Journal of Public Economics xxx (2014) xxx–xxx

Contents lists available at ScienceDirect

Journal of Public Economics

journal homepage: www.elsevier.com/locate/jpube

Linking benefits to investment performance in US public pension systems ☆

Robert Novy-Marx [a,1], Joshua D. Rauh [b,*]

[a] University of Rochester and NBER, United States
[b] Stanford University and NBER, United States

ARTICLE INFO

Article history:
Received 18 October 2012
Received in revised form 25 November 2013
Accepted 14 January 2014
Available online xxxx

Keywords:
Pensions
State and local public finance
Risk sharing

ABSTRACT

This paper calculates the effect that introducing risk-sharing during either retirement or the working life would have on public sector pension liabilities. We begin by considering the introduction of a variable annuity for the retirement phase in which positive benefit adjustments are granted each year only if asset returns surpass 5%. This change would reduce unfunded accrued liabilities by over half, and would lower the annual contribution increases required to target full funding in 30 years by 44%. Alternative measures that have similar effects on costs include increasing employee contributions by 10.3% of pay while keeping benefits unchanged; or giving employees a collective DC plan with an employer contribution of 10% of pay for future service. If there is a minimum guarantee that benefits cannot fall below their initial levels, the impact of introducing variable annuities is substantially smaller. We discuss these results in the context of models of lifecycle portfolio choice, and analyze the conditions under which lifecycle agents might receive utility gains from the implementation of variable annuities.

1. Introduction

Pension systems in the US are typically either pure defined benefit (DB) plans, in which the employer bears all the investment risk and responsibility for asset allocation, or individual defined contribution (DC) plans, in which risk bearing and asset allocation are the responsibility of the employee. If the goal of a pension system is to provide economic security in old age in a financially sustainable way (Barr and Diamond, 2008), neither of these plan types has succeeded. State and local DB plans in the US have funding arrangements that have created large fiscal liabilities for their sponsors (Novy-Marx and Rauh, 2011a). Meanwhile, evidence suggests that the 401(k) implementation of the individual DC plan model has resulted in some employees making suboptimal savings and investment decisions (Brown et al., 2007; Choi et al., 2011; Tang et al., 2010) and paying substantial fees for the funds in their individual accounts.

As of 2011 there were 11 million full-time employees of state governments, 4 million full-time employees of local governments, and around 10 million retirees of these governments. 83% of these employees are in DB only plans.[2] The retirement income replacement rate of DB plans plus Social Security for public sector workers can run over 100% (Beshears et al., 2011). Unfunded pension obligations at the state and local level were $3.1 trillion in 2009 (Novy-Marx and Rauh, 2011a, 2011c) and probably top $4 trillion today.

In addressing the problem of unfunded DB liabilities, several states including Colorado, Minnesota, South Dakota, and New Jersey have reduced or eliminated automatic cost of living adjustments (COLAs). In response to underperforming investments, these states have essentially performed ex post renegotiations of the pension contract, partially converting real benefit streams into nominal benefit streams. While these attempts to change COLAs have been challenged in courts, they have generally been upheld, whereas some other reforms that directly impact the workforce such as raising retirement ages for all workers have faced greater challenges.[3] COLA adjustments can have a large effect on unfunded liabilities (Novy-Marx and Rauh, 2011b).

Rather than attempt continual, costly renegotiation of contracts, a more efficient alternative is to implement ex ante risk sharing. For example, participants in most DB systems in the Netherlands now bear some investment risk. The retirees only receive COLAs if the assets in the fund have performed sufficiently well during both their working

☆ Rauh gratefully acknowledges funding from the Zell Center for Risk Research at the Kellogg School of Management. We thank Lans Bovenberg, Debbie Lucas, James Poterba, Eduard Ponds, Steve Zeldes, an anonymous referee, and participants at the 2012 Netspar Pension Workshop, the 2012 NBER Conference on Retirement Benefits for State and Local Employees, and the Vienna School of Economics for helpful comments. We thank David Villa for useful conversations.

* Corresponding author at: 655 Knight Way, Stanford, CA 94305, United States. Tel.: +1 650 723 9898.
E-mail addresses: Robert.Novy-Marx@simon.rochester.edu (R. Novy-Marx), Rauh_Joshua@gsb.stanford.edu (J.D. Rauh).
[1] Tel.: +1 585 275 3914.

[2] This calculation is based on data from the Bureau of Labor Statistics National Compensation Survey: Benefits. http://www.bls.gov/ncs/ebs/benefits/2012/ownership/private/table02a.htm.

[3] Other states have responded to unfunded liabilities by raising employee contributions, another example of ex post cost shifting.

0047-2727/$ – see front matter © 2014 Elsevier B.V. All rights reserved.
http://dx.doi.org/10.1016/j.jpubeco.2014.01.007

lives and during their retirement, an arrangement known as conditional indexation (see Bovenberg and Nijman, 2011; Ponds and van Riel, 2009). Employees might bear even more risk through a collective DC arrangement, where not only the COLA but also the accrued benefit is a function of asset performance and the sponsor no longer provides a benefit guarantee.[4]

Public sector plans in the US rarely involve true risk sharing. In several states, employees receive both DB and DC benefits, and in isolated cases (e.g., Oregon) DC assets are pooled.[5] The Wisconsin Retirement System (WRS) is unique among US public sector DB plans in that post-retirement annuity adjustments explicitly depend on investment returns. Retirees in the Core program of the WRS receive no COLAs, but rather performance-linked benefit increases that are granted only if smoothed asset returns achieve at least a 5% return threshold and all actuarial assumptions are met. WRS employees also are guaranteed that their benefits will not fall below their initial level at retirement, a feature that limits the scope of benefit cuts for retirees but adds costs to the plan.

We call this feature of the Wisconsin system performance-linked annuity adjustments, or PLAAs. In such an arrangement, participants only bear the risk during retirement.[6] This is in a sense the opposite of a collective DC plan with annuitization, in which the participants bear risk during the accumulation phase of the lifecycle.

This paper considers the effects that introducing risk sharing either late in the lifecycle through PLAAs or earlier in the lifecycle through a collective DC arrangement would have on US public pension liabilities, and on their cash-flow demands. Specifically, we calculate the effects that PLAA indexation would have if it could be applied prospectively to retiree benefits in all 50 states, and we derive the employee contribution increases that would have equivalent effects on government budgets. We then calculate how large the employer contribution would have to be under the introduction of a collective DC arrangement if similar cost-savings were to be achieved through risk-sharing early in the lifecycle.

Replacing COLAs across the US with PLAAs with a 5% hurdle and a guarantee that benefits would not fall below their initial level at retirement reduces the present value of legacy liabilities by $575 billion (or 12%) and the unfunded legacy liability by around 25%. Without minimum benefit guarantees, the legacy liability falls by $1.2 trillion (or 26%) and the unfunded legacy liability falls by 53%. These reforms would also lower the annual required revenue increases to fund state plans within 30 years. These required increases stand at $1147 per household per year under current plan rules.[7] They fall to $770 per household per year with PLAAs if benefits are not guaranteed to remain above a minimum level, but to only $1016 per year if benefits are guaranteed not to fall below the initial level at retirement.

Tying benefit adjustments to higher threshold rates of return would of course have stronger cost shifting effects. In the limit, a variable annuity with a high enough threshold and a guaranteed nominal floor is equivalent to eliminating COLAs entirely, which Novy-Marx and Rauh (2011b) show would reduce unfunded liabilities by approximately half. The cost savings to states from moving to PLAAs with a 5% hurdle and no minimum benefit guarantee would be equivalent, on average, to states requiring employees to increase payroll contributions by 10.3 percentage points, i.e. 10.3% of pay. With benefits guaranteed not to fall below the initial minimum, the equivalent savings would be only 2.6% of pay.

The PLAA arrangement leaves participants bearing risk only during retirement, not during the time they are working. Standard intuition from the lifecycle portfolio literature (Jagannathan and Kocherlakota, 1996; Heaton and Lucas, 1997; Viceira, 2001; Campbell and Viceira, 2002) suggests that given a choice, individuals prefer to bear risk during the earlier years of their lives instead of the later years. We find that freezing DB plans and implementing collective DC plans in which the employers contribute 10% of pay to the employee's account would achieve the same cost savings as introducing PLAAs for all employees. The collective DC plan could offer either mandatory or voluntary annuitization upon retirement, which if converted at market rates without guarantees would impose no additional costs on plan sponsors relative to a lump sum.

We also find substantial heterogeneity across states in the effects of introducing hybrids. States that currently have large COLAs stand to gain the most from implementing variable annuity adjustments. States with relatively high service cost accruals of the DB plan (e.g., benefit factors), those with relatively low current contribution rates, and those in which employees are already mostly in Social Security benefit relatively more from introducing the collective DC arrangement than from the introduction of variable annuities. While our analysis considers the effects of these reforms as mandatory measures for all workers, there also would be substantial heterogeneity across worker groups in which of the reform options would be preferred.

We briefly discuss some of the legal issues that states would face in converting COLAs to PLAAs. In states where benefits are protected by "diminished or impaired" language, such reforms (and in fact any reforms to existing pension benefits) would probably not be legal without changes to state constitutions (Monahan, 2010). In others, they may be applicable to some or all participants. Introducing risk-sharing through a collective DC arrangement for future accruals would be allowable as long as the law allows changes to prospective benefit accruals.

A move from guaranteed COLAs to PLAAs would achieve cost savings for taxpayers by reducing the present value of expected benefits for existing employees. In the 40% of plans where existing COLAs are linked to consumer price inflation, the reform would leave members exposed to inflation risk that they previously did not bear. In fact, one way to conceptualize a COLA as a subset of the framework of PLAA plans is to think of it as a PLAA with a return threshold equal to the real rate of return on inflation-linked bonds.

In plans where existing COLAs guarantee fixed-rate benefit increases, the relief for taxpayers is achieved by linking the benefit increase to performance, instead of increasing payments irrespective of asset returns. In this latter type of plan, employees currently do not have inflation protection per se but simply higher expected levels of benefits. The variable annuities in PLAAs do provide some inflation protection, however, because the performance thresholds are nominal, whereas long run nominal investment performance is correlated with inflation.

In a utility framework, we find that depending on the parameters, PLAAs with the hurdle rates and floors that we study in this paper can have either gains or losses relative to a COLA in terms of expected utility. Of course, the PLAAs we compare to COLAs here are generally substantially cheaper to provide, particularly with 5% hurdle rates and above. Even where expected utility is reduced, there are points of the distribution where the utility outcomes from the PLAAs surpass those of the COLAs, due to the benefits of equity exposure to CRRA utility agents with relatively modest degrees of risk aversion.

[4] In contrast to an individual DC plan like a 401(k), investment risk in a collective DC plan is pooled both within and across generations of participants in the plan. The United Kingdom Department of Work and Pensions (2009) surveys these arrangements.

[5] The cash balance plans that have replaced a number of traditional DB plans in the corporate sector are a hybrid arrangement analogous to a collective DC plan with a minimum return guarantee during the employee's working life. Nebraska state employees and certain Texas municipal and county employees are in cash balance plans (NASRA, 2013).

[6] The WRS has other option-like features including the participant's option to take a money-purchase benefit based on contributions and investment performance instead of a formula-based benefit. So in fact WRS employees can participate in the upside of investment performance during the accumulation phase, although not the downside. Furthermore, WRS employees have the option to participate in a Variable Fund program that increases the amount of risk borne by the participant during both the accumulation phase and the decumulation phase. The Core benefit represents most of the system assets.

[7] This is a calculation for state-sponsored plans only. Novy-Marx and Rauh (2014) introduce this methodology and calculate required increases of $1385 per household per year for state and local plans combined.

Please cite this article as: Novy-Marx, R., Rauh, J.D., Linking benefits to investment performance in US public pension systems, J. Public Econ. (2014), http://dx.doi.org/10.1016/j.jpubeco.2014.01.007