

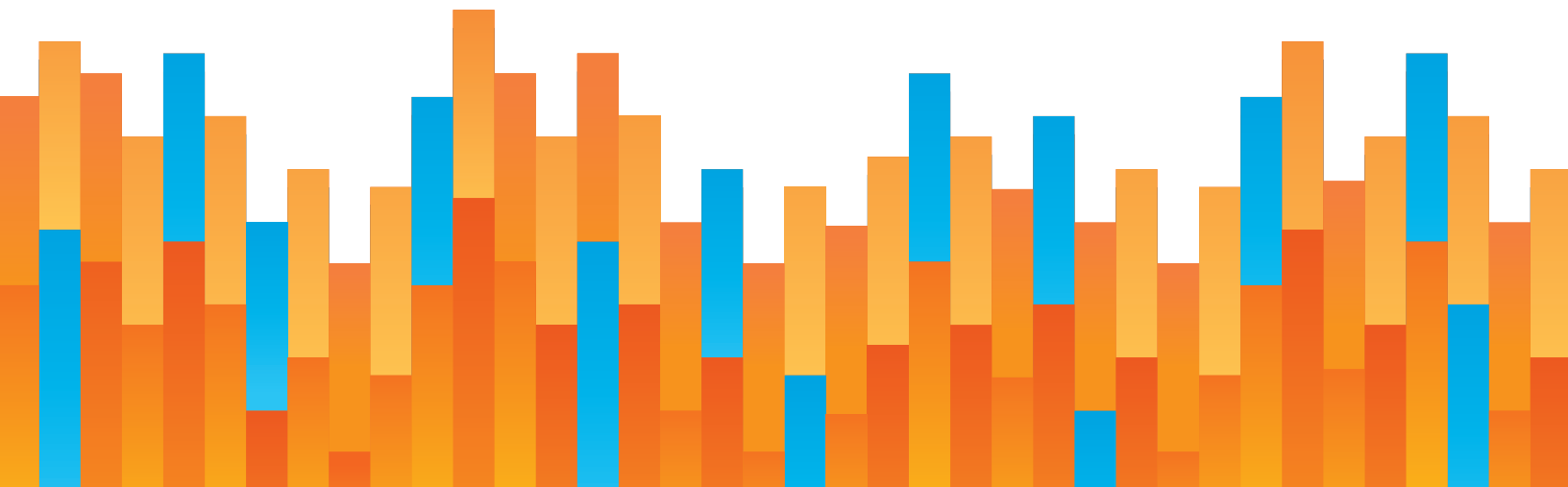


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THE IMPACT OF CASH FLOW ON PUBLIC PENSIONS

by Truong Bui

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PART 1

INTRODUCTION

The defined benefit (DB) pension plans governments use across the U.S. today rely on combining *contributions today* from members and the state with *long-term investment returns*. This is because they are intended to be prefunded, which ensures that retiree pension expenses are covered fully over the long run. Prefunding benefits this way allows more benefit payments to flow out of the plan than contributions are flowing in without compromising the integrity or solvency of the system. Analyzing a system's cash flow—the rates at which money is entering and leaving the fund—is one way to anticipate imbalances in pension plans that must be fixed to ensure long-term solvency.

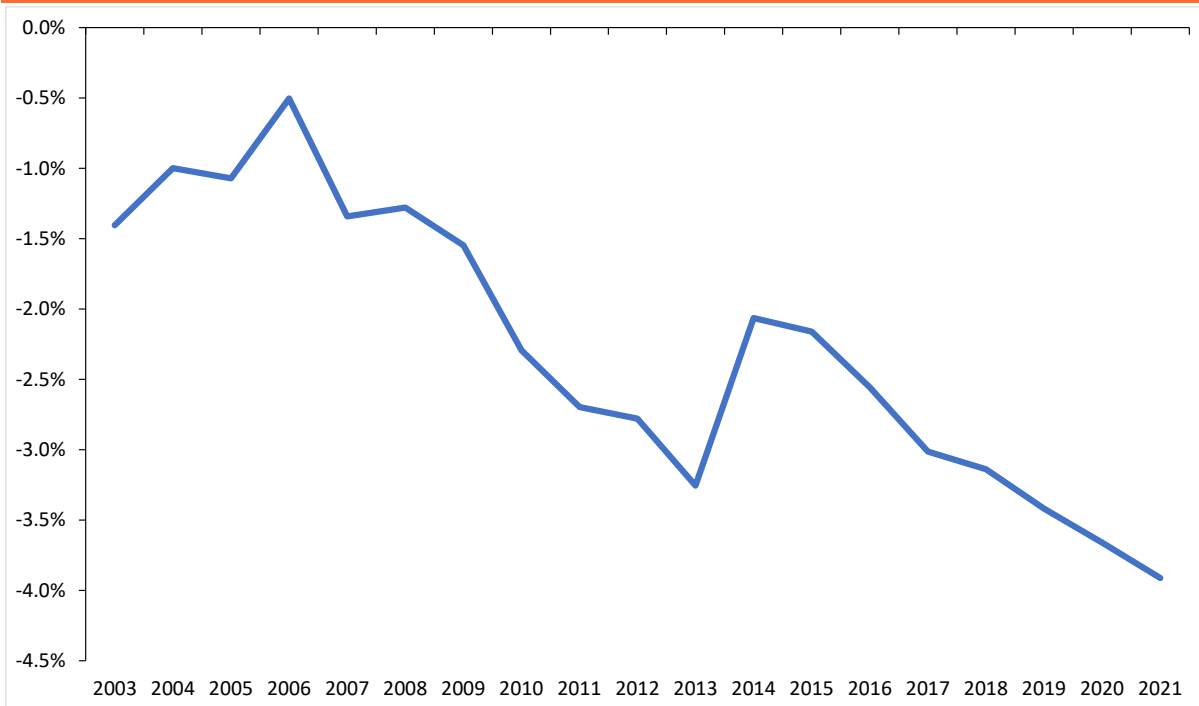
This brief uses the Montana Public Employee Retirement System (PERS) as a case study to illustrate the principles and importance of conducting a cash flow analysis of pension plans.

PART 2

WHAT IS A CASH FLOW ANALYSIS?

A cash flow analysis examines a pension plan's operating cash flow—which is the difference between a pension plan's expenses and contributions, excluding investment returns—and how it affects the plan's market value of assets. The market value of assets (MVA) is a real-time estimation of the pension plan's asset value. A negative operating cash flow means a retirement system has to pay out more in benefits and refunds than it receives in total contributions from taxpayers and members in a given year. This imbalance erodes the value of the asset every year and thus requires a certain level of investment returns to keep the plan's assets from declining. Figure 1 shows the operating cash flow of an example plan, Montana Public Employee Retirement System (PERS), as a percentage of its market value of assets (MVA) since 2003.

FIGURE 1: MONTANA PERS—OPERATING CASH FLOW AS A PERCENTAGE OF MARKET VALUE OF ASSETS



Source: Author's calculations using Montana PERS ACFR and valuation reports

The ratio is calculated by dividing the operating cash flow in each period by the MVA at the beginning of the period. As this analysis reveals, PERS' operating cash flow as a percentage of its MVA has steadily decreased over the last 15 years, standing at -3.91% for the fiscal year 2021.

A negative and declining operating cash flow does not necessarily indicate something is wrong with a plan's management. Because defined benefit (DB) pension plans are prefunded by design, they tend to accumulate positive cash flow in the early decades after their initial launch and eventually, as the plan matures, reverse that cash flow as it pays out more in benefits than it receives in contributions.

Additionally, given identical maturity, a plan with a higher operating cash flow ratio (expenses are relatively less than contributions) *is not necessarily better off* than a plan with a lower ratio (expenses are relatively higher than contributions). This is because a fully funded plan would not require debt payments (i.e., less contribution inflows) and thus could potentially have a *lower* operating cash flow ratio than a poorly funded plan that receives high amortization payments. When modeled by the Pension Integrity Project, the Montana

PERS operating cash flow ratio would be -4.6% (in contrast to the current -3.91%) if the plan were fully funded and not making annual amortization payments.



In short, assessing pension cash flows is complex and does not reduce to a simple rule that says that the greater the negative cash flows, the worse the health of the pension system.



In short, assessing pension cash flows is complex and does not reduce to a simple rule that says that the greater the negative cash flows, the worse the health of the pension system. That said, a mature plan that aims to continue providing pension benefits in perpetuity is prone to some unique risks with negative operating cash flow.

PART 3

ANALYZING THE RISK OF PENSION PLAN INSOLVENCY THROUGH ASSET DEPLETION

For an ongoing DB plan (not closed to new members) that must continue to pay out, a negative operating cash flow suggests that the plan needs to receive sufficient investment revenue to keep its assets from decreasing and eventually depleting. The investment income must attain a certain rate of return to offset the negative operating cash flow for that year. The operating cash flow ratio provides a good approximation of the minimum required rate of return to ensure that a plan's assets remain steady.¹ For example, the -3.91% ratio for Montana PERS in FY2021 implies that the plan needed to earn at least 3.91% in investment return in 2021, which, when added to the contributions, will maintain the plan's current asset balance.²

¹ It's only an approximation because it doesn't take into account investment returns on mid-year cash flows.

² It should be noted that maintaining assets year over year is not the ultimate goal of a pension plan. It's only the *minimum* standard over the long run so that the fund will not be depleted.

Notably, the operating cash flow ratio is not a fixed number over time, therefore, the minimum return required to balance assets is dynamic over time. As the plan matures, the ratio may steadily become lower.

Besides a plan's maturity, its cash flow ratio is also affected by investment performance, benefit/plan design changes, and funding policy. Investment shortfalls erode assets and drive down the cash flow ratio if the ratio is negative and increase this ratio if it is positive.

Quantifying the risk of insolvency (or asset depletion) is possible if certain assumptions about the plan's investment returns and funding policy are made, such as assuming the investment rate of return will stay constant over time. Table 1 shows the annualized rates of return that would deplete Montana PERS assets over three different time frames.



For an ongoing DB plan (not closed to new members) that must continue to pay out, a negative operating cash flow suggests that the plan needs to receive sufficient investment revenue to keep its assets from decreasing and eventually depleting.



Under a fixed statutory contribution policy where contribution rates remain fixed at current levels (as a percentage of payroll) and do not respond to investment performance over time, Montana PERS would become insolvent after 10 years with a constant -13.9% annualized rate of return, after 20 years with a 0.3% annualized rate of return, and after 30 years with a 4.2% annualized rate of return.

Under the actuarially determined contribution (ADC) policy, where the contribution rate is calculated to amortize each new unfunded liability over 30 years and thus is responsive to investment performance, the plan's assets technically would never be depleted as long as amortization payments are fully paid. This is because the required amortization payments—resulting from severe underfunding—would be so large that the operating cash flow would turn *positive*.

Assuming that very large amortization payments will always get paid, however, is not very realistic. To create more realistic scenarios, we cap the employer contribution rate at 18% to see how low returns have to be to make the plan insolvent. Table 1 shows that the plan would be insolvent in 30 years with a constant annualized return of 1.2% under the ADC policy with the 18% cap.

TABLE 1: MONTANA PERS ASSET DEPLETION HORIZON

		Threshold Annual Returns	
		Fixed Statutory Rate	ADC Rate + 30 yr. Amo + 18% Cap on ER Rate
Asset Depletion Horizon	10 years	-13.9%	-20.5%
	20 years	0.3%	-3.8%
	30 years	4.2%	1.2%

The previous analysis relies on constant annual returns to provide an intuitive understanding of insolvency risk for a pension plan. In reality, investment returns are volatile, not constant. To incorporate this volatile nature of investment returns, we use stochastic modeling to estimate the probabilities of insolvency under two different return settings: Plan's Return Assumptions and Conservative Return Assumptions. Under the Plan's Return Assumptions setting, we used the plan's own assumptions regarding risk (portfolio return volatility) and expected returns. Under the Conservative Return Assumptions setting, we use the capital assumptions provided by four financial firms: JPMorgan, BNY Mellon, BlackRock, and Research Affiliates.³

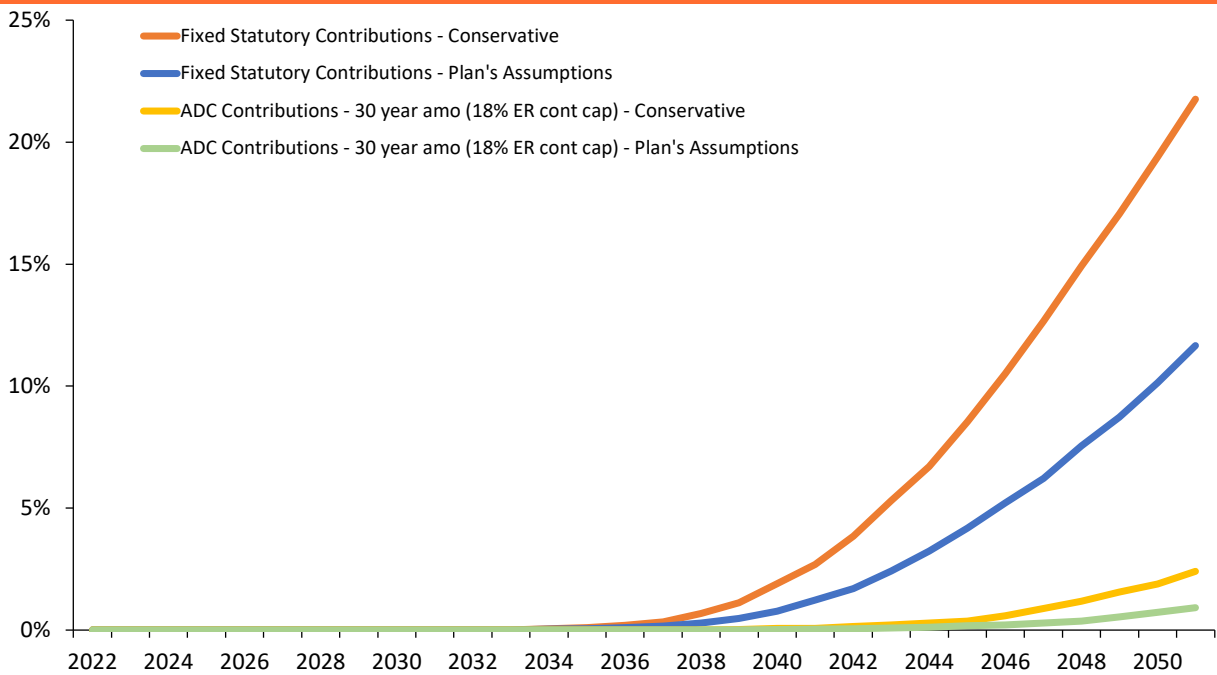
Figure 2 compares the asset depletion probabilities of the plan—using both the plan's return assumptions and more conservative ones—under two contribution policies: a fixed statutory rate and an ADC rate with an 18% cap on employer contribution. Using the plan's

³ These assumptions are called "conservative" because the average expected return based on these firms' assumptions is lower than Montana PERS's assumed rate of return.

own assumptions, the fixed statutory contribution policy’s chances of asset depletion in 30 years are as high as 11%. The insolvency risk for the ADC contribution policy, however, is much lower: only about 1% chance of it happening in any year up to 2051. Using the more conservative assumptions, the risk of insolvency in 30 years for the fixed statutory contribution policy basically doubles (22% chance), and the risk for the ADC rate + 18% contribution cap policy increases to around 2%-3% over the same period.

These probabilities mirror the results of our previous analysis using constant returns and show that a responsive funding policy (as opposed to a fixed statutory funding policy) makes the plan more resilient to insolvency risk.

FIGURE 2: MONTANA PERS – PROBABILITY OF INSOLVENCY IN ANY YEAR UP TO A GIVEN YEAR



Source: Author’s calculations using Montana PERS ACFR and valuation reports

PART 4

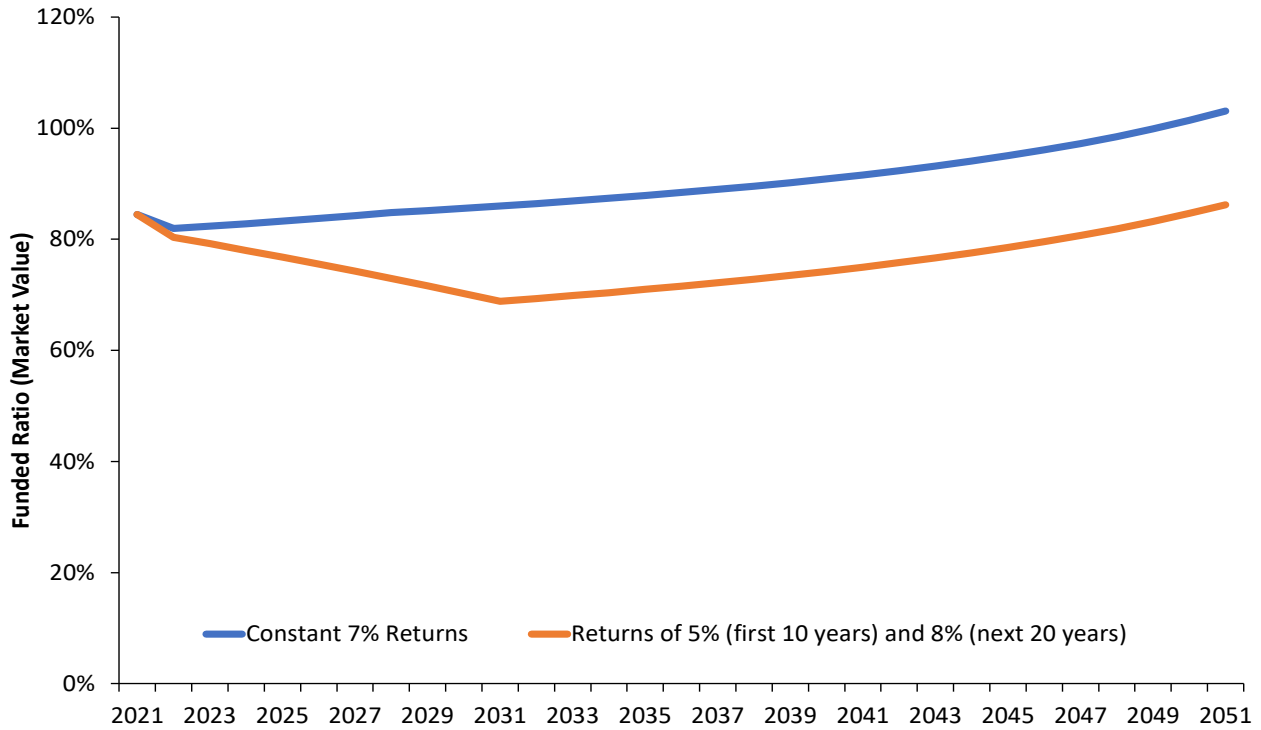
CASH FLOW DEMANDS FROM PLAN'S MATURITY PUTS PRESSURE ON REQUIRED RETURNS

In addition to insolvency risk, a mature plan with negative cash flows like Montana PERS also needs to be concerned with the impact of a near-term shortfall in investment performance on the long-term return target.

A simple example illustrates this problem. Suppose the average annual return over the next 10 years is 5%. To achieve a target average return of 7% in 30 years, the plan must make up for the shortfall in the first 10 years by earning an average annual return of 8% from year 11 to year 30.

To keep the problem simple for illustrative purposes, it assumes that policymakers will choose to maintain current contribution rates at a fixed level (i.e., that they adopt the “fixed statutory rate” contribution policy described earlier, where contributions do not respond to asset shortfalls). Figure 3 shows the funding outcomes under the two return scenarios.

FIGURE 3: FUNDED RATIO UNDER TWO DIFFERENT RETURN PATHS



Source: Author’s calculations using Montana PERS ACFR and valuation reports

Even though the “constant 7%” scenario and the “5% first 10 years, 8% next 20 years” scenario produce the same average rate of return (7%) over the full 30-year period, they would lead to two quite different outcomes for the plan. Under the “constant 7%” return scenario, Montana PERS would be fully funded after 30 years (assuming other actuarial assumptions are perfectly realized). Under the other scenario, however, the funded ratio is projected to reach about 86% only.

This discrepancy is due to the fact that the negative cash flow is steadily reducing the asset base that investment returns are earned from. Therefore, early investment returns have more impact than returns earned later. Another way to put this is that because the plan is so mature and paying out large benefits, a significant portion of its current assets won’t be around in the longer term to earn the extra returns to offset the subpar performance in the early years.

This is one important reason why—even granting that long-term returns are expected to be higher than short-/medium-term returns⁴—a mature pension plan should consider its cash flow demands in the context of its return assumption and give more weight to the lower short-/medium-term expected returns in the process. That is, a case could be made that mature plans may need to adjust their return assumptions according to mid-term rather than long-term return projections to match the shorter nature of cash flow demands.

⁴ Many forecasters believe that long-term expected returns (over the next 20-30 years) will revert back to the higher historical long-term average. Such long-term predictions however are highly uncertain, there have been some fundamental global financial market shifts since 2000, and there's no guarantee that history will repeat itself.

PART 5

CONCLUSION

Having negative operating cash flow does not necessarily indicate an inherent problem with mature pension plans. However, it can reveal certain risks that should be properly managed. Adopting a funding policy that is responsive to unfunded liabilities would minimize insolvency risk, and using a more conservative return assumption—particularly one that is aligned with short-term market expectations—would help plans better align return assumptions with funding targets.

ABOUT THE AUTHOR

Truong Bui is a managing director of the Pension Integrity Project.

Bui primarily works on the pension team's data and quantitative work and has contributed to numerous policy studies and data visualizations.

Prior to joining Reason, Bui was a financial analyst for Thien Viet Securities, a local investment bank in Vietnam, where he specialized in business valuation and investment memo preparation.

Bui graduated from RMIT University Vietnam with a bachelor's degree in commerce and received a Master of Business Administration, with an emphasis in finance, from the Drucker School of Management at Claremont Graduate University.

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