

Liability Beta vs. Market Beta

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Beta is a term first pioneered by PhD. William Sharpe in his 1970 book “Portfolio Theory and Capital Markets”. Here he introduced his famous capital asset pricing model (CAPM) which presented the idea that individual investments contain two types of risk: Systematic and Unsystematic risk.

Systematic risk was deemed to be market risk that cannot be diversified away while unsystematic risk was deemed to be the specific risk of that investment (i.e. credit, features, etc.) that can be diversified away through adding other investments to the portfolio. Modern portfolio theory (MPT) shows that unsystematic risks can be removed or reduced through portfolio diversification. The problem that remains is that of market risk.

The Notre Dame fixed income indexes study of 1986 proved that the market risk for bonds is interest rate risk which is quite dominate. Their calculations showed that interest rate risk explained or accounted for 96% plus of the total return for the major bond index aggregates. This study further proved that interest rate is best measured by a yield curve that is well diversified by maturity or duration (term structure). Any bond index that does not have a distinct term structure is not a good measurement of bond market risk.

Through time, it became obvious how difficult it was for active management to consistently outperform a market index as a benchmark (especially after fees). This led to Index Funds as a major asset management style. The growth in this form of asset management has been dramatic especially when including the explosive growth of exchange traded funds (ETFs).

With the advent of **Portable Alpha** as a strategy, assets are divided into two groups: Alpha and Beta. A Portable Alpha strategy transfers (ports) the excess return (Alpha) over to the Beta portfolio to secure the victory. The Beta portfolio is considered the portfolio that matches the objective as an index benchmark (i.e. Index Fund) and Alpha is considered the portfolio that outgrows (excess return) the index objective.

Given the current asset liability management (ALM) or liability driven investment (LDI) trends, it has become obvious that the true objective of a pension is to fund a liability schedule unique to each plan sponsor. Since the objective of a pension (and most institutional objectives) is liability driven shouldn't the terms Beta and Alpha be redefined for any LDI objective. After communication with PhD. William Sharpe years ago, he suggested I qualify my research as **Liability Beta** and **Liability Alpha** to distinguish it from market beta and market alpha. I agree, that makes good sense.



Market Beta and Alpha

Most asset managers are given an index bogey or objective that best represents the asset class risk/reward behavior that the client has chosen as the objective of such asset allocation. Asset consultants are quite diligent in selecting and monitoring the asset managers to perform under these index objectives. The goal could be to either match the risk/reward behavior (Beta portfolio or index fund) or outperform the return behavior (earn Alpha). A few good questions here are: if your asset managers earn market Alpha, does that mean they earned liability Alpha? If all asset managers outperformed their index bogey but total assets underperformed liability growth, did the client win or lose? Did asset allocation create value added (Alpha)?

Liability Beta and Alpha

Several strategies exist to match pension liabilities (cash flow matching, duration matching, derivatives, interest rate swaps, etc.). These liability Beta portfolios are to match the liability cash flow schedule (cash flow matching) or interest rate sensitivity of liabilities (duration matching) or both. Liability Alpha is rarely a consideration yet this is how a pension improves its funding status and reduces pension costs (i.e. contributions). In the end, **total assets must outgrow total liabilities over time to earn liability Alpha thereby enhancing the funded status and reduce pension costs.**

Custom Liability Index

Given any liability driven objective, the proper index benchmark should be a **Custom Liability Index (CLI)** that best measures the size, shape and risk/reward behavior of these client specific benefit payment schedules. The Ryan ALM CLI is a monthly report that calculates the present value, growth rate and interest rate sensitivity of liabilities. Client liabilities are like snowflakes... you will never find two alike. Only a CLI could accurately represent the true pension objective. It should be obvious that **the true objective of a pension is to fund their liabilities in a cost-efficient manner with prudent risk.** It is difficult, if not impossible, for asset liability management (ALM) to function effectively without proper knowledge of the liability cash flows. In sports, the scoreboard dictates the strategy. The CLI is the pension scoreboard for liabilities. When compared to assets, the plan sponsor knows every month if they are winning or losing the pension game.

Current accounting rules and actuarial practices price liabilities as a **zero-coupon bond portfolio** at a single discount rate on an annual basis, months delinquent where the liability cash flow schedule (annual projections of benefits) is rarely seen. Moreover, this single discount rate may not be a market rate (GASB for public plans uses the ROA). Could any asset manager perform versus a generic market index if it came out annually, months delinquent where the index portfolio was not transparent and all issues were priced at the same yield? Sounds ridiculous ... well, welcome to the current pension liability world we live in.

The **Society of Actuaries (SoA)** in their 2004 research paper addressed this situation citing that current accounting rules distort economic reality and urged pensions to create a set of *economic books* that price liabilities at the market on a frequent and accurate basis. Such economic books are best created and maintained as a Custom Liability Index. Indeed, until a Custom Liability Index is

installed, the asset side cannot function effectively towards a liability objective. How could an asset allocation model function without correct input as to the true economic Funded Ratio (assets/liabilities) and the size of the economic deficit or surplus (funded status)? How could performance measurement be calculated quarterly without knowledge of the true economic liability growth rate (total return)? How could you match and fund assets to liabilities without a Custom Liability Index?

I designed the CLI over 32 years ago as the best representation and benchmark for any liability objective. The CLI is a monthly report that prices liabilities at the market (using either the Ryan ALM ASC 715 (AA corporates) discount rates or US Treasury STRIPS). The CLI calculates the true economic present value of liabilities and their growth rate so the funded status and performance measurement of assets versus liabilities can both be ascertained.

Lehman Aggregate and Generic Bond Indexes

As the designer of many of the popular Lehman bond indexes (now Bloomberg Barclay's), I am honored by the acceptance of these bond indexes. However, it should be obvious that they do not behave like liabilities. All of the popular generic bond indexes are rules based. Such rules *only* use coupon bonds and **do not have zero-coupon bonds**. Mathematically, the longest duration of any coupon bond is around 17 years today. As a result, such bond indexes could not be a proxy for long duration liabilities or match these liabilities as an index fund. Furthermore, most pensions are weighted to long durations with an average pension fund in the 10 to 15-year average duration area. The Bloomberg Barclay's Aggregate's average duration is usually between four to five years ... a definite mismatch to pension liabilities cash flow. Even the long Corporate or Credit index cannot match liabilities. It has two distinct rules based problems. First, it has no issues shorter than 10 years in maturity which leaves out a large and most important segment of liability cash flows. Second, it has no issues with durations longer than 17 years. This is an inappropriate proxy for any pension's liabilities. **It is not the average duration you are trying to match and monitor but the entire liability term structure (liability cash flows)**. Once again only a Custom Liability Index is the proper fit as a liability benchmark.

Liability Beta Portfolio™ (LBP)

If the Beta portfolio is the portfolio that matches the index objective (Index Fund) then given a liability objective, the proper liability Beta portfolio is ... **the portfolio that matches the liability objective (Liability Index Fund)**. To be accurate, you must fund each monthly liability payment.

The Ryan ALM LBP is a cash flow matching portfolio that matches and funds monthly liability cash flows *chronologically*. Our LBP is a cost optimization model that will produce the optimal lowest cost portfolio to fund the target liability cash flows. Our **LBP should reduce funding costs by about 2% per year (1-10 year liability schedule = 20% funding cost savings)!** Moreover, the LBP will outyield the CLI thereby providing liability Alpha similar to the yield difference which enhances the funded status. The Ryan ALM LBP should also mitigate interest rate risk (similar duration and term structure matching) and reduce pension expense, the volatility of the funded status and contributions.



The intrinsic value in bonds is the certainty of their cash flows. We urge pensions to use bonds for their value... to match bond cash flows that fund liability cash flows. We do not view bonds as performance vehicles or Alpha assets. They are best as *liquidity assets* to fund liabilities as they come due. By bifurcating liquidity assets from growth assets (Beta vs. Alpha assets) you BUY TIME for the Alpha assets to grow unencumbered. Many pensions use a “Cash Sweep” where they take away income from all asset classes to fund benefits + expenses (B+E). According to S&P 500 data, dividends reinvested accounted for: **47% of rolling 10 years returns since 1940.** So let the bond allocation (liquidity assets) fund B+E which will buy time for the Alpha assets to grow significantly more.

Ryan ALM provides a turnkey process that we believe is a best fit as a pension solution to include:

Custom Liability Index (CLI)
Liability Beta Portfolio™
ASC 715 discount rates

Please call or email Russ Kamp at 201-675-8797 RKamp@ryanalm.com for more info.

“An error is not a mistake until you refuse to correct it”
John F. Kennedy