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Managing contribution volatility in a well-funded pension plan

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Introduction

After several years of healthy investment returns, some plan sponsors are finding that their pension plans have reached or are approaching a 100% funded status. While having a fully funded plan is a great place to be, it does come with its own challenge—namely, the risk of significant contribution volatility. Having a contribution that varies considerably and unpredictably from one year to the next is especially unappealing for public plans and municipal budgets.

This article explores the sources of contribution volatility and provides some approaches to managing it, specifically in the context of a well-funded plan.

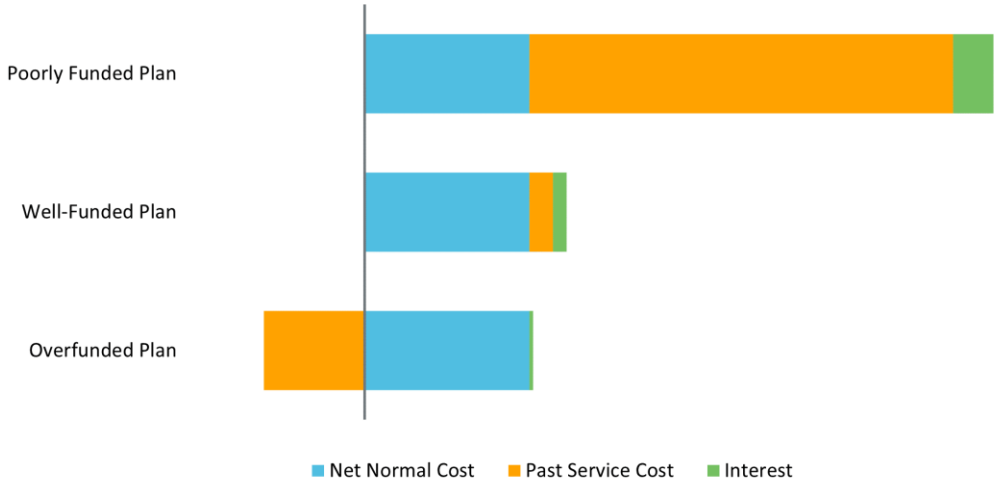
Some public plans use a fixed contribution rate, so their contributions are only impacted by changes in the plan's liabilities or investments to the extent they periodically adjust the contribution rate. This article focuses on plans that base their funding on an actuarially determined contribution (ADC), not a fixed contribution rate. It does provide plan sponsors of fixed contribution rate plans with some alternatives to consider if they wish to move to a more responsive funding model based on actuarially based funding concepts while minimizing contribution volatility.

Contribution calculation basics

Before we dive into our discussion of contribution volatility and mitigation measures, let's look at the basics of how the ADC is typically calculated. The ADC usually consists of three pieces: a normal cost to cover the value of benefits expected to be earned during the year by the employees who are covered by the plan, plus a past service cost to systematically pay off any unfunded accrued liability, plus a timing adjustment to account for when the contribution is made relative to the valuation date.

Figure 1 lays out the pieces of the ADC for three sample plans. The three plans are identical in all respects, except that one plan is poorly funded, one plan is slightly less than 100% funded, and one plan is overfunded. The net normal cost (in blue) is the same for all three plans, while the past service cost (in orange) varies significantly based on the funded level of each plan. For the poorly funded plan, the past service cost is by far the largest portion of the contribution. For the well-funded plan, the past service cost is a small part of the contribution. And for the overfunded plan, the past service cost is negative and actually offsets part of the normal cost.

FIGURE 1: ACTUARIALLY DETERMINED CONTRIBUTIONS FOR THREE SAMPLE PLANS



Sources of contribution volatility

Now that we have laid out the mechanics of how the contribution is calculated, let's examine why the contribution might change significantly from one year to the next. Pension contributions are driven by the size of the plan's underlying liabilities and assets. Whenever either of these items changes unexpectedly, the ADC may also change significantly.

Plan liabilities are calculated using a number of demographic and economic assumptions. Expectations about future turnover and retirement patterns, member longevity, disability rates, pay increases, and cost of living adjustments are just some of the assumptions that actuaries use when calculating a plan's liability. Any time actual plan experience varies from what was predicted by the assumptions, the result is that the liability is higher than expected (an "actuarial loss") or lower than expected (an "actuarial gain"). For example, having a large number of retirements or higher-than-expected cost-of-living adjustments (COLAs) can result in a substantial liability increase. And as plan experience and economic conditions unfold over time, actuaries periodically adjust their assumptions about the future. These assumption changes can result in swings in the liability. For example, over the past few years many plan sponsors have seen liability increases as a result of reductions in the interest rate assumption and the adoption of updated mortality tables.

While plan liabilities can change from one year to the next in response to actuarial gains or losses or changes in the actuarial assumptions, plan assets are a much bigger source of contribution volatility. As investors know, it is not unheard of for assets to return +30% or -20% in single year. And while we expect these swings to even out over the long term, and most plans use some sort of asset smoothing technique to dampen this volatility, a large asset loss will still result in an unexpected increase in the contribution amount. And that increase will be more significant for a well-funded or overfunded plan. A plan with more assets is exposed to more investment risk; the same *percentage* loss results in a higher *dollar* loss than for a plan with fewer assets.

Figure 2 looks at the impact on the ADC of a 10% decrease in the actuarial value of assets for both a poorly funded plan and an overfunded plan. As you would expect, the result for both plans is an increase in the ADC. The asset loss makes the poorly funded plan slightly *more* underfunded, so the past service cost and the ADC increase modestly. The overfunded plan, meanwhile, drops from 111% funded to 100% funded; this means the plan no longer has a negative past service cost to offset part of the normal cost and the contribution more than doubles! A plan that is funded somewhere in between these two plans might also see a significant increase in the ADC—perhaps 50% to 100%.

FIGURE 2: CONTRIBUTION CALCULATIONS BEFORE AND AFTER A 10% DECREASE IN THE ASSETS

		POORLY FUNDED PLAN		OVERFUNDED PLAN	
		YEAR 1	YEAR 2	YEAR 1	YEAR 2
1	Accrued Liability	$360,000,000	$360,000,000	$360,000,000	$360,000,000
2	Actuarial Value of Assets	190,000,000	171,000,000	400,000,000	360,000,000
3	Unfunded Accrued Liability: (1) - (2)	170,000,000	189,000,000	(40,000,000)	0
4	Funded Ratio: (2) / (1)	53%	48%	111%	100%
5	Past Service Cost: (3) amortized over 20 yrs	12,600,000	14,000,000	(3,000,000)	0
6	Net Normal Cost:	4,900,000	4,900,000	4,900,000	4,900,000
7	Interest on (5) + (6) to start of FY	1,200,000	1,300,000	100,000	300,000
8	ADC: (5) + (6) + (7)	18,700,000	20,200,000	2,000,000	5,200,000
	Increase in Contribution		8%		160%
			1,500,000		3,200,000

Based on a 6.7% interest rate and a 2.0% amortization growth rate

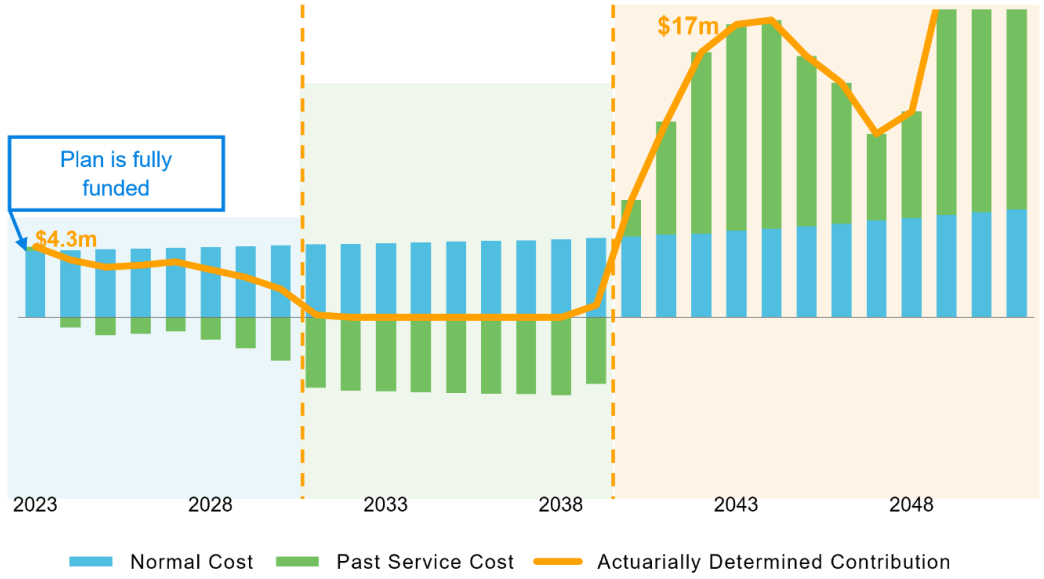
As this example illustrates, a modest amount of investment volatility can result in an overfunded plan experiencing significant changes in the contribution amount from one year to the next.

Managing contribution volatility

Of course, volatility is not a new challenge for plan sponsors, and there are several common funding policy features that are used to manage it. For example, investing the plan's assets in a diverse set of asset classes with varying levels of risk and return serves to dampen market volatility. In addition, smoothing asset returns so that investment gains or losses are recognized over multiple years can further reduce the impact of market swings on the annual contributions. The way the past service cost is calculated as a payment toward the unfunded accrued liability also acts to smooth out the impact of any increases, because they are paid off over a number of years rather than all at once.

So a typical plan already has some tools in place to reduce contribution volatility. Let's look at how successful those strategies are when we project future contributions under realistically volatile market conditions over a multi-decade time horizon. Figure 3 illustrates how a typical fully funded plan might fare over the next 25 years with some hypothetical market ups and downs. At the beginning of the period, the plan is 100% funded, and the ADC consists just of a net normal cost of $4.3 million. In the blue-shaded area of the next seven years, investment returns are generally good and the plan becomes slightly overfunded. The resulting negative past service costs offset some of the normal costs, so the ADC slowly declines. In the green-shaded years that follow, one year of super returns produces a surplus so big that the ADC is completely eliminated for the better part of a decade. Then, in the final orange-shaded years, poor returns drive the plan to an underfunded position, the past service cost grows significantly, and the ADC jumps to $17 million. Just think of how markets performed in the 1990s followed by the dot-com bubble bursting and in the 2008 global financial crisis, and you can see that the scenario illustrated in Figure 3 is not far-fetched!

FIGURE 3: IMPACT ON CONTRIBUTIONS WITH TRADITIONAL FUNDING POLICY



Based on a 6.25% interest rate, 6.25% amortization growth rate, 5-year asset smoothing, and a 20-year closed amortization period, with a shift to 10-year layered bases once the period reaches 10 years.

As the solid orange line in Figure 3 shows, the ADC is quite volatile over this 25-year period. Fortunately, there are some new approaches that can help plan sponsors manage this undesirable situation.

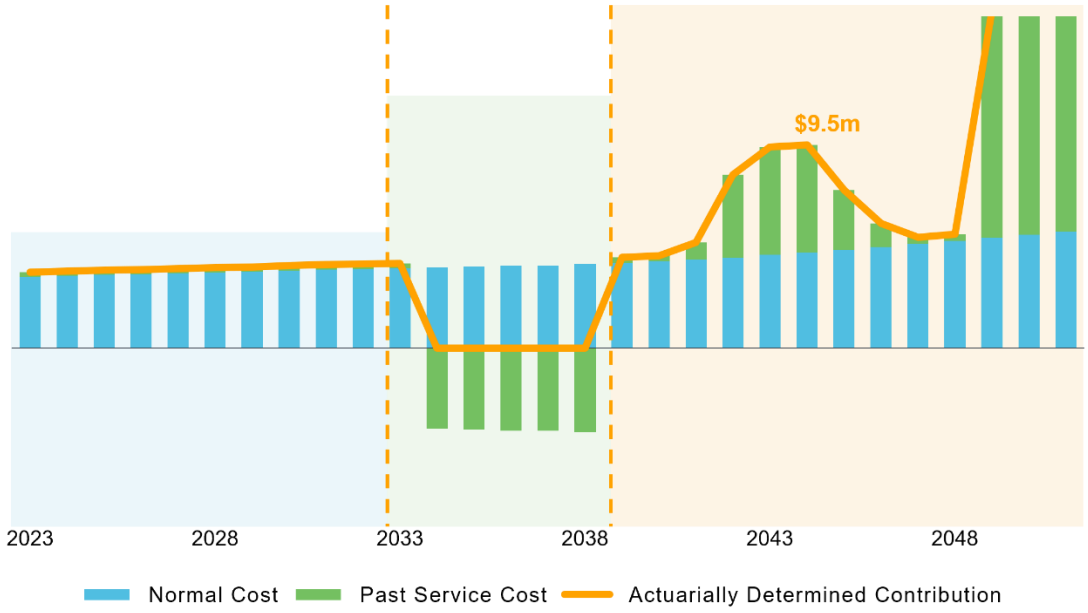
APPROACH #1: BUILD UP A FUNDING CUSHION

One tactic is to continue to pay the full normal cost even if the plan becomes modestly overfunded. In this approach, the plan sponsor agrees to only take a contribution "holiday" once the funded ratio reaches a specified threshold, such as 110% or 125%. In this way, the sponsor deliberately uses investment gains in good times to build up a surplus, which provides a cushion against market downturns. Note that it is important to clearly communicate the rationale behind this approach to the various stakeholders, in order to avoid pressure to decrease contributions or improve benefits when the plan is overfunded.

Let's look at how this change in the funding policy would impact the contribution pattern we illustrated in Figure 3. Figure 4 shows the plan's contributions over the same 25-year period with the same investment ups and downs, but this time the full normal cost is contributed until the plan is 125% funded or better. So, in the blue-shaded years, when the plan is slightly overfunded, the plan sponsor continues to pay the full net normal cost, with no offset due to the funding surplus. In the green-shaded years, the plan reaches the 125% funded threshold, so the surplus can be used to offset the net normal cost, just like in Figure 3. And when the market losses hit in the orange-shaded years, the plan falls below 100% funded as it did before, but this time the underfunding and resulting contributions are much smaller. The cushion that was built up in the early years essentially gets used up in these later years, which makes the plan sponsor's cost less volatile over the 25-year period than it was in Figure 3.

One way to measure volatility is to calculate the standard deviation of the annual contributions. A lower standard deviation means less volatility. The standard deviation of the contributions in Figure 3 is 8.1, while the standard deviation with the funding cushion in Figure 4 is 5.7—clearly, building up a funding cushion resulted in a smoother contribution stream!

FIGURE 4: IMPACT ON CONTRIBUTIONS WITH 125% FUNDING TARGET



APPROACH #2: RISK-BASED FUNDING POLICY[1]

Another approach for managing contribution volatility is to base the funding policy on the plan's risk level. A risk-based funding policy is a more sophisticated variation on the funding cushion mechanism presented above. With this type of policy, the plan's accrued liability and net normal cost are increased (or "loaded") based on a range of plan-specific factors. A partial list of risk factors appears in Figure 5. The plan is assigned a "riskiness score" based on the presence and magnitude of these factors. A higher riskiness score (meaning the presence of multiple "risky" plan factors) results in a higher load on the accrued liability and the net normal cost, and therefore a higher ADC. This causes a deliberate accumulation of assets in anticipation of adverse consequences down the road arising from the risky plan factors. If and when risky plan factors cause big changes to the plan's assets or liabilities, there is a funding cushion in place to act as a shock absorber.

FIGURE 5: RISK FACTORS

Investment Considerations	Portfolio volatility Portfolio liquidity Presence / absence of a well-defined investment policy
Plan Benefits / Features	Pay basis: frozen / career / final; base pay only vs. other items included Subsidized forms of annuities; non-level benefits; lump sum options Subsidized early retirement Disability: high rate / subsidized benefits / low bar to qualifying Cost-of-living feature
Plan Sponsor Actions	History of contributions relative to ADC Best practices: annual valuations, experience studies, audits

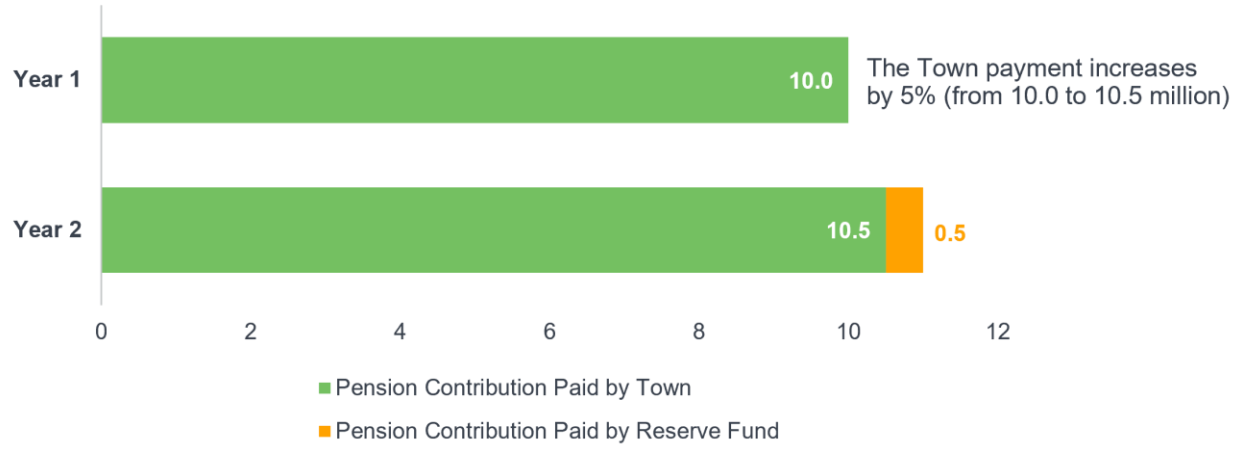
[1] Winningham, B., Boyles, M., Shapiro, A., & Kent, D. (January 12, 2022). Risk-Based Funding Policy. Retrieved July 17, 2022, from https://www.nirsonline.org/wp-content/uploads/2022/03/Risk-Based-Funding-Policy.pdf.

APPROACH #3: A PENSION RESERVE FUND

Another tactic to consider is establishing a pension reserve fund. The reserve fund would be drawn upon in situations where the year-over-year contribution increase exceeds a predetermined threshold, such as 5%. Should this occur, the operating budget would pay the first 5% of the contribution increase and the reserve fund would pay the remainder. This provides the operating budget with more stability and predictability. The reserve fund can also be replenished when market returns are strong. For example, if the ADC goes down from one year to the next, the plan sponsor could budget a contribution equal to the prior year's ADC and deposit the excess to the reserve fund. The parameters around the reserve fund can be further refined to define when the reserve fund no longer needs to be replenished, and even when funds might be withdrawn from the fund for something other than pension contributions. Note that the reserve fund is a general fund, not a pension asset, and as such may be subject to certain restrictions such as the extent to which it can be invested in equities. Such restrictions might mean that the reserve fund monies earn less than if they were held within a pension trust, but because the goal of the reserve is to hedge against the consequences of investment risk, a more conservative asset allocation is in line with the objective.

Figure 6 shows a numerical example of how a reserve fund mechanism with a 5% threshold might work. In this example, the ADC increases from $10 million to $11 million—a 10% increase. The increase in the plan sponsor's budgeted contribution is capped at 5% (or $0.5 million in this case), so the general fund pays $10.5 million of the ADC, while the reserve fund covers the remaining $0.5 million.

FIGURE 6: RESERVE FUND ILLUSTRATION



APPROACH #4: CONTRIBUTION SMOOTHING

The last approach to consider is contribution smoothing. This is a more sophisticated take on using a fixed contribution rate. While a fixed contribution rate certainly eliminates volatility, it is a departure from the actuarial concepts underlying the calculation of an ADC. As a result, fixed annual contributions may not be sufficient to bring the plan to a fully funded status within a reasonable period of time. With contribution smoothing, a plan sponsor moves its annual contribution gradually in the direction of the ADC over a set period of years. Five-year contribution smoothing, for example, would mean that the contribution moves 20% of the way from last year's actual contribution to this year's ADC. The sponsor could place additional conditions on the smoothing; for instance, the contribution could decrease only if the funded ratio exceeds a certain threshold like 120%, thereby building up a cushion in good times similar to approach #1. Another variation on this method would be to have a fixed contribution rate only when the plan is fairly well funded. If the plan's funded ratio falls below some predetermined threshold such as 90%, the plan would switch from fixed contributions to paying the ADC.

EVALUATING THE OPTIONS

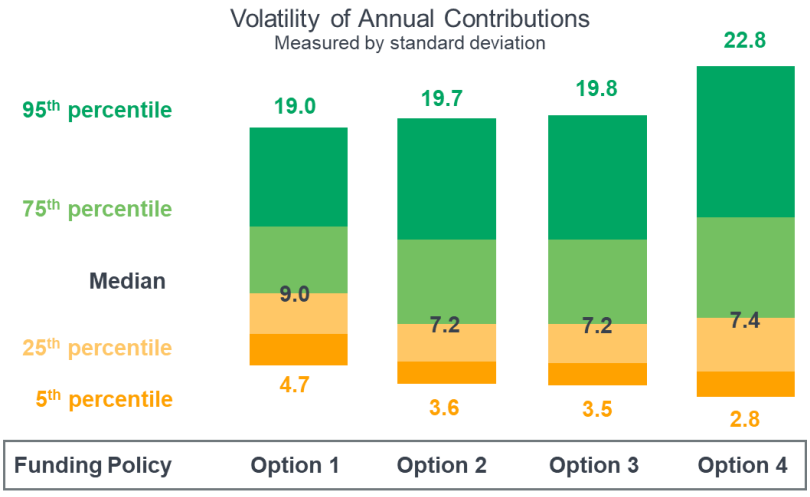
We've laid out several techniques that can help to manage contribution volatility. How should a plan sponsor evaluate which approach would be best for its plan? We recommend running long-range forecasts under a wide variety of investment scenarios (termed "stochastic analysis"). A stochastic projection model runs thousands of randomly generated investment return scenarios for the next 20 to 30 years and calculates the plan's assets, liabilities, cash flows, and key metrics across all of the scenarios. The model can simultaneously explore the financial outcomes for several different funding policies. Running such projections gives plan sponsors quantitative answers to such questions as:

- What is the highest/lowest/average annual contribution across the projection period?
- How volatile are the contributions (e.g., standard deviation)?
- What is the net present value of all of the contributions during the projection period?
- What is the funded ratio at the end of the projection period?
- How many times does the contribution increase by more than x%?
- How many times does the contribution go down?
- How often is the reserve fund depleted before the end of the projection period?
- How many years is the contribution lower with Funding Policy B compared to the current funding policy?

Having the answers to questions such as these provides the plan sponsor with a wealth of data and a sound basis on which to base its funding policy decisions.

Figure 7 illustrates what kind of output the model can provide. The graph shows the standard deviation of the annual contributions across 10,000 scenarios using four possible funding policy options. The median result, the result in the middle off all the outcomes, appears in bold font. Other key percentiles are shown as well. A percentile represents the point that falls above that percentage of outcomes. For example, a 95th percentile of 19 means 95% of the scenarios had a standard deviation less than 19. In the example below, we can see that Option 1 has the highest median volatility, but the smallest range of volatility outcomes. Option 4 has a median that is higher than Option 2 and 3 and the biggest range of outcomes, so it is least attractive. Graphing the key metrics of the model outcomes across various funding policy options in this manner is instrumental in evaluating which option is best suited for a particular plan and particular objective.

FIGURE 7: SAMPLE STOCHASTIC MODEL OUTPUT



Conclusion

Contribution volatility is one of the biggest challenges facing municipal pension plan sponsors. Even when a pension plan approaches or reaches 100% funding, the issue of volatile contribution requirements remains, and in fact becomes more significant. There are changes plan sponsors can make to their funding policy that can help to mitigate that volatility. Sponsors should be thoughtful about what impact these changes will have and what the trade-offs to the changes may be. A stochastic analysis provides the data necessary to evaluate the various options.

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