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PERCSPECTIVES ON POLICY

MARKET RISK AND RETIREMENT PLANS

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Retirement planning is fraught with uncertainty. Workers want to end up in a position where their employer-sponsored retirement plan, household savings, and Social Security will provide enough annual income to pay for their anticipated living expenses in retirement. These include health care spending during retirement, a special concern for those hoping to retire before reaching 65, the age of Medicare eligibility.

For most Americans, Social Security and employer-sponsored retirement plans provide the bulk of the resources they will draw from during their retirement years. Social Security benefits, at least for now, are fairly straightforward to plan around and have the least uncertainty. The benefit formula has been stable for many years. The calculation of workers' benefits begins with determining their average monthly income based on their 35 highest wage-indexed years of earnings. This average monthly income is then converted to a monthly payment based on a progressive benefit formula. Retirees' monthly benefits are also indexed for inflation throughout their retirement.

Today, most workers' employer-provided retirement plans are defined contribution plans, often referred to as 401k plans. These plans are prevalent in the private sector. Employers and employees each contribute a specified percentage of each employee's monthly earnings into that employee's account. The accounts are invested in approved investment vehicles, typically equity and bond mutual funds. The funds grow from the ongoing contributions and the returns on investment. Most workers have at least some choices over how their accounts are invested. The total value of workers' accounts at retirement are contingent on the level of their monthly contributions through their working years and on the performance of the portfolio the workers chose.

In contrast, some workers, particularly those

who work in the public sector, are enrolled in defined benefit plans, often just called pension plans. Like defined contribution plans, employers and employees each contribute a specified percentage of the employees' monthly earnings into the defined benefit plan. The pension plan manages how the contributions are invested – in stocks, bonds, real estate, and other investments – with the goal of supporting the eventual defined benefits promised to plan participants. Like Social Security, these plans have a benefit formula. The formula is often based on a conversion factor multiplied by the number of years of employment with the sponsoring employer, then multiplied times the average of several of the worker's highest earning years.

With the defined contribution plan, workers' ultimate retirement nest egg is uncertain due to market risks. With the defined benefit plan, workers' benefits are based on a formula, but the value of the underlying investment portfolio held by the pension plan is also uncertain due to market risks.

Market risk exists with both defined contribution and defined benefit retirement plans, but for the defined benefit plan – the pension plan – this risk is borne by the plan itself and not by the worker. Of course, the plan is provided by the employer, and employer bears the market risk. For public sector plans, the employer is a government institution and agency, so market risk is ultimately borne by taxpayers.

How can we compare the relative risks of defined contribution and defined benefit plans? Who insures the defined benefit pension plans when their returns are lower than expected? How does the pension plan adjust to market uncertainty? Does it increase contribution rates when the funding gap is forecast to increase, or does it reduce benefits? These questions are just a few of many that arise when attempting to compare the two types of pension plans.



Today, only about 14% of full-time private sector employees participate in a defined benefit pension, whereas 81% of state and local government workers participate in such a pension plan. Private sector pensions are insured through the Pension Benefit Guaranty Corporation (PBGC). While the PBGC is government owned, premiums from the individual pension plans (and not taxes) are intended to fund the provided insurance. The PBGC's program covering single employers is in good shape financially, although the multi-employer program (largely covering private sector plans provided by unions) is expected to be insolvent in the next 5 to 6 years.¹

In Texas, the largest public sector defined benefit pension plan is the Teacher Retirement System (TRS) with almost 1.7 million members. TRS has a reported unfunded actuarial accrued liability of \$47.6 billion for 2021 and a funded ratio of assets to liabilities of 79.1%. This means that the program is now underfunded by almost 21%. This is an improvement from 2020 when the funded ratio had been 76.8%. The rise in the funding ratio in 2021 is the result of an investment return of 24.8%, largely due to returns in the stock market and in real estate. Around the country the story is the same; The Pew Charitable Trusts expect the rise in investment returns to have increased the funded ratio for public sector pensions to 84% in 2021 for the pension plans it tracks, up from an estimated funded ratio of 69% in 2020.² However, even with this exceptional investment return for fiscal year 2021, state and local pension plans remain underfunded.

One way to illustrate how market risk affects both defined benefit and defined contribution plans is to simulate the investment outcomes for two otherwise identical hypothetical individuals, one participating in each type of retirement plan. Here we use the realized distribution of historical stock and bond returns over the last 25 years to simulate a range of portfolio outcomes for a hypothetical Texas teacher who begins working in 2021 at the age of 30 and retires 32 years later in 2053. The assumption of continuous work is for illustrative purposes. Importantly, fewer than half of female teachers in Texas, who account for about 80% of plan participants, remain employed for 7 years and less than 25% work for 25 years. We assume that our hypothetical teacher's future earnings follow an earnings path based on the average of the career earning schedules from the Austin, Dallas, Fort Worth, Houston, and San Antonio

school districts.³ Annual contributions from the employer and employee are based on the rates used in the 2021 TRS Actuarial Valuation Report. In 2021 the total contribution rate is 16.21%, and by 2025 it rises to 17.75%.⁴

The distribution of equity returns (including dividend reinvestment) and bond returns, including their correlation, for the past 25 years are used to develop the simulated range of outcomes for the hypothetical workers.⁵ Over the last 25 years, the average nominal return on equities, including dividend reinvestment, was 10.9% and the average nominal return on 10-year government bonds was 3.7%. As a point of reference, during these years the inflation rate averaged 2.24%.

Two portfolios are modeled. The first portfolio is a simplified version of the portfolio held by TRS with a fixed 80% allocated to equities and 20% to bonds.⁶ The second portfolio is a simplified version of a life-cycle portfolio with a high equity share when the worker is young that declines as the worker approaches retirement.⁷ For the lifecycle portfolio we also assume an expense ratio of 0.52% based on Morningstar's asset-weighted average for target date funds.⁸ The lifecycle portfolio is intended to represent a range of outcomes the workers could achieve if they invested in a standard target date fund.

The table below summarizes the distribution of 1,000 simulated retirement accumulations for the two portfolios, the fixed share portfolio and the lifecycle portfolio, in nominal dollars (in 2053). Each run of the simulation produces a different accumulated portfolio measure. On average, the fixed share portfolio produces retirement wealth of \$2.468 million while the lifecycle portfolio produces average retirement wealth of \$2.094 million. Meanwhile, for the defined benefit employee, the implied retirement wealth is \$2.123 million, slightly higher than the retirement wealth based on the lifecycle portfolio.⁹ This value of the implied TRS wealth is at the 46th percentile in the distribution of the fixed share portfolio outcomes and at the 60th percentile in the distribution of the lifecycle portfolio outcomes.

This simulation illustrates that at currently-scheduled contribution rates, the value of the TRS pension is higher than 60% of the simulated lifecycle portfolio outcomes, and thus is lower than 40% of those outcomes. Does this mean that the defined benefit pension is superior to a defined contribution plan invested in a lifecycle portfolio?



Simulated Accumulated Savings at Retirement

Value at 62 Years of Age

| | Average | 25 th Percentile | 50 th Percentile | 75 th Percentile | Percentile of the TRS Pension's Value |
|-----------|-------------|-----------------------------|-----------------------------|-----------------------------|---------------------------------------|
| Fixed | \$2,467,598 | \$1,614,465 | \$2,182,159 | \$3,060,804 | 46 |
| Lifecycle | \$2,094,210 | \$1,432,974 | \$1,895,021 | \$2,552,508 | 60 |

In 60% of the cases, for a worker who remains in the system for 33 years, the answer is yes. Of course, for workers who work fewer years or desire portability in the case of job or career changes, the defined contribution plan is preferred. (As previously noted, many TRS participants work fewer than 25 years and as a result, the earnings on which their TRS benefit is calculated are earned years before their retirement age. With inflation, the value of their pension at retirement is diminished. For these workers, the portability of the defined contribution plan allows their savings to continue to grow until retirement.)

The simulation also shows that at currently scheduled contribution rates the stylized TRS portfolio allocation will fund the TRS pension for 54% of the outcomes, but will fall short for 46% of the outcomes. This illustrates the market uncertainty borne by TRS and, ultimately, largely falls on taxpayers. That is, in our simulations the TRS contribution amounts and investment allocation will fund the TRS promised pension payouts just under half the time, and will fail to fully fund the promised pension payouts in just over half the time.

It should be noted however, that the currently scheduled contribution rates are much higher than they were in recent years. Legislative changes in 2013 increased employer and employee contribution rates and legislative changes in 2019 further increased these rates. At the contribution rates in place prior to 2013, 70% of the outcomes would fall short of the amount necessary to fund the TRS pension. One other revenue source available to defined benefit pension plans are forfeited employer contributions made on behalf of employees who do not vest in the pension. These revenues bolster the pension plan's revenues from contributions and investment returns, but as evidenced by the recent legislative changes higher contributions were also necessary. The higher employer contributions lead to higher taxes, which is how taxpayers ultimately provide some of the insurance for public pension

plans. Higher contributions from current workers are the other source of insurance.

Both defined contribution and defined benefit plans must deal with market risk. Given that at the currently scheduled contribution rates of incoming teachers could have a portable defined contribution plan that rivals the pension offered by TRS, it may be time to consider giving teachers to option to participate in such a plan.

¹ Congressional Research Services, "An Overview of the Pension Benefit Guaranty Corporation," January 8, 2021.

² Pew Charitable Trusts, "The State Pension Funding Gap: Plans Have Stabilized in Wake of Pandemic, September 2021.

³ We assume wages grow at 3% per year based on the payroll growth rate for TRS from the Texas Pension Review Board. <https://data.prb.texas.gov/plans/327.html>

⁴ Teacher Retirement System of Texas, Actuarial Valuation Report, August 31, 2021. See table on page 4 and Table 5b. on p.22. Contributions of rehired retirees are not included in rates used here.

⁵ Stock, dividend, and bond returns are from Robert Shiller's online data, U.S. Stock Market 1871-Present and CAPE Ratio. <http://www.econ.yale.edu/~shiller/data.htm>. We use the means, variances, and covariance of the stock and bond returns from June to June for the last 25 years to simulate 1,000 lifetime accumulations.

⁶ This allocation is based on the asset allocations provided for TRS from the Texas Pension Review Board. <https://data.prb.texas.gov/plans/327.html>

⁷ The equity/bond allocations are estimated from Figure H.6, p. 108 in, "Pension Benefit Design Study," Teacher Retirement System of Texas, December 2018. At young ages over 90% of the portfolio is allocated to equities and the equity share remains above 80% until the worker reaches 50 years of age. Between 50 and 62 the equity share declines more rapidly, reaching 57% at the age of 62.

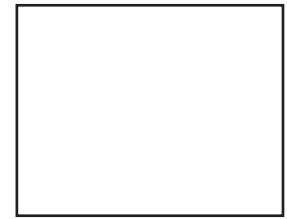
⁸ "What Are Target-Date Funds?" by Karen Wallace, May 7, 2021. <https://www.morningstar.com/articles/808120/what-are-target-date-funds>

⁹ The implied value of the TRS pension assumes a nominal annuity rate of 4%. Cohort life tables from the Social Security Administration are used to calculate the expected net present value of the TRS pension payments.



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