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WHAT IS THE COST OF A PENSION PLAN?

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Editor's Note: The views expressed in this article are those of the author and do not reflect those of the author's employer or the Society of Actuaries.

What is the cost of a pension plan? It seems like a simple question that any pension actuary should be able to answer. But, if you ask five actuaries, you might get 10 answers. The actuarial profession has failed to satisfactorily answer this question, and this is not something we can ignore. In the past, we've seen others such as accountants and legislators—groups with much less expertise in pensions—define pension cost for us. That rarely results in well-constructed outcomes, but we're typically left with no choice but to follow the rules they set. Today we are facing another pivotal situation, as liability measurement for public pension plans is becoming more hotly debated in the United States. Both the public and the actuarial profession will suffer if we cannot address this issue in a practical and meaningful way. In this article, I'll explore the nuances of potential answers to the question "What is the cost of a pension plan?" My goal is to present pros and cons of different definitions of pension cost, rather than suggest a single answer, in order to challenge common beliefs and give readers food for thought.

Method 1: Accounting Expense

Some say that the cost of a pension plan is the accounting expense, effectively deferring to the judgment of the FASB, CICA, IASB, or whatever accounting standards body is in place. Do accountants understand pensions so well that they are in a better position than actuaries to define their costs? Although accounting expense is a meaningful number because of its impact on sponsors' financial statements, using accounting expense as a measure of pension cost falls apart for so many reasons—not the least of which is that several accounting standards bodies have lambasted their own rules, but haven't yet completed the process of changing them. For example, the FASB's Nov. 10, 2005 Board Meeting Handout mentioned a problems with this definition of cost include the treatment of the expected return on assets—without adjustment for risk—as guaranteed, as well as the amortization of gains and losses over periods entirely different from when they occurred. There are many other problems with accounting cost that do not need to be described in detail in this article, as the accounting standards bodies that are currently in the process of reforming their rules have already provided comprehensive self-critiques.¹ These issues have caused accounting costs to be rejected by the users of accounting statements—exactly those for whom they're intended.

Method 2: Financial Economic Cost

Some people say that financial economics gives good insight into the cost of pension plans. These people often assert that pension benefits are similar to debt-like liabilities of the sponsor, and should be measured using market-based yields on bonds with similar characteristics to the expected pension benefit streams. The unfunded/(overfunded) obligation as of the snapshot date is viewed as a debt/(asset) of the sponsor, and Normal Cost represents the cost attributable to service in a particular period, to be treated similar to employee wages in a labor cost model. Any investment experience is considered to be the result of investment bets, and is categorized separately from the cost of the new benefits promised.

This method suffers from the fact that most pension benefits are neither traded in deep, liquid markets nor exactly the same as any traded bonds—pension benefits are typically subject to longevity, turnover, and retirement rates that few bonds include. Proponents of this method typically agree that these issues represent imperfections in the model, but also believe that these issues are not large enough to warrant broad rejection of the financial economic framework—that would be like throwing out the baby with the bathwater, they contend. But with all these assumptions, many people have criticized this method as being too theoretical.

Method 3: Cash Contributions (Take 1: Simple Version)

There is nothing theoretical about the amounts on the checks that plan sponsors write to their plans, so many people believe that the cost of pension plans is best measured by cash contributions. This method certainly has obvious appeal, but there are challenges to applying it effectively.

For example, suppose a sponsor of an underfunded plan decides to issue bonds in order to make a large contribution to the plan. Is that contribution truly the plan “cost” for the period, or is it better described as issuing one debt (explicit bond debt) to pay down another (the underfunded pension plan)? Alternatively, suppose a sponsor of an overfunded plan takes a contribution holiday while the participants continue to accrue benefits, eroding the overfunded status of the plan. Is the plan truly “free” in that period? Although cash contributions are certainly an important thing to understand, clearly measuring the short- or medium-term cost of a pension plan based on contributions has deficiencies.

Method 4: Cash Contributions (Take 2: Advanced Version)

What about using the long-term contributions as a method for understanding the long-term costs of a pension plan? It sounds good, but there are challenges with this too. For starters, the future contributions are not known. Some people embrace this, asserting that pension costs are unknown, and the way to understand them is to do a Monte Carlo (aka “stochastic”) simulation of future contributions to show the range of possible contributions. I have done Monte Carlo simulation analyses for many plan sponsors, and I believe that they provide a lot of useful information. Plan costs are uncertain, and that should be acknowledged and measured. However, when used in isolation as the only method for understanding pension costs, Monte Carlo simulation methods are incomplete. I will explain.

Although Monte Carlo simulation presents a range of possible outcomes, it doesn't provide a single “expected” cost level for discounted contributions. Some people have criticized the exercise of determining a single value of the pension cost (regardless of the assumptions and methods used) as irrelevant because it is “pricing” the pension plan as of a point-in-time measurement date, whereas most plan sponsors have as primary objectives

the long-term funding of the plan and investing of its assets.² I agree that the long-term funding and investing of plan assets is important and I agree that there is an element of “pricing” in this exercise, but I also believe pricing is vital.

For an example of why pricing is relevant, let’s consider an employer trying to understand its labor costs—certainly an important thing for employers to understand. Employee salaries are easy to compute, but pension benefits will be paid for with an uncertain amount of contributions. Using a probability-weighted average (or median) level of contributions from a Monte Carlo simulation hides the risk in the pension plan, which has an implicit cost. So for the employer to truly understand its labor cost, it must price the pension plan on a risk-adjusted basis.

For another example of why pricing is important, let’s consider a governmental entity with a pension plan for its employees. If the plan is underfunded, I believe that is similar to the sponsor incurring an implicit debt. Further, I believe that the level of government debt is important information that taxpayers and politicians should know as they develop public policy. So “pricing” of pension costs is important, although certainly not the only important aspect of pension plan management.

How can we measure the implicit level of debt associated with this underfunded pension plan, given that the level of contributions necessary to satisfy that implicit debt is unknown?

Let’s start simple, looking at using a Monte Carlo simulation and calculating the probability-weighted average of the contributions in each year of the simulation. This is a simple calculation, but the results can be misleading for two major reasons:

- First, averaging the contributions masks the uncertainty of the contributions. Ask just about any plan sponsor, and they will tell you that they’d rather have certain contributions than uncertain ones, all else being equal, which illustrates that uncertainty has an implicit (though difficult to measure) cost. Averaging the contributions in each year hides that cost.
- Second, contribution spikes tend to occur when market performance and the economy are suffering. For most plan sponsors, this means contributing when they can least afford to do so. Again, this has an implicit (though difficult to measure) cost. Again, probability-weighted averages hide that cost.

Since we have established that a simple probability-weighted average of the future contributions doesn’t fully value their risk, now we will explore what could be done if the sponsor asks a harder question: What is the *risk-adjusted*, probability-weighted expected value of future contributions? In essence, the sponsor wants to know the risk-adjusted price of the plan.

Method 5: Cash Contributions (Take 3: Really Advanced Version)

Now we seek to risk-adjust the discounted future contributions. In calculating a present value of future contributions, can the discount rate be used to incorporate the risk adjustment? This question could be asked for a simple deterministic contribution projection, or it could be a further advancement applied to the prior method that uses probability-weighted expected contributions from a Monte Carlo simulation, attempting to incorporate a fair adjustment for risk. There are many different choices for the discount rate, but each has its own set of problems:

- Risk free rate: It is only appropriate for discounting risk-free cash flows, and we've already established that pension contribution levels are very uncertain.
- Sponsor's borrowing rate: Similar to the risk free rate, it is only appropriate for payments with timing, seniority, certainty, and other terms specific to the borrowing facility—pension contributions in a particular year have so much uncertainty that this is not appropriate.
- Sponsor's cost of capital: Like the two prior options, this has the flaw that the pension contributions do not have the same risk and return prospects as other uses of the sponsor's capital.
- The expected return on plan assets (unadjusted for risk): This is the worst of the bunch because it creates multiple layers of hiding risk: asset allocations with higher risk and higher expected returns will produce lower expected future contributions, and those contributions would be discounted at a higher rate. So if the goal is to create a reasonable method for computing the risk-adjusted present value of future contributions, this method fails miserably.

Certainly this isn't an exhaustive list of all possible ways to risk-adjust the results of a Monte Carlo simulation. There are too many possible methods to detail, but they tend to have very similar problems. Simplistic methods for using contributions to measure pension costs are both flawed and impractical, and the actuarial profession must move beyond such methods.

Can we find a mathematical mechanism to adjust for the risk? Maybe, but the challenge is to make sure that it is not arbitrarily chosen. That is, how would we know that the mechanism adjusts for the "fair" value of the risk—not too much and not too little? For example, using the mean contribution level, adjusted by some mathematical factor based on the standard deviation of contributions could be such a mechanism. But the mathematical factor would be based on what someone "felt" was an appropriate risk adjustment. Is an arbitrarily chosen mechanism more dangerous than no mechanism at all if the risk adjustment gives a false sense of comfort?

Moving Forward

With so many pitfalls, where does this leave us in our question about using contributions as a measure of the long-term cost of a pension plan?

Although I think that measuring plan costs based on contribution levels is not necessarily wrong—in many situations it is the most conceptually appealing method—it is important to realize that this method has a tremendous number of nuances and traps, making it an actuarial minefield.

There are many other ways to measure plan costs—readers may already be thinking of some! While this article doesn't advocate for one particular solution, I will suggest some principles that a robust cost-measurement system should incorporate:

- Pricing of pension costs is important in understanding the funded status and the labor costs.
- Pricing must not be based on median or average costs levels. Risk must be incorporated.
- Risk adjustments must be based on an objective methodology with economic substance, as arbitrary mathematical adjustments are whimsical.

Conclusion

This article originally noted that many people like using contributions as a measure of plan costs because of practical appeal. But now that we've seen how many potential problems there are for measuring plan costs based on contributions, maybe this method isn't so practical after all. The actuarial profession must either address these issues when using contributions as the basis for a measure of plan costs or revert to a different method for answering the simple question: "What is the cost of a pension plan?"

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NOTES

¹ One good example of the self-critique is the handout to the FASB meeting handout "Accounting for Pensions and Postretirement Benefits other than Pensions" on Nov. 10, 2005, which is posted online at http://www.fasb.org/board_handouts/11-10-05.pdf.

² I have seen the criticism of "pricing" in several places, and I will cite one as an example: Mindlin, Dmitry. "Windmill Fighters in Potemkin Villages." *Contingencies*. January/February 2007.

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