

## Part 2 - Traditional Defined Benefit (DB) Plans

These plans have been around for a long time, but are now being viewed negatively by employers. Much of that is due to not being aware of how to best manage the growing risks inherent in these plans. Without proper modeling, it is difficult to take proper action and mitigate these risks.

In this paper, we will discuss the various underlying risks and ways that plan sponsors can manage them so they don't become a significant burden while continuing to provide meaningful retirement income to plan participants. As we indicated in our first paper in this series, we will be discussing other plan design options in the future. In this paper we will only focus our attention on the traditional defined benefit plan and how to better manage risks within these plans. Other plan designs provide more options to share these risks and will be discussed later on.

### What are the risks in DB plans?

There are several risks in providing a DB plan to employees which we will discuss below. Should readers have any questions about other issues that have come up with their own plans, we welcome a discussion regarding these issues to help the community get a full picture of what other plan sponsors have experienced.

1. Investment Risk – not achieving the expected rate of return
2. Maturity Risk – number of retirees exceeding number of active employees
3. Mortality Risk – people living longer than expected
4. Statutory and Regulatory Risk – Congress, Internal Revenue Service (IRS) or other government agencies changing funding requirements
5. Company Risk – an increase in the cost of the program will hurt financials and may cause businesses to lose project bids

The first two risks noted above have a strong correlation which may not be fully understood by the plan sponsors.

Investment risk is well understood by everyone. The plan needs money to pay the benefits promised. This money comes from either contributions, made to the plan by the sponsoring organizations, or through investment returns. The following basic equation shows how pension finance works at the most basic level.

$$\text{C}ontributions + \text{I}nvestment Income = \text{B}enefits + \text{E}xpenses$$

Since the traditional DB plan provides a fixed benefit for life and the cost of administering the plan is also a relatively fixed quantity, all of the volatility comes from investment income. If the investment income exceeds expectations, then contributions can be lowered. However, if investment income is lower than expected, contributions will increase.

Unfortunately, in recent years, investment income has been lower causing a significant amount of strain on the contributions. To make up for this, some plan sponsors have taken on more investment risk to achieve the targeted return which in turn may lead to more volatility in the returns. The other option, which is taken far less often, is to reduce the expected return assumption. This alternative may also lead to a lower benefit in the plan. While this option is not favored by everyone, as discussed in our first paper, due to the accrual nature of DB plans, this will yield a better result for mid- and long-career individuals compared to changing to a defined contribution (DC) plan.

The other risk now faced by many plans is the maturity of the plans. This can be seen by the growing number of retirees in DB plans compared to the active workforce. While this is something that is expected to occur in pension plans, it takes many years to come about. When a pension plan first starts the plan only covers active employees. Then, as people retire, the population slowly matures over several decades and the number of inactive participants increases. What we see now are many plans that are paying out more money each month to retirees than they are receiving in contributions from the active workforce. This leads to negative cash flow which can be a serious problem for pension plans if not managed carefully.

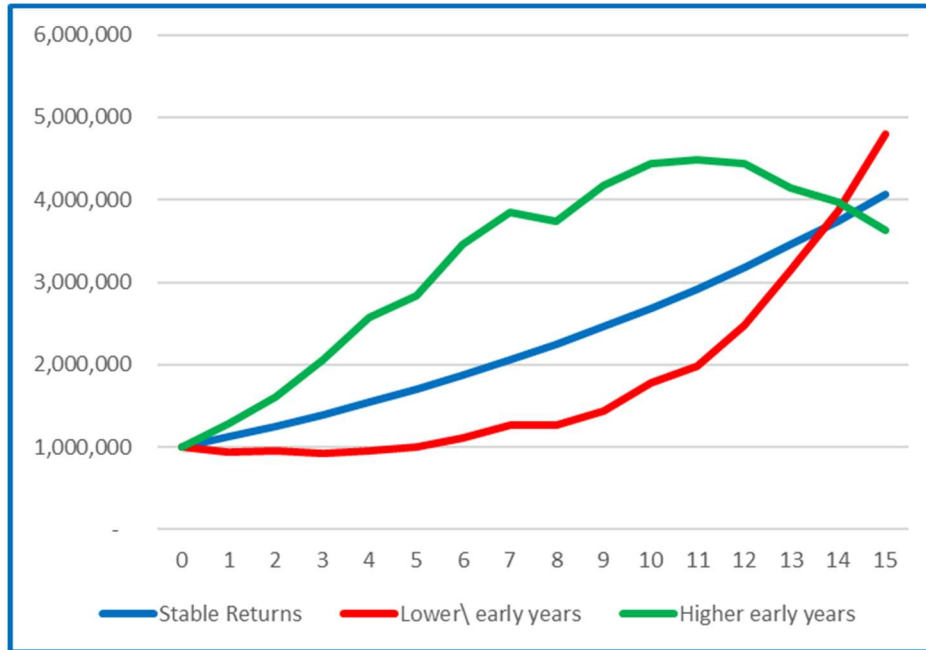
The following charts show a Plan with \$1,000,000 at the beginning of the period. We have modeled three different return scenarios that all average 7% over a 15-year period. The first scenario is a stable return of 7% each year, the second scenario has lower market returns during the first half of the period followed by higher market returns, and the third scenario has higher market returns during the first half followed by lower market returns.

This first chart shows neutral cash flows, meaning the contributions coming in are equal to benefits and expenses being paid out. This plan is neither adding to the investment portfolio nor draining money from the investment portfolio.



As you can see, due to the neutral cash flow, the plan ends up in the same place at the end of the 15 years since each of the portfolio return sequences results in a 7% average annual yield in the portfolio.

In this next chart, we will see what happens if the net cash flow is +5%. This means we are accumulating assets as the contributions exceed the benefits and expenses paid each year by 50,000 (5% of the initial \$1,000,000).



In this case, the values of the assets under each scenario are all similar at the end of the 15 years, with the “Lower early years” being slightly better. This is because, during the early years when the market was down, the new assets coming into the investment portfolio were purchasing investments at a discounted price. When the market recovered during the later years, these newly acquired assets performed extremely well.

Now, let's look at the third case – what happens if the cash flow is negative and we are spending down the portfolio at \$50,000 per year?



Here the asset values are dramatically different. In the scenario where the market is down in the early years, and the plan has lower-than-expected returns, more investments need to be sold off to raise capital for paying benefits and expenses. This leaves the plan with fewer investments and when the market recovers the plan falls short due to having liquidated much of the investments it originally held.

You can now see how strongly correlated the maturity of a plan is to the investment returns. Since many plans were first installed decades ago, they are now becoming more mature and the underlying risk of these plans has changed dramatically. Yet, many sponsors keep their original investment policy or add more investment risk to chase higher returns while the plan cannot adequately handle the risk due to the higher level of maturity in the plan.

When considering the interaction of these two key risks in pension plans, it is important to understand that every pension plan can be divided into two groups –

- The active population, which will always be cash flow positive and therefore have significantly lower investment risk
- The inactive population, which will always be cash flow negative and therefore have significantly greater investment risk

Once we understand this, we can see that the investment policy for pension plans should be somewhat dynamic and change over time. The assets needed to support the inactive group should be invested in lower-risk investments and the assets supporting the active group can be invested in more risky assets. As the plan matures over time, the investment mix should become less risky, rather than staying with the same long-term policy based on discussions when the plan was adopted. Consideration needs to be made of how the plan may have changed over the decades since plan inception.

## Mortality Risk

Years ago, when pension plans were first developed, the computer modeling tools used by actuaries to value pension plans were relatively basic and the ability to deal with future mortality improvement was limited. Now, with the development of better computers and programs, actuaries are able to consider many more factors when developing projections of pension plan costs. One of these improvements has led to the development of mortality improvement scales by the Society of Actuaries and the use of these scales in valuations better reflects future expected outcomes.

Therefore, this risk is far lower now than it has been in the past and, since mortality risk is pooled in pension plans, it proves to be far less of an issue now than it did just ten years ago.

## Statutory and Regulatory Risk

Overall, regulatory risk is a significant concern for plan sponsors as changes in funding requirements or PBGC premiums can significantly impact the cost of maintaining a defined benefit plan. This risk is largely outside of the control of plan sponsors and can have a major impact on the financial viability of a plan.. Unfortunately, the ever-increasing cost of PBGC premiums is leading some plan sponsors to move away from defined benefit plans, even though this results in shifting retirement plan benefits from older workers to younger workers.

## Company Risk

If the risks noted above are not managed, then the sponsoring organizations may feel significant financial strain.

Significant increases in contributions that were not budgeted for will hurt the company's profitability and will lead to depressed stock prices. This may ultimately lead to closing or freezing the pension plan. Some businesses may have to reflect increased labor costs to account for the increase in contributions. In this case, they will bid higher rates on new projects and may lose out on some projects making it more difficult to keep their staff employed. If they lose too much business, then they will not be able to make the necessary contributions, causing the pension plan to suffer and leading to additional contribution increases in the future.

## How do we deal with these risks?

Having a dynamic investment policy that reflects the level of maturity in the pension plan will help reduce the amount of investment risk taken by the plan. The actuarial models used today allow actuaries to develop pension plan costs using multiple interest rates and can project what level of investment income is needed now and what will be needed in future years.

Setting up a laddered bond portfolio to cover retiree benefit payments over ten years is also beneficial. This ensures that equity investments will not need to be liquidated in bear markets as the bond portfolio will cover benefit payments without forcing the sale of investments. The period covered by the bond portfolio will diminish, but markets typically recover in a few years

and the bond portfolio can be refreshed when that occurs. When market returns exceed expectations, the laddered bond portfolio can be extended.

Performing deterministic and stochastic forecast analysis of the pension plans can help trustees and sponsors better understand what is actually needed by the plan long-term to be sure they are not taking on unnecessary investment risk in the pension plan.

Making sure the plan is valued with a reasonable level of mortality improvement based on the covered population should also be done. This will ensure no big surprises occur when mortality tables may periodically be updated. Past updates have led to significant cost increases that were not considered, but can now be estimated.

### Summary

We have discussed the risks inherent in traditional defined benefit plans and some ideas to help mitigate these risks. The greatest risk is being forced to sell off assets during down markets and therefore not being able to recover losses when markets recover.

Our next set of papers will discuss various plan designs and how the design of the plan can help mitigate and share some of these risks.

### Contact Us

If you have any questions or comments regarding this paper, please feel free to reach out to Richard Hudson at [RHudson@factuarial.com](mailto:RHudson@factuarial.com) or 212-395-9555 x117. We would love to hear about other real-life issues and use them to add to our information and share with the public.