



HOW HAS THE DECLINE IN ASSUMED RETURNS AFFECTED PLAN COSTS?

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INTRODUCTION

Many state and local pension plans have lowered their long-term investment return assumptions in the wake of the financial crisis. Such a change is generally viewed as a positive development for pension funding discipline, bringing assumptions more in line with market expectations and forcing plan sponsors to increase annual required contributions. In this case, however, the decline is actually due to lower assumed inflation, not a lower *real* return (that is, the return net of inflation). In a fully-indexed system where benefits fully adjust with inflation, a lower inflation assumption should actually have no impact on costs. At the same time, plans have changed their asset allocation, resulting in a *higher* expected *real* return, which – all else equal – lowers costs. Therefore, a quick assessment of these underlying assumption changes

suggests that plans may have actually lowered their costs with the decline in the assumed return. But, public plan benefits are not fully indexed, so the *real* value of benefits increases as the inflation expectation drops, which increases plan costs. This *brief* explains the overall impact of these opposing dynamics and compares the net effect on costs with that produced by a lower *real* return assumption.

The *brief* proceeds as follows. The first section documents the impact of declining inflation on assumed returns and explains why lower inflation has no impact on costs if benefits are fully linked to inflation. The second section shows that public plan benefits are not fully linked to inflation, so that a lower inflation assumption leads to higher *real* benefits and plan costs. The third section describes the increase in

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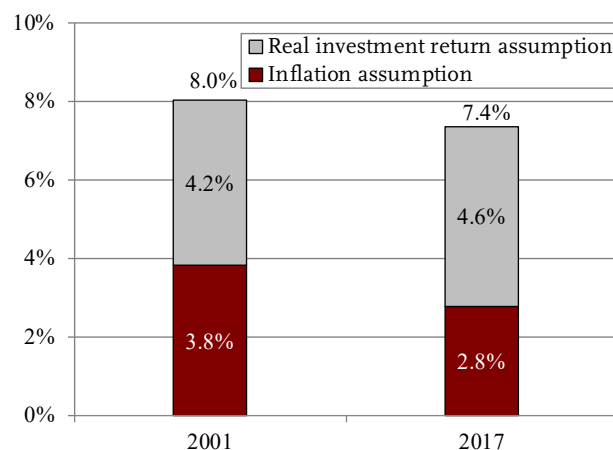
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plans' expected *real* rate of return, which lowers costs. The fourth section puts the pieces together – finding that plan costs have increased because the lack of full indexing dwarfs the impact of the higher *real* return. The increase, however, is substantially less than if plans had lowered their real return assumption. The final section concludes that it is important to identify the source of a decline in assumed returns because lower inflation and lower *real* returns have different effects on costs.

WHAT IS BEHIND THE DECLINE IN ASSUMED RETURNS?

The average nominal return assumption for public plan assets decreased from 8.0 percent in 2001 to 7.4 percent in 2017. A decline in the return assumption usually increases plan costs.¹ But to understand how a given decline impacts costs, the assumed return must be separated into two components: inflation and the *real* return. In this case, more than 100 percent of the decline in the average assumed return is explained by a drop in inflation – plans reduced their average inflation expectations by a full 1-percentage point, from 3.8 percent to 2.8 percent (see Figure 1).²

FIGURE 1. AVERAGE INVESTMENT RETURNS AND INFLATION ASSUMPTIONS FOR STATE & LOCAL PLANS, 2001 AND 2017



Source: Authors' calculations based on most recent Comprehensive Annual Financial Reports (CAFRs) and Actuarial Valuations (AVs) released by plans as of December 2018.

For a hypothetical plan, where benefits fully adjust with inflation (i.e. the *real* value of benefits is constant), lower inflation will have no impact on the required contribution. Yes, lower nominal returns will produce less revenue. But if the lower nominal returns are driven by lower inflation (i.e. the *real* return remains constant), they will also decrease initial benefits (through lower wage growth) and the cost-of-living-adjustment (COLA) paid after retirement. As a result, the contribution rate for a plan that assumes, say, a 4-percent real return and 4-percent inflation (8-percent nominal return) would be the same if, instead, the plan assumed a 4-percent real return and 3-percent inflation (7-percent nominal return).³

The actual situation for public plans differs from the scenario described above in two ways. First, benefits before and after retirement are not fully linked to inflation, so they do not decline one-to-one with lower inflation. As a result, lower inflation increases the *real* value of benefits and increases plan costs. Second, public plans have shifted into riskier assets, which increases their expected *real* return and reduces costs.

WHY DOES LOWER INFLATION INCREASE PUBLIC PLAN COSTS?

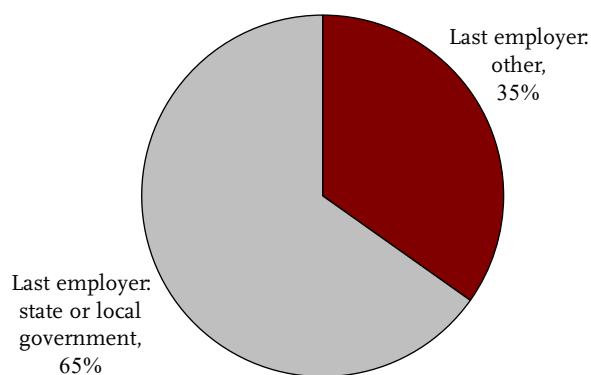
Public plans may seem like fully indexed systems, because they provide benefits based on final earnings and offer post-retirement COLAs. But, in reality, not all benefits are based on final earnings, and most COLAs are not designed to fully compensate for inflation.

INITIAL BENEFITS

If all public sector workers remained with their employer until they retired, their final earnings would reflect inflation and *real* wage growth over their work lives, and their initial benefits based on final earnings would be fully indexed.⁴ However, 35 percent of employees who vest in a pension benefit do not retire as public sector employees (see Figure 2 on the next page). These workers receive much lower benefits for their time in the public sector than employees who finish their career in the public sector. For example, a worker leaving at age 40 with 10 years of service, a salary of \$40,000, and entitled to 2 percent of final earn-

ings for each year of tenure would receive 20 percent of \$40,000 or \$8,000 at age 60. If that employee had remained working until age 60, that 20 percent would apply to final earnings of \$60,000 and produce a benefit of \$12,000 for the first 10 years of service. The only way for the worker who leaves at age 40 to avoid a \$4,000 loss in benefits would be for the plan to base pension benefits on projected age-60 earnings – that is, index earnings for inflation and *real* wage growth.⁵ Without such indexing, benefits erode in real terms, and the employer gains. The higher the rate of inflation, the larger the erosion. Conversely, a lower rate of inflation raises the cost to the employer by making the deferred benefits *relatively* more expensive.

FIGURE 2. DISTRIBUTION OF VESTED STATE AND LOCAL EMPLOYEES BY LAST EMPLOYER



Source: Authors' calculations from Munnell et al. (2012).

BENEFITS AFTER RETIREMENT

Although public plans are well known for providing post-retirement COLAs, the extent of indexing is far from complete. Most COLAs are deliberately designed not to fully match inflation, and some plans provide no COLA or only ad hoc adjustments (see Table 1). Thus, the benefits of many retirees erode in value over time with rising inflation.

Limiting COLAs may be an effective way to contain costs, but such provisions cut the other way when the inflation rate declines. Since the drop in benefit payouts does not fully reflect the drop in inflation, costs rise. At the extreme, for plans without a COLA, a 1-percentage-point reduction in assumed inflation produces a 1-percentage-point increase in *real* post-retirement benefits.

TABLE 1. DISTRIBUTION OF PLANS BY COLA POLICIES, 2018

COLA policy	Percent
Fully indexed to inflation	14%
Partially indexed to inflation	26
Fixed	31
No COLA or ad hoc	28
Total	100

Notes: See Endnote 6. Column does not sum to 100 percent due to rounding.

Source: Authors' calculations based on most recent CAFRs and AVs released by plans as of December 2018.

In short, the lack of complete indexing of both initial benefits and benefits after retirement means that a change in inflation is not a wash. Instead, as inflation declines, *real* costs increase.

WHY HAS THE EXPECTED REAL RETURN INCREASED?

At the same time that plans have lowered their inflation assumption, they have also shifted their investment mix out of fixed income and into riskier asset classes (see Table 2).

TABLE 2. AVERAGE ASSET ALLOCATION FOR STATE AND LOCAL PLANS, 2001 AND 2017

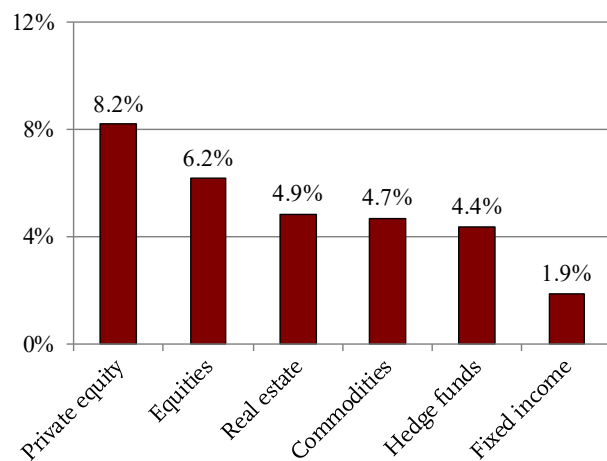
Asset class	2001	2017
Public equities	56%	49%
Fixed income	33	23
Private equity	3	8
Hedge funds	0	8
Real estate	4	8
Commodities	0	3

Note: Columns do not sum to 100 percent because cash and other miscellaneous investments are excluded.

Source: Authors' calculations based on the *Public Plans Database* (2001 and 2017).

These riskier assets have higher expected real returns (see Figure 3), which are consistent with the increase in the expected real return from 4.2 percent to 4.6 percent during 2001-2017 (as shown above in Figure 1).⁷ The higher expected *real* return – all else equal – leads to lower costs, as fewer contributions are required to meet future benefit obligations.

FIGURE 3. AVERAGE EXPECTED REAL RETURNS FOR STATE AND LOCAL PLANS IN 2017, BY ASSET CLASS



Source: Authors' calculations based on most recent CAFRs.

WHAT IS THE NET EFFECT ON PLAN COSTS?

What is the net effect on plan costs due to the lower inflation assumption and higher expected *real* return? The answer depends on the impact that these changes have on the two components of plan costs – the payment to amortize unfunded liabilities and the normal cost contribution.

CHANGE IN THE ANNUAL PAYMENT TO AMORTIZE UNFUNDED LIABILITIES

Calculating the effect on amortization payments proceeds in two steps. The first is to calculate how the change in assumptions impacts *total* accrued liabilities. Based on data reported under the new GASB statements, a 1-percentage point change in the *real* return produces a 12.5-percent change in accrued liabilities.⁸ Combining this information with data on changes in accrued liabilities after a simultaneous

change to the assumed return *and* inflation yields the impact of inflation on liabilities. The result is that a 1-percentage point change in inflation produces a 7.6-percent change in accrued liabilities.⁹ Given these estimates, decreasing the inflation assumption by 1 percentage point and increasing the expected *real* return by 0.4 percentage points produces a 2.6-percent increase in accrued liabilities ($[1 \times 7.6\%] - [0.4 \times 12.5\%] = 2.6\%$).

The second step is to calculate the impact on *unfunded* accrued liabilities. In the wake of the financial crisis, public pension assets have hovered around 75 percent of liabilities. Since a quarter of total liabilities are unfunded, increasing total liabilities by 2.6 percent would increase the unfunded portion by 10.4 percent – or four times as much. However, because the interest on the unfunded liability drops with the decline in the nominal assumed return, the amortization costs only rise by 4.2 percent to pay down the larger unfunded liability.¹⁰

CHANGE IN THE ANNUAL NORMAL COST

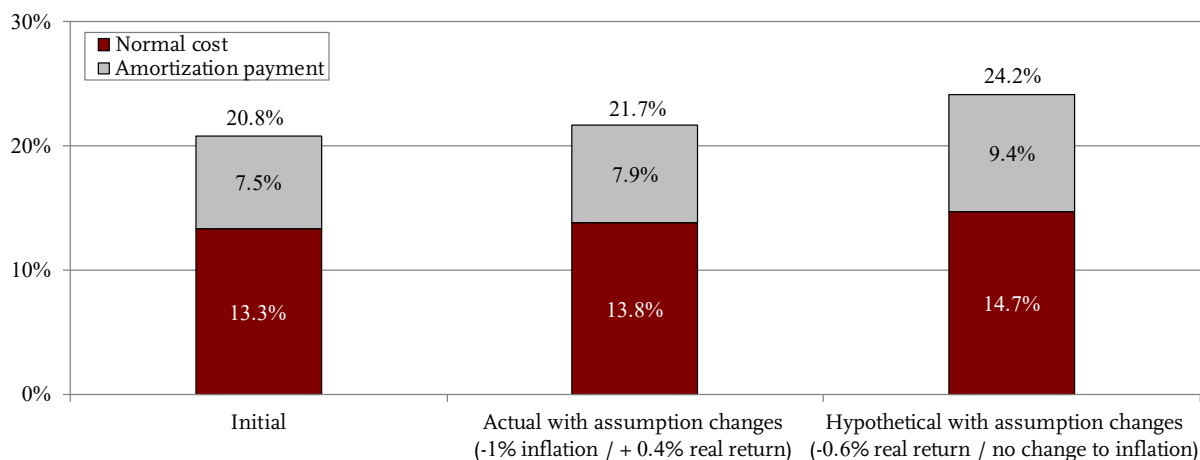
The annual normal cost equals the value of the additional retirement benefit accrued by an active employee for one year of work – that is, it incrementally accounts for the value of the retirement benefit an employee earns over his whole career (i.e. the employee liability). As a result, as employee liabilities increase, the annual normal cost must increase by the same rate.

The change in active employee liabilities can be calculated by netting out the estimated change in retiree liabilities from the observed change to total accrued liabilities.¹¹ Doing so suggests that active employee liabilities change approximately 1.4 times more than total accrued liabilities.¹² Given the 2.6-percent change in accrued liabilities, employee liabilities – and the associated normal costs – increase by roughly 3.6 percent ($2.6\% \times 1.4 = 3.6\%$).¹³

CHANGE IN THE REQUIRED CONTRIBUTION

Figure 4 (on the next page) combines the changes in amortization payments and the normal cost to illustrate the overall impact on required contributions as a percentage of payroll. In 2010, when plans began to lower their assumed returns in earnest, the required contribution for plans was 20.8 percent – 13.3 percent of payroll for normal cost and 7.5 percent of payroll for the amortization payment. The changes in the underlying assumptions that have resulted in the lower

FIGURE 4. REQUIRED CONTRIBUTION AFTER A DECLINE IN THE ASSUMED RETURN, BY ASSUMPTION CHANGE



Source: Authors' calculations.

assumed returns – the 1-percentage-point decrease in inflation and the 0.4-percentage-point increase in the *real* return – would have raised the required contribution by 1.4 percent of payroll (20.8 percent to 22.2 percent).¹⁴ But, under a hypothetical scenario in which lower assumed returns are instead driven by a reduction in the assumed *real* return, the increase in the required contribution would be nearly three times as high at 4 percent of payroll (20.8 percent to 24.8 percent).

CONCLUSION

The investment return expectations of public plans have steadily declined since 2001. Generally, a lower assumed return means greater contributions are needed to fund benefit promises. However, the decline in public pension return assumptions is due completely to lower expectations for general inflation, with the expected *real* return increasing slightly. Because public pension benefits are not fully indexed, lower inflation produces higher costs. At the same time, higher expected *real* returns lower costs.

It is important to identify the source of a change in the assumed returns because changes to inflation and changes to real returns have very different effects on costs. While, on balance, lower inflation and a higher *real* return increased costs, the increase was much smaller than if the decline in the assumed return was due to a lower *real* return.

ENDNOTES

- 1 The decision to change the assumed rate of return is made by the plan's board of trustees with advice from the plan actuary, and generally starts with the capital asset pricing (CAPM) study prepared by the plan's investment consultant.
- 2 The Federal Reserve Bank of Cleveland reports that long-term (20 to 30 years) expectations for price inflation declined by about 75 basis points from 2001 to 2017. One reason that the public plans data show a slightly larger decline in the inflation assumption may be that older plan reports are not always clear as to whether the reported inflation assumption refers to price inflation or wage inflation. To the extent that earlier data are capturing wage inflation rather than price inflation, this analysis may be overstating the decline in assumed inflation.
- 3 See Munnell, Aubry, and Hurwitz (2013).
- 4 Because the actuarial assumption for wage growth due to worker productivity has remained constant at 0.5 percentage points since 2001, this *brief* assumes that *real* wage growth for public employees is constant (i.e. public employee earnings are fully indexed). In practice, public sector labor contracts change slowly and some salary schedules are quite regimented, which can lead to mechanical changes in *real* wage growth – rather than fundamental changes due to productivity – whenever a new inflation assumption is used.
- 5 This method is used for determining Social Security benefits.
- 6 COLA categories are based on the COLA policy in place for the largest group of active employees as of 2018. Plans with a COLA cap that exceeds the plan's current inflation assumption are categorized as fully indexed to inflation. Plans with a cap that is less than their inflation assumption are categorized as partially indexed to inflation. Plans that choose one or multiple set percentages as their COLA, but do not explicitly link the COLA to inflation, are categorized as fixed. In many cases, this group includes plans that have a final COLA that varies based on the plan's funded status or investment earnings.
- 7 Using the portfolio allocations in Table 1 to weight the expected returns for each asset class in Figure 3 yields an expected real return of 4.7 and 5.1 percent in 2001 and 2017, respectively. This 0.4-percentage-point change is consistent with the change in the assumed real return reported by plans. One reason that 4.7 and 5.1 percent are both higher than the assumed real return reported by plans in those years is that plans stochastically model their assumed return using the standard deviations, covariances, and expected returns for each asset class rather than a deterministic model based on a simple weighted average of the expected asset class returns. See Munnell, Aubry, and Hurwitz (2013) to see why stochastic models will always produce lower returns than deterministic models with similar inputs.
Another potential reason for the discrepancy in the levels of the real returns may reflect the fact that actuaries and plans are slow to move the long-term assumed return. A current example of this pattern is CalPERS. The plan has acknowledged a lower return expectation than it currently uses, but has chosen to implement a glide path toward that lower expectation over many years.
- 8 Under the new GASB statements, plans report the value of their accrued liabilities after a 1-percent increase and decrease in their *nominal* assumed return – leaving all other aspects of the plan unchanged. Because inflation remains constant for this GASB-required exercise, the resulting change in liabilities also reflects the impact of a 1-percent change in the *real* return.
- 9 Plans break down the annual change in their accrued liability into various factors (Munnell, Aubry, and Cafarelli 2015). For the sample of plans that lowered their return and inflation assumptions in the same year (without changing any other key assumptions), the average assumption change was a 0.26-percentage-point decrease in the assumed return and a 0.55-percentage-point decrease in the inflation assumption, and the average change in liabilities due to assumption changes was a 0.53-percent increase in liabilities. Based on the data from new GASB reporting, a 0.29-percentage-point increase in the *real* return (the net effect of a 0.26-percentage-point decrease

in the return and a 0.55-percentage-point decrease in inflation) should decrease liabilities by about 3.6 percent ($12.5\% * 0.29 = 3.625\%$). As such, the 0.55-percentage-point decrease in inflation increased liabilities by about 4.2 percent ($0.53\% - (-3.625\%) = 4.155\%$) and a 1-percentage point decrease in inflation increases liabilities by about 7.6 percent ($1\%/0.55\% * 4.155\% = 7.55\%$).

10 The amortization factor for a 30-year amortization of unfunded liabilities using a 7.4-percent interest rate is about 5.94 percent larger than the factor using an 8-percent rate. This partially offsets the 10.4-percent increase in the initial unfunded liability and results in an increase to the amortization payment of about 4.2 percent [$(1.104/1.0594) - 1 = 4.21\%$].

11 On average, the active and inactive (including both inactive vested and retirees) liability represent 43 and 57 percent of reported accrued liabilities, respectively. A 1-percent change in the *real* return produces an 8.7-percent change in the value of retiree liabilities. (Modelling benefits for current retirees is relatively straightforward using plan actuarial valuations, which provide mortality tables, average retiree benefits by age, and the COLA provisions. The valuations also report the value of retiree liabilities and the discount rate – also the assumed return.) Given that reported accrued liabilities change by 12.5 percent, the active portion of accrued liabilities must increase by 17.5 percent.

12 In the same way that long-term bonds are more sensitive to interest rate changes than short-term bonds, the value of active employee liabilities tends to be more sensitive to assumption changes than retiree liabilities because – on average – the benefit payments will occur in later periods.

13 This estimate assumes that the proportion of active employees' total expected liability that has already been accrued does not change with the shift in assumptions. In practice, the change in future normal costs for active employees would depend on how plans choose to allocate an increase in the liability between their existing accrued liability and future normal costs.

14 Because expected payroll growth drops from 4.1 percent to 3.1 percent due to a lower inflation assumption, the 4.2-percent increase in UAAL payments results in a 4.77-percent increase in UAAL payments as a percentage of payroll – from 7.5 percent of payroll to 7.9 percent of payroll. The numerator – amortization costs – increases by 4.2 percent, while the denominator – 30 years of future payrolls – decreases by 12 percent [$4.2\%/0.88\% = 4.77\%$]. However, because benefit accruals as a percentage of pay (i.e., the benefit multiplier) are not changing for this exercise, the normal costs as a percentage of payroll increase by precisely 3.6 percent – from 13.3 percent of payroll to 13.8 percent of payroll.

REFERENCES

- Federal Reserve Bank of Cleveland. 2019. "Inflation Expectations." Cleveland, OH. Available at: <https://www.clevelandfed.org/en/our-research/indicators-and-data/inflation-expectations.aspx>
- Munnell, Alicia H., Jean-Pierre Aubry, and Mark Cafarelli. 2015. "How Did State and Local Plans Become Underfunded?" *State and Local Plans Issue in Brief* 42. Chestnut Hill, MA: Center for Retirement Research at Boston College.
- Munnell, Alicia H., Jean-Pierre Aubry, and Josh Hurwitz. 2013. "How Sensitive Is Public Pension Funding to Investment Returns?" *State and Local Plans Issue in Brief* 34. Chestnut Hill, MA: Center for Retirement Research at Boston College.
- Munnell, Alicia H., Jean-Pierre Aubry, Joshua Hurwitz, and Laura Quinby. 2012. "Public Plans and Short-Term Employees." Working Paper No. 18448. Cambridge, MA: The National Bureau of Economic Research.
- Public Plans Database*. 2001-2017. Center for Retirement Research at Boston College, Center for State and Local Government Excellence, and National Associate of State Retirement Administrators. Available at: <https://publicplansdata.org>

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