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APRIL 2018

POLICY SOLUTIONS FOR MISSOURI'S GOVERNMENT EMPLOYEE PENSIONS

By Andrew G. Biggs

INTRODUCTION

It is by now well known that many state and local government employee retirement systems face significant funding shortfalls. On paper, public sector pensions acknowledge being underfunded by more than $1 trillion; economists estimate a nationwide funding shortfall exceeding $4 trillion. Missouri's public employee plans are no exception: the main state government plan, the Missouri State Employees Retirement System (MOSERS), has seen its funding health decline while required government contributions have increased. Policymakers are looking for ways to reform public employee pensions to reduce both costs and risks to government budgets while maintaining retirement programs that serve public employees. This paper examines a range of reform options that policymakers may wish to consider in reforming the MOSERS plan. None of these reforms is a silver bullet that will

restore MOSERS to full funding. But together they can form the basis of a long-term reform package to make Missouri public pensions affordable and sustainable.

The paper begins by summarizing MOSERS' current funding status, the ways in which pension financing requirements can affect broader government budgets, and the expectations that policymakers should have for pension reforms. The paper then explores a range of options available to policymakers to reform public employee pensions, with a focus on how these options would alter current MOSERS policies.

MOSERS' CURRENT STATUS: OUTLOOK AND IMPACT

In MOSERS' latest actuarial valuation (calculated as of June 30, 2016),[1] the plan is 69.6 percent funded, down from 75 percent in the 2015 report and at its lowest level of funding since at least 1997, the first year reported in MOSERS' actuarial valuation. MOSERS currently faces an unfunded liability of $3.9 billion, based on total benefit liabilities of $12.7 billion and actuarially calculated assets of $8.9 billion. Annual government contributions for 2018 are estimated at nearly $400 million, equal to 19.45 percent of total employee salaries. The 19.45 percent contribution rate is up more than 3 percentage points from the 16.34 percent rate for 2017. The 2018 MOSERS contribution will be over twice as high as the 2001 level, when government costs equaled only 8.1 percent of employee payroll.

While the plan projects that it will return to 100 percent funding by the year 2046, that result depends upon MOSERS's investments returning an average of 7.65 percent annually over the next three decades. Many investment experts are skeptical of such an assumption, believing that returns in the 6 to 6.5 percent range are more likely. If so, required government contributions could be substantially higher. For instance, the MOSERS actuarial analysis shows that if the future average investment return were assumed to be 6.65 percent rather than the baseline 7.65 percent, the annual government contribution would rise from 19.45 to 24.65 percent of employee payroll. But this result assumes that the plan recognizes today that a 6.65 percent return is more likely and adjusts government contributions immediately.

If, however, MOSERS continues to calculate required contributions on the assumption of a 7.65 percent future return but realized returns turns out to be lower, then future government contribution rates would rise significantly above 24.65 percent to account for the intervening years of below-necessary contribution rates.

In Missouri and across the nation, government contributions to public-sector pensions today are both high and variable. Contributions are high because pension benefits have risen over time and investment returns have in recent years fallen short of assumed levels. Contributions are variable because public pensions, including MOSERS, take considerably greater investment risk today than they did in the past. Despite actuarial methods designed to reduce the impact of investment risk on the volatility of contributions, such as investment return smoothing and the use of long amortization periods for the repayment of unfunded liabilities, a higher-risk investment portfolio inevitably means contribution levels that vary more from year to year.

Figure 1 illustrates this volatility, using a stylized pension plan drawn from the model used in Biggs (2014).[2] It shows 10 sample government contribution paths for a stylized pension system that, in the absence of investment risk, has an annual government contribution equal to 5 percent of employee payroll. As Figure 1 demonstrates, however, once investment risk is incorporated, employer contributions can vary widely. In many years, investment returns above the assumed rate mean that no government contribution was needed. In other years, however, low investment returns require government contributions three to four times the level that would be expected absent investment risk. Moreover, the transition from low to high required contributions can occur quickly. A pension cost that is both large and volatile can destabilize the rest of the government's budget priorities.

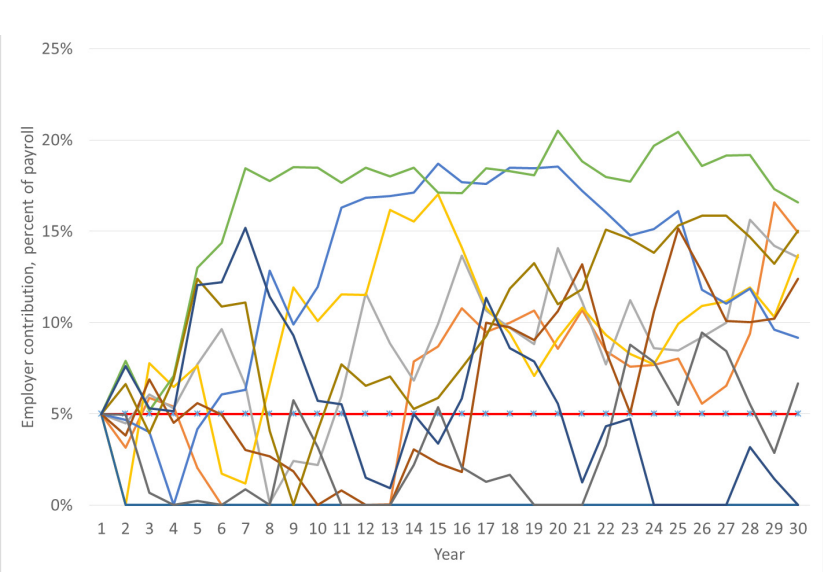
Together, these factors have caused policymakers of varying political orientations to consider reforms to public employee pensions. Public pension reforms can include steps both to reduce and to stabilize the government's cost of supporting the plan, while putting the plan on a more sustainable funding path for the future. These goals are separable: some reforms might reduce costs but not stabilize them, others might stabilize costs but not reduce

them. Ideally, reforms could produce both lower and more stable pension costs for governments sponsoring such plans. However, there is no magic solution to pension reform. A reform that reduces government costs will in general either increase employee contributions or reduce the benefits employees receive at retirement. Likewise, reforms to reduce the volatility of government pension costs, such as risk-sharing, imply that employees or retirees bear greater risk. This is not to imply that some reforms may not be superior to others, but only to recognize that there are no reforms generating dramatic benefits that do not also have significant costs.

Figure 1

Sample Employer Contribution Rates for Plan with Static Employer Rate of 5% of Payroll.

Because of investment risk, required employer contribution rates can vary widely.



Source: Biggs, Andrew G. "The public pension quadrilemma: the intersection of investment risk and contribution risk." The Journal of Retirement 2, no. 1 (2014): 115–127.

The poor funding and high costs of MOSERS are the principle reasons that policymakers are considering reforms. But another reason some policymakers consider reforms that would raise employee contributions or reduce retiree benefits is the perception that MOSERS is very generous compared to the private sector retirement plans available to most taxpayers. And there is evidence to support this supposition. Most MOSERS participants make no contributions toward their retirement plan, while employees hired since 2011 pay 4 percent of their salaries to fund MOSERS' benefits. By contrast, the typical private sector worker with a 401(k) contributes about 6 percent of his pay to his plan, according to nationwide data from Vanguard.[3]

Likewise, the benefits offered by MOSERS are considerably more generous than those typically funded by private sector employers. This is not immediately obvious from the MOSERS actuarial valuation, due to the way that state and local pensions calculate their costs. According to the valuation, the "normal cost" of MOSERS—that is, the cost of new benefits accruing to employees in the coming year—is 8.60 percent of employee payroll. Total employee contributions are equal to 1.41 percent of wages, leaving an employer normal cost of 7.19 percent of pay. While this is substantially higher than the typical employer contribution to private-sector 401(k) plans (which, according to the Bureau of Labor Statistics,[4] is about 3.0 percent of wages), the difference is not so large that that it could not plausibly be offset by other factors, such as less-generous wages in the public sector. However, the 8.60 percent total normal cost for MOSERS is calculated under the assumption of a 7.65 percent future investment return, which is obviously uncertain. And all the risk of that uncertain investment return is borne by the government. The most intuitive comparison to private sector 401(k) plans would be one that had a total contribution of 8.6 percent of employees' wages, but upon which the employer guaranteed a future annual return of 7.65 percent. This obviously would be a much better deal for the employee than a 401(k) that had the same contribution rate but upon which the employees themselves bore the investment risk.

The way to account for the government's guarantee against investment risk is to re-calculate the total normal cost using a low-risk interest rate. This approach incorporates the value of the upfront pension contributions made by the government, plus the obligation to make additional future contributions if insufficient investment returns or other factors cause the plan's assets to be insufficient to pay full promised benefits as scheduled. This is precisely the method used by the Congressional Budget Office in a 2017 study calculating the compensation that federal government employees receive via their traditional pension plans.[5]

According to MOSERS' actuarial valuation, the total normal cost of the plan rises by about 25 percent for each 1 percentage point decline in the assumed investment return. For instance, lowering the assumed return to 6.65 percent would increase MOSERS total normal cost from 8.60 percent to 10.79 percent. If one considers MOSERS benefits to be truly guaranteed—which is how they are advertised to participants, how they tend to be treated under law, and how the plan's trustees and managers wish them to be treated—then such benefits should be valued using the interest rate on guaranteed government bonds. As of late August 2017 the yield on 20-year U.S. Treasury bonds, which have approximately the same duration as that of new benefits being accrued under MOSERS today, is around 2.5 percent. That yield could be rounded up to 3.0 percent, as Treasury bonds offer liquidity which MOSERS benefits do not. Nevertheless, that still means that the total value of new benefits accruing under MOSERS today is approximately 25.2 percent of wages. Netting out the 1.4 percent average employee contribution leaves government-funded benefits with a value of about 23.7 percent of annual pay, almost eight times more generous than the average private-sector employer's contribution to his employees' 401(k) plans. Thus, it should not be surprising that many, though not all, pension reforms tilt toward lowering taxpayer costs at the expense of higher employee contributions or lower retirement benefits.

However the burdens of pension reform are allocated, one should not expect a reform to pensions to have a dramatic effect on the current level of unfunded pension liabilities. It is difficult for any pension reform to reduce existing pension liabilities. The reason is that accrued pension benefits—which are what constitute a pension plan's liabilities—are generally taken to be guaranteed. In some cases, governments have been able to reduce cost-of-living adjustments (COLAs), as courts have regarded these as "non-core" benefits. However, in other cases courts have prohibited even cuts to COLAs. In bankruptcy or a bankruptcy-like proceeding, cuts to accrued pension benefits may be allowable, though in the few cases to date—including the cities of Detroit, Vallejo, and Stockton and the commonwealth of Puerto Rico—such reductions have generally been modest or even nonexistent. Thus, while unfunded pension liabilities are a motivator for pension reforms, few reforms would directly reduce unfunded liabilities simply because pension liabilities generally cannot be reduced.

That said, pension reforms *can* reduce annual pension contribution costs and reduce the accumulation of future unfunded pension liabilities. For instance, increasing required employee contributions could immediately reduce the burden of government pension contributions or speed the return of a plan to full funding. Likewise, while unfunded liabilities for most public pensions have continued to increase in recent years, shifting employees to 401(k)-style retirement plans would reduce the accrual of new unfunded liabilities, even if that reform did not reduce pension liabilities that had been accrued in prior years.

While policymakers should be skeptical of proposed reforms that promise both relief from high current contributions and a rapid return to full funding, a variety of reforms are available that could make public employee pension costs more affordable and less volatile in future years.

It also is worth considering how pensions and pension reforms play into the composition of public employees' overall compensation packages. Traditionally, public employees at all levels have received a compensation package that is more heavily weighted toward benefits than is the compensation of private-sector workers. Biggs and Richwine[6] confirm that this is true among state government employees in all 50 states, including Missouri. Pensions, in particular, are far more generous in the public sector than in the private sector, a difference that in general is only partially offset by lower public

sector wages and salaries. However, pension reform raises the possibility that part of the compensation package for public employees may be put at risk, in the sense that the retirement benefit the employee anticipated upon beginning in public employment may not materialize when that employee retires. Such changes may be entirely justified, either for budget reasons or to equalize treatment of public- and private-sector employees. However, the potential for a mid-career change to future benefits may cause some public employees to prefer a compensation package that is less heavily weighted toward deferred retirement benefits and more heavily weighted toward immediate benefits, which can include salaries as well as contributions to defined-contribution (DC) retirement plans. One cannot say with certainty how employee preferences may change, but such changes are a possibility.

OPTIONS FOR REFORM

Increasing Employee Contributions

The National Association of State Retirement Administrators (2016),[7] which represents public pension funds, reports that since 2009 at least 35 states have increased employee contribution rates. However, one should not overestimate the impact of these rate increases. From 2002 to 2015, the median pension contribution rate for employees who are covered by Social Security benefits rose only from 5.0 to 6.0 percent, while for employees who lack Social Security coverage the median contribution rate rose only from 8.0 to 8.1 percent. Meanwhile, the average total annual required contribution rose from 10.3 to 27.2 percent of employee payroll from 2002 to 2013,[8] implying that the increase in government pension contributions far exceeded the rise in employee contributions.

On average, MOSERS employees contribute 1.41 percent of their salaries to the retirement plan. However, these contributions are produced entirely from new employees hired since 2011, who pay 4 percent of their wages toward the program. Employees hired prior to 2011 do not contribute to MOSERS. Thus, relative to other states, there appears to be considerable room for employee contribution rate increases in Missouri. If policymakers simply wished to improve the financing of MOSERS and other Missouri plans while leaving the remainder of the program untouched, an increase in the employee contribution rate might be the most direct means to do so. Higher employee contributions generate budget savings from the moment they are implemented and produce predictable cost savings in all future years. Moreover, to the degree that public employees' pension plans are perceived to be more generous than those offered outside of government, employee contribution increases could more evenly balance employee and taxpayer costs.

One policy to improve MOSERS' financing would equalize contribution rates between different MOSERS employees so that all pay the 4 percent contribution required of employees hired since 2011. That change would increase MOSERS' annual contribution income by about 2.6 percent of employee payroll, equal to about an extra $50 million per year. These funds could be used either to reduce the government's contribution costs or, preferably, to speed up returning MOSERS to full funding. If more experienced employees are asked to pay more, it seems reasonable that those funds be used to secure the benefits they have been promised.

In 2017, a contribution rate increase was enacted for public school teachers in St. Louis, who participate in the St. Louis Public Employees Retirement System. Under the legislation,[9] the current five percent of salary employee contribution rate will increase by half a percentage point annually beginning in 2018, until it reaches nine percent of pay in 2022. Newly hired employees will immediately pay the nine-percent contribution rate.

However, raising the employee contribution rate would not significantly reduce the volatility of government pension costs. To understand this, refer back to Figure 1, which illustrates the variability of the government's required contribution after incorporating the effects of investment risk. In the model that underlies Figure 1, the employee contribution is fixed at 6 percent of payroll. The government contribution is expected to be 5 percent of payroll, but varies with the funding status of the plan. Imagine if the employee contribution rate was increased by one percentage point to 7 percent of pay. The result of this would be that, in every year and under practically every scenario, the government's contribution would be one percentage point lower.* While the government's

* The only exceptions are years in which the government contribution already was zero, as the contribution rate cannot be negative.

finances would be improved overall, a higher employee contribution rate would do relatively little to cushion the state budget in years with particularly high required government contributions. For instance, in a year in which the government contribution rate would have been 15 percent of pay—three times the baseline rate—it would fall only to 14 percent of pay. By itself, an employee contribution rate increase isn't sufficient to dramatically reduce the volatility of the government's costs of supporting employee pensions.

Risk-Sharing Models

The volatility of government contributions to defined-benefit (DB) pensions introduces uncertainty into public budgeting, often requiring additional pension contributions at precisely the times when the economy is weak, tax revenues are down, and expenditures on means-tested government transfer benefits are high. One potential solution to reduce contribution volatility is to adopt risk-sharing models that divide the risk of investment returns and other sources of funding uncertainty between the government and employees via adjustments to contributions and/or benefits.

One approach already in use in several states would split the total pension contribution, not merely the cost of accruing benefits, between workers and the government. Recall that the total annual pension contribution is composed of two parts: the normal cost of benefits earned by employees in that year, and the cost of amortizing unfunded liabilities from prior years. The normal cost is typically shared between the government and employees, but the government funds amortization payments by itself. These amortization payments are where investment risk and the varying funding health of the pension generate volatile contribution rates.

One potential reform would allocate the *total* pension contribution between the government and employees rather than splitting only the normal cost. The split need not be 50-50, but whatever portion was allocated to the employee would reduce both the average cost and the volatility of the government's pension contribution. Nevada follows such a model for teacher pension contributions, such that the total annual required contribution is split evenly between the government and teachers. From 2002 to 2015, the total teacher pension contribution rose from 18.8 to 25.8 percent of total payroll, an increase of 7 percentage points.[10] However, because the total contribution is split between government and teachers, the taxpayer share of the increase was only 3.5 percent of payroll while teachers' own contributions also rose by 3.5 percent of their pay.

A risk-sharing contribution policy does not merely reduce government costs, but also reduces the risk and volatility of government contributions. This allows for greater certainty of pension costs and better planning of future budgets. That said, risk-sharing contributions also generate greater volatility in employees' take-home pay. In Nevada, the impact of rising pension costs on teachers' net salaries has generated dissension.[11] Nevertheless, risk-sharing of pension contributions could increase employee awareness of the rising investment risk taken by public pensions.

Reforms passed to Utah's retirement system in 2000 also included risk-sharing via employee contributions. The Utah reforms offered newly-hired employees the choice between a pure DC plan and a DB pension. However, in both systems the government's contribution could rise to no more than 10 percent of employee payroll. If the DB plan became underfunded, employee contributions would be adjusted upward to restore the plan to full funding.[12] This approach combines a defined benefit for employees with contribution certainty for the government. However, the provisions of the new plan have yet to be severely tested. Were the plan to suffer a substantial funding challenge, the increase in employee contribution rates could reach levels that either make government employment less attractive or generate a political backlash from public employees themselves.

A second potential approach is to adjust benefits, either on their own or in conjunction with changes to employee contributions and other benefit provisions. For instance, the Wisconsin Retirement System predicates annual cost of living adjustments on the financial status of the plan and the plan's annual investment returns. Benefits cannot fall below the initial amount paid upon retirement, but post-retirement benefit increases are not automatic and such increases can be clawed back in times of financial distress. Novy-Marx and Rauh[13] find that such an approach could reduce the unfunded liabilities of a pension plan by over half.

The Canadian province of New Brunswick recently introduced a reformed pension structure based upon "shared risk." Like the Wisconsin Retirement System, New Brunswick's reforms create two classes of benefits: core retirement benefits, which the plan aims to guarantee, and supplemental benefits which can vary more readily based upon the funding status of the plan.[14] The New Brunswick reforms would enact a variety of steps should the plan become less than 100 percent funded. These include increases in both employee and employer contributions; reductions in early retirement benefits; reductions in the rate at which benefits accrue for current employees; and finally, reductions in base benefits. If the plan becomes overfunded, then opposite changes can be made. Such an approach, coupled with the more stringent discount rates by which the funded ratios of all Canadian pensions are measured, could lead to a better-funded plan that more quickly and equitably resolves funding shortfalls should they arise.

However, while shared-risk pension models may be attractive to employers, it should be recognized that sharing risk does not make risk go away. Rather, risk-sharing moves part of the pension's investment or other risks to the employees, who may not wish to shoulder such risk. The shared-risk model began with Dutch pensions, which have automatic benefit reductions and other changes to plan provisions if the plan's funding health falls below a given level. However, while these auto-balancers are celebrated abroad, in the Netherlands they have become controversial as poor investment returns and low interest rates have made the prospect of benefit cuts more likely. Government officials have eased financing rules over the past several years to help avoid benefit reductions. Plan managers have done their part by assuming high investment returns for the future, precisely the same step that U.S. state and local plans take to make their funding appear healthier.[15] Many younger Dutch believe that their country's pension systems are weighted too heavily toward older participants. Even as the Dutch risk-sharing model is lauded abroad, the Netherlands itself is considering reforms that could move closer to a traditional DC model, albeit with greater sharing of investment and mortality risk than a pure DC model would contain.[16]

Few would argue that U.S. public pension managers and policymakers are more fiscally responsible than their Dutch counterparts. Any shared-risk reforms for U.S. state and local pensions must take that reality into account. One possible way to make shared-risk models work better in the U.S. would be to require adjustments to employee contributions, benefit accruals, and retirement benefits annually based upon the funding health of the plan. Rather than presenting a "cliff" of substantial adjustments that plan managers and policymakers would take potentially unwise steps to avoid, regular annual adjustments would be more modest because funding gaps would not be allowed to accumulate. Moreover, because such changes would take place each year, pension participants would become accustomed to them and would take them into account in their own household retirement planning.

Buyouts of Accrued Pension Benefits

One option that has been discussed in Missouri is a "buyout" of accrued pension benefits, in which the retirement system pays certain participants a lump sum today in exchange for those participants giving up their right to future monthly retirement benefits.

The proposal being offered in Missouri applies only to so-called "terminated vested" MOSERS participants, although in principle it could be applied to other participants. Terminated vested participants are former employees who have accrued benefits under the plan but have yet to begin collecting those benefits. For instance, an employee might have worked for the state from age 25 to 45 and thereby accrued the right to a future pension benefit, but not yet retired and claimed that benefit.

Under the proposal, terminated vested participants would be offered a lump sum payment equal to 65 percent of the actuarial present value of their expected future retirement benefits.[17] The process of calculating this value involves projecting the level of future benefits a participant will be paid and the number of payments they are likely to receive over their expected life span. These dollar values are then discounted back to the present at the investment return assumed by the plan, which at the time of the actuarial analysis was 7.65 percent.

As of early December 2017, 3,748 former MOSERS-covered employees had accepted the buyout offer, out of 17,000 who were sent an eligibility letter. Buyouts

were offered to 2,192 former transportation employees covered by the MoDOT & Patrol Employees' Retirement System (MPERS), with 379 employees accepting the offer. For both groups, the average check issued was approximately $14,000.[18] The immediate savings to the MOSERS pension plan are $2.5 million, with longer term savings projected at $90 million. The question for former employees who are offered a buyout—and for policymakers who are presumed to care about the welfare of these individuals—is whether the buyout offer is a good deal.

Analysis of a voluntary buyout proposal should begin with a basic assumption: that participants will willingly give up one financial claim only if they are given a second financial claim that they perceive to be of equal or greater value. The value of the lump sum that would be paid is clear; however, the value of the future pension benefit the participant would give up depends on two factors.

The first factor is simple: the trade-off provides a lump sum equal to 65 percent of the actuarial present value of the participant's future expected benefit. Assuming that the actuarial present value is a reasonable approximation of the economic value of those future benefits, one would not expect participants to give up a claim to those future benefits in exchange for a lump sum equal to 65 percent of those benefits' actuarial present value. Put in simple terms, if someone offered you 65 cents in exchange for one dollar, you would be unlikely to take the deal.

The second factor is risk. The future pension benefits promised to MOSERS participants are all but guaranteed, via both the law and the political power of public employees. However, the actuarial present value on which the lump sum buyout is based is calculated by discounting those guaranteed future benefits using the 7.65 percent assumed return on a portfolio of risky investments. Even if we assume that 7.65 percent is a reasonable estimate of the future return on MOSERS assets, a participant accepting even an undiscounted buyout on those terms would be trading a safe asset for a risky asset with the same expected return. This is a trade that most reasonable people would not make, and indeed would be almost unknown in efficient financial markets.

This choice can be illustrated using a common example from the economics literature. In the example, an individual is offered a choice: a 50-50 chance of winning some dollar amount—say, $1—or a guaranteed payment of some specified dollar amount. If individuals were indifferent to risk, the minimum guaranteed payment they would accept would be equal to 50 percent of the uncertain $1 payment. In reality, however, almost all individuals will accept a guaranteed payment well below the expected value of the risky payout.

To better calculate how participants would view the buyout offer, one must revalue their future MOSERS benefits after accounting for the low risk of those benefits. If one considers those benefits to be guaranteed, the value of that guarantee can be captured by re-discounting participants' benefits using the approximately 2.25 percent yield on guaranteed 10-year U.S. Treasury securities.[†] This risk adjustment increases the present value of a participant's future MOSERS benefits by a factor of about 1.7.

The 65 percent buyout of the actuarial present value of future expected MOSERS benefits represents only about 39 percent of the present value of those benefits calculated on a risk-adjusted basis. In other words, by accepting the buyout a terminated vested MOSERS employee would be giving up over 60 percent of the value of his future benefits. Again, in terms of broad financial markets almost no one could be expected to make a financial transaction that, on the terms by which financial markets analyze such transactions, is a clear money-loser. However, there are two cases in which individual government employees might in practice choose to accept the buyout.

First, some government employees might have a strong need or preference for lump sums of money over future income streams derived from monthly benefit payments. In certain extreme cases such a preference might be justified, such as if an employee faced high medical bills that were not covered by insurance. In other cases, an employee might desire a lump sum for less advisable reasons, such as to purchase a luxury item. In both cases, however, it seems likely that employees eligible for the

[†] It is likely that the average duration of expected benefits for terminated vested MOSERS employees is about 10 years. Using a different duration of U.S. Treasury bonds would not alter the results of this exercise in a qualitative way.

MOSERS buyout could borrow money on better terms than are offered to them via the buyout. A home equity loan, credit cards or even a payday loan offer better terms than the proposed MOSERS buyout.

Second, some employees might opt for the MOSERS buyout due simply to financial illiteracy. Economists wonder why so few individuals purchase life annuities for retirement, which in return for a lump sum payment upfront provide the purchaser with a guaranteed monthly payment for life. Life annuities provide valuable protection against outliving one's assets. A humorous explanation for the unpopularity of annuities is that they instantly turn a millionaire into someone with a $50,000 annual income. Even if the $50,000 annual annuity payment could be expected to equal $1 million over the course of an individual's retirement, the individual nevertheless feels "less rich." Some employees might be willing to accept the buyout because the lump sum made them feel richer at the time the transaction took place, even if it was likely to make them poorer over the long run. There is an ethical question regarding whether governments should seek to buttress their own finances by taking advantage of the financial illiteracy of former government employees.

In any event, it is unlikely that a buyout would have a substantial positive effect on the finances of Missouri's public employee pension plans. Even the actuarial analysis of the buyout proposal, which assumed a 50 percent participation rate, found that the buyout would lower MOSERS unfunded liabilities by only about $104 million, a 2.7 percent reduction, while annual government contributions would be cut by only about $7 million, less than a 2 percent cut. Using more realistic assumptions regarding take-up of the buyout offer would lead to substantially smaller positive effects on pension financing and annual contribution costs.

Shifting Employees to Defined Contribution Accounts

The most fundamental pension reform being considered is to shift public employees, in whole or in part, from traditional DB plans to DC 401(k)-type plans. In a DB pension, such as MOSERS, benefits generally are calculated as a percentage of the employees' final earnings multiplied by the employees' years of service. The employer, in this case the government, changes its annual contributions to ensure that benefits promised by that formula can be paid. In a DC plan, by contrast, the employer's contribution to the employee's retirement account is fixed and is supplemented by employee contributions. The employee chooses how to invest those contributions and receives a higher or lower benefit in retirement based on the performance of those investments.

There are several key differences between a DB and a DC retirement plan. The first, and most important, is who bears the risk: with DB pensions, the government bears all or nearly all of the risk associated with investment returns, changing lifespans, and other factors. With a DC plan, those risks—the most important of which is investment

Table 1: **Maximum Potential Employer Contribution (as percent of employee wages) to Savings and Thrift Plans, Private Sector Workers**

	Percentile				
	10th	25th	50th	75th	90th
All Workers	1.5	2.5	3	5	6
Management, professional, and related	1.8	3	3	5	6
Management, business, and financial	2	3	4	5	6
Professional and related	1.5	3	3	4.5	6

Note: Data include only employers who offer a matching contribution.

Source: Bureau of Labor Statistics, National Compensation Survey, 2014. Table 52.
https://www.bls.gov/ncs/ebs/detailedprovisions/2014/ownership/private/table52a.txt

risk—are borne by employees. Assuming that DB and DC plans invest similarly, the total risks of the plans are similar. A DB plan, despite being run by the government and using various actuarial smoothing methods, does not make investment risk go away. The rising required contributions for MOSERS and other pension plans are evidence of that risk. Likewise, shifting public employees to DC plans would make the government's risk go away, but that risk does not disappear: rather, the risk would be shifted to employees, who must alter their contribution rates, retirement age, and expected retirement income to account for fluctuating investment returns.

A second main difference is generosity. While in theory any retirement plan can have any level of employer support, in practice DC retirement plans have substantially lower levels of employer contributions than DB plans. For instance, in 2016 the required employer contribution to MOSERS was equal to 19.45 percent of employee payroll. As discussed above, even this contribution carries with it a contingent liability since it is based on a high, but risky, assumed investment return. For context, Table 1 shows the distribution of private sector employer contributions to employee DC accounts, based on data from the 2014 National Compensation Survey conducted by the Bureau of Labor Statistics. The figures apply only to employers who offer a contribution and show the maximum contribution available to employees who fully satisfy the criteria applied to the employer match. For both reasons, typical employer contributions will be somewhat lower than shown in Table 1. Regardless, the median private-sector employer contribution to 401(k)-type plans is 3 percent of employee wages, less than one-sixth the government contribution made to MOSERS on employees' behalf. Even at the 90th percentile, private sector employer contributions are only 6 percent of employee wages, less than one-third the MOSERS level. Unfortunately, the BLS data do not go beyond the 90th percentile, but one can reasonably infer that only the tiniest fraction of private sector employees receive 401(k) matching contributions on par with what the Missouri government currently contributes to MOSERS.

Perhaps because employer contributions to 401(k)-type plans are more transparent and well-understood by the public, when DC plans are introduced into the public sector they tend to have employer contributions that more closely resemble those of private sector 401(k) plans. For instance, Pennsylvania recently passed pension reforms under which newly-hired employees would have three retirement plan options, including one that is purely DC. In this option, the government would make a matching contribution equal to only 2 percent of employee pay. Likewise, teacher pension reforms recently enacted in the state of Michigan would include a 4 percent automatic employer contribution to DC accounts plus an employer match of up to 3 percent of employee contributions, for a total maximum employer contribution of 7 percent of pay.

Many DB pensions have theoretical employer contributions that are comparable to those of DC plans, assuming that the DB pension achieves all of the investment return and other assumptions under which the employer contribution is calculated. In practice, however, nearly all public sector DB plans have significant unfunded liabilities that require substantial additional employer contributions. By contrast, the employer contribution to a DC plan is fixed. The amount that policymakers set as the maximum contribution is indeed the maximum the government would be required to pay. Thus, while the introduction of a DC plan would have little or no impact on the unfunded liabilities already accumulated under a legacy DB pension, under a DC plan governments can have far greater confidence that the accumulation of further liabilities will be curtailed.

DC plans can be introduced in various ways. For instance, states such as Michigan and Pennsylvania have established DC plans only for newly-hired employees, a so-called "soft freeze" of the existing DB plan. By contrast, the commonwealth of Puerto Rico, whose DB pensions are extremely poorly funded, has recently decided to shift all employees to DC pensions, referred to as a "hard freeze." Both options will ultimately lead to substantial cost savings to the government, but a hard freeze will produce these savings far more quickly. For instance, imagine if a new DC retirement plan had an employer contribution of 3 percent of employee wages. Under a hard freeze, employer costs for new accruing benefits would instantly shift to 3 percent of employee pay, even if the government must still continue to amortize unfunded liabilities accrued under the old DB plan. Under a soft freeze, however, where only newly-hired employees participate in the new DC plan, the employer cost rate would not reach 3 percent until all existing DB participants had retired, a process that would likely take at least four decades. While a soft freeze

of an existing DB plan may generate less opposition from current public employees, a soft freeze also delays savings for a substantial period of time.

Likewise, several states offer a DC plan as an option for employees while leaving a DB plan open to workers. However, it is important to consider how these two types of plans differ. Recall that under a DC plan employees bear the investment risk, whereas under a DB plan the government bears such risk. All other things equal—meaning, in particular, the level of contributions—a DB plan will be more attractive to employees than a DC plan because a DB plan offers participants effectively high returns with all the risks borne by the taxpayer. When a DB plan calculates its required contribution, it starts with the benefits promised to future retirees and then discounts these costs back to the present using the assumed investment return for the plan. For MOSERS, this assumed return was 7.65 percent as of the 2016 actuarial valuation, though the MOSERS Board has discussed lowering the assumed investment return for future valuations. From this discounted present value, employer and employee contributions are calculated. However, this process is mathematically equivalent to starting with the employee contribution rates and then assuming that those contributions will be guaranteed a 7.65 percent annual return going forward, and then calculating the benefits that would be payable. This is a far more attractive option to employees than a DC plan in which to receive guaranteed, riskless returns they must invest in government bonds returning far less than 7.65 percent. To be sure, this illustration applies only to public employees as a group; individuals are not offered a 7.65 percent guaranteed return on their own contributions. But this illustration shows that, on average, a public-sector DB plan with a given contribution rate will provide more generous benefits than a DC plan with the same contribution rate. But this greater generosity comes with a cost, which is the high likelihood of future unfunded liabilities which will in turn raise costs to the taxpayer, often at the least opportune times.

One advantage that DC plans have over DB pensions is flexibility with regard to the age of retirement. A worker with a DC plan who approaches retirement with insufficient savings can boost his retirement income through a combination of higher annual contributions and by deferring retirement for a period. Deferred retirement, even for a year or two, can significantly increase an individual's income once a worker does choose to retire, because the additional time in the workforce allows for additional contributions and compounding of existing account balances, while the retirement period over which the account must provide income shrinks by roughly 5 percent for each year of deferred retirement. DB plans, by contrast, do not offer this option; the rules for retirement eligibility are generally fixed, and while plans generally allow for additional benefits to employees who delay retirement, the gains flow to the employee rather than to the system's overall financing. Thus, the sponsor of an underfunded DB pension must rely wholly upon contribution increases to make up the funding gap. In the wake of the Great Recession and the accompanying decline in financial markets, near-retirees and retirees in the private sector increased their labor supply and delayed retirement as a way to rebuild their retirement savings. Labor force participation for these groups increased even as employment fell for all younger age groups.[19]

Increasing the Retirement Age

A commonly considered option to reduce public pension costs is to increase the retirement ages embedded in these plans' benefit formulas. In general, public-sector employees may and do retire earlier than their private-sector counterparts due to provisions of their retirement plans that allow certain employees to claim full pension benefits at younger ages than are commonly available in the private sector. In addition, the DC plans that are common in the private sector generally lack formal retirement age qualifications, and the structure of DC plans tends to encourage longer work lives than under traditional DB pensions.

Under the most recent tier of MOSERS, which applies to employees hired since 2011, full benefits are available beginning at age 67 if the employee had at least 10 years of service or at age 55 if the employee's age plus years of service is equal to 90. This latter rule implies that an employee who began service at age 20 could retire with full benefits at age 55 while an employee who began working for the state at age 30 could retire at age 60. Employees with at least 10 years of service can retire as early as 62, though with a reduction in benefits of 6 percent per year they retired prior to age 67.

For context, under Social Security the age of earliest eligibility for retirement benefits is 62 while the "normal" or "full" retirement age is currently 66, with a gradual increase to 67 by the early 2020s.[‡] The early retirement age is the earliest time at which any retirement benefits can be collected. For each year an individual claims Social Security benefits prior to the full retirement age they receive a benefit reduction of about 6.7 percent.

Increasing the retirement age for a public employee pension such as MOSERS would have two main effects. First, it would decrease the number of years of unreduced benefits that are paid out. For instance, if the "rule of 90" were increased to 100, a full-career employee who began working at age 20 would need to wait until age 60 to collect benefits, versus age 55 under current rules. This would eliminate five years of benefit payments to such an employee. Second, increasing the retirement age would raise the benefit penalty for retiring prior to the full claiming age. For instance, if the MOSERS full retirement age were increased from 67 to 70, employees retiring at age 62 would receive a benefit reduction of 42 percent rather than 30 percent.

Options for increasing the retirement age could include raising the requirements under the 2011 tier of MOSERS, or increasing requirements for prior tiers—which include employees hired prior to the year 2000 and those hired between 2000 and 2011—to more closely match the provisions of the most recent tier.

It is worth noting how retirement ages may be affected were Missouri to opt for a DC program. Under a DC retirement plan, formal retirement ages are not of great financial importance to the government. An employee who chooses to retire earlier must stretch his savings over a longer period, while an employee who delays retirement has both more years in which to contribute to his plan and fewer years of retirement for the plan's assets to cover.

DC plans do tend to result in longer work lives than DB pensions. The reason is likely due in part to the lower average generosity of DC plans relative to DB pensions. However, a second important factor is that DB pensions in the public sector generally offer a poor marginal return on employee contributions late in their working lives. That is, due to the construction of DB benefit formulas, the annual contribution made by an employee often exceeds the additional benefits he will accrue during that year of work.[20] This can present strong incentives to retire early, and it appears public employee retirement behavior is influenced by these incentives.

[‡] The Social Security full retirement age has an ambiguous meaning: It is the age at which the "full" retirement benefit can be collected, but an individual who continued work through age 70 would nevertheless receive increased benefits in exchange for delaying retirement. A change in the Social Security full retirement age has no effect on when employees can claim benefits, but instead it lowers or raises the benefit they would be eligible for at any given age of claiming.

Adopting More Conservative Funding Practices

One fact that is little known among government pension policymakers that the accounting and funding practices used for U.S. state and local government pensions are different from those used for private-sector DB pensions and public-sector DB pensions in other countries. Adoption of more conservative pension funding practices could prevent pensions from becoming the destabilizing force they are today in government budgets. However, more conservative funding practices would come at a substantial near-term cost.

The differences in pension accounting and funding between state and local plans and other DB pensions are in two main areas: the discount rate used to measure pension liabilities and the period over which unfunded liabilities must be addressed.

U.S. state and local government pensions value (or "discount") their future benefit payments to the present using the interest rate the plans assume they will earn on their investments. In general, this expected annual return is between 7 and 8 percent. Pensions use these discounted present values to calculate how much they must contribute each year to fund those future benefits. By contrast, U.S. corporate pensions discount their liabilities using the average yield on corporate bonds with the same duration as those liabilities. As of July 2017, this would imply a discount rate of about 3.7 percent. State and local pension stakeholders argue that a lower discount rate for private pensions reflects a fundamental difference between public and private plans. But public employee plans in countries such as Canada and the Netherlands also use discount rates in the 3 to 4 percent range. A low discount rate is designed to reflect the fact that the benefits promised by public sector plans are intended to be, and in most cases are, effectively guaranteed. As Dutch economist Theo Kocken stated, "We had lengthy discussions about this in the Netherlands. But all economists now agree. The

expected-return approach is a huge economic offense, hurting younger generations."[21]

By itself, the use of a high discount rate to value liabilities implies that a public-sector plan such as MOSERS sets aside—even under the assumption of full funding—only about 55 percent as much assets per dollar of future promised benefits as would a U.S. corporate or overseas public-sector pension. This practice obviously implies lower contributions for U.S. state and local plans relative to their counterparts in the corporate or overseas sectors. However, it also makes state and local plans more vulnerable to market downturns because, quite simply, they are not nearly as well-funded as other DB pensions.

Second, state and local government plans adopt a substantially longer period to pay off unfunded liabilities than do U.S. corporate pensions, which are governed by federal law. Typically, state and local pensions take between 20 and 30 years to pay off their unfunded liabilities. MOSERS amortizes its unfunded liabilities over a period of 28 years. By contrast, corporate pensions generally must pay off their unfunded liabilities within a period of seven years. Roughly speaking, this will imply amortization payments that are four times larger than a state and local plan would pay, but the corporate plan returns to full funding four times more quickly. In Canada, unfunded pension liabilities for public plans are amortized over 15 years. In the Netherlands, a pension that falls below 105 percent funding must produce a plan to return to 120 percent funding within 10 years.

An immediate shift to more responsible pension funding standards is almost impossible to imagine for Missouri or any other U.S. state. Pension reform is on the table because of the large and growing costs of funding retirement benefits, even using accounting and funding standards that are far looser than in almost any other part of the pension world. Had state and local plans adopted more conservative funding standards in the past, they would very likely be better off today. Nevertheless, when many governments cannot afford to meet their current required contributions it is difficult to imagine them finding the resources to pay more.

However, some states are looking to adopt at least somewhat more reasonable assumptions in the future. Both California and Connecticut have plans to gradually reduce the assumed return on their pensions' investments, a step that will increase required contributions as the assumed return is shifted down but will result in more solid funding down the road. Gradually adopting more conservative investment return assumptions and a shorter amortization period would, over time, shift public pensions to a stronger and more resilient funding base while allowing for a transition path from today's levels. To be sure, this approach can go wrong: California, for instance, adopted a path of increasing contributions for the state's teachers' pension plan and now finds that the higher required contribution may be unsustainable by school districts. Thus, policymakers must bear in mind that future taxpayers may not be able to sustain a given funding level if current taxpayers are unwilling or unable to do so.

Reducing Cost-of-Living Adjustments

In the DB pensions that remain active in the private sector, the benefit paid at retirement age is generally maintained in nominal terms throughout retirement. However, most public-sector pensions—including those in Missouri—include annual adjustments designed to maintain the purchasing power of benefits in response to inflation. Reducing cost-of-living adjustments (COLAs) can have a powerful effect on pension funding because, unlike most other benefit changes, COLA reductions can be implemented immediately.

COLAs under MOSERS are complex and vary according to when an employee began working for the government. Most current retirees are covered under a formula that pays a 4 percent annual post-retirement benefit increase so long as inflation, as measured by the Consumer Price Index (CPI), was below 5 percent, which it has been in every year since 1990. However, once the nominal MOSERS benefit had increased by 65 percent, subsequent benefit adjustments are limited to 65 percent of the increase in the CPI over the course of the year.

To illustrate the effects of this formula in recent years, I begin with a hypothetical employee who is assumed to retire at age 62 in the year 1994 and who receives a benefit of $10,000 per year. Were he to have received annual benefit adjustments based only on increases in the CPI-W (the CPI for Urban Wage Earners and Clerical Workers, which is used to calculate Social Security COLAs), by age 84 in 2016 his annual benefit would have increased to $16,077. Using the MOSERS formula, however, by

age 84 that retiree's benefits would have been increased to $18,965, 18 percent higher than a straight inflation adjustment would have yielded. Most economists believe that the CPI-W used by Social Security overstates the true rate of inflation by some amount, meaning that the real increase in purchasing power generated by MOSERS post-retirement benefit increase formula likely exceeds 18 percent.

Thus, to the degree that policymakers wish only to maintain the purchasing power of benefits in the years following retirement, a downward adjustment to the MOSERS benefit formula may be appropriate. For instance, MOSERS participants hired since 2011 receive an annual post-retirement benefit adjustment equal to the lesser of 5 percent or 80 percent of the Consumer Price Index. Applied to the hypothetical participant retiring in 1994, this formula would produce a benefit at age 84 of $14,636, 23 percent lower than is paid by the formula applying to most current MOSERS retirees. Put another way, during the period from 1994 to 2016 the CPI-W increased by an average of 2.3 percent annually. Under the MOSERS tier one formula applying to most current retirees, stylized benefits would increase by about 3.1 percent annually. Under the less-generous formula applying to employees hired since 2011, post-retirement benefits would have risen by only 1.8 percent per year.

Moreover, there is increasing reason to believe that retirees may not wish for or require full inflation adjustment of benefits over their lifetimes. In a simple view of the life cycle model used by economists, retirees wish to maintain the same level of spending each year throughout retirement. This would point toward maintaining pension benefits along with inflation each year. However, data drawn from the Consumer Expenditure Survey and the Health and Retirement Study find that households tend to reduce their spending as they age, including households that appear to have more than sufficient savings and retirement income. The most likely explanation is that retirees' ability to derive pleasure from spending, and thus the amount they wish to spend, is linked with their health status and declines as they "slow down." For instance, new retirees may spend a great deal on houses, cars or vacations, but as they age the desire for that kind of spending declines, even more than spending on health care increases.[22]

Reductions in COLA benefit increases can significantly reduce a pension plan's unfunded liabilities, because—unlike many other plan changes—COLA reductions begin having an effect immediately upon implementation and the effect grows over several decades. After that time, a lower COLA will reduce annual benefit outlays by a roughly constant percentage each year. Roughly speaking, a one-percentage-point reduction in annual COLA benefit increases will reduce the total liabilities of a pension plan by approximately 10 percent.[23] While future retirees in the less-generous tiers of MOSERS will receive less-generous COLAs, moving to that formula more quickly could improve MOSERS' funding health while still providing current retirees with adequate COLAs.

Increase Benefit Vesting Period

Most DB pensions, including those in Missouri, require an employee to accrue a given number of years of job tenure before they "vest" in their benefits. Private corporate pensions follow a vesting period dictated under federal law, which—depending upon circumstances—ranges from five to seven years. However, state and local government pensions are free to set their own vesting periods, and some have opted to change them in response to recent financial pressures.

In the past, some pension plans have had a hard "cliff" vesting requirement under which employees who leave employment prior to satisfying the vesting requirement receive no benefit at all. The U.S. military continues to have a hard vesting period for its pension plans. Other plans, particularly in the private sector, use so-called "graded" vesting in which an employee gradually gains rights to their benefits. The public sector today generally retains a cliff vesting requirement, but offers a refund of employee contributions—often with interest—for employees who leave prior to full vesting.

MOSERS sets a vesting period of between four and ten years, depending upon the year in which the employee began service. The oldest MOSERS participants qualified for benefits after four years of service, while those hired since 2011 must work 10 years to qualify for benefits. Employees in the lowest tier of MOSERS can request a refund of their contributions if they leave government employment prior to vesting. However, unlike some

other public plans, it does not appear that MOSERS pays any interest on these contributions. In addition, departing non-vested employees do not receive a refund of government contributions made on their behalf.

A long vesting period causes the effective benefit formula for a DB pension to become more backloaded, meaning that benefits more strongly favor long-career over short-career employees. A backloaded benefit formula may make sense if employees with long job tenure are substantially more productive than newly-hired employees. Weighting the pension system toward long-career employees would encourage workers to stay in government employment longer and build the skills needed to become productive. However, there is little research on government employment showing that long-tenure employees are much more productive than short-tenure employees. Research focusing on teachers generally finds that they improve their skills throughout the first five or ten years of their career, but do not improve substantially thereafter.[24] This evidence would not support a heavily backloaded pension formula. But there is almost no research on non-teaching government employees, so it is difficult to say whether a backloaded benefit formula makes sense in general government. However, a long vesting period could make government employment less attractive to new hires, who may not know ahead of time whether they will remain in their new job long enough to become vested.

In recent years, a number of states have increased the vesting periods of their pension systems in order to reduce costs. According to the National Association for State Retirement Administrators (NASRA), nine states have raised the vesting periods of their retirement plans.[25] However, NASRA notes that increased vesting periods produce relatively small cost reductions in proportion to the number of short-career employees who would be denied a benefit via a longer vesting requirement.

However, Missouri has recently lowered the vesting period for MOSERS. Legislation passed in July 2017 would allow MOSERS participants to become eligible for benefits after five years of employment, versus the previous vesting period of 10 years. This change would increase the number of public employees who become eligible to receive benefits in retirement. To offset this increased cost, Senate Bill 62 makes three changes.[26] First, it delays the first cost of living adjustment (COLA) so that it occurs in the second year past retirement rather than the first; this results in new retirees having benefits throughout their retirement that are lower by approximately one year of inflation, which is 2.5 percent as forecast by MOSERS. Second, survivors of deceased MOSERS employees would not be eligible to receive survivor benefits until the age at which the employee would have been eligible for retirement benefits. And third, retirees or other beneficiaries could no longer include unused sick leave as part of their salary upon which benefits are calculated.

CONCLUSIONS

Missouri's public employee pensions, like those of state and local governments around the country, are significantly underfunded and are imposing rising costs on the government. Increasing pension contributions threaten to squeeze out other more basic functions of government such as education and public safety. Policymakers are looking for options to reform pensions in order to reduce the size and increase the stability of government contributions while putting MOSERS and other state plans on a stronger financial footing.

The reform options outlined here would affect pension participants in several ways. Some would raise contributions for workers; others would reduce benefits for present retirees; still others would affect only retirees in the future. Some options would retain the current DB structure in which the government bears all the risk of the plan, while others would shift employees either partially or wholly toward plans in which they bear investment and other risks. Importantly, a variety of reform options can be combined to form a package that makes pensions affordable and sustainable. For instance, higher employee contributions and an increased retirement age might make the current DB plans sustainable into the future; likewise, a more modest traditional pension coupled with a DC plan might also be sustainable. Policymakers have flexibility in designing reforms, but must bear in mind the need to do so soon, before the pension funding problem grows even larger.

Andrew G. Biggs is a resident scholar at the American Enterprise Institute.

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