplus (the dollar value of assets minus liabilities) by having an asset duration equal to the liability duration. Duration is the present-value-weighted average time to receipt of the cash flows from a security or portfolio. Macaulay (1938), in his book entitled *Some Theoretical Problems Suggested by] the Movement of Interest Rates, Bond Yields and Stock Prices in the United States since 1856*,² is credited with introducing the term “duration” and defining it as above. In 1942, Koopmans’s paper “The Risk of Interest Fluctuations in Life Insurance Companies” pointed out that if the duration of the bonds held in a portfolio were matched to the duration of the liabilities those bonds would fund, the effects of

²This title is often shortened to the part not in brackets.

interest rate changes could be mitigated or nullified completely (i.e., the portfolio would be immunized).

This effort to define ALM strategies that would protect a portfolio from interest rate changes largely conducted by academics, culminated in a 1952 paper titled “Review of the Principles of Life-Office Valuations” by a nonacademic actuary, F.M. Redington, who worked for a British insurance company. He is credited with introducing the term “immunization” to signify the investment of assets in such a way that the existing business is immune to a general change in the interest rate.

As interest rates began to fall in early 1982, call risk surfaced as a serious impediment to immunization and dedication models, especially for those who ventured into mortgage-backed securities. This call (or prepayment) risk would alter cash flows and maturity structures, with resulting damage to the integrity of immunization and dedication models that depended on the certainty of these cash flows and maturity dates.

Accounting Rules Redirect Pension Asset Management

Because immunization strategies focus on matching the present values of assets and liabilities, it is important to determine what discount rates to use to calculate the present value of liabilities. When the Financial Accounting Standards Board (FASB) issued its Financial Accounting Standards No. 87 in 1985 (effective December 1986), it marked both a good and bad moment in the evolution of asset/liability management. First, it clarified that the discount rate methodology to be used for liabilities should be based on a **high-quality bond yield curve that settles the liabilities**. The Treasury supplied the discount rates used to calculate the present value of liabilities, and these rates were based on the 30-year Treasury yield. Assets were valued as a moving average of market values (usually a five-year average).

This FASB standard would help those designing immunization strategies to understand how to match the present value of liabilities. However, for pension expense purposes, the new statement allowed corporations to use the return on assets (ROA) assumption as follows: If the dollar growth in pension assets based on the ROA rate exceeded the pension expense amount, then pension expense would be negative—that is, it would become pension *income* which would directly enhance earnings. Because corporations are earnings led and not liabilities led, the ROA became the hurdle rate objective for pension assets.

When interest rates went below the ROA assumption rate (around 8%) in the late 1980s, dedication and immunization strategies fell out of vogue because they locked in a return that would not be sufficient to neutralize or overcome pension expense, resulting in a drain on EPS. As a consequence, dedication and immunization were largely replaced by *surplus optimization strategies* that aimed at the growth of pension assets to outpace liability growth, thereby creating a pension surplus that would reduce or even eliminate contribution costs. Contribution costs were a function of the funded status (the present value of assets minus the present value of liabilities). Any deficit or underfunding (a funded ratio less than 100%) was to be erased through contributions planned out over time so that the pension plan would be fully funded over the life of the liabilities.

The late 1980s and the decade of the 1990s were good times for pensions. With the switch to a surplus optimization strategy, asset allocation models were heavily skewed to equities over bonds because the ROA was now the “bogey,” or investment return benchmark. This asset allocation decision worked out well during this period; equities enjoyed several good years of double-digit returns, resulting in pension surpluses that enhanced EPS (returns above the ROA were an “actuarial gain” line item that increased EPS) and reduced contribution costs. During this period, ALM became a hard sell, given the level of interest rates, the historical return track record of equities, and the resulting financial statement benefits of an ROA hurdle rate. This focus on an absolute return (ROA) rather than on relative cash flows would soon haunt the pension industry and prove fatal to some plan sponsors.

The equity bear market that hit in 2000–2002 became a pension tsunami for several reasons. The correction was quite deep, amounting to a 49% fall in the S&P 500 Index, with the result that pension asset growth underperformed liability growth by as much as 75% on a cumulative basis over those three years. This event led to spiking contribution costs because of crashing funded ratios, an EPS drain from the pension assets underperforming the ROA (actuarial loss), and even insolvency of the plan sponsor, with several companies (notably airlines) filing for bankruptcy because pensions tend to be the largest liability of many firms.

The Society of Actuaries (SOA) became concerned that such an asset/liability disparity occurred as a result of accounting rules and it issued a research paper draft (2004) titled “Principles Underlying Asset Liability Management,” which warned that *accounting measures can distort economic reality* and produce reports that are inconsistent with economic results. It

further stated that entities that focus on economic value tend to achieve their financial objectives more consistently in the long run. In other words, the SOA promoted ALM on an economic basis (i.e., market value), rather than on an accounting basis, as the proper asset management style.

At that time, corporations were begging for relief from spiking pension contribution costs. Congress responded with the Pension Protection Act (PPA) of 2006. A number of pension experts provided testimony during the several-years-long process of writing the PPA. In my testimony before the ERISA Advisory Council on Employee Welfare and Pension Benefit Plans (2003), I recommended that liabilities should be priced at the market as a yield curve since liabilities are a term structure. In harmony with FAS 87 rules, I reminded them that the discount rate used should be one that settles the liabilities. I further proposed that as an acid test a rule should be created and enforced that reads, “If you cannot buy it, you cannot use it as a discount rate!”

In the end, PPA legislation relaxed the contribution costs calculation by offering two ways to discount liabilities: (1) a 24-month moving average of a three-segment yield curve and (2) the current spot-rate yield curve. In both options, the yield curve was based on high-quality corporate bonds rather than Treasury bonds. In effect, the PPA raised discount rates which lowered the present value of liabilities, thereby enhancing the apparent funded ratio and lowering contribution requirements.

The FASB was also concerned that existing standards did not communicate the funded status on balance sheets, so in 2006 it issued Statement of Accounting Standards No. 158: *Employers' Accounting for Defined Benefit Pension and Other Postretirement Plans* (effective 2007). This communication, usually referred to as FAS 158, clarified that the discount rates used should correspond to the **current market value of a portfolio of high-quality zero-coupon bonds whose maturity dates and amounts match the expected future benefit payments**. This accounting standard also introduced Other Post-Employment Benefits (OPEB) liabilities onto the balance sheet, revealing that they are one of the largest liabilities facing U.S. institutions.

ALM Strategies Reborn as LDI

After the equity correction of 2000–2003, the stage was set for institutions to return to the basic practice of asset/liability management, because failure to do so had resulted in deteriorating funded ratios, large actuarial losses, spiking contribution costs and even bankruptcies. This time, however, ALM was more

frequently referred to as liability-driven investing (LDI) to suggest a new, enhanced approach.

Because of the ongoing secular trend toward lower rates and the fact that the expected return on assets continued to be used to calculate pension expense, corporations continued to pursue an asset allocation away from bonds but with less equity concentration. This trend opened the asset allocation door to many new asset classes and strategies, including hedge funds, alternative investments, and new LDI strategies.

Frank Fabozzi, Ph.D. and I have written prolifically on ALM strategies and considerations. Fabozzi's books are a mainstay for any ALM practitioner. His *Bond Portfolio Management* (especially the chapter "Managing Funds Against Liabilities"), published in 2001, and his *Handbook of Fixed Income Securities* (chapter on "Cash Flow Matching"), published in 2022, have become required reading. Fabozzi and I teamed up in 2005 to produce the article "Reforming Pension Reform," proposing a solution to the growing pension crisis. Our solution starts with pricing liabilities at the market (economic value) and then building a custom liability index as the proper benchmark for pensions (or any liability-driven objective), because liabilities are unique to each pension plan. We later followed this article with "Liability Index Fund: The Liability Beta Portfolio" (2011), in which we argued that a liability index fund should be ***the core portfolio and is the only correct beta portfolio for a pension with a liability objective***. The liability beta portfolio is the proper form of ALM or LDI which cash flow matches liability cash flows at low cost. To create and maintain such a portfolio, a custom liability index is also required.

Waring and Siegel produced a detailed account of why saving defined benefit pension plans is a good idea in their 2007 paper "Don't Kill the Golden Goose! Saving Pension Plans." They conclude that the first element needed to manage a defined benefit plan is an "economic" view of the liability. The only risks that can be hedged through investment policy and strategy are those that are correlated with market returns of one kind or another. Accounting values are not hedgeable because they are smoothed and are not market values. In the face of a trend toward freezing defined benefit plans in favor of defined contribution plans, the authors argued that defined benefit plans are more cost effective and efficient than defined contribution plans.

Public pensions have the largest deficits and the lowest funded ratios, a result that may be attributable to the Governmental Accounting Standards Board (GASB) accounting rules, which smooth assets over five years and price liabilities at a ROA discount rate. Since 1999, this accounting practice has

usually overvalued assets and undervalued liabilities versus economic values (market values). In my paper “The Public Pension Crisis” (2011), I described how the ROA discount rate misled pension trustees and consultants into making inappropriate asset allocation, benefit, and contribution decisions by thinking they were highly funded when they had true large economic deficits. All of these decisions are linked together. My solution to the public pension crisis starts with liabilities. I argued that until a Custom Liability Index (CLI) is installed as the proper benchmark priced as a yield curve of market rates, all asset allocation, budget, and contribution decisions are in jeopardy.

In conclusion, the true objective of a pension plan is **to secure the benefits in a cost-efficient manner with prudent risk**. This is best accomplished thru cash flow matching of the liability cash flows. A Custom Liability Index should also be installed as the proper benchmark so asset allocation can know the true economic funded status and performance measurement of asset growth versus liability growth can be accurately assessed.

“Insanity is doing the same thing over and over again and expecting different results”

Albert Einstein

Bibliography

Black, Fischer. 1980. “The Tax Consequences of Long-Run Pension Policy.” *Financial Analysts Journal*, vol. 36, no. 4 (July/August):21–28.

“I believe that every tax-paying firm’s defined benefit pension fund portfolio should be invested entirely in bonds (or insurance contracts). Although the firm’s pension funds are legally distinct from the firm, there is a close tie between the performance of the pension fund investments and the firm’s cash flows. Sooner or later, gains or losses in pension fund portfolios will mean changes in the firm’s pension contributions. Shifting from stocks to bonds in the pension funds will increase the firm’s debt capacity, because it will reduce the volatility of the firm’s future cash flows. Shifting from stocks to bonds will give an indirect tax benefit equal to the firm’s marginal tax rate times the interest on the bonds.” (p. 21)

Choi, Kenneth S. 1992. “Caveats in Immunization of Pension Liabilities.” *Journal of Portfolio Management*, vol. 18, no. 2 (Winter):54–69.

“Immunization requires that the value of assets and the present value of liabilities be the same, and that the interest rate sensitivity or

duration of the assets be the same as that of the liabilities. The first issue in immunization is establishment of the appropriate discount rates to compute the present value and the duration of a liability schedule. The question of the appropriate discount rates for a given liability schedule has crucial ramifications for construction of an asset portfolio to immunize the liability stream.” (p. 54)

Collie, Bob. 2012. “LDI’s Journey toward Greater Customization.” *aiCIO Magazine*, vol. 4, no. 4 (LDI Special Issue):6–11.

“The basic initial steps of an LDI program are an increase in the portfolio’s sensitivity to interest rates and a reduction in equity holdings. These steps are similar no matter who is taking them. However, as the LDI program becomes more advanced and the link between the asset portfolio and the liabilities becomes stronger, a point is reached at which a greater degree of customization becomes necessary.” (p. 6)

Ehrentreich, Norman. 2009. “The Asset Return–Funding Cost Paradox: The Case for LDI.” Ehrentreich LDI Consulting & Research.

“Pension regulations of the 1980s have effectively removed incentives for corporate plan sponsors to overfund their pension plans. Now, equity based investing strategies sooner or later lead to large funding shortfalls, and the inability of most plan sponsors to close them immediately makes them persistent. Therefore, the most basic requirement for converting eventual higher asset returns into lower funding costs, i.e., having average funding levels of 100% or more, is regularly violated by most pension plans.” (p. 1)

Fabozzi, Frank. 2005a. “Dedicated Bond Portfolios.” In *The Handbook of Fixed Income Securities*. 7th ed. New York: McGraw-Hill:1103–1117.

“The dedicated bond portfolio, as it is frequently called, is a strategy that matches monthly cash flows from a portfolio of bonds to a prespecified set of monthly cash requirements of liabilities. Cash matching or prefunding these liabilities leads to the elimination of interest-rate risk and the defeasance of the liability. Applications for the dedicated strategy include pension benefit funding, defeasance of debt service, municipal funding of construction takedown schedules, structured settlement funding, GIC matching and funding of other fixed insurance products.” (p. 1103)

Fabozzi, Frank, and Ronald Ryan. 2005. “Reforming Pension Reform.” *Institutional Investor* (January):84–88.

“Until pension liabilities are priced at the market, pension funds run the risk of an asset-liability disconnect. Liabilities should be priced off of a market yield curve. An ironclad pension accounting rule should be: If you cannot buy it, you cannot use it as a discount rate. Start with the Treasury zero-coupon yield curve. Use this yield curve to build

custom liability indexes for each plan. Once a plan sponsor creates a custom index as a benchmark for liabilities, it can properly manage assets. Asset allocation and performance measurement models will be able to compare the growth and risk behavior of assets and liabilities by term structure. If assets are not measured against liabilities, they are likely to have the wrong index objective.” (p. 88)

Fabozzi, Frank, and Ronald Ryan. 2011. “Liability Index Fund: The Liability Beta Portfolio.” *Journal of Financial Transformation*, vol. 33 (December):29–33.

“For corporate defined benefit plans, only a CLI [custom liability index] is the appropriate asset benchmark for liability-driven objectives. With a CLI, Beta and Alpha portfolios are redefined and can work in harmony with the true objective. The asset management guidelines of a pension plan can then take into account the risk/reward behavior of the true economic objective in establishing investment policy, especially the liability Beta portfolio which should be installed as the core portfolio.” (p. 33)

“By definition, an index fund is the correct Beta portfolio that matches the index benchmark with such accuracy that the tracking error is nil with the Beta calculation at 1.00 and the correlation at or near 100. With a liability-driven objective, only a liability index fund could qualify as the Beta or matching portfolio. A liability index fund, by definition, requires an index that reflects a pension fund’s liability term structure. Since each liability structure is unique, this calls for the creation of a custom liability index (CLI). Until the asset portfolio’s cash flows match each monthly liability payment (i.e., liability term structure), the interest rate risk (systematic risk) that dominates the risk/reward behavior of pension liabilities cannot be hedged.” (p. 31)

Financial Accounting Standards Board. 1985. “Statement of Financial Accounting Standards No. 87: Employers’ Accounting for Pensions.” FASB

“Interest rates vary depending on the duration of investments; for example, U.S. Treasury bills, 7-year bonds, and 30-year bonds have different interest rates. ... The disclosures required by this Statement regarding components of the pension benefit obligation will be more representationally faithful if individual discount rates to various benefit deferral periods are selected.” (paragraph 199)

“In making those estimates, employers may also look to rates of return on high-quality fixed-income investments currently available and expected to be available during the period to maturity of the pension benefits.” (paragraph 44)

Financial Accounting Standards Board. 2006. “Statement of Financial Accounting Standards No. 158: Employers’ Accounting for Defined Benefit Pension and Other Postretirement Plans.”

“The objective of selecting assumed discount rates is to measure the single amount that, if invested at the measurement date in a portfolio of high-quality debt instruments, would provide the necessary future cash flows to pay the accumulated benefits when due. Notionally, that single amount, the accumulated post-retirement benefit obligation, would equal the current market value of a portfolio of high-quality zero-coupon bonds whose maturity dates and amounts would be the same as the timing and amount of the expected future benefit payments.” (paragraph 144a)

International Association of Insurance Supervisors. 2006. “Standard on Asset-Liability Management.” IAIS Standard No. 13

“This paper describes best practices for asset-liability management (ALM) that a well-managed insurer would be expected to follow and identifies 11 minimum requirements. Asset-liability management (ALM) is the practice of managing a business so that decisions and actions taken with respect to assets and liabilities are coordinated. The objective of ALM is not to eliminate risk. Rather, it is to manage risks within a framework that includes self-imposed limits. The IAIS requires that insurers have in place effective procedures for monitoring and managing their asset-liability positions to ensure that their assets and investment activities are appropriate to their liability and risk profiles and their solvency positions.” (pp. 3, 5, 6)

Leibowitz, Martin L. 1986a. “The Dedicated Bond Portfolio in Pension Funds—Part I: Motivations and Basics.” *Financial Analysts Journal*, vol. 42, no. 1

“Dedicated bond portfolios allow a corporate pension fund to take advantage of favorable fixed income markets and the actuarial system’s willingness to provide special benefits for a minimum-risk investment approach. Purely as an investment approach, a dedicated portfolio serves as a least-risk asset, minimizing the risks involved in fulfilling a large class of nominal-dollar liabilities. Because the process is largely assumption-free, it provides the sponsoring corporation with an actuarially acceptable way to take advantage of available market interest rates to improve funding status.” (p. 68)

Leibowitz, Martin L. 1986b. “The Dedicated Bond Portfolio in Pension Funds—Part II: Immunization, Horizon Matching and Contingent Procedures.” *Financial Analysts Journal*, vol. 42, no. 2

“Immunization, horizon matching and various contingent schemes offer pension plan sponsors and managers an opportunity to minimize risk while retaining some degree of management discretion to pursue lower costs or higher returns. Immunization calls for the creation of a portfolio of bonds whose value coincides with the present value of a given schedule of liabilities and whose duration, or interest rate sensitivity, is the same as that of the liabilities. By specifying a minimum portfolio

return somewhat below the available market rate, the manager can create a “cushion spread” that provides the basis for several contingent schemes. As long as the portfolio retains assets sufficient to meet the target return, it may be actively managed. When adverse market moves threaten this return, the portfolio must be converted into a dedicated mode that will assure the target return.” (p. 47)

Macaulay, Frederick R. 1938. *Some Theoretical Problems Suggested by the Movement of Interest Rates, Bond Yields and Stock Prices in the United States since 1856*. New York: National Bureau of Economic Research.

“The time to maturity is not an accurate or even a good measure of ‘duration.’ ‘Duration’ is a reality of which ‘maturity’ is only one factor. Whether one bond represents an essentially shorter or an essentially longer term loan than another bond depends not only upon the respective ‘maturities’ of the two bonds but also upon their respective ‘coupon rates’ and under certain circumstances, on their respective ‘yields.’ Only if maturities, coupon rates and yields are identical can we say, without calculations, that the ‘durations’ of two bonds are the same. The duration of a stream of payments may be thought of as the average life of the stream.” (p. 45)

McDaniel, Kip. 2011. “LDI’s Founding Document.” *aiCIO Magazine*, vol. 3, no. 2 (LDI Special Issue)

“The history of a formal LDI theory is littered, it seems, with false starts. Our conclusion is that, although historically a distinction has been drawn between asset and liability management by banks and pension funds, financial theory offers no good reason for this distinction. Time to stop treating pensions as anything special. They’re the same as any other liability—and time to show that on the balance sheet.” (pp. 8, 9)

Oracle Financial Services. 2008. “Asset Liability Management: An Overview.” Oracle White Papers (<http://www.oracle.com/us/industries/financial-services/045581.pdf>).

“Asset Liability Management (ALM) can be defined as a mechanism to address the risk faced by a bank due to a mismatch between assets and liabilities either due to liquidity or changes in interest rates. Apart from liquidity, a bank may also have a mismatch due to changes in interest rates as banks typically tend to borrow short term (fixed or floating) and lend long term (fixed or floating). The function of ALM is not just protection from risk. The safety achieved through ALM also opens up opportunities for enhancing net worth.” (p. 2)

Ryan, Ronald. 2003. “Testimony before the ERISA Advisory Council on Employee Welfare and Pension Benefit Plans.” U.S. Department of Labor

“Liabilities should be priced at the market as a yield curve. A rule should be created, or enforced, that reads: If you cannot buy it, you cannot use it as a discount rate! Bond indexes are market-weighted; they’re not liability weighted. Until a custom liability index is built for each pension plan, based upon the unique actuarial term structure of that plan, and priced off of real zero-coupon bonds, pensions are in jeopardy of managing to the wrong objective.” (p. 9)

Ryan, Ronald. 2011. “The Public Pension Crisis.” *IMCA Investments and Wealth Monitor*

“The solution to the public pension and budget crisis starts with liabilities. Until a custom liability index (CLI) is installed as the proper benchmark, all asset allocation, asset management, benefit and contribution decisions will be based upon erroneous and misleading calculations. The benchmark must be a CLI because no two pensions are alike due to different salaries, mortality and plan amendments.” (p. 30)

Society of Actuaries. 2004. “Principles Underlying Asset Liability Management.” SOA Exposure Draft

“Asset Liability Management is the ongoing process of formulating, implementing, monitoring, and revising strategies related to assets and liabilities to achieve financial objectives, for a given set of risk tolerances and constraints. A consistent ALM structure can only be achieved for economic objectives. Various accounting measures are affected by rules that change the emergence of income and the reported book value of assets and liabilities. These measures can sometimes distort economic reality and produce results inconsistent with economic value. Because ALM is concerned with the future asset and liability cash flows, the natural focus of ALM is economic value. Entities that focus on economic value tend to achieve their financial objectives more consistently in the long term.” (p. 6)

Waring, M. Barton, and Laurence B. Siegel. 2007. “Don’t Kill the Golden Goose! Saving Pension Plans.” *Financial Analysts Journal*, vol. 63, no. 1

“The first element of ‘new’ technology needed to manage DB plan risk and cost is an *economic* view of the liability. The only risks that are helpful to know about are the risks that can be hedged through investing the assets. Such risks are those in the liability that are market related—that is, correlated with the returns of assets or indices available in the markets. Therefore, sponsors need to set aside the actuarial and accounting views of the liability and rediscount the cash flows at appropriate, market-related rates. Plus, they need to understand how these market-related values, economically sensible measures of periodic pension cost, and economically required contributions change as market interest rates change.” (p. 36)

Waring, Barton, and Duane Whitney. 2009. “An Asset–Liability Version of the Capital Asset Pricing Model with a Multi-Period Two-Fund Theorem.” *Journal of Portfolio Management*, vol. 35, no. 4 (Summer)

“The authors present a new capital asset pricing model (CAPM) that incorporates investors’ deferred spending plans, or ‘economic liabilities’—the underlying purpose behind all investments—and thus reveal a new risk-free asset, the investor’s liability-matching asset portfolio.” (p. 111)

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