Are There Transition Costs to Closing a Public-Employee Retirement Plan?

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ABSTRACT

Defined-benefit pension plans for state and local government employees have imposed rising costs and financial risk on government budgets. In response, some policymakers have proposed shifting newly hired public employees into alternate retirement plans, including 401(k)-style defined-contribution accounts. Some critics have argued that closing a pension plan to new entrants would impose transition costs on plan sponsors. When a pension has no new participants, the duration of the plan's liabilities shortens. Shorter-term liabilities are generally funded with safer investments, and safer investments have lower expected returns. These lower returns, the argument goes, would force plan sponsors to increase contribution levels. In this study, I show that if a pension plan were closed to new hires, over time the duration of liabilities would shorten, and the portfolio used to fund those liabilities would become more conservative. However, the effects of these transition costs are so small as to be barely perceptible.

Policymakers in cities and states around the nation are considering changes to address the rising costs and increasing budgetary risks of defined-benefit pensions for public employees. While the nation is long past the financial crisis that raised pension funding to the top of elected officials' agendas, state and local pension plans remain mired in unfunded liabilities and rising employer contribution costs. Annual required contributions for state and local plans have risen from 8.6 percent of employee payroll in fiscal year 2001 to 27.2 percent in 2013. Owing to these rising costs, nearly six in ten state and local governments failed to make their full pension contributions in 2013.[1]

With the goals of reducing long-term pension costs and lowering the year-to-year volatility of government pension contributions, some policymakers have proposed closing current defined-benefit plans to new entrants and enrolling newly hired government employees in defined-contribution 401(k)-type plans. With a defined-contribution plan, the employer's contribution is fixed as a percentage of workers' wages and does not vary from one year to the next. In addition, private-sector employer contributions to 401(k)-type plans tend to be substantially lower than the contributions that state and local governments make to their defined-benefit plans. Under most proposed reforms, current employees would remain in the plan and continue to earn benefits, but over time an increasing share of employees would participate in a new program.

One objection to such reforms is so-called transition costs, which are temporary cost increases associated with switching from a defined-benefit to a defined-contribution pension plan. Some representatives of the public pensions industry argue that these transition costs make switching to defined-contribution plans prohibitively expensive.

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1. Andrew G. Biggs, "The State of Public Pension Funding: Are Government Employee Plans Back on Track?" (AEI Economic Perspectives, American Enterprise Institute, Washington, DC, September 8, 2015).

> "[I]n almost any financial environment other than US state and local pensions, the funding strategy adopted for a given liability does not change the value of the liability itself."

The argument concerning transition costs is that, once a defined-benefit pension is closed to new entrants, it must shift its investments toward safer, more liquid assets that carry lower returns because the average age of the workers and retirees participating in the plan increases. As a general rule, older individuals take less investment risk than younger workers. Thus, as a closed defined-benefit plan begins to "age," the plan would tend to be safer but have lower-returning investments. Since pension contributions are based on the expected return on the plan's investments, closing a defined-benefit plan is purported to increase contributions above the level that would be required were the plan to remain open.

Put another way, a defined-benefit plan generally funds liabilities with shorter durations—that is, benefits that must be paid in the near future—using safer, lower-returning investments. Longer-term liabilities, such as benefits that are earned by a young worker today but may not be paid out until several decades in the future, are generally funded using riskier but higher-returning investments. When a defined-benefit plan closes, there are no new participants to generate those long-term liabilities. As a result, the overall duration of the plan's liabilities shortens, and the plan would generally react by gradually shifting its portfolio to safer, but lower-returning, assets.

This lower-returning portfolio would increase an employer's pension contributions. Under rules promulgated by the Governmental Accounting Standards Board (GASB), known as Statements No. 67 and No. 68, a public employer's pension contribution is calculated based upon the expected return on the plan's investments.[2] Under public pension funding practices, even small differences in the assumed return on the plan's investments can have a large impact on the government's required contributions. For instance, the California Public Employees' Retiree

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2. See "Pension Standards for State and Local Governments," *Governmental Accounting Standards Board* website, accessed July 21, 2016, http://www.gasb.org/jsp/GASB/Page/GASBSectionPage&cid=1176163528472.

System (CalPERS) calculated that reducing its assumed investment return by one percentage point—from 7.5 percent to 6.5 percent—would increase employer contributions to the CalPERS Tier II plan from 24.4 percent of employee payroll to 34.6 percent of payroll, a 42 percent increase in cash outlays every year thereafter.[3] To be clear, nothing *requires* a pension that is closed to new entrants to alter its portfolio allocation, but such alterations are the predictable consequence of closing a pension plan to new entrants.

It should be noted that most economists take serious issue with the manner in which public sector pensions use the expected return on plan investments to calculate plan liabilities and the contributions necessary to fund those liabilities. From the economic point of view, as reflected in how private financial markets work and in regulatory rules for corporate pensions, the value of a liability is not changed by the funding strategy that an entity uses to pay that liability. If a future benefit must be paid with certainty, that benefit will be a costly liability for the entity that must pay it. The paying entity might choose to fund that liability using smaller contributions invested in riskier but hopefully higher-returning assets. Alternatively, it might fund its liability with larger contributions invested in safer but lower-returning assets. Yet, in almost any financial environment other than US state and local pensions, the funding strategy adopted for a given liability does not change the value of the liability itself.

Nevertheless, that is not how state and local pensions assess their liabilities. Under accounting rules promulgated by GASB, public plans discount their liabilities using the assumed return on the assets that the plans use to pay those liabilities. This has the perverse effect of inducing public pensions to take on additional investment risk, as riskier investments allow pensions to assume a higher interest rate, which produces a lower present discounted value of the plan's liabilities and thus lowers the contributions the plan needs to fund those liabilities.

This dynamic also makes public plans skeptical of holding safer, less risky investments because the lower return associated with safe assets would—under GASB accounting rules—require the plans to report larger liabilities and thus increase their annual contributions. It is this accounting environment in which the argument about transition costs takes place.

In a number of places where fundamental pension reforms are being considered, transition costs have been raised as an objection against such reforms. For instance, Pennsylvania's Public Employee Retirement Commission noted that adopting a more conservative investment portfolio in response to closing

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3. California Public Employees' Retiree System, *State Actuarial Valuation as of June 30, 2014*, https://www.calpers.ca.gov/docs/forms-publications/2014-state-valuation.pdf.

a plan to new entrants "would result in a lower valuation interest rate, which would result in higher actuarial accrued liabilities, requiring larger employer contributions as a percentage of payroll."[4] Also in Pennsylvania, the actuarial firm Buck Consultants issued to the Pennsylvania State Employees' Retirement System an actuarial report on reform legislation sponsored by Mike Tobash of the Pennsylvania House of Representatives:

> It is possible that, under House Bill No. 1353, liquidity considerations may arise due to the shift in liability towards retirees. At such time, the Board may change the asset allocation policy to reduce the risk of the portfolio and reflect the need to hold a growing portion of its assets in more liquid, less volatile asset classes. In general, lowering the riskiness of the portfolio may result in a lower expected return. . . . This would increase the accrued liabilities and contribution requirements of the System.[5]

These claims of transition costs have reportedly undermined efforts for public pension reform. In 2014, for instance, a Pennsylvania newspaper reported that "in failing to take up [Governor Tom] Corbett's previous proposal, lawmakers cited concerns about . . . the transition costs of a new system for new hires."[6]

But arguments predicting transition costs have not been limited to Pennsylvania. In California, local governments have considered withdrawing from the California Public Employees' Retirement System. However, CalPERS has ruled that local governments wishing to pull out of the system must shift to much more conservative investments than CalPERS holds for open plans. A study published by CalPERS gives the system's reasoning for its required investment changes:

> As a closed [defined-benefit] plan ages, fewer contributions due to fewer active members, relative to retiree benefit payments, increases the need for more liquid assets. This creates a need

4. Timothy J. Nugent and Katherine A. Warren to James L. McAneny, "Re: Senate Bill 566, Printer's Number 577, as amended by Amendment A08034," August 30, 2010, page 12, in "Unified Contribution Pension Plan," Actuarial Note Transmittal for Commonwealth of Pennsylvania Public Employee Retirement Commission, September 9, 2010.

5. David L. Driscoll to Jeffrey B. Clay, "Re: Amendment No. A06917 to House Bill No. 1353 (Printer's No. 2152)," May 2, 2014, page 4, in "Hybrid Retirement Benefit Plan," Actuarial Note Transmittal for Commonwealth of Pennsylvania Public Employee Retirement Commission, May 28, 2014.

6. "Pa. Gov. Corbett Revisits Pension Reform," *Lancaster New Era*, March 3, 2014.

to shift assets to investments that have a more predictable cash flow such as bonds. This generally has a negative impact on the fund and results in lower investment income. This lost investment income needs to be covered by additional contributions.[7]

CalPERS requires a terminated plan to hold a portfolio consisting of riskless US Treasury securities because, under CalPERS rules, once a plan is closed, the plan sponsor cannot be required to make any future contributions to the plan.[8] The precise discount rate applied depends on the duration of the plan's liabilities and yields on Treasury securities of different maturities. For illustration, the yield as of July 2016 on 10-year Treasuries was 1.6 percent, while the yield on 20-year Treasuries was 1.8 percent. Typically, the duration of a pension plan's liabilities is about 15 years. This lower assumed yield would significantly increase contribution costs for local governments hoping to pull out of CalPERS, and it has effectively prevented a number of jurisdictions from doing so.[9]

Critics have made similar arguments with regard to proposed pension reforms in Florida and Minnesota. Such criticism is distributed widely among pension stakeholders, and it can be expected that arguments about transition costs will be raised in almost any jurisdiction that is considering closing its traditional defined-benefit pension to new participants.

While arguments regarding pension transition costs are common, it is rare that the issue is examined quantitatively. That is to say, while it is not illogical to assume that a closed pension plan would hold more conservative assets as the duration of its benefit liabilities grew shorter, it is not clear how much more conservative a pension's investments should become and how quickly the plan should shift to that more conservative portfolio. Those two questions are crucial in examining how employer pension contributions would be affected by transition costs. This paper is an effort to answer those questions with greater specificity.

Before answering those questions, however, it is worth outlining the core intuition behind my argument. I do not deny that a closed plan would over time become "older" and the duration of its liabilities would become shorter. Nor do I deny that most plans would or should fund more conservatively as the plan's participants age and its liabilities become more heavily weighted toward near-term

7. California Public Employees' Retirement System, *The Impact of Closing the Defined Benefit Plan at CalPERS*, March 2011, 4.
8. California Public Employees' Retirement System, *Annual Review of Funding Levels and Risks*, November 17, 2015.
9. Tim Reid, "California City Looks to Quit CalPERS, Fears It Can't Afford To," *Reuters*, August 27, 2014.

benefit payments. What I focus on is *why* the plan's liabilities become more heavily weighted toward the near term, and I find that closing a plan to new entrants reduces the plan's long-term liabilities. That reduction in long-term liabilities does not change the way in which near-term liabilities are funded. Rather, it simply eliminates long-term liabilities. Thus, the shift toward near-term liabilities and a more conservative investment portfolio is a result of the plan's overall liabilities being reduced. If the plan's overall liabilities are reduced, then the cost of funding the plan's liabilities is also reduced. So a closed defined-benefit plan's shift toward a more conservative investment portfolio is accompanied—and indeed caused—by a reduction in the plan's total liabilities.

The process of answering questions about the size and rapidity of the shift follows several steps. First, we must think about the patterns of public pension liabilities—that is, how much the plan is obligated to pay at which points in time. Second, we must consider how pensions generally fund liabilities of different durations. And third, we must consider how a gradual shortening of plan liabilities due to the plan being closed to new entrants will affect the plan's asset allocation and funding requirements.

PATTERNS OF PUBLIC PENSION LIABILITIES

Public-employee pensions generally express their liabilities as a single dollar figure—say, $1 billion. In reality, however, that single figure represents the discounted sum of promised benefit payments ranging from the current year to many decades in the future. Public plans rarely disclose their projected annual benefit payments, although the Society of Actuaries' Blue Ribbon Panel on Public Pension Plan Funding recommended that plans be required to do so.[10] However, estimating the pattern of future annual benefit payments is necessary to analyze the issue of public-employee pension transition costs.

Figure 1 below is drawn from data released by the Oregon Public Employees Retirement System (PERS), which serves employees in the state government and in many local governments in Oregon.[11] Oregon PERS was for many years an extremely generous plan, paying the average retiree a benefit equal to about two-thirds of final salary and paying full-career employees with at least 30 years' service benefits of approximately 100 percent of final salary.[12] A lower tier for newly hired employees will reduce benefits in the future, though

10. Society of Actuaries, Blue Ribbon Panel on Public Pension Plan Funding, *Report of the Blue Ribbon Panel on Public Pension Plan Funding*, February 2014.
11. Oregon Public Employees Retirement System, *Information for PERS Employers*, October 8, 2015.
12. Oregon Public Employees Retirement System, *PERS: By the Numbers*, October 2015.

current employer funding costs remain very high. A recent legislative attempt to lower costs by reducing postretirement cost-of-living adjustments was overturned by the state's supreme court, making PERS funding a vexing issue for many government agencies.[13]

The actuaries contracted by Oregon PERS project annual benefit payments through the year 2044. However, for these purposes I wish to know all the future benefits owed by the program, which extend well beyond 2044. For that reason, I use regression analysis to construct a path of annual benefit payments designed to approximate those projected by Oregon PERS through 2044 and extending through 2093, after which I assume that no further benefits would be owed to current PERS participants.[14] While projections from Oregon PERS actuaries would be preferable to my approximations, the accuracy of the projected liabilities does not affect the qualitative conclusions to be drawn from this discussion. As will become clear, there are no plausible circumstances in which closing a defined-benefit plan to new entrants will increase the plan's liabilities, regardless of how the plan chooses to alter its investment portfolio.

It is worth discussing the patterns of these liabilities. In the current year, the entire payment is made to participants who are currently retired or disabled. In future years, however, payments will also be due to participants who are currently vested in their benefits—meaning either current employees or former employees who have yet to retire. Over time, however, benefits paid to current retirees will decline as those retirees reach their life expectancies. And over a number of decades, even benefits owed to current employees will begin to decline.

"[T]here are no plausible circumstances in which closing a defined-benefit plan to new entrants will increase the plan's liabilities, regardless of how the plan chooses to alter its investment portfolio."

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13. Oregon Public Employees Retirement System, *FAQs: Oregon Supreme Court Decision on 2013 Legislation Impacting PERS*, May 29, 2013.
14. I use a third-order polynomial to approximate payments from 2015 through 2044, while assuming that benefit payments drop to zero by the end of 2093. I then use the regression equation to estimate benefit payments from 2016 through 2093.
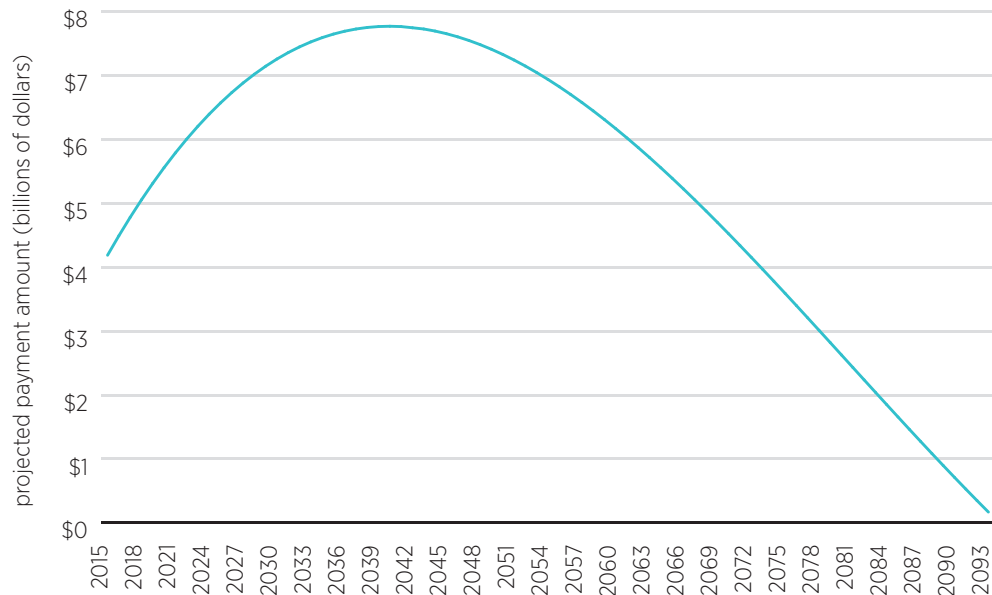
Each plan has a specific pattern of future liabilities, which can differ based upon a number of factors, including the basic generosity of the benefit formula, whether the demographics of the plan are changing, and whether benefits have increased or decreased over time. However, this basic pattern of increasing annual benefit payments over the first several decades followed by falling payments is generally held to be consistent across plans and thus can be used to illustrate the core concepts regarding transition costs.

These annual benefit payments represent the actual liabilities of the pension plan. They are specific dollar amounts that must be paid to participants at specific points in time. However, in representing these liabilities to policymakers and the public, it is customary for each year's benefit payments to be discounted back to the present using a given interest rate and then for these discounted values to be summed into a single dollar figure. So, for instance, if a plan declares itself to have $1 billion in future liabilities, that value is the sum of the discounted values of each year's individual benefit payments.

For private-sector pensions and for most public-employee pension plans in other countries, the interest rate used to calculate the present value of a given year's benefit liabilities is fixed based on the risk of the liability, not on the assets

used to fund that liability. For instance, private-sector pensions discount their liabilities using the yield curve on a basket of corporate bonds, which implies that pension benefits promised by a company carry roughly the same risk of default as bond payments promised by that company.

State and local pensions in the United States, however, use a different approach in which the interest rate used to calculate the present value of a liability is based on the expected return on the assets used to fund that liability. Most state and local plans hold an investment portfolio with an assumed annual return of about 7.75 percent.[15] Thus, plans would discount their future liabilities using this interest rate.

It should be strongly emphasized that the method of valuing future benefit liabilities used by US state and local pensions is not consistent with the way economic theory values such liabilities, nor is it consistent with the way private-sector defined-benefit pensions or pension plans for public employees in other countries value plan liabilities. Under accounting rules established by the Governmental Accounting Standards Board, a US pension plan values (or "discounts") its future benefit liabilities using the assumed return on the plan's investments.[16] This has the perverse result that a plan that takes significant risks with its investments may discount its future liabilities using a high discount rate, which results in a low present value of plan liabilities. The plan may then make low contributions to fund those future liabilities before any of the assumed high investment returns are realized. However, when a pension takes a large investment risk, there is a significant chance the plan will accrue large unfunded liabilities in the future and will be forced to increase future contributions to make up the difference. US public pension accounting standards do not capture this contingent liability, but anyone watching public pension financing in the United States knows how large a role these extra catch-up contributions play in the growing funding burden that pensions place on state and local government.

A more appropriate way to measure pension liabilities is to discount future benefits using an interest rate commensurate with the risk of those benefits. For example, corporate pensions discount their liabilities using a corporate bond yield, indicating that the risk of the corporation's defaulting on its pension benefits is comparable to the risk of its defaulting on its debt

15. This assumed annual return is based on the author's calculations using fiscal year 2014 data from Public Plans Database, accessed July 21, 2016, http://crr.bc.edu/data/public-plans-database/.
16. "Pension Standards for State and Local Governments."

liabilities.[17] For state and local governments, it appears that pension benefits are even safer than explicit government debt. Pensions have continued to be paid either in full or with only minor reductions in bankrupt cities such as Detroit, Michigan, and San Bernardino and Stockton, California, even as holders of explicit government debt receive pennies on the dollar. The financial restructuring of Puerto Rico may also follow a similar pattern where obligations to pension participants are considered senior to those of holders of explicit government debt. In these cases, discounting future pension payments using a low interest rate is a way to capture the pension sponsor's obligation to pay those benefits under almost all circumstances.

Thus, even if a plan must shift to a lower-risk, lower-returning investment portfolio, that change does not represent a net cost to the program or to the taxpayer. A lower-returning portfolio requires larger contributions up front but poses a smaller risk of large investment losses in the future. So even if the transitions cost argument is true in every way—that closing a public plan to new entrants requires shifting to a more conservative portfolio and that a more conservative portfolio requires higher contributions—it is not sufficient to conclude that the public is made worse off.

Nevertheless, as will be discussed in following sections, a more detailed examination of pension funding practices is necessary to determine the extent of change in portfolio allocations that the closing of a plan to newly hired employees would cause.

PENSION LIABILITY FUNDING FOR DIFFERENT DURATIONS

In general, both economic theory and everyday financial practice recommend that a liability that must be paid in the near term be funded with safer, and thus lower-returning, investments than a liability that must be paid in the more distant future. While there is no hard-and-fast rule, the statements from pension stakeholders cited earlier are consistent with the idea that a plan with longer-term benefit liabilities can and should take greater investment risk than a plan with a shorter duration of liabilities.

To illustrate, we must make assumptions regarding how a pension should invest to cover benefit liabilities taking place at different points in time. No fixed rule exists, and so we must rely on a rule of thumb. However, within reasonable

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17. On this issue, see Robert Novy-Marx and Joshua Rauh, "Public Pension Promises: How Big Are They and What Are They Worth?," *Journal of Finance* 66, no. 4 (August 2011): 1211–49; and Andrew G. Biggs, "An Options Pricing Method for Calculating the Market Price of Public Sector Pension Liabilities," *Public Budgeting & Finance* 31, no. 3 (Fall 2011): 94–118.

bounds, the specifics of the rule on the relationship between age and portfolio allocation make little difference to the overall conclusions that will be drawn here.

For illustrative purposes, I rely upon asset allocation rules included as part of TIAA-CREF's lifecycle fund for individual investors. A lifecycle fund automatically adjusts from a riskier, higher-returning portfolio when the individual is young and retirement is distant to a safer but lower-returning portfolio when the individual approaches retirement. The logic of such individual funds is the same as that of investments for defined-benefit plans: When a benefit must be paid in the near future, the assets used to fund that benefit cannot be very risky.

The TIAA-CREF fund contains a number of asset classes, including US equity, international equity, fixed income, short-term fixed income, and inflation-protected. However, for illustrative purposes I simplify the allocations to consist of only two asset classes: equities (meaning stocks) and fixed-income investments.[18] The TIAA-CREF fund automatically allocates assets for people aged 20 to 75 (see figure 2). From age 20 through 40, equities make up 90 percent of the fund's allocation, with fixed-income investments at only 10 percent. By age 50, equities have dropped to 75 percent of the portfolio, and by age 65, equities and fixed-income investments are evenly split at 50 percent apiece. By age 75, fixed-income investments make up 60 percent of the portfolio and equities just 40 percent. TIAA-CREF does not state whether the asset allocation would change after age 75; for these purposes I will assume that the bond share of the portfolio continues to rise and the equity share continues to decline in years following age 75 at the same pace as from ages 65 through 75. Therefore, at the assumed maximum life expectancy of age 100, the portfolio would consist of 85 percent fixed-income investments and 15 percent stocks.

I adapt the TIAA-CREF asset allocations for pension purposes as shown in figure 3. Pension benefits to be paid in the near term would be funded with a portfolio of 85 percent bonds and 15 percent stocks in order to ensure that adequate funds are on hand to pay benefits regardless of how the market may perform. Benefits to be paid in 80 years' time—such as those for the 20-year-old new employee first earning benefits today—would be funded with 90 percent stocks and only 10 percent bonds, the same allocation that TIAA-CREF uses for a 20-year-old individual investor. In intervening years, asset allocations would follow a similar pattern to the TIAA-CREF lifecycle fund. Again, very little rides upon the specifics of the rule concerning age and portfolio allocation. What matters is that pensions follow such a rule at least in general terms.

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18. Details on the TIAA-CREF fund allocations are available at http://www1.tiaa-cref.org/public /products-services/mutual-funds/lifecycle/index.html.

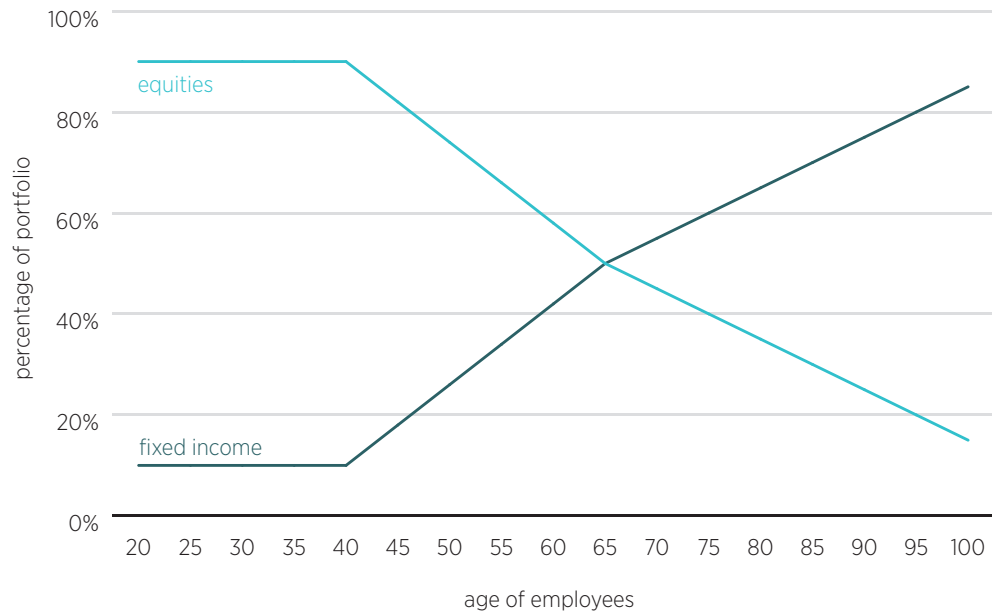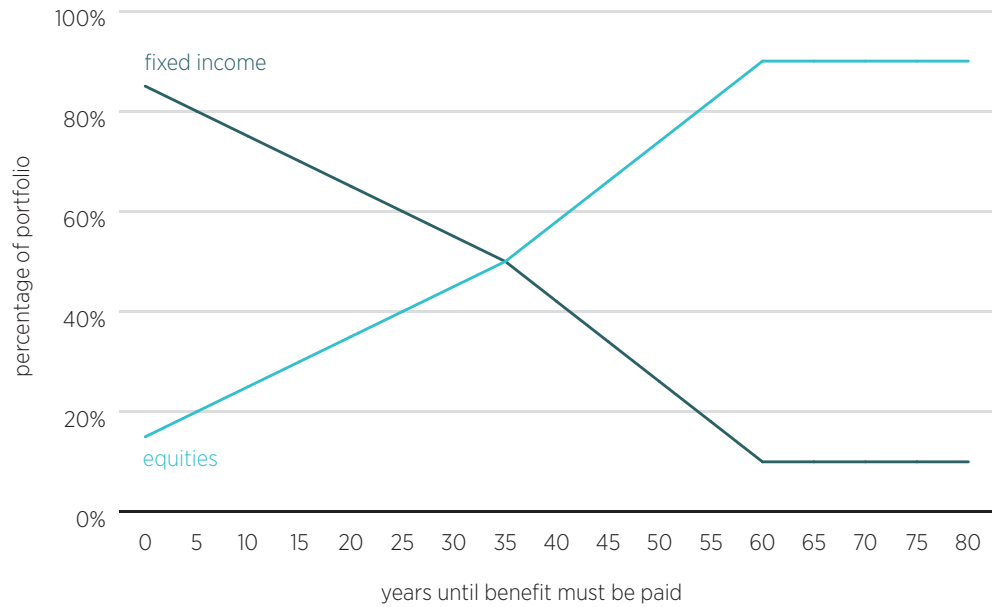**FIGURE 2. PORTFOLIO ALLOCATIONS BY AGE, TIAA-CREF LIFECYCLE FUND**

FIGURE 3. PORTFOLIO ALLOCATION FOR DEFINED-BENEFIT PENSION, BY TIMING OF BENEFIT LIABILITY

EFFECT OF PLAN CLOSURE ON PLAN LIABILITIES AND INVESTMENTS

When a public sector pension plan is closed to new entrants, the duration of its liabilities gradually shortens. For instance, imagine that in an open pension plan, the plan's longest-term liability is to a new employee, aged 20, who could live until age 100. This implies a maximum duration of 80 years. If the plan were closed to new entrants, in the following year there would be no new 20-year-old employees generating an 80-year potential liability. Rather, the plan's longest-term liability would be for the now 21-year-old worker who was hired in the previous year, implying a maximum duration of liabilities of 79 years. With each following year, the maximum duration of a closed pension plan's liabilities shrinks by one year.

Proponents of public pension plans argue that the gradual shortening of the duration of liabilities for a closed plan would imply that the plan should take less investment risk. Lower-risk investments pay lower returns because an investment's return is in part a reward for taking risk. Thus, as a closed pension plan's investments gradually become less risky, the expected return on those investments will fall.

Because under GASB rules a public sector plan calculates the present value of its liabilities using the expected return on plan assets, a lower assumed investment return would—all other things being equal—increase the present value of plan liabilities. And because public sector plans calculate their annual contributions based on the present value of plan liabilities, this process of shifting to a less risky investment portfolio would cause contributions for a closed public plan to increase. This increase in contributions is the transition cost that opponents of public-plan closures refer to.

I begin my study of transitional costs by calculating a baseline investment portfolio for current Oregon PERS benefit liabilities. For each future year, I multiply the annual nominal benefit dollar figures in figure 1 by the portfolio allocation percentages found in figure 3. Then, using the investment returns assumed by Oregon PERS for stocks and bonds, I calculate the assumed rate of return on the portfolio appropriate for the benefits to be paid in that year. I then discount the future benefit payment to the present, using the assumed return on the portfolio deemed appropriate for a liability of that duration. The yearly present values, as calculated using GASB-style expected-return discount rates, are summed to give a total liability. Likewise, the stocks and bond allocations used to fund each year's benefit payments are summed, providing a view of the plan's overall portfolio allocation.

> "[T]he pension's overall portfolio is allocated based, not on the average duration of the plan's liabilities, but on the *weighted* average duration, and years with low benefit payments carry little weight."

For instance, in the year 2020, Oregon PERS is projected to pay out $5.559 billion in benefits. According to the investment rules illustrated in figure 3, a benefit needing to be paid in five years' time should be funded with a portfolio of about 21 percent stocks and 79 percent bonds. Oregon PERS assumes that stocks have an expected annual return of 8.33 percent and fixed-income investments an expected annual return of 5.06 percent. This implies that benefits payable in the year 2020 would be funded with a portfolio with an annual expected return of 5.747 percent. If the nominal benefits payable in 2020 are discounted to 2015 using a 5.06 percent interest rate, this produces a present value of $3.997 billion. This process is repeated for each year until future benefits are assumed to be exhausted in 2094.

Following this process, I find that—if the TIAA-CREF investment allocations are followed—Oregon PERS would have total liabilities of about $102 billion, which would be funded using an overall portfolio consisting of 32.16 percent stocks and 67.84 percent fixed-income investments.[19]

Now that I have established the baseline, I can illustrate how a public plan's investment portfolio would be affected if it were closed to new participants. As discussed above, when a plan is closed, the duration of liabilities gradually shrinks. Since short-term liabilities are funded less heavily with stocks than are longer-term liabilities, the investment portfolio will have fewer stocks over time. And a portfolio with fewer stocks will have both lower risk and a lower expected return.

Using the stylized Oregon PERS baseline, when the plan is open, liabilities extend out 80 years, and each

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19. Note that Oregon PERS actuarial valuations report a lower total liability value of about $73 billion because Oregon PERS holds a portfolio that invests a greater share in stocks and a lower share in fixed-income investments than the TIAA-CREF rule would recommend. It is possible to devise a rule concerning age and asset allocation that would reproduce Oregon PERS's reported liability figures by taking substantially greater investment risk. Doing so raises the question of how committed public pensions are to targeting asset allocations to the duration of plan liabilities versus a strategy of taking greater overall risk in hopes of addressing plan funding shortfalls through higher investment returns.

year's liability is funded according to the TIAA-CREF lifecycle approach, the expected return on the plan's overall portfolio is 6.112 percent. If the plan were closed to new entrants, after 10 years the maximum duration of liabilities would shrink to 70 years, and the stock share of the portfolio would decline—but only slightly, from 32.16 percent to 32.13 percent. The reason the change is so slight is that the plan's longest-term liabilities—the benefit payments made in the distant future (see figure 1)—are small relative to the plan's overall liabilities, which are clustered toward the next several decades. In other words, the pension's overall portfolio is allocated based, not on the average duration of the plan's liabilities, but on the *weighted* average duration, and years with low benefit payments carry little weight. As a result, the expected return on the plan's portfolio 10 years following closure would decline only from 6.112 percent to 6.111 percent (figure 4).

Thirty years after the plan was closed to new entrants, the stock share would fall only from 32.16 percent to 31.20 percent. The reason, again, is that while long-term liabilities are funded more heavily with stocks than near-term liabilities, those longest-term liabilities are tiny relative to the overall obligations of the plan. The expected rate of return on the portfolio would have declined by only three one-hundredths of one percent, from 6.11 percent before plan closing to 6.08 percent 30 years later.

By the 79th year following the closure of the plan to new participants, in which the final payments are due based on benefits accrued before closing the plan, the assumed return on the plan's investment portfolio would have declined to 5.551 percent, a total 0.56 percentage point reduction from when the plan was open to new participants. Thus, the effect on a plan's portfolio allocation of closing the plan to new entrants is very small and very gradual.

EFFECT OF CHANGING ASSET ALLOCATIONS AND LIABILITIES ON EMPLOYER CONTRIBUTIONS

All other things being equal, a reduction in the assumed return on pension assets would increase the contribution required to fund the plan's liabilities. For instance, if a pension's liabilities did not change, reducing the assumed return on plan investments from 6.112 percent to 5.551 percent—the expected return on the plan's portfolio 79 years after being closed to new entrants—would increase the contribution needed to fund those liabilities by roughly 10 percent. By that time, however, the plan's liabilities have been almost entirely repaid, with only 0.02 percent of liabilities remaining from the time at which

FIGURE 4. ASSUMED PORTFOLIO RETURN, BY YEARS AFTER PLAN CLOSURE
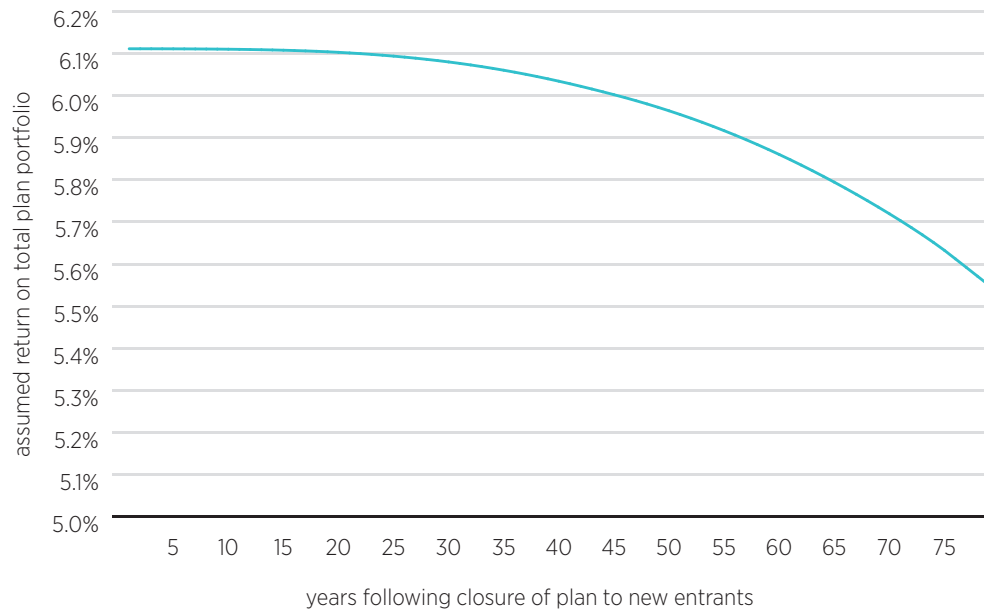
the plan was closed to new entrants. In other words, by the time these higher-liability discount rates truly come into play, there are far fewer liabilities to which the discount rates can be applied.

This pattern holds throughout the period in which a closed plan pays off benefit liabilities accrued before plan closure: The reduction in employer contributions due to falling plan liabilities is larger than the increase in contributions due to a lower assumed investment return being applied to those liabilities.

This isn't merely coincidence: No matter how high the assumed return on assets used to fund longer-term benefit liabilities, the present value of those liabilities is always greater than zero. There is no way in which eliminating those longer-term liabilities can increase the value of total plan liabilities or the payments needed to address them.

Because current participants are allowed to remain in the plan and accrue new benefits, the dollar value of plan liabilities will rise for a period before beginning to decline. That is to say, as the duration of liabilities shortens—say, going from 80 years at the time of plan closure to 79 years in the year following plan closure—the dollar value of liabilities will increase in the years following plan closure because current participants can continue to earn new benefits,

and those benefits are based on individual earnings that rise over time. However, benefit liabilities will not grow as fast as total employee payroll because over time, a rising number of employees will no longer be participating in the traditional pension plan.

EFFECT OF PLAN CLOSURE ON TOTAL EMPLOYER PENSION COSTS

Whether closing a defined-benefit plan to new entrants increases or decreases *total* employer pension costs depends on the level of combined contributions for the remaining traditional defined-benefit plan and for whatever plan is implemented for newly hired employees. If new employees were enrolled in a 401(k)-type retirement plan with an employer contribution that is typical of such plans (about 3 percent of employee payroll[20]), it is likely that modest cost savings would begin immediately and build over time. Even under GASB rules, the typical state and local pension plan's "normal cost" to employers is around 7 percent of employee payroll.[21]

Moreover, the employer contribution to a 401(k)-type defined-contribution plan fully satisfies the employer's obligation to the plan, while an employer contribution to a defined-benefit plan funded with risky assets comes with the contingent liability to make up for asset losses should they occur. In other words, while a defined-benefit plan may have a given an expected cost, the actual cost of funding plan liabilities can change significantly from year to year based on the performance of the plan's investments. Thus, a governmental entity that closes an existing defined-benefit plan to new entrants and enrolls new hires in a defined-contribution plan replaces a risky pension obligation with a fixed annual payment that does not change from year to year.

CONCLUSIONS

Closing a defined-benefit pension plan to new participants has two effects with regard to the plan's financing. First, the duration of the plan's liabilities shortens as existing participants age but are not replaced with newly hired employees. Second, in response to the shortening duration of liabilities, many

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20. Bureau of Labor Statistics. *National Compensation Survey 2014*, Table 52, http://www.bls.gov/ncs/ebs/detailedprovisions/2014/ownership/private/table52a.txt.
21. Author's calculations for fiscal year 2014 from the Public Plans Database.

plans would shift toward a safer, lower-yielding investment portfolio. Claims of transition costs associated with closing a pension plan are based upon the change in the plan's portfolio in isolation from the reduction in the plan's liabilities that causes the shift in portfolio allocation. When the results of closing a defined-benefit pension plan are viewed in totality, it becomes clear that liabilities do not increase.

To be clear, closing a pension plan to new entrants does not provide immediate relief from high pension costs, because already accrued liabilities must be met and current participants continue to accrue new benefits. In the private sector, pension cost containment has often been pursued through so-called hard freezes in which not only is the plan closed to new entrants, but current participants are shifted to a new plan, such as a 401(k). A soft freeze, in which current participants continue to accrue benefits, will reduce costs more slowly than a hard freeze.

However, there is no year when employer pension costs *rise* because of closing the plan to new entrants, which is the definition of so-called transition costs. The plan's portfolio becomes more conservative only because the longest-term liabilities, those that are generally funded most heavily with stocks, are eliminated. Mathematically, it is not possible for the elimination of liabilities—however those liabilities might be financed—to increase the cost of funding a plan's liabilities. Over time, moreover, employer pension costs decline when the current plan is closed to new entrants.

ABOUT THE AUTHOR

Andrew G. Biggs is a resident scholar at the American Enterprise Institute (AEI), where his work focuses on retirement income policy. Before joining AEI, Biggs was the principal deputy commissioner of the Social Security Administration. In 2005, he worked on Social Security reform at the White House National Economic Council. In 2013, the Society of Actuaries appointed Biggs co-vice-chair of its Blue Ribbon Panel on public pension underfunding. In 2014, *Institutional Investor* named him one of the 40 most influential people in the retirement world. Biggs holds a bachelor's degree from Queen's University Belfast in Northern Ireland, master's degrees from Cambridge University and the University of London, and a PhD from the London School of Economics.