The Role of Pension Contributions in Asset Allocation
(Single Employer Version)

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Pension contributions tend to be viewed correctly as a cost or penalty due to pension assets underperforming pension liability growth. Contributions are calculated annually by the plan actuary and can be an unbudgeted item. Noticeably, contributions usually play no role in the asset allocation strategy of most pensions. Given the size of contributions today, it is critical that contributions are a major consideration in the asset allocation strategy. For many corporations, the contribution cost has risen as much as 5x to 7x the fiscal 1999 level. This research paper explores the calculation and role that contributions should play in asset allocation as well as the management of a pension.

The Contribution Calculation (Single Employer)
Single-Employer defined benefit pension plans (corporations) are under IRS guidelines and Pension Protection Act (PPA) rules for the calculation of contributions. IRS Section 430 governs the minimum required contribution calculation which, in general, is the sum of:

(a) **Normal Cost** = the present value of all benefits which are expected to accrue or to be earned under the plan during the plan year.
(b) **Shortfall Amortization** = the amounts necessary to amortize the shortfall amortization base of the plan for any plan year in level annual installments over a 7 plan year period.
(c) **Minus Credit Balances** = cumulative prior year contributions in excess of the minimum required contribution subject to certain restrictions.
(d) **Administrative Expenses** = added to normal costs.

In determining any shortfall amortization installment, the plan sponsor is governed under the funding requirements of the PPA. Funding shortfall is determined by the Funded Status as measured by the value of pension assets minus the present value of liabilities under the IRS discount rates and PPA valuation rules. Pension assets can be valued under two methodologies:

(1) Market value of assets
(2) **Smoothing** = moving average of the market value of assets limited to 25 months with the resulting average limited to within a corridor of 90-110%.

Pension liabilities are valued based on interest rates or the discount rates allowed under PPA funding requirements to determine the present value of liabilities. There are basically two methodologies allowed:

(1) **PPA spot rates** = provided by the Treasury department as a yield curve of current *hypothetical* AA corporate zero-coupon bonds rates.

(2) **PPA 3-segment rates** = this is a 24-month moving average of 3-segment rates (1-5 years, 5-15 years and 15+ years) based on the published rates from the Treasury for *hypothetical* AA corporate zero-coupon bonds. Under the new MAP-21 legislation the 3-segment rates must fall within a corridor of 85-115% of the published Treasury rates for a 25-year moving average whichever is the closest to the 3-segment rates. Each year after 2013 the corridor widens by 5% until 2016 when it freezes at that level.

Asset Allocation

Asset allocation is the single most important asset decision since it controls the risk/reward behavior of 100% of the pension assets. Since it will greatly affect the Funded Ratio and Funded Status, the success or failure of the asset allocation strategy may be the single most important pension decision. The asset allocation decision and strategy should be based on the Funded Ratio (present value of assets/liabilities). Logically a large deficit status should have a much more aggressive asset allocation strategy than a pension with a surplus status. Unfortunately, the Funded Ratio tends to play little or no role in the asset allocation strategy. Too often the asset allocation focus is on achieving the return on asset (ROA) assumption. History has proven that achieving the ROA does not mean you have achieved a fully funded plan or even enhanced the Funded Status such that the $ deficit has been reduced. In truth, given a higher $ deficit requires a higher $ minimum required contribution. Moreover, **in order for contributions to be reduced, pension assets must outgrow pension liabilities in dollars!** Simple math can prove this assertion as shown in exhibit 1 where pension assets achieved the ROA growth target of 8%. Liabilities are assumed to have the same 8% growth rate. As a result, the Funded Ratio stays stable at 60% but the Funded Status $ deficit *increases by 46.9%* which would increase contribution costs accordingly. In order for contribution costs to remain stable (although high), assets would have to outgrow liabilities by 5.33% annually (13.33% ROA). In order for contributions to be reduced asset growth would have to outperform liability growth by over 5.33% annually:

Exhibit 1
Funded Ratio = 60% ($40 Deficit)
Assets and Liabilities grow at ROA = 8%

	Assets		Liabilities		Funded Ratio	
Year	Begin	End	Begin	End	$ Deficit	Funded Ratio
1	$60.00	$64.80	$100.00	$108.00	$43.20	60%
2	64.80	69.98	108.00	116.64	46.66	60%
3	69.98	75.58	116.64	125.97	50.39	60%
4	75.58	81.63	125.97	136.05	54.42	60%
5	81.63	88.16	136.05	146.93	58.77	60%
6	88.16	95.21	146.93	158.65	63.44	60%

Requires ROA = 13.33% to *not* increase Contribution costs
Asset growth > Liability growth by 5.33% = Level Contributions

The true objective of asset allocation should be to enhance the Funded Status such that contribution costs remain low and stable over the life of the pension. In sharp contrast to this objective, since 1999 pensions have been hard hit with both the *volatility* and the *spiking* $ cost of contributions that has plaqued so much of pension America. To this end, **pension assets must outgrow liabilities in $** to reach a fully funded position! Asset allocation needs to be focused and redirected on what excess return (liability Alpha) is needed to reach a fully funded position over a time horizon no longer than the average life (duration) of liabilities.

For most pensions, the term *liability Alpha* is a new concept. With a liability objective Alpha needs to be redefined as the excess asset growth (return) above liability growth (return). In order to calculate this **target liability Alpha** an accurate and frequent assessment of the Funded Ratio is required. The Funded Ratio deficit divided by the duration of liabilities divided by the Funded Ratio provides a sense of the annual target liability Alpha needed to reach a fully funded position over a time horizon equal to the duration of liabilities. For example, a 70% Funded Ratio with a 10-year duration would suggest that the annual target liability Alpha is 4.29% ((30/10) / 70). If asset growth exceeds liability growth by 4.29% annually for 10 years, the plan should reach a fully funded status. Naturally, such liability Alpha is never a certainty and is sure to be a volatile calculation. As a result, the calculation of the target liability Alpha needs to be updated as part of the *tactical* asset allocation process.

Noticeably, the Funded Ratio should be viewed from both a gross and net (with contributions) calculation. Too often such information is only provided annually months delinquent as presented in the actuarial report or not at all (i.e. annual projected contribution schedule and duration of liabilities is seldom provided). Given that the main focus of a pension is its Funded Ratio and Funded Status, you would think that they are updated frequently and certainly presented at every investment review meeting to keep score that the plan is on track to reach a fully funded status. Imagine a scoreboard in sports that is only updated after the game is over… too late to change your strategy. Indeed the scoreboard regulates how the game is played. If you are way behind you change your strategy and get more aggressive to catch up… or vice versa.

The Role of Contributions in Asset Allocation

Contributions are a *future asset* and, as such, *enhance the Funded Ratio and Funded Status*. Contributions are made in the form of annual cash injections and are initially **used to pay the current liabilities due that year**. Should there be any annual contributions greater than the annual liability payments it would usually remain in cash to pay next year's liabilities. Since contributions make the liability payments and are usually not invested, they reduce the liabilities thereby enhancing the Funded Ratio and Funded Status. This ***net Funded Ratio*** should then become the focus of asset allocation and not the gross liability or gross Funded Ratio. The *net Funded Ratio* after contributions is never calculated in actuarial reports. Seldom has contributions ever been presented or used in this manner. Yet, this is the normal role of contributions… to fund current liabilities.

As emphasized earlier, asset allocation models need to focus on enhancing the Funded Ratio and Funded Status by achieving the annual target liability Alpha. If the net Funded Ratio improves to 80% in our above example, the annual target liability Alpha improves to 2.50% annually which may adjust the asset allocation strategy. If liabilities had a weighted average yield to maturity of 3%, this would suggest that a 5.50% asset growth rate is

sufficient to reach a fully funded status in time. Such a low growth rate target might suggest a rebalancing or restructuring of the asset allocation to a more conservative strategy that has more certainty and less risk in achieving this target liability Alpha or asset growth rate.

Our research and evidence supports that it is the *net Funded Ratio* (after contributions) that needs to be enhanced. Please note that the projected contributions used to calculate the net Funded Ratio is usually recalculated by the actuary every year and becomes a constant monitoring event which could alter the asset allocation process.

As a result, asset allocation needs to be *responsive* to this ever changing net Funded Ratio. This is commonly called *tactical* or *dynamic* asset allocation although we feel the word responsive is more indicative of what the process should be. Asset allocation needs to recognize and respond to the net Funded Ratio status. As it reaches a fully funded position, asset allocation needs to get more conservative perhaps with more of an allocation to an asset/liability matching strategy (immunization) as the core portfolio such that it secures this funded status position which allows contribution costs to remain low and stable.

Custom Liability Index (CLI)

Although funding liabilities is the true objective of any pension, liabilities tend to be missing in action in asset allocation, asset management and performance measurement. The reason for this contradiction or disconnect is the absence of a Custom Liability Index (CLI) that best represents the size, shape and risk/reward behavior of liabilities. Once a CLI is installed as the proper benchmark, then and only then can the asset side function effectively on asset allocation, asset management and performance measurement.

Liabilities are like snowflakes… you will never find two alike. Pension liabilities are unique to each plan sponsor since they each have a different labor force with a different salary structure, mortality and plan amendments than any other pension. As a result, only a *Custom Liability Index* could ever properly represent or measure the unique liabilities of any pension. A CLI should be calculated accurately and frequently so the plan sponsor and its pension consultant can be informed with timely data that can support the asset allocation decision. A CLI should provide both a gross and net liability valuation based on all of the discount rate requirements and options (ASC 715, PPA spot rates, PPA 3-segment, PPA MAP-21). Moreover, the CLI should provide a monthly calculation of the liability growth rate so performance measurement of total assets vs. total liabilities can be assessed.

The Performance Measurement Model

Assets need to be monitored versus their bogey or index objective on a frequent basis. In harmony with the true pension objective they also need to be measured vs. the risk/reward behavior of the CLI. This should be the true test of asset allocation. Total asset growth must outperform total liability growth for the Funded Ratio and Funded Status to be enhanced. Without a CLI, such a measurement would be difficult and certainly not timely. Total asset growth should certainly be measured and monitored vs. total liability growth at each investment review meeting. Each asset manager could and should also be monitored vs. liabilities as well. A simple moral or warning is applicable here:

If you outperform the S&P 500 but lose to liability growth… the client loses!

Obviously, there is no victory or liability Alpha earned here although traditional performance measurements would suggest otherwise. All asset functions need to be in sync with the true objective of enhancing the Funded Ratio, the Funded Status and reducing contribution costs.

Conclusion

Traditional asset allocation models and strategies were focused on achieving the ROA assumption. This is not the true or proper objective. Until a Custom Liability Index (CLI) is installed as the proper pension benchmark asset allocation will be disconnected to the true liability objective. Contributions should be a major consideration in the asset allocation process since they are a future asset. Contributions are typically used to pay the current liabilities due each year thereby reducing the liabilities current assets need to fund. This *net liability* needs to be calculated and monitored by the CLI on a frequent basis. Since full funding is the goal, asset allocation needs to know the annual liability Alpha needed to reach this funding status. The CLI will provide such information to calculate the annual target liability Alpha. Performance measurement then needs to monitor asset vs. liability growth to verify that the pension plan is on track. This requires total asset growth compared to total liability growth (as measured by the CLI). In the end, this asset allocation process requires a CLI which calculates a net liability growth (after contributions) in order to be effective and in harmony with the true objective of any pension plan. To achieve the pension objective of funding liabilities at the lowest and least volatile contribution costs, asset allocation needs to focus on the Funded Ratio and Funded Status. This requires the CLI to provide a frequent liability valuation which includes projected contributions. Asset allocation is a process based on asset/liability management (ALM) and valuations. All assets must be considered. The pension contribution, over time, may be one of the largest asset classes. It should be included in any and all asset decisions.

Ronald J. Ryan, CFA: Awards and Recognition

IMN

William F. Sharpe
Index Lifetime Achievement Award
ETF Product of the Year Award

money management

Lifetime Achievement Award

The Journal of Portfolio Management

Bernstein Fabozzi/Jacobs Levy Award
Research Paper of the Year

CAPITAL LINK

Most Innovative ETF of the Year Award