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WHITE PAPER

PUBLIC PENSION RISK SERIES

THE IMPACT OF INTEREST RATES AND INFLATION ON U.S. PUBLIC PENSIONS:

A CREDIT PERSPECTIVE

ABSTRACT

Understanding the risks to municipal credit quality posed by public sector commitments to retirees requires a dynamic analysis that considers how multiple economic and demographic factors will interact over the life of a bond issue. One key issue to analyze is the effect of prevailing and anticipated interest rate and inflation environments on pension funding – and assessing how changes in those conditions may impact pension risks in the future.

That analysis is particularly important now: The global economy has experienced a lengthy period characterized by low interest rates and low inflation. Fueled by recent economic stimulus measures and supply chain issues, inflation is picking up. Amidst uncertainty over whether the uptick in inflation is transitory or part of a longer-term trend, this paper examines the credit implications related to U.S. state and local government pensions[1] of different scenarios for interest rates and inflation.

To examine the low-interest environment, we look back at actual developments that occurred during the time period 2010 thru 2019 and then discuss their credit implications, assuming that the low interest rate environment continues for the foreseeable future. Broadly, across the universe of U.S. public sector pension plans, it's possible to identify three major trends that were driven by the extended low-interest rate environment during the time period:

- *Lower assumptions for future returns, increasing the actuarially determined contribution necessary to maintain or improve a plan's funded status.*
- *Higher market values for current assets, reducing the risk that pension or other post-employment benefit obligations will "crowd out" other municipal spending priorities, (including debt service).*
- *Increasing allocations to riskier investments, raising the risk of volatility in pension plan returns which can make returns less predictable, and add risk to a plan's budgetary requirements over time.*

To examine the credit implications of a higher-interest, higher-inflation scenario, we need to take a more theoretical perspective on possible trends to examine, because so much has changed in the U.S. public sector pension universe since the last period of moderate inflation, which ended more than 20 years ago[2]. Funding levels, plan demographics, asset allocations, and in many cases plan provisions have changed dramatically during that time. We will examine the impact of higher interest and higher inflation as though these trends are starting now, in today's public sector pension environment. Trends to be examined include[3]:

- *Potential impact on pension fund investment returns;*
- *Potential demographic impacts;*
- *Actuarial assumption changes and the impact on employer contribution requirements;*
- *Possible legislative reactions.*

Understanding these broad impacts is not a substitute for analysis at the individual credit level: One or more of the trends we will examine may not be present at any individual public sector retirement system, and the net impact of these trends on the risk profile of an issuer's retirement obligations can vary widely. In addition to explaining these trends and their potential implications for municipal credit quality, this paper will discuss BAM's approach to incorporating them into its overall credit analysis.

[1] This paper specifically does not include private sector pension plans, whose liabilities (both for plan funding and accounting) are directly linked to the interest rate environment. Furthermore, while the focus of this paper relates to pension plans, the same points made herein can also generally be applied to funded (not pay-as-you-go) other postemployment benefit plans.

[2] The last time the 10-year compound rate of inflation was above 3% was 1998, when it was 3.12%, according to Bureau of Labor Statistics CPI-U data (author's tabulations from data found here: https://data.bls.gov/data).

[3] This section draws from Record of Society of Actuaries 1979, Vol. 5 No.4

SCENARIO

1:

The Low Interest-Rate, Low Inflation Environment

Since the beginning of 2010, U.S. Treasury yields have been low, with 10-year yields averaging 2.4% (2.3% since 2015) and 30-year yields averaging 3.2% (2.8% since 2015)[4]. And during those ten years of persistently low interest rates, state and local pension plans in the U.S. experienced further declines in funding ratios (plan assets divided liabilities), indicating a need for increased employer contributions that, in turn, increase budget pressures and, potentially, credit risks.

BAM's pension and other postemployment benefit (OPEB)[5] risk analysis methodology includes both quantitative and qualitative aspects, and persistent low interest rates can affect both. For this paper, we:

- Assumed that observed trends since 2010[6], during a period of actual low interest rates, continue into the foreseeable future, and then
- Translated those trends into impacts on BAM's pension/OPEB risk analysis, by separately considering what might happen to plan liabilities, plan assets, plan contributions, and other more qualitative factors.

The limits of this approach should be noted: This paper is not attempting to make a prediction of future asset performance (and other trends), but is simply an exercise that projects forward trends of the period 2010 thru 2019. Notably, in addition to low interest rates, the U.S. economy in that decade was characterized by low inflation and steady growth without recession: Going forward, deviations from either of those factors could have a tremendous impact on future asset performance, and in turn, BAM's assessment of pension/OPEB risk.

[4] Author tabulations of daily U.S. 10- and 30-year Treasury yields for the periods of January 1, 2010 and January 1, 2015 thru December 31, 2019. Corporate and municipal bond yields typically correlate to Treasury yields, and so Treasuries are a reasonable indicator of the greater interest rate environment.

[5] OPEB usually refers to retiree health benefits, but can also include retiree life insurance and other benefits that are not pensions.

[6] Choosing the observation period 2010 thru 2019 has the dual advantage of being a period of demonstrably low interest rates and excluding both the stock market noise of the Great Recession of 2008-2009 and the market volatility (starting in February/March 2020) associated with the COVID-19 pandemic.

IMPLICATIONS OF PERSISTENT LOW INTEREST RATES

Persistent low interest rates correlate to various economic factors[7] that may have credit implications:

INCREASED CONSUMER SPENDING: A low interest rate environment correlates with lower interest rates charged on loans. When the cost of borrowing is lower, consumers in general are willing to spend more. More consumer spending means an increase in the demand for goods, which can help fuel increases in productivity and increase stock market prices.

SIMULTANEOUSLY LOW FEDERAL FUNDS RATE AND INFLATION: High demand for goods, driven by more consumer disposable income in a low interest rate environment, may cause inflation to tick upward. To keep inflation in check, the Fed may increase the federal funds rate, which is closely correlated to loan interest rates. A higher cost of borrowing means less disposable income, which slows down spending, decreases demand for goods, and in turn should control inflation. However, this can result in a negative impact on stock prices. If low interest rates are assumed to persist, it would suggest that rising inflation continues to not be a concern, and that the Fed keeps the federal funds rate low—thereby maintaining an environment for favorable stock market performance.

STABLE OR RISING U.S. STOCK AND BOND MARKETS: Already discussed above is that lower interest rates should correlate to increased stock market prices. Bond prices are inversely affected by changes in interest rates. When interest rates rise, demand for lower-yielding bonds drops, decreasing their prices. When rates fall, demand for higher-yielding bonds increases, causing their prices to rise. However, if low interest rates are assumed to persist, it creates an environment in which bond prices can at least remain steady.

Actual market performance over the period 2010 thru 2019 has borne out the theoretical assertions listed above, as shown in Figures 1-A (annual 2010-2019) and 1-B (cumulative to each year, beginning January 1, 2010)[8] below. ▼

Figure 1-A:

Annual Returns on Stocks and Bonds, and Annual Inflation
(2010 - 2019)

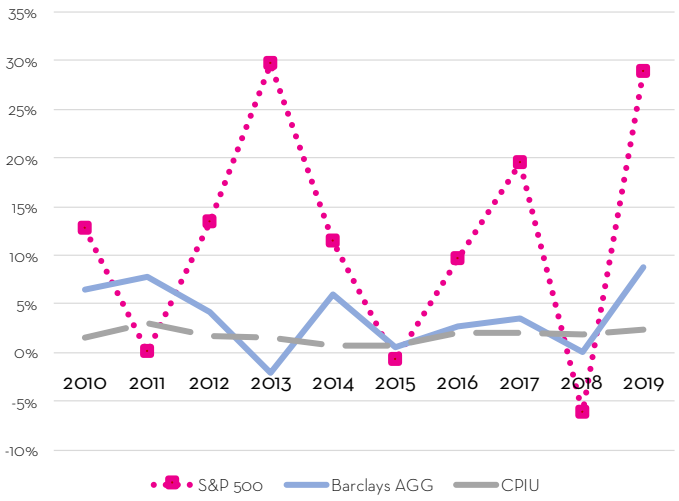
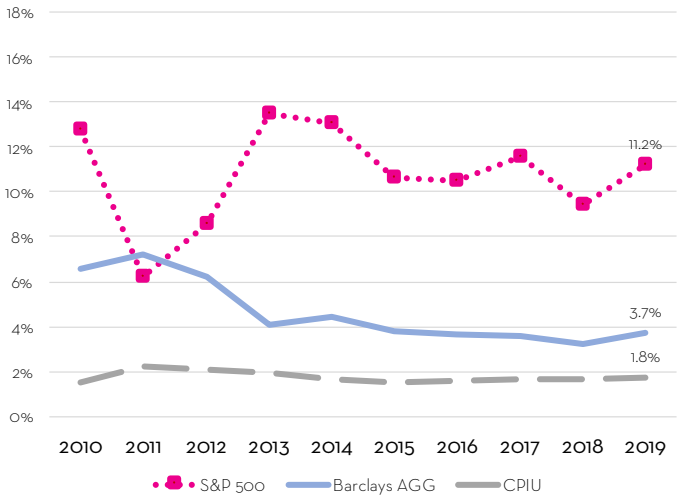


Figure 1-B:

Cumulative Annual Returns on Stocks and Bonds, and Inflation
(2010 - 2019)



Over the ten-year period beginning in 2010, S&P 500 stock market index has returned 11.2%, bonds (as represented by the Bloomberg Barclays US Aggregate Bond Index) have returned 3.7%, and annual inflation (CPI-U) has been 1.8%.

[7] "How Interest Rates Affect the U.S. Markets," by Chris Seabury, July 31, 2019, https://www.investopedia.com/articles/stocks/09/how-interest-rates-affect-markets.asp

[8] Author's tabulations of S&P 500 from https://www.macrotrends.net/2324/sp-500-historical-chart-data, Bloomberg Barclays US Aggregate Bond Index from www.bloomberg.com, and Bureau of Labor Statistics CPI-U from https://www.bls.gov/regions/midwest/data/consumerpriceindexhistorical_us_table.pdf Note, just as we have assumed that Treasury yields are a reasonable indicator of the interest rate environment, we are assuming that the S&P 500 index is an indicator of stock market performance and the Bloomberg Barclays US Aggregate Bond Index is an indicator of bond market performance.

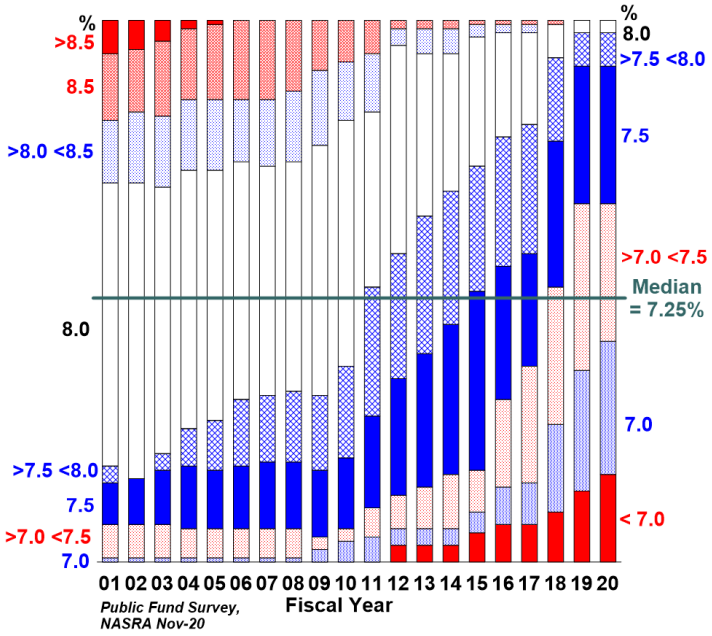
Implications for BAM Pension Risk Analysis

TREND 1:
DECREASING INVESTMENT RETURN ASSUMPTIONS

The median discount rate in use for financial reporting by issuers was 7.25% in 2019 (see Figure 2)[9], and the discount rate is usually equal to, or about the same as, the rate used by actuaries to determine pension plan contributions. Since FY 2001, when the median discount rate was 8.0%, there has been a slow, but steady, movement to decrease the discount rate. It should be noted that in FY 2009-2010, the median rate was still 8.0%, so the change in the median rate from 8.0% to 7.25% has really taken place in the last ten years.

Figure 2:

Trend in Median Investment Return Assumption
(2001 - 2020)



Assuming this trend continues, lower discount rates imply that disclosed plan liabilities will increase[10], but it's unclear by how much. Historically, decreases to investment return assumptions have had a minor impact on unfunded plan liabilities, but it's possible that the impact will be different going forward.[11]

The discount rate, also known as the investment return assumption, is comprised of two parts: inflation and the real rate of return on plan assets. See Figure 3[12] below, which shows the breakdown of components of the assumed investment returns, and note that the trend of decreasing nominal rates of return is especially pronounced after 2009, which is consistent with what we observed in Figure 2. ◀

[9] Public Fund Survey, NASRA, December 2019, updated February 2020
[10] Mathematically, the lower the discount rate, the higher the liability, all else being equal.
[11] "How Did State/Local Plans Become Underfunded?" by Alicia H. Munnell, Jean-Pierre Aubry, and Mark Cafarelli, January 2015, which showed that of the entire change in unfunded liabilities from FY 2001 to FY 2013, only 7.1% of the change was attributed to changes in actuarial assumptions, including the discount rate.
[12] NASRA Issue Brief: Public Pension Plan Investment Return Assumptions, updated February 2021

Figure 3:

Historical Average Assumed Nominal and Real Rates of Return and Average Assumed Inflation Rate
(2002 - 2019)

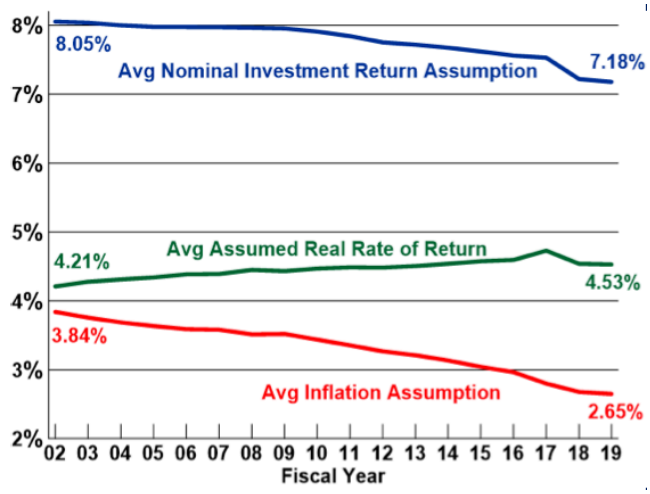


Figure 3 suggests that the primary cause of decreases to investment return assumptions has been changes to the assumed rate of inflation. This is important because the *reason* for the discount rate decrease matters: if it's because of a decrease in the plan's real rate of return of investments, liabilities will increase by more than if the reason is a decrease in the inflation assumption. Here's why: The inflation assumption is also a component of the plan's salary increase and cost-of-living adjustment assumptions; if the inflation assumption is lowered, it would tend to decrease the salary increase and cost of living adjustment (COLA) assumptions as well. Changes to these assumptions would lower liabilities, partially offsetting the impact of the discount rate liability increase. In short, if the trend of slowly decreasing investment return assumptions continues, it should result in modestly higher plan liabilities. ◀

BAM'S VIEW:

Implications for Credit Analysts

Under BAM's pension/OPEB risk analysis methodology, plan liabilities and employer contributions are already adjusted to a constant 6% discount rate. Therefore:

- BAM's quantitative metrics related to plan liabilities should be essentially unchanged by a decrease in the issuer's discount rate (they might improve slightly if the discount rate change is driven by the inflation assumption, causing salary growth and/or COLA assumptions to decrease);

- To the extent plan liabilities increase, actuarially determined employer contributions should increase (which often—but not always[13]—translates into higher actual employer contributions). One of BAM's qualitative pension/OPEB risk factors is to examine the projected number of years it will take to pay off unfunded liabilities. To the extent actual contributions rise as a result of a discount rate decrease, the pay-off period may shorten.

In summary, discount rate decreases should result in modest improvements to BAM's quantitative metrics and qualitative risk assessment factors.

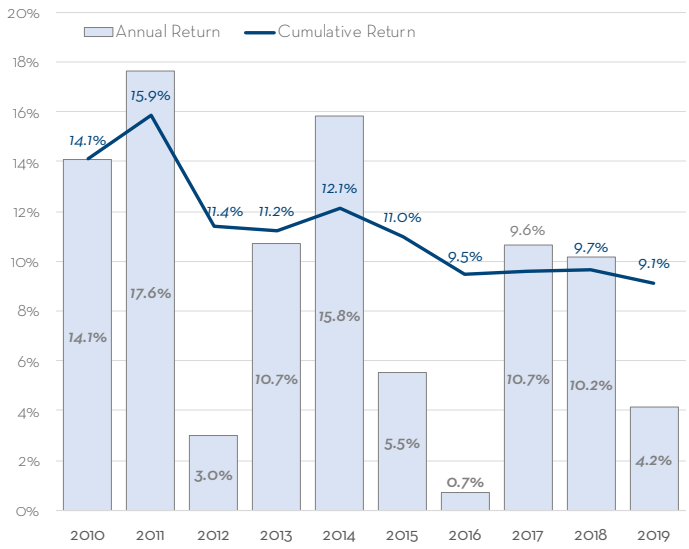
[13] Some pension plans' contributions are not actuarially determined and so changes in plan liabilities would not directly affect employer contributions. For example, some plans' contribution rates are legislated percentages of payroll.

TREND 2:
FAVORABLE PENSION FUND ASSET PERFORMANCE

Data indicates that pension fund assets performed favorably over the period 2010 thru 2019. As noted above, over the ten-year period beginning in 2010, stocks have returned 11.2%, and bonds have returned 3.7%. Of course, public pension funds consist of a combination of these and other asset classes (such as real estate and alternatives). Over the ten-year period ending December 31, 2019, pension fund investment returns have averaged 9.1%. See Figure 4.[14] ▼

Figure 4:

Historical U.S. Public Sector Pension Fund Asset Performance (thru 2019)



At the same time, actuarial investment return assumptions have declined to a median rate of 7.25% in fiscal 2019. Assuming the trends over the past 10-year period continue into the future, the implication is that unfunded pension liabilities will continue to decrease, but only modestly. As over the past ten years, there are strong headwinds keeping pension funds from experiencing more-significant progress in closing the gap between plan assets and liabilities, including: insufficient contributions, demographic shifts, and the aforementioned decreases to the discount rate, which raise the bar for break-even contribution levels. And, over the past ten years, the fixed income portion of asset portfolios has delivered very little upside; in an era of persistently low interest rates, fixed income investment performance may continue to challenge the delivery of superior pension fund asset returns.

BAM'S VIEW:

The implications of favorable investment performance for pension/OPEB risk analysis are:

- Favorable asset performance would translate into lower adjusted unfunded liabilities and lower adjusted contributions, which would result in positive impacts to all of BAM's quantitative pension metrics.

- Furthermore, BAM's qualitative factors that are affected by unfunded liabilities may experience improvement: the number of years needed to pay off unfunded liabilities, a lower incidence (or delay) of depletion dates[15], and the demographic risk factor (which BAM cross-references to the pension plan's BAM-adjusted funding ratio)[16].

14 Public Plans Data https://publicplansdata.org/ March 2021; author's tabulations.

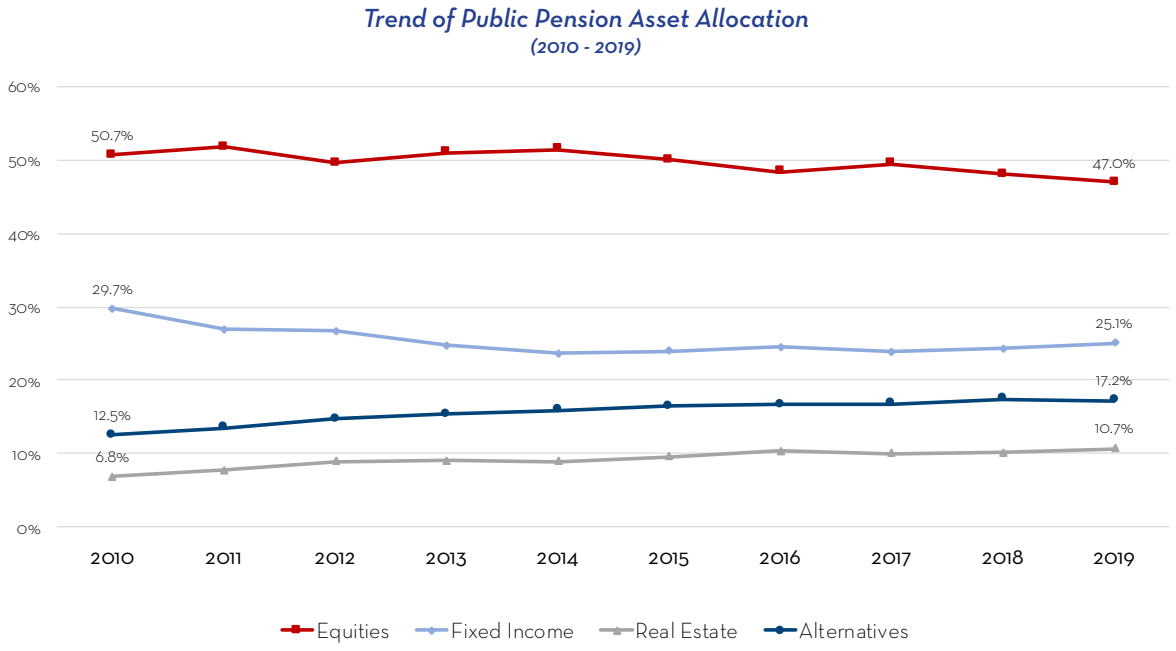
15 Under GASB 67/68 requirements, when determining the discount rate for liability measurement, plan assets and liabilities are projected to determine the period over which assets are sufficient to pay plan benefits; if assets run out before benefit obligations, the cross-over point is the pension fund's depletion date. When this occurs, it is a sure sign that the employer's funding policy is not adequate. BAM considers the existence of a depletion date a significant pension risk factor.

16 BAM assumes the demographic risk, which rises as the percentage of retirees in the overall pension plan population rises, is mitigated by high funding ratios (assets divided by liabilities).

TREND 3:
PLAN SPONSORS EMBRACE RISKIER PENSION ASSETS

A notable trend that took place over the period 2010 thru 2019 was the continued movement of plan assets toward riskier investments. See Figure 5.[17] This trend was partly fueled by Governmental Accounting Standards Board rules, which dictate that pension and OPEB financial disclosure discount rates are to be based on the expected return on plan assets, and also partly fueled by plan sponsors' hesitance to lower discount rates, which could translate into higher funding costs and budgetary pressure. But the key underlying factor in the trend toward investing in riskier asset classes is the search for investment return, because fixed income investments were not a high-return asset class over the past decade (see Figures 1-A and 1-B). ▼

Figure 5:



If we assume that low interest rates persist, and further assume the trend away from fixed income investments in favor of more-volatile investments such as equities and alternatives, then we would expect a negative impact from a pension-risk perspective. More-volatile investments can deliver favorable returns when performing well, but are more susceptible to losses, and can face larger losses, when a financial downturn occurs. When asset losses occur, the pension funding requirements to make up for those losses put more pressure on issuers' budgets: in extreme cases, these costs can crowd out an issuer's ability to pay its debts and trigger defaults.

One might observe from Figure 5 that the sum of average asset allocations of equities and alternatives is not significantly higher at the end of 2019 compared to 2010 (63.2% in 2010 compared to 64.2% in 2019). However, this change takes on more significance when considered in the context of a steadily aging pension plan population. The national average ratio of active members to retired members was 1.91 in 2010, and was 1.34 in 2019.[18] So, one can reasonably conclude that pension plans' assets have been taking on risk at the same time the covered plan population is aging.

[17] Public Plans Data https://publicplansdata.org/ March 2021; author's tabulations.
[18] Public Fund Survey, November 2020. The lower the ratio, the greater portion of the pension plan population is comprised of retirees. Note, the national ratio has steadily declined at least since 2002.

BAM'S VIEW:

Much like an individual investor, time horizon affects the level of volatility a pension plan can tolerate. For example, a pension plan whose population mainly consists of young employees has more time to weather asset volatility than a pension plan whose population mainly consists of retirees. Therefore, BAM cross-references the percentage of plan assets in more-volatile assets against the demographics of the plan population. See Table 1. ▼

Table 1:

BAM's View of How Demographics and Investment Policies Interact

Percent of Portfolio Equities plus Alternatives	*Ratio of Actives to Annuitants*			
	< 50%	≥ 50% and < 100%	≥ 100% and < 150%	> 150%
≥ 80%	Highly Elevated	Elevated	Moderate	Low
≥ 65% and < 80%	Elevated	Moderate	Moderate	Low
≥ 50% and < 65%	Moderate	Moderate	Low	Low
< 50%	Low	Low	Low	Low

Persistently low interest rates can set the stage for heightened investment risk in issuers' pension plans, which is likely to be exacerbated by demographic trends toward more mature plan populations.

SCENARIO

2:

The Higher Interest-Rate, Higher Inflation Environment

The COVID-19 pandemic appears to have been a game-changer for the U.S. and global economies. Financial markets were severely shaken beginning in February 2020 as entire countries went into lock-down mode. In the U.S., the S&P 500 index slid about 34% from February 14 to March 23, 2020.[19] Aided by substantial Federal stimulus, the global economy and financial markets quickly began to show signs of a swift and massive recovery.[20] And, in 2021, we began to see an uptick in inflation.[21] It is unknown whether the increase in inflation is temporary or a harbinger of a longer-lasting trend. However, for the purpose of describing potential pension risk impacts in municipal credit analysis, we will assume a prolonged period of higher interest rates and higher inflation.

There are various potential impacts of a higher interest, higher inflation environment, and all have pension risk implications in municipal credit analysis.

- Potential impact on pension fund investment returns;
- Potential demographic impacts;
- Actuarial assumption changes and their impact on employer contribution requirements;
- Possible legislative reactions.

IMPLICATION 1:

POTENTIAL IMPACT ON PENSION FUND INVESTMENT RETURNS

Earlier in this paper we described the implications of persistent low interest rates. The implications of higher interest rates and higher rates of inflation are generally the opposite.

For instance, bond prices are inversely affected by changes in interest rates. When interest rates rise, demand for lower-coupon bonds drops, and prices fall.

To illustrate the impact of changes in interest rates on bond market performance, it is useful to compare changes in 10-year Treasury yields against the performance of the Bloomberg Barclays US Aggregate Bond Index.[22] See Table 2 below. ▶

[19] S&P 500 index value was 3,380.16 on February 14, 2020 and was 2,237.4 on March 23, 2020

[20] For example, the S&P 500 index stood at 4,682.9 on November 22, 2021, nearly a 109% increase from the March 23, 2020 low.

[21] Year-over-year CPI-U index changes from February thru October 2021 were 1.7%, 2.6%, 4.2%, 5.0%, 5.4%, 5.4%, 5.3%, 5.4% and 6.2%. From U.S. Bureau of Labor Statistics November 23, 2021

Table 2:

Bond Returns and Changes in Treasury Yields

Bloomberg Barclays US Aggregate Bond Index Returns Tabulated by Year-Over-Year Change in 10-Year Treasury Yields, 1981-2020

10-yr Treasury Change:	-4% to -3%	-3% to -2%	-2% to -1%	-1% to 0%	0% to 1%	1% to 2%	2% to 3%
Count (# years):	1	2	8	13	9	6	1
Bloomberg Aggregate Returns:							
Average	32.60%	20.29%	11.18%	6.85%	3.84%	3.43%	-2.92%
Minimum	32.60%	18.47%	5.24%	-1.60%	0.01%	-2.02%	-2.92%
Maximum	32.60%	22.11%	16.00%	15.15%	8.96%	8.40%	-2.92%

Whereas market values of fixed-income investments are primarily driven by the interest and inflation environment, equity market valuations are driven by many different factors that affect investor demand.[23] Those factors include: reported corporate earnings; economic factors such as interest rates, unemployment rates and currency fluctuations; expectations of many items including revenues, profits and political changes; and, emotions such as greed and fear. Because equity pricing is affected by many factors besides interest rates and inflation, the correlation between actual historical stock market performance and levels of interest rates is less strong than it is for bond prices. There are many theoretical arguments that can be made about the outlook for future equity markets, including:

- The market run-up from the early pandemic crater through 2021 has borrowed or front-loaded returns from future years;
- Higher yields may cause some investors to prefer bonds over stocks as a less-risky investment, decreasing demand for stocks and depressing stock prices;
- Higher interest rates mean the discounted present value of future corporate profits will be lower;
- A higher cost of borrowing for consumers means less disposable income, which slows down spending, decreases demand for goods, and can result in a negative impact on stock prices.

BAM'S VIEW:

While markets are unpredictable, most of these outlooks suggest that a higher-interest, higher-inflation economic environment sets the stage for less favorable investment performance than observed during the low-interest, low-inflation decade 2010 thru 2019. We described the impact of favorable pension fund asset performance on pension risk in credit analysis earlier in this paper. If pension fund asset performance is less favorable, potential impacts on pension risks are:

- Unfavorable asset performance would translate into higher adjusted unfunded liabilities and higher adjusted contributions, which would result in negative impacts to all of BAM's quantitative pension metrics.
- BAM's qualitative risk factors that are affected by unfunded liabilities may experience a negative impact:
  - The number of years needed to pay off unfunded liabilities may increase;
  - A higher incidence (or acceleration) of depletion dates;
  - Elevated demographic risk (more on this factor below).
- Elevated investment risk may continue to be an issue due to the continued trend of movement toward riskier asset classes as pension funds seek to justify higher discount rate assumptions, and/or search for higher asset returns.

22 This assumes that 10-year Treasury yields are an indication of the "interest rate environment" and that the Bloomberg Barclays US Aggregate Bond Index approximates "bond market performance." The 10-year Treasury yield change is based on the difference between beginning and end of year yields. Author's tabulations from Bloomberg Barclays US Aggregate Bond Index from www.bloomberg.com, 10-year Treasury yields from https://www.macrotrends.net/2016/10-year-treasury-bond-rate-yield-chart

23 This discussion draws from the article "What Factors Determine the Price of Stocks?" by Chirantan Basu at https://finance.zacks.com/factors-determine-price-stocks-2313.html

IMPLICATION 2:
POTENTIAL IMPACT ON PENSION PLAN DEMOGRAPHICS

Most pension benefit formulas are a function of wages earned, or of average wages earned, at the end of employees' careers. If inflation rises, employees nearing retirement may become fearful of the impact inflation can take on the purchasing power of their pensions. Because actual wage increases usually include an inflation component, employees may delay retirement as a way to stave off the impact of inflation on their standard of living. At least since 2000, the ratio of active employees to retirees in U.S. public sector pension plans has steadily decreased.[24] The trend of plan population maturation may slow down if employees delay retirement.

BAM'S VIEW:

BAM considers demographic pension risk in the context of the funding ratio. As noted above, a higher inflation environment sets the stage for underperforming plan asset returns and generating higher liabilities because of wage increases to keep pace with inflation, both of which would increase unfunded liabilities. So, even if the pace of retirements slows down as employees seek their own hedge against inflation, BAM's assessed demographic risk could increase. See Table 3. ▼

Should employees delay retirement, those end-of-career wage increases will work their way into the calculation of the employees' pensions. Higher pension benefit amounts translate into higher pension liabilities. Should the growth in pension plan liabilities outpace the growth in assets, unfunded liabilities will increase.

Of course, on an individual employer level, there may or may not be increased unfunded liabilities or any changes in retirement patterns. But in an increased inflation environment, the stage is set for these items to occur.

Demographic risk is an important factor in pension risk assessment for several reasons: (i) if the plan is underfunded and has a large retiree population, it is likely that employer contribution rates will increase, which increases budgetary burdens; (ii) most public sector pension plans require employee contributions, but the fewer active employees in a pension plan population, the less impactful that revenue source is in reducing unfunded liabilities; and (iii) if pension reform is needed, the most difficult reforms to enact are those that affect current retirees, but a large retiree population makes any reform affecting only active employees less impactful.

Table 3:

BAM's View of How Demographics and Funding Ratios Interact

	Ratio of Actives to Annuitants			
BAM-Adjusted Funding Ratio	< 50%	≥ 50% and < 100%	≥ 100% and < 150%	> 150%
< 50%	Highly Elevated	Highly Elevated	Moderate	Low
≥ 50% and < 70%	Highly Elevated	Moderate	Moderate	Low
≥ 70% and < 90%	Moderate	Moderate	Low	Low
≥ 90%	Low	Low	Low	Low

[24] See https://www.nasra.org/publicfundsurvey

IMPLICATION 3:

POTENTIAL IMPACT ON ACTUARIAL ASSUMPTIONS AND EMPLOYER CONTRIBUTION REQUIREMENTS

When actuaries determine pension plan contribution requirements,[25] they make a variety of assumptions in order to calculate projected plan benefits for each participant, and then discount them back to the valuation date to determine the pension liability. It's important to recognize that these assumptions are not necessarily arrived at independently. Under professional actuarial standards[26], the assumptions must be reasonable for the intended purpose and when taken together. One element of reasonableness is that the assumptions should be internally consistent, a key example of which being the actuary's assumption regarding inflation. Earlier in this paper, we noted that the inflation assumption is part of the actuary's investment return, salary increase and future cost-of-living adjustment assumptions. For plans whose method of amortizing unfunded liabilities is based on an increasing schedule related to payroll growth, the payroll growth assumption is related to inflation as well.

Actuaries periodically review their assumptions for reasonableness and recommend changes when they believe that a pattern of experience has emerged that indicates a future long-term trend that is different from the current assumption. Thus, a temporary uptick in inflation may not be enough cause to raise the actuary's inflation assumption. However, the longer a period of higher inflation lasts, the more likely it will be that actuaries rethink their inflation assumptions.

Increasing the inflation assumption affects pension plan liabilities and employer contributions in the following ways: [27]

INVESTMENT RETURN ASSUMPTION: The investment return assumption is comprised of two parts: inflation and real return. The higher this assumption, the lower plan liabilities will be. We discussed earlier in this paper that a prolonged period of inflation sets the stage for a period of subpar investment performance, so it is possible that an increased inflation assumption will coincide with a decrease in the real return assumption, leaving the investment return assumption essentially unchanged. If the U.S. economy moves into a prolonged period of higher interest rates, pension plan investments may even migrate toward a higher allocation of fixed income instruments, taking some investment risk off the table and further supporting the notion of lower long-term real rates of return. Lastly, even if market trends seem to suggest decreasing the actuarial investment return assumption, changes tend to happen very slowly over time. Therefore, investment return assumptions are unlikely to change materially solely as a result of a new period of higher inflation.

SALARY INCREASE ASSUMPTION: The actuary's salary increase assumption is generally comprised of two parts: inflation and merit increases.[28] An increase to the inflation assumption will generally result in an increase in pension liabilities related to active employees because their projected benefits will be higher.

[25] This statement is made assuming contributions are calculated on an actuarial basis, which is not always the case. However, plan liabilities are always calculated on an actuarial basis.
[26] Actuarial Standard of Practice (ASOP) 4, "Measuring Pension Obligations and Determining Plan Costs or Contributions," ASOP 27, "Selection of Economic Assumptions for Measuring Pension Obligations," and ASOP 35 , "Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations."
[27] This discussion centers on the impact to pension plan funding calculations, and not on accounting expense under GASB 68 methodology.
[28] There may also be a component of the salary increase assumption related to progression and promotion.

COST-OF-LIVING ADJUSTMENT ASSUMPTION: For plans that offer them, retiree pension cost-of-living adjustments are usually tied to inflation in some manner.[29] An increase in the inflation assumption will result in higher pension plan liabilities, because retirees' pensions will be assumed to increase at a higher rate in the future.

PAYROLL GROWTH ASSUMPTION: This assumption is important for pension plans who plan to amortize their unfunded liabilities as part of an employer contribution that is tied to to total payroll.[30] If an increased inflation assumption causes the payroll growth assumption to increase, then the unfunded liability amortization component of future contributions would be assumed to increase at a steeper rate. It follows that a steeper rate of increase means a lower starting point – which could provide some near-term relief from the contribution increases resulting from the higher salary increase and COLA assumptions noted above.

BAM'S VIEW:

In terms of pension risk in municipal credit analysis, actuarial assumption changes related to an increased inflation assumption would be expected to increase pension plan liabilities and contribution requirements, thereby increasing budgetary strains. Plans whose amortization of unfunded liabilities is tied to payroll growth may experience short-term budget relief, but may see an increased incidence of inadequate funding and even negative amortization.[31] Overall, this would present an overall increase to pension-related credit risk.

Although the act of revising actuarial assumptions to better reflect future inflation may result in an elevated assessment of pension risk in the short term, failing to revise the assumptions and allowing the impact of inflation to affect plan liabilities and costs as higher-than-expected inflation occurs is ultimately a greater risk factor. The former approach allows for a gradual pay-down of liabilities related to increased inflation, whereas the latter approach opens the door to the back-loading of costs and potential unwelcome budget surprises.

[29] Some pension plans provide fixed percentage COLAs that are not related to the actual rate of inflation.
[30] This is a common practice among U.S. public sector pension plans.
[31] Negative amortization occurs when contributions are so low that they allow unfunded liabilities to increase during the year. In BAM's view, this is a significant pension risk.

IMPLICATION 4:
POSSIBLE LEGISLATIVE REACTIONS

One potential public sector employer reaction to an increased inflation scenario would be to recognize the erosion of pensions' purchasing power for current retirees. To the extent that pension plans do not already provide cost-of-living adjustments to retirees' pensions, or only provide them on an ad hoc basis, it's possible that unions or retiree groups may push for unplanned COLAs. Adding pension liabilities creates a need for additional employer contributions, which can add to budgetary pressures caused by pensions. Therefore, such a benefit increase would be seen as a negative from a credit perspective.

Under the appropriate conditions, public sector pension plans may be candidates for de-risking: transferring plan assets and liabilities to insurance companies who agree to pay benefit obligations to pensioners[32] in return for a premium. Essentially, the transaction is a mass-purchase of insured annuities for a group of plan members. The premiums charged by the insurance companies are a function of the interest rate environment, so when rates are low, premiums are high. This transaction allows the employer to completely discharge its pension obligations to the plan members whose liabilities are transferred. This strategy has been in use with private sector pensions for many years because their funding interest rates are related to Treasury rates and plans are generally well-funded.

During the prolonged era in which Treasury rates have been well below public funds' investment return assumptions, the insured annuity premiums were too expensive for this strategy to be an option.[33] However, if interest rates rise enough to make the annuity premiums comparable to the liabilities to be transferred, and if the plan is well-funded enough to make this strategy not a detriment to other plan members whose liabilities remain with the plan, then de-risking can be a viable option for plan sponsors. In terms of pension risk, a de-risking transaction would be a positive for various reasons, including that a smaller pool of plan assets would generate less contribution volatility if financial markets experience turbulence.

[32] The typical de-risking transaction involves terminated vested and/or retiree groups of plan members: those whose pensions and payment terms are already clearly defined.
[33] In other words, the cost of the insured annuity was significantly higher than the liabilities being held by the pension plan.

Summary

Persistently low interest rates correlate to factors such as low inflation and favorable stock market performance. Actual experience over the ten-year period 2010 thru 2019, a period of actual low interest rates, has borne out these theoretical correlations. Not all of the observed trends associated with persistently low interest rates will apply to every issuer. However, based on BAM's methodology, the impact of these trends on pension/OPEB risk is generally positive. The catch, however, is that issuers have tended to assume more investment risk in their pension asset allocations, and may continue to do so should the low interest rate environment persist. The potential volatility in assuming more investment risk is a major concern, because an economic downturn can increase pension funding budget requirements to unacceptable levels—heightening the risk of crowding out an issuer's ability to pay its debts.

A higher interest, higher inflation environment sets the stage for subpar asset performance and increased pension liabilities, leading to potential increases in unfunded pension liabilities. A related concern is the possibility of salary increases that exceed historical trends and legislative actions to grant retiree cost-of-living adjustments, both of which would be expected to increase pension liabilities. Should unfunded liabilities rise, then employer contributions would need to increase, elevating budgetary pressures that can affect issuers' abilities to pay their debts.

We do not know if the current rise in inflation is temporary. This paper has set out a theoretical framework BAM's analysts use when assessing the credit risk impact from different trends that can arise based on the interest/inflation environment. Ultimately, low interest-rate/low inflation and higher interest-rate/higher inflation environments will affect different bond issuers differently, and municipal bond analysts and investors should continue to apply granular analysis when evaluating the credit outlook for specific holdings.

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