2Q18

TOPICS OF INTEREST

Introduction to required return

Supporting document

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Introduction

*In **"Introduction to Required Return"** we discussed a metric that could be used to build a practical framework for making investment decisions. In this paper we take a closer look behind the concept, explain step by step how we arrive at the framework, and discuss special considerations regarding its use.*

Existing metrics

To better appreciate the required return metric we need to comment on the metrics being used today, which can be divided into two broad categories:

- Solvency/Funding
  - Metrics calculated to determine what the cash contribution to a plan should be.
- Accounting
  - Metrics calculated disclose a pension plan's assets and liabilities to stakeholders (tax payers, plan participants, shareholders, etc.).

However, absent within these descriptions are metrics designed to assist in investment decisions. The investment perspective is one focused on cashflow, the likelihood of meeting target contribution levels, the sponsor's financial health, its risk tolerance or the long-term goals of a plan.

Barring regulatory or legal considerations, investing to maximize indications of plan health under an accounting or funding framework is not the financial goal of the pension sponsor. The pension sponsor's goal is to pay its beneficiaries and maximize the likelihood of meeting that goal. If this framework is done responsibly, improvements in plan health should occur as a consequence of prudent management but not as the primary objective of the plan. It is here that we find the necessity for an additional metric to assist in making decisions.

Required return derivation

We begin by viewing the pension problem from a cash flow perspective, asking what tomorrow's asset value will be given all of today's cash outflows and inflows.

FIGURE 1 - REQUIRED RETURN MOTIVATION

$$\begin{aligned} Asset_{tomorrow} = &\left(Asset_{today} + Contribution_{today} - Benefit\ Payment_{today} - Expense_{today}\right) \\ &* (Investment\ Return_{today}) \end{aligned}$$

Figure 1 shows that tomorrow's asset value is equal to today's asset value, plus any contributions made, minus any benefit payments or expenses. We then attribute that cash flow with our investment performance.

Since the pension planning horizon is not based on days, but decades, we need to extend our analysis beyond a single period and look at multiple time periods. To assist in this, we express our framework mathematically, both for concision and transparency. Below we show an example calculation under a two-year projection.

FIGURE 2 - FUTURE ASSET CALCULATION: 2 YEAR OUTLOOK

$$Year\ 1\ Asset\ Value: A_1 = (A_0 + C_0 - B_0 - E_0)(1 + z_0)$$
$$Year\ 2\ Asset\ Value: A_2 = (A_1 + C_1 - B_1 - E_1)(1 + z_1)$$

$$\begin{aligned} &where: \\ A_0 &= Initial\ asset\ value \\ A_a &= Asset\ value, time\ a \\ B_a &= Benefit\ pament, time\ a \\ C_a &= Contribution, time\ a \\ E_a &= Admin\ and\ misc. expenses, time\ a \\ z_a &= Investment\ performance, time\ a \end{aligned}$$

By performing a little algebra and observing the pattern that ensues, we can generalize this calculation for any projection period, represented by the variable *n*, and arrive at the resulting equation.

FIGURE 3 - FUTURE ASSET EQUATION: N YEAR OUTLOOK

$$A_n = A_0 \prod_{a=0}^{n-1}(1+z_a) + \sum_{a=0}^{n-1}\left((C_a - B_a - E_a)\prod_{t=a}^{n-1}(1+z_t)\right)$$

$$where\colon A_a \geq 0;\ \forall a \in \{1, \dots, n\}$$

Figure 3 expresses the value of A_n, the value of the pension asset at time *n* in the future; it is calculated as the interest accrued on the initial asset A_0 and the interest accrued on any remaining cashflow. Our final restriction is that the value of the asset can never be less than zero, as that would represent an inability to meet an obligation in a given year. It is important to note that we have an idea of what we want our final asset value to be, A_n, as that represents our financial objective. These objectives are flexible, ranging from full funding under a given discount rate, or simply some improvement in its current financial state.

In addition, using this equation requires a projection on an uncertain future, assuming values for variables that we do not know with certainty. For instance, we may not know what tomorrow's contribution will be, as for a public plan that is dependent on political, legal, and financial considerations. But in contrast, we do have good approximations of what tomorrow's benefit payments, expenses, and what we'd like A_n to be[1].

Each pension is unique, but the distinction between the variables we know (benefit payments, expenses, current asset value, the target asset value) and the variables we do not know (investment return and contributions) form the basis of how we think about addressing a pension's challenges. Based on this understanding we transform *Figure 3* from an interesting abstraction into a useful tool, an example of which is seen in *Figure 4* below.

FIGURE 4 - REQUIRED RETURN CUSTOMIZED EQUATION: N YEAR OUTLOOK

$$A_n = A_0(1+z)^n + \sum_{a=0}^{n-1}(\, C(1+x)^a - B_a - E_a\,)\,(1+z)^{n-a}$$

Figure 4 is nearly identical to *Figure 3*, except that we do not presume to know what tomorrow's contributions or investment return will be. This is the default state when evaluating a pension, but additional considerations may require us to make changes[2]. In addition, we add one more variable, *x*, which represents a growth rate assumption we place on the contribution amount; in practice, it behaves as a conservative inflation assumption.

The result of *Figure 4* is that we can now insert values via our projections and extract useful relationships such as:

- Evaluate the costs (by comparing a contribution amount with some investment target) necessary in attaining a financial objective. Change either variable and observe the resulting relationship.
- Once this relationship is calculated, we can then evaluate the risks associated with attempting to meet a contribution commitment and attaining an investment return target.
- If we know what our future contributions will be via a funding policy or some promised commitment (C_a from *Figure 3* is known), then we can solve for *z* – the required return.
- We can evaluate the cost a plan will incur by experiencing differences in return timing (evaluating the impact on contributions by changing z_a in *Figure 3*).
- We can look at the relationship between cash outflow (benefit payments and expenses) and cash inflow (contributions and investment income) which will have liquidity considerations for the plan and may require an adjustment to the investment strategy.

The equation in *Figure 3* behaves as the starting point for deriving these and many other relationships from the plan based on its unique characteristics. While it is general enough to incorporate all pension types, we will consider the single employer private pension as an example.

Special considerations: single employer private pensions

Single employer private pensions provide unique challenges due the regulatory framework that governs them. Below are a few considerations that will require adjustments to *Figure 3*.

- The federally mandated discount rate, a variable that impacts the Minimum Required Contribution (MRC), is relatively stable but will require a projection. These MRC values will impact our variable C_a.
- Depending on the financial health of the plan, Pension Benefit Guaranty Corporation (PBGC) premiums may have a non-trivial impact on cash outflow, which will require extra attention to the projection of our expenses variable (E_a). The more poorly funded the plan is, the more important this consideration becomes.
- Because discount rates are lower than its public counterpart, investment strategy may be significantly less risky, meaning that the focus of the analysis may shift away from investment concerns and toward contribution concerns (hold z_a nearly constant, focus on cost impacts resulting from changes to C_a).

The evaluation of every pension plan must be treated on a case by case basis depending on the accuracy and confidence we have in the underlying projection; private pensions are no exception.

Conclusion

The goals of this framework and countless others[3,4,5] are identical – to build a metric that aids investment decision-making, to inform plan sponsors and stakeholders about the costs associated with those decisions, and to do so in a way that is intuitive and easy to understand.

The required return focuses on cash flow, treating the pension like a bank account that expenses withdraw from and contributions and investment returns make deposits to. We focus our analysis on the metrics that matter most by leveraging sources of strength (projections of benefit payments and expenses) and addressing sources of weakness (tomorrow's investment performance). In a holistic manner we can incorporate investment policy, contribution commitments, and financial obligations in a unified framework; this is the required return.

Notes & Disclosures

1. *For open plans, its sensitivity to inaccurate assumptions will vary depending on its own unique characteristics. Plans with COLAs can be sensitive to these differences, partially handled by using conservative assumptions.*

2. *For example, if the plan issued a Pension Obligation Bond (POB).*

3. *"Funding Ratio Peaks and Stalls," Leibowitz, Kogelman, Bova, 2017 CFA Institute Financial Analysts Journal.*

4. *"Rethinking Asset/Liability Management," Bridgewater Strategic Report, 2017.*

5. *"A New Metric for Managing Pension Plans," Bazdarich, 2013 Western Asset.*

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