



# The effect of pension design on employer costs and employee retirement choices: Evidence from Oregon<sup>☆</sup>



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## ABSTRACT

We use administrative data from Oregon's Public Employees Retirement System (PERS) to study the effect of pension design on employer costs and employee retirement-timing decisions. During our 1990–2003 sample period, PERS calculates each member's retirement benefit using up to three different formulas (defined benefit (DB), defined contribution (DC), and a combination of DB and DC), and PERS pays the maximum benefit for which the member is eligible. We show that this "maximum benefit" calculation results in average ex post retirement benefits that are 54% higher than if they had been calculated using only the DB formula and that employees receiving DC benefits are significantly more likely than employees receiving DB benefits to retire before the plan's normal retirement age. Monte Carlo simulations verify that the higher costs could have been predicted at the start of our sample period. Exploiting exogenous plan changes, we show that employees respond to within-year variation in their retirement incentives and, consistent with peer effects, that they respond more strongly to these incentives when more of their coworkers face similar incentives. Finally, consistent with the emerging literature on financial mistakes by households, we show that a small but noteworthy fraction of retirees would have benefited from shifting their retirements by as little as one month.

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## 1. Introduction

Employers must weigh the expected benefits of the pension plans they offer to employees against the expected costs. Among other benefits, offering a generous pension plan may allow an employer to attract

and retain higher quality employees. Governor Tom McCall emphasized these potential benefits in 1967 when arguing to reform Oregon's Public Employees Retirement System (PERS):<sup>1</sup>

"We are in a time of inflation and high employment. I have personal experience with the difficulty of recruiting top quality people at the available salaries and personal knowledge of the real sacrifices made by some who have accepted positions in my administration.... At all levels our state employment has shown heavy turnover. This requires extensive recruiting and training programs and threatens a real loss of competency if not checked...."

The idea was that a more generous pension plan would improve the quality of the services provided by state and local employers while reducing the administrative and other costs associated with employee turnover. On the other hand, increasing expected retirement benefit payments imposes a direct cost on employers who must cover the larger pension payments. It may also impose indirect costs insofar as changes to plan generosity affect employee behavior.

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<sup>1</sup> The quote comes from page 12 of "The Oregon Public Employees Retirement System History, the First 60 Years," published by PERS on July 6, 2010.

PERS was created in 1946 and has been modified over the years by the state legislature. By 1990, PERS had evolved into a complex pension plan with both defined benefit (DB) and defined contribution (DC) elements, serving essentially all non-federal public employees across the hundreds of non-federal public employers in Oregon.<sup>2</sup> In particular, during our 1990–2003 sample period, PERS calculates each member's retirement benefit using up to three different formulas (DB, DC, and a combination of DB and DC), and PERS pays the maximum benefit for which the member is eligible. The DB benefit depends upon the member's salary and years of service. The DC benefit depends upon the accumulation of assets in one or two DC-style retirement accounts. To be clear, the DC elements in PERS differ significantly from those in a traditional 401(k) plan: Oregon manages the investments, provides an annual return of at least 8% to certain plan members, and converts DC account balances into life annuity payments using annuity factors that Chalmers and Reuter (2012) show to be better than actuarially fair. The fact that members can expect to receive higher retirement benefits when equity market returns have been high makes the pension more generous to members—and more expensive to PERS employers—than if PERS used only its DB benefit formula. Similarly, the fact that members are insured against downside market risk makes the pension more generous to members—and more expensive to PERS employers—than if PERS used only its DC benefit formula. Indeed, rising pension costs led the state legislature to restructure PERS in August 2003, removing the “maximum benefit” feature for new employees and reducing the value of the “maximum benefit” feature of the plan for existing employees.

In this paper, we use administrative data to study the effect of PERS' structure on both employer pension costs and member retirement-timing decisions between January 1990 and December 2003. We begin by comparing the actual retirement benefits of PERS retirees to the hypothetical benefits they would have received if PERS used only its DB benefit formula. We find that the majority of retirees (87.5%) receive higher benefits than they would have if PERS used only the DB benefit formula. And, for the typical retiree whose career started at age 39 and ended after 21 years of service, actual benefits are 54% higher than those calculated using just the DB benefit formula. While some of the additional costs can be attributed to the effect of high equity market returns on DC account balances, more than half of them can be attributed to generous features of the plan, especially PERS' use of better-than-actuarially-fair annuity factors. When we replace PERS' annuity factors with those available each year from insurance companies, we find that actual benefits would have only been 24% higher than those calculated using the DB benefit formula.

To benchmark our ex post cost estimates, we simulate the ratio of DC benefits to DB benefits using PERS plan features as of January 1990 and historical equity market return data from 1929 to 1989. Our simulation results show that, in expectation, most members earn larger DC benefits than DB benefits. For a simulated member whose PERS career starts at age 39 and ends when she reaches the early retirement age of 55, DC benefits are 18% higher than DB benefits at the 25th percentile of the ex ante distribution, 31% higher at the median, and 48% higher at the 75th percentile. Had the simulated member worked for an additional 5 years (matching the career length of the typical retiree in our sample), her DC/DB ratio would have been even larger. These findings imply that PERS could have forecast in 1990 that offering the DC benefit formula would significantly increase its expected pension costs. A more general implication is that expected pension costs can increase sharply when retirement benefits are linked to call-option-like payoffs in the equity market.

While our data do not allow us to assess the effectiveness of PERS in attracting and retaining high-quality employees, they do allow us to

assess how plan design affects member retirement behavior. We find that as average retirement benefits increase above the levels they would be in a DB-benefit-only plan, the probability of PERS members retiring before the plan's normal retirement age increases. In part, this pattern reflects the fact that high equity market returns during our sample period allowed a subset of retirees to earn more in retirement benefits than they earned in salary. More generally, by allowing members to fund retirement after fewer years of service, PERS' structure increases employee turnover, which increases administrative costs associated with hiring and training more employees.<sup>3</sup> It also makes member retirement-timing decisions more sensitive to equity market returns.

To provide more direct evidence on the link between pension design and retirement-timing decisions, we exploit two major sources of exogenous variation in the level of the DC benefit. The first arises from the fact that, until January 2000, PERS calculated returns earned in the DC-style accounts only once per year, in March. For members retiring in other months, their account balances were determined by extending the prior year's return forward, providing them with the opportunity to exploit “stale returns” (in the spirit of Stanton, 2000). Consider a member trying to decide, in February 1993, whether to retire in February or March. She earned an annual return of 15% in her member account in 1991. However, because equity market returns were significantly lower in 1992, she expects to earn an annual return of 8% in 1992. If the member retires in February 1993, before PERS finalizes the prior-year return, PERS will calculate the change in her DC account balance between January 1992 and February 1993 using the stale prior-year return of 15%. But, if she retires in March 1993, she expects that PERS will calculate the change in her DC account balance between January 1992 and March 1993 using an updated prior-year return of 8%, resulting in significantly lower benefits. In this example, the member faces a strong incentive to retire in February instead of March.

We find that members' retirement-timing decisions respond to PERS' use of stale returns. This is true both in graphs showing that the fraction of retirements occurring in January and February (when members are best able to estimate the retirement incentive due to stale returns) falls sharply after PERS eliminates the use of stale returns in January 2000 and in regressions using members' retirement incentives to predict their retirement dates. While our findings suggest that the typical member is able to determine whether she benefits from having her DC account balance calculated using stale returns, we also find that several hundred of the members who retired in February, and therefore had DC benefits calculated using stale prior-year returns, would have been better off retiring in March, when the prior-year returns were finalized. In other words, just as Campbell (2006) finds that some households make costly financial mistakes, we find that some members make costly mistakes with respect to the retirement-timing decision.

The second major source of exogenous variation arises from PERS' adoption of updated annuity factors in July 2003. Because the old annuity factors were based on mortality tables from 1978, and because life expectancies have subsequently increased, the new annuity factors reduced DC retirement benefits between 1.4% and 17.8%. Consistent with members seeking to avoid this well-publicized reduction in benefits, we observe more retirements during the first six months of 2003 than during any other six-month period between 1990 and 2003. Furthermore, in our regressions, we find that members facing larger reductions in annuity factors are more likely than those facing smaller reductions to retire before July 2003. This highlights the challenge that employers face when seeking to reduce pension costs: attempts to lower pension costs by cutting future benefits are likely to trigger additional retirements, which are likely to both attenuate the cost savings and impose administrative costs on employers, at least in the short run.

<sup>2</sup> See Snell (2012) and the following link for a listing of state and local plans that provide complex benefits plans that share some common characteristics with the Oregon plan: <http://www.nasra.org/resources/HybridBrief.pdf>.

<sup>3</sup> Goda et al. (2009) discuss similar policy issues that arise from the retirement incentives built into the U.S. Social Security system.

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