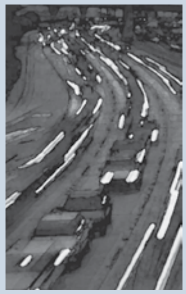
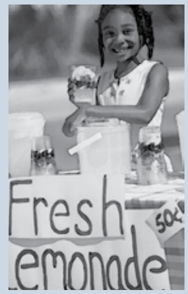
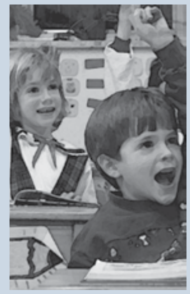
independence institute





PERA's Problems in 2013

by Joshua Sharf

IP-6-2013
September 2013

727 East 16th Avenue • Denver, Colorado 80203
www.IndependenceInstitute.org • 303-279-6536 • 303-279-4176 fax

PERA's Problems in 2013

Executive Summary

The trajectory of the Public Employee Retirement Association of Colorado's (PERA) financial condition has been anything but linear. From times of seeming excess to times of projections for failure, the public employee pension scheme has changed radically over time. As of 2013, expected improvements to the system's outlook have not materialized, and PERA is once again in crisis. While far from alone in the government employee problem, Colorado may be facing one of the worst current circumstances.

PERA has assets with an actuarial value of $39.4 billion, balanced against reported accrued liabilities of $63.5 billion, for an overall funded ratio of 61.9 percent. PERA also reports an unfunded liability of $24.2 billion. In reality, the funded ratio is significantly lower, and the unfunded liability for which the taxpayers are currently responsible is much higher, likely as much as $57 billion.

That staggering total amounts to just over $23,500 in unplanned future payments for the average Colorado household. To pay out that amount over the current 35-year amortization window, at the 8 percent annual return in PERA's assumptions, would take roughly $2,000 a year out of each household's budget.

Allocations to PERA already are taking resources from important government services, such as schools. For the major suburban Denver school districts, PERA payments already consume 11 percent of their annual operational expenses. Barring any policy changes, that number will continue to climb, to 20 percent and higher.

PERA's management and apologists incorrectly claim that its under-funding is a function of state under-funding. In fact, the problems are a result of poor investment allocation, overly generous benefits, and a willingness to sell future benefits to members at far below market value, especially in the late 1990s and early 2000s. PERA also systematically understates risk by understating the discount rate for its liabilities.

PERA's funded ratio (currently 61.9 percent) has been worse in the past. However, two circumstances make a similar funded ratio more troubling now than before. First, PERA's unfunded liability as a percentage of the state's economic output has grown significantly. Second, the ratio of active members to beneficiaries has declined. The combined effect continues to increase PERA's burden on the state economy. Should a bailout be necessary, the responsibility will fall on the taxpayers, and not on PERA members.

Colorado's problems are not unique, and the state has the opportunity to learn from the mistakes made and solutions implemented by other states. These solutions are readily implemented into both short- and long-term legislative agendas, beginning with transparency and accuracy, and ending with the transformation of PERA into a sustainable retirement program.

How Big Is Colorado's Problem?

At the end of 2012, PERA reported an unfunded liability of $24.2 billion—roughly 25 percent bigger than the entire annual state budget, and roughly 10 percent of the state GDP.[1] The amortization period for the current year's contributions is supposed to be 30 years, by law. However, PERA reports it to be 53 years for the State Division, and 49 years for the School Division. With a PERA retirement age of 58, future retirees who are elementary school students today will be eligible to retire before this year's contribution is completely paid off.

There is good reason to believe that the situation is significantly worse than that.

PERA reports a sensitivity analysis of its liability in its Comprehensive Annual Financial Report (CAFR), varying the expected rate of return from 6.5 percent to 9.5 percent, and discounting its future liabilities at the rate of return. The baseline rate of return was recently lowered from 8.5 percent to 8 percent, a rate that New York City Mayor Michael Bloomberg recently called "laughable."[2] Moving past the "indefensible" test at 7.5 percent to the lowest tested return of 6.5 percent, the unfunded liability balloons to $36 billion, or roughly 140 percent of the entire state budget.

However, using the rate of return as the discount rate understates the size of the liability. The discount rate is the interest rate that corresponds to the risk associated with PERA's promises. Financial economists agree that the size of a liability is independent of the return on the assets used the fund that liability. An appropriate rate of return for long-term contractual obligations is the state's long-term cost of borrowing, about 5.3 percent for Colorado. In a recent report on PERA's State Division, Moody's Investors Service used 4.4 percent as its discount rate.[3] Projecting the liability back to those discount rates results in significantly higher unfunded liabilities, as shown in figure 1:

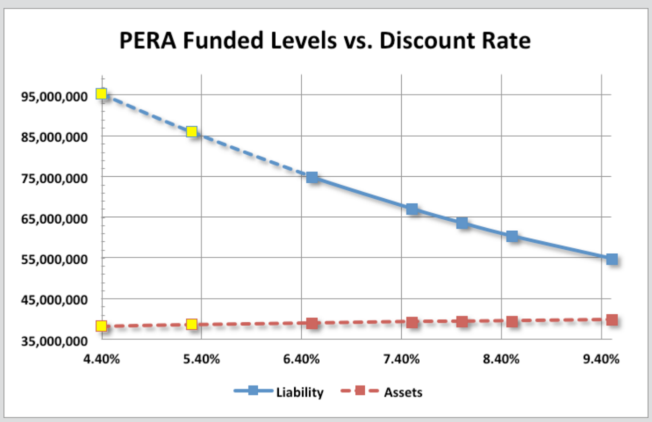


Figure 1

A 5.3 percent discount rate produces an unfunded liability of $47.4 billion, and a funded ratio of 45 percent. More dramatically, a discount rate of 4.4 percent yields an unfunded liability of $57 billion, with a funded ratio of only 40 percent.

The Government Accounting Standards Board (GASB) recently took a step towards requiring an appropriate discount rate by requiring that the *unfunded* portion of a liability be discounted at the government's borrowing rate, producing a lower overall blended rate.[4] A 2009 study by Boston College's Center for Retirement Research estimated that would bring the School Division's funding down to 52 percent, and the State Division down to 48 percent.[5]

This change is intended to more accurately reflect a plan's underlying health. In reality, it may have the effect of encouraging pension plans to take on even more risk. The funded portion of a plan won't change, but the unfunded portion will appear to grow, increasing the incentive to mask unfunded levels by investing in assets with higher returns, but greater volatility.[6]

Assuming a constant rate of return makes the modeling easier, but also fails to account for the real-world volatility of investment returns. Greater volatility increases the chance of one year of large investment losses, or several years of moderate losses. In such years, PERA will not have the option of cutting back on payouts, and will find itself trying to catch up from a lower asset base, having eaten its seed corn.

An American Enterprise Institute study used a Monte Carlo simulation[7] of portfolio returns and accrued liabilities to estimate the likelihood that various U.S. public pension funds would have enough assets on hand to meet their obligations.[8] That study gives PERA's State Division a roughly 1-in-25 chance of staying solvent, its School Division a 1-in-20 chance, and its Municipal Division a comparatively better 1-in-9 shot of doing so.

That study gives PERA's State Division a roughly 1-in-25 chance of staying solvent, its School Division a 1-in-20 chance, and its Municipal Division a comparatively better 1-in-9 shot of doing so.

How Did We Get Here?

PERA's problems did not accumulate overnight. Instead, they are the result of a combination of several factors:

1. The bursting of the dot-com bubble, and the 2008 market reaction to the financial crisis. The dot-com bubble was compounded by poor asset allocation
2. An increase in benefits, including a decrease of the threshold for purchasing service credit
3. Pension spiking, or gaming the system to inflate average salaries for the purpose of benefit calculations[9]
4. The state's failure to make its GASB Annual Required Contribution

PERA began the mid-1970s with a funded ratio of roughly 60 percent, which had improved to 75 percent by 1984. At that point, PERA's portfolio was 30 percent equities. As shown in figure 2, it's easy to see that PERA achieved full funding by 2000 as a result of letting the fund's equity position grow to an untenable 70 percent. The decision to let the portfolio's bets on stocks ride left it dangerously vulnerable to the bursting dot-com bubble.

Also during the late 1990s and 2000, the legislature expanded PERA benefits and refigured the retirement eligibility formula, making it more attractive to retire earlier. At the same time, the PERA Board made it easier to purchase service credit.[10] The 1997 PERA law increased benefits by 25 percent, including raises for both future and existing retirees.

Also during the late 1990s and 2000, the legislature expanded PERA benefits and refigured the retirement eligibility formula, making it more attractive to retire earlier.

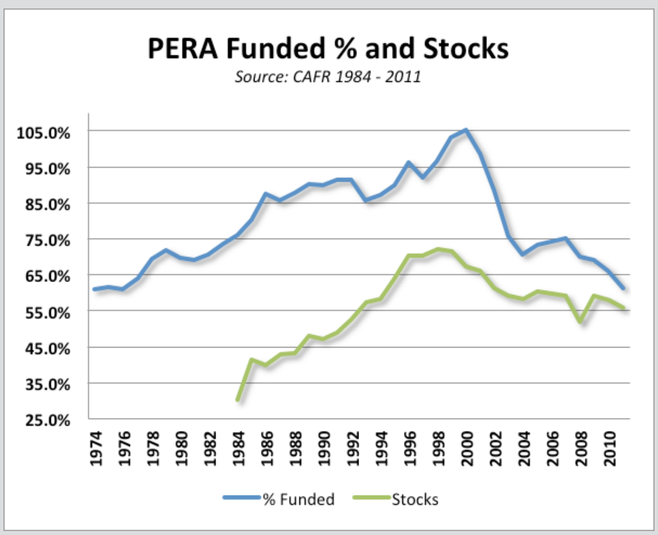


Figure 2

The effect on the unfunded liability was drastic. Figure 3 shows, for the State and School Divisions, the sources of funds. The effect of lowering the purchase price service credit for the state division to 15.5 percent, at the same time as making it easier to retire early, is evident. In 2003, the credit was the single largest source of funds, larger than either employer or employee contributions:

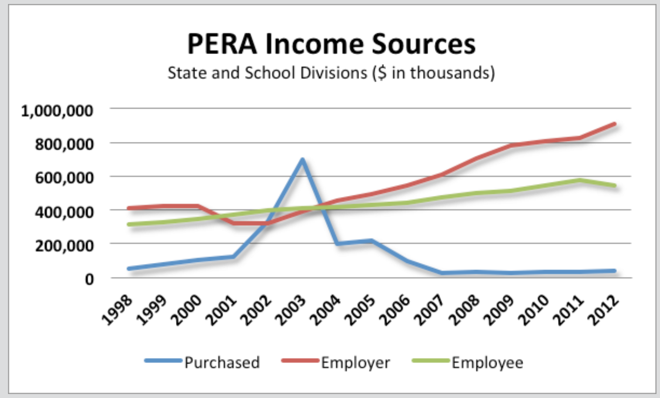


Figure 3

Another factor in the unfunded liability is the state's failure to make its Annual Required Contribution (ARC). The ARC is set by a formula by the Government Accounting Standards Board (GASB), designed to keep the fund actuarially sound.[11] PERA and its apologists often blame this for the parlous state of PERA finances, in fact, the cumulative contribution of that shortfall to the unfunded liability is a relatively small portion of the total.

Figure 4 shows the amount by which the state fell short of its ARC from 2003 to 2012. The red part of the column indicates the actual shortfall; the green portion represents the total amount of interest that shortfall would have earned through 2012. Therefore, each column reveals the total amount that today's PERA assets are short as a result of that year's shortfall.

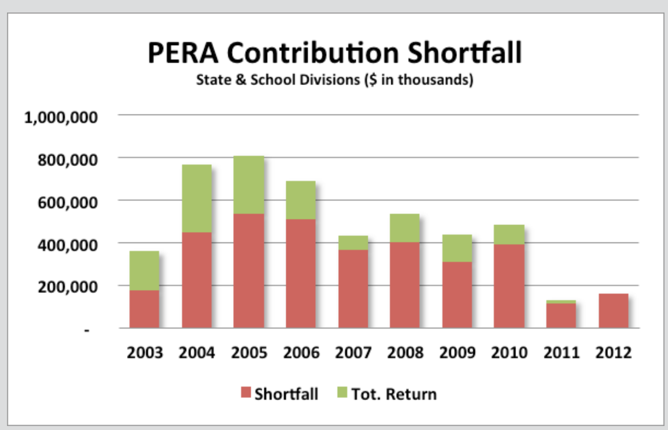


Figure 4

To date, this adds to a net shortfall in 2012 of $4.8 billion. PERA admits to an unfunded liability of $24 billion, and as we have seen, the number may be as high as $57 billion. As large a sum as $4.8 billion is to you and me, it's only 20 percent of the smallest estimate.

Figure 5 below shows the cumulative effect on the ARC shortfall, the amount that the legislature borrowed from the future by deferring payments, and the effect on the funded ratio.[12]

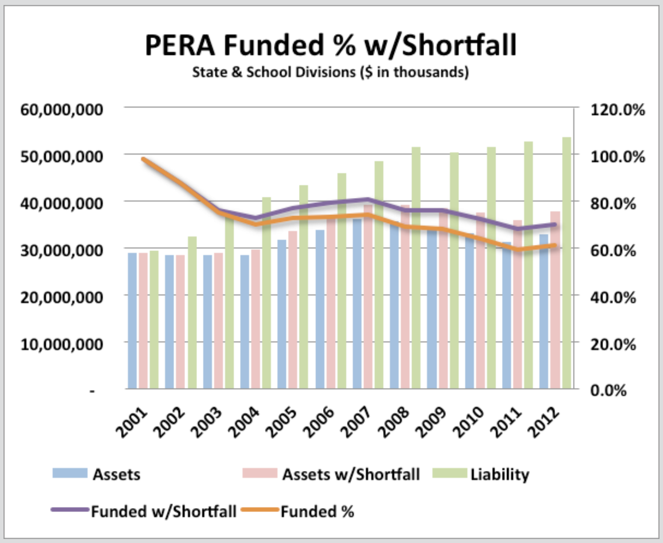


Figure 5

PERA notes that while the funded ratio has been worse in the past, concerns about the size of the unfunded liability have only become more urgent now. There are two reasons why the situation is worse now than in the past.

... the ratio of current PERA members to beneficiaries has been dropping steadily, from 3.5:1 to 2.0:1 over the last 20 years (see figure 6). Thus, when a bailout becomes necessary it will fall more heavily on the taxpayers than it would have in the past.

In the first place, the ratio of current PERA members to beneficiaries has been dropping steadily, from 3.5:1 to 2.0:1 over the last 20 years (see figure 6). Thus, when a bailout becomes necessary it will fall more heavily on the taxpayers than it would have in the past. There simply aren't as many employees paying into the system per recipient as before.

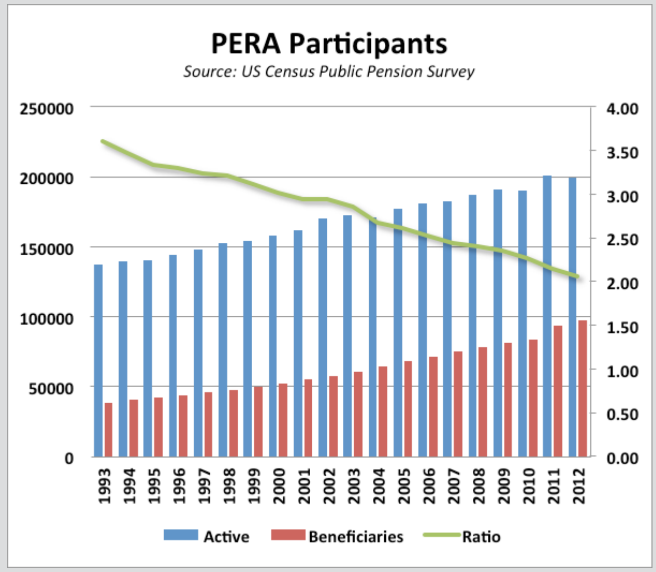


Figure 6

The other reason for concern is the size of the unfunded mandate in comparison to Colorado's Gross Domestic Product (GDP). The ratio of unfunded mandate to GDP shows how burdensome a bailout would be to the state's taxpayers. The higher the ratio, the harder it will be to bail out the fund, when that becomes necessary. The amount of resources available to taxpayers to fund such a bailout is directly related to the size of the state's economy.

Through the late 1990s, PERA's admitted unfunded liability amounted to about 2 percent of the state's GDP. Since 2000, however, the unfunded liability that PERA acknowledges has risen to 9 percent of the state's GDP (as shown in figure 7), and may be as high as 21 percent using the lower discount rate in figure 1. Such a ratio places a significant burden on Colorado taxpayers.

Through the late 1990s, PERA's admitted unfunded liability amounted to about 2 percent of the state's GDP. Since 2000, however, the unfunded liability that PERA acknowledges has risen to 9 percent of the state's GDP (as shown in figure 7), and may be as high as 21 percent using the lower discount rate in figure 1.

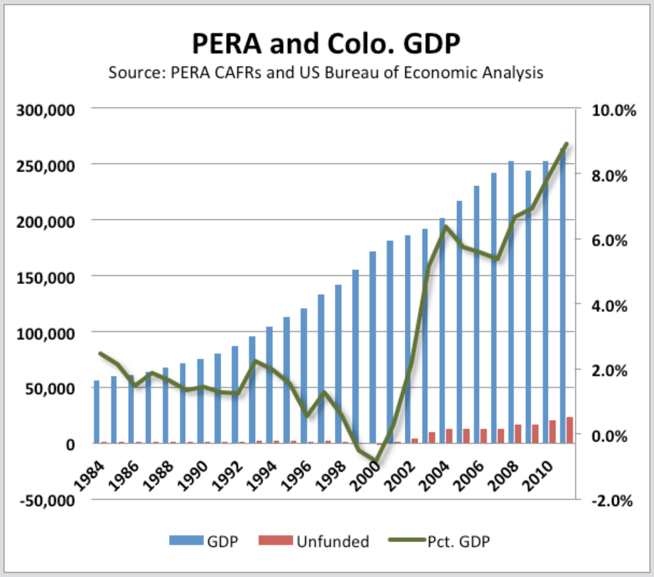


Figure 7

A Matter of Fairness

PERA's unfunded liability and the growing employer contributions necessary to maintain its solvency pose a long-term threat to the state's finances and its ability to carry out its responsibilities.

Colorado faces three options. Either 1) retirees and those near retirement will find promised benefits failing to materialize, 2) public services will be cut to pay for retirement benefits, or 3) taxes will be raised on a public already retiring later than those whose early retirement they are funding. Each option is fundamentally unfair, leaving someone with limited options for dealing with an unexpected situation. Money is already being diverted from the classroom in a number of the state's largest school districts[13], as shown in figure 8.

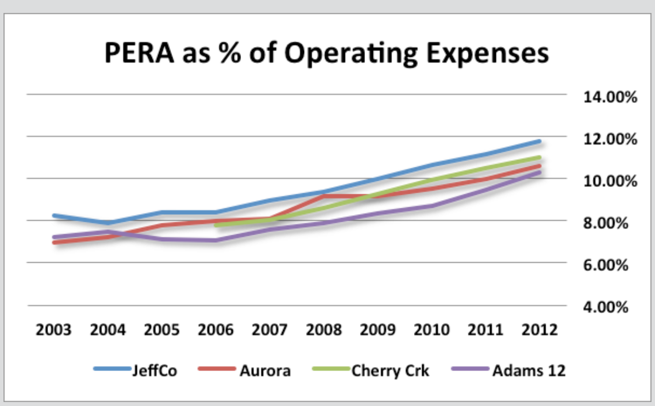


Figure 8

The increase began with the 2006 law requiring employers to pay an Amortization Equalization Disbursement (AED) and have continued to grow with SB10-001's Supplemental AED (SAED) requirements. The employer contributions have been growing considerably faster than the rate of inflation for some time (see figure 9)

The employer contributions have been growing considerably faster than the rate of inflation for some time (see figure 9)

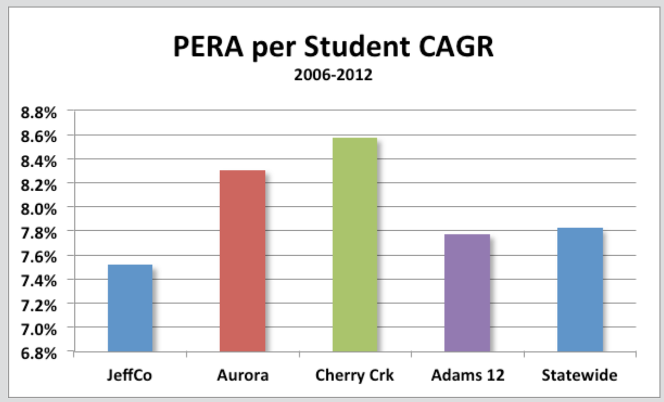


Figure 9

These increases represent real dollars being diverted from the classroom to teachers' retirements, dollars coming largely, although not entirely, at the expense of taxpayers. In figure 10 below, the Statewide Employer and Employee contributions are shown on the left axis, while the per-student cost is shown on the right.

The increase in the per-student contribution closely tracks the increase in employer contributions, and is now over $733 per student statewide. The employee contribution has remained basically flat since 2008, despite the stated intent of both lawmakers and PERA that the SAED burden be distributed with employers.

The increase in the per-student contribution closely tracks the increase in employer contributions, and is now over $733 per student statewide. The employee contribution has remained basically flat since 2008, despite the stated intent of both lawmakers and PERA that the SAED burden be distributed with employers.

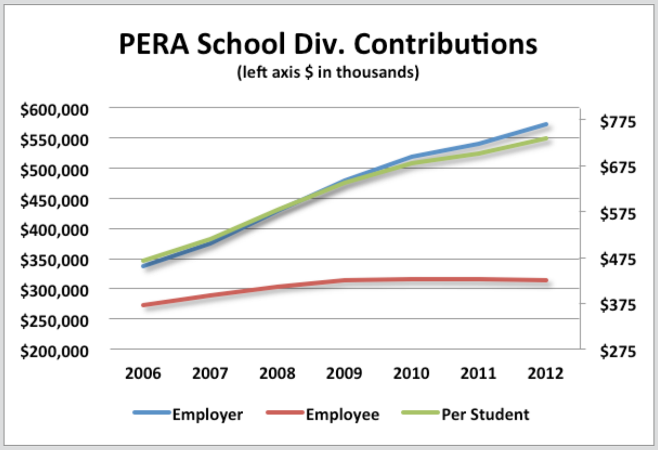


Figure 10

Ultimately, this level of growth in PERA is unsustainable. While the State Division hasn't yet seen a similar level of growth, eventually the state budget will see similar stress. Legislators will be forced to choose among taxpayers, beneficiaries, and basic services.

National Context

PERA's problems are part of a national pattern, with public pensions all across the country putting state and municipal governments under pressure.[14] The collective national unfunded liability in 2010 was reported by the funds themselves to be $450 billion, and estimated to be as high as $3 trillion.[15] One study, taking into account the market value of fund assets and the volatility of their returns, concluded that, "A larger number of public pension plans have zero probability of paying accrued benefits than have a probability in excess of 50 percent."[16] In other words, more plans have no chance of living up to their promises than have a better than even chance of making all the payouts.

The collective national unfunded liability in 2010 was reported by the funds themselves to be $450 billion, and estimated to be as high as $3 trillion.

Several funds have been cited as being in particularly bad shape. Illinois Teachers' State Retirement System executive director Richard Ingram has said that his fund, which reports being 46 percent funded, may go bankrupt by 2030.[17] The demands of paying for the California Public Employees' Retirement System, CalPERS, (possibly 40 percent funded[18]), and the California State Teachers' Retirement System, CalSTRS, (less than 70 percent funded[19]) have led California to face a $16 billion deficit this year. Locally, pension plan demands recently drove the city of Stockton to declare bankruptcy.

That option is not available to the state, a sovereign entity unable to declare bankruptcy.[20] In the absence of the option of seeking bankruptcy protection, California would only have the option of defaulting on a payment. That decision almost certainly would be the subject of immediate legal action, with the resulting litigation resulting in much greater uncertainty and conflict than an orderly restructuring of debts and obligations under bankruptcy.

In the absence of the option of seeking bankruptcy protection, California would only have the option of defaulting on a payment.

In an effort to avoid such dire consequences, a number of states and cities have taken steps to scale back pension benefits and shore up funding. Utah, Michigan, and Alaska all have begun to move new hires into 401(k)-type defined contribution plans. Other municipalities have reduced or frozen COLAs (Cost of Living Adjustments), or changed the formulas by which they are calculated.[21] Retirees in Providence, Rhode Island, recently agreed to a COLA freeze and changes in health benefits.[22] And two larger California cities each voted to change their respective systems: San Jose will cut benefits and increase employee contributions, while San Diego will freeze benefits and put new workers into a defined contribution plan.[23]

Recent Attempts at Reform

In the past several years, Colorado has passed a number of PERA reform bills. One was aimed at reducing the state's unfunded liability, while the others provided temporary fixes designed to relieve immediate budgetary pressure.

SB10-001

In 2010, the legislature passed a number of significant adjustments to PERA's benefit calculations by adopting Senate Bill 1:

- COLAs, no longer considered sacrosanct, were capped at the lesser of 2 percent or inflation.

- The practice of double-dipping with PERA-covered employers was ended.
- The retirement age was raised to 58 from 55 for most new hires after January 1, 2011.
- The salary used for calculating benefits was spread out over the last 5 years of service, and limited to raises of 8 percent per year.

These changes, while reining things in at the edges, left intact the overall defined benefit structure. In addition, the COLA caps are currently the subject of litigation. As Amy Monahan of the American Enterprise Institute succinctly explains:

> *In October 2012, the Colorado Court of Appeals reversed the trial court, finding that plaintiffs did have a contractual right to their COLAs but remanding the case for further consideration of whether the impairment of plaintiffs' contract rights was nevertheless permissible because it was reasonable and necessary to serve an important public purpose. The case is currently pending before the Colorado Supreme Court.*[24]

Similar legal tangles have held up or brought into question pension reforms in various California municipalities.[25] And the day after Detroit's Emergency Manager, Kevin Orr, sought to take the city into bankruptcy, a state judge ruled that the Chapter 9 filing in federal court violated a clause in Michigan's state Constitution that guaranteed municipal pension benefits.[26]

Ironically, such actions have the unintended consequence of increasing the unfunded liability, by justifying the risk-free rate of return used as the plan discount rate. Were benefits to be subject to change, even statutory change, the plan could use a higher discount rate that reflects greater risk. As a result, the plan's apparent unfunded liability would be reduced.

SB10-146, SB11-076

While affecting PERA, these two laws adopted in consecutive years were primarily budget bills. They shifted 2.5 percent of the annual PERA contribution from the state to the employees, at a savings of roughly $20 million per year. Each was a one-time fix, and neither was repeated in 2012 for the fiscal year running until June 30, 2013.

Policy Proposals

The ultimate answer to Colorado's fiscal problem is to follow Utah, Alaska, Michigan, Rhode Island, and San Diego in transitioning to a defined contribution (DC) plan, following the private-sector trend.[27] Such a transition, done well before the crisis stages, carries a net benefit for all parties concerned—the employees, the state, and the taxpayers—by limiting the potential long-term liability and converting to a plan that is by definition actuarially sound.

The ultimate answer to Colorado's fiscal problem is to follow Utah, Alaska, Michigan, Rhode Island, and San Diego in transitioning to a defined contribution (DC) plan, following the private-sector trend.

In a defined benefit (DB) plan, a member has a share in a liability, a promise to pay. As we have seen, there may or may not be sufficient funds to cover the obligations. A DC plan, by contrast, is by definition always fully funded. The beneficiaries own the assets, and can only access the value of those assets. There are no unfunded promises, because none are made.

The main financial reason usually given for refusing to convert from defined benefit to defined contribution—aside from political motivations—is the transition cost, defined as a change in the way that future obligations are scheduled to be paid.

There are two ways to amortize a long-term pension liability: Level Dollar, which assumes equal payments over the 30-year window, and Level Percent of Pay, which assumes that the payments stay level as a percentage of the participants' salaries, but that the salaries rise. Level Dollar amortization costs less over the life of the debt retirement, but costs more now, at a time when state budgets are already tight. Level Percent of Pay costs more, but pushes much of that cost into the out years.

The main financial reason usually given for refusing to convert from defined benefit to defined contribution—aside from political motivations—is the transition cost, defined as a change in the way that future obligations are scheduled to be paid.

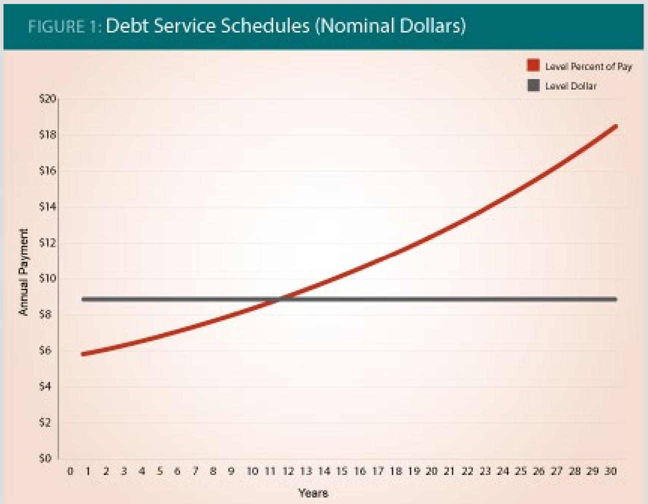


Figure 11

GASB rules state that when a defined benefit plan closes, it must change from Level Percent of Pay Amortization to Level Dollar amortization, for purposes of calculating its ARC. The effect is to shift amortization payments from later years to earlier ones.[28]

However, economist Josh McGee points out that this change only affects financial reporting, and doesn't actually require any additional payments be made sooner. The method of funding the liability can be independent of its financial reporting, meaning that no actual payments need to be made sooner. Most important, a transition, accompanied by a "hard freeze" in benefits—leaving vested benefits untouched, but accruing all new benefits in a defined contribution plan—caps the unfunded liability. It does not eliminate the unfunded liability. It does, however, prevent the liability from growing. Remember that a defined contribution plan is by definition fully funded, and under a "hard freeze," no more liabilities can accrue under the DB plan.[29] The state will be left with the same liability, and the same obligation to fund it. The plan can be no worse off than it is now, and by capping the risk associated with its unfunded liability, it can end up in considerably better shape than it otherwise would have been.

Intermediate Proposals

The State also could take intermediate steps both to put the plan on sounder footing and buy time, while increasing transparency and accuracy in reporting.

A number of such bills have been introduced into the legislature in recent sessions. Many of these ideas were drawn from the Independence Institute's Citizens Budget[30], a comprehensive look at state fiscal policy. While none of the following proposals was enacted into law, they are all good ideas that could be reintroduced:

- **SB12-016: Local Government Option to Change PERA Contributions**
  Would have allowed local governments to shift a portion of the employer contribution to the employees, an option available to state government.

- **HB12-1250: Health Care Benefit**
  Would have recalculated the Health Care Division contributions as a function of health care costs, based on current subsidies paid out, rather than employees' salaries.

- **SB12-082: PERA Retirement Age Equal to Social Security**
  Would have set the PERA retirement age equal to the retirement age for Social Security, as a matter of fairness to the taxpayers supporting the system.

- **SB12-119: PERA Fiscal Sustainability (30-Year Amortization)**
  Would have required PERA to adjust its benefits and contributions whenever the amortization period for a given division exceeds 30 years.

- **SB12-136: Include Retirement Benefits in Biennial State Compensation Report**
  Would have included PERA costs and recommendations in the state personnel director's compensation report, to be prepared biennially instead of annually, as is now the case.

- **HB13-1040: Highest Average Salary**
  Would have increased PERA's current calculation of benefits from the highest three years' salary to the highest seven years' salary.

- **SB12-055: Actuarial Soundness**
  Would have required PERA to use the state's long-term cost of borrowing to discount its liabilities, and would have required benefit and contribution changes to bring the individual funds' amortization periods under 30 years.

- **HB12-1142: Allow all PERA Employees Access to Defined Contribution Plan**
  Would have opened up access to PERA's defined contribution plan to all PERA employees, rather than only certain state employees.

- **SB12-1179: PERA Board Composition**
  Would have reduced the conflicts of interest on PERA's board by removing elected board positions, and replaced them with board positions filled by non-PERA employees and beneficiaries. At the moment, virtually every PERA board position has an incentive to maintain the current structure, to increase benefits, and to guard PERA against outside scrutiny. PERA board members have both the incentive and the legal obligation to act in the best interests of PERA members, but no board members are charged with the explicit legal obligation to act in the best interests of the taxpayers.

Political Challenges & Opportunities

Colorado faces a distinctive political landscape in trying to enact change.

PERA, in particular former Executive Director Meredith Williams, has been especially aggressive in its defense not only of its own defined benefit plan, but also of defined benefit plans in general, dismissing criticism of them as "allegations." Among the identified "allegations" are that defined benefit plans are overly optimistic in their returns assumptions, that they are headed toward insolvency, that they have received and will need taxpayer bailouts, and that they should include defined contribution options.[31] Far from being mere allegations, they are matters on which almost all serious financial economists agree, a phenomenon requiring something close to metaphysical certainty to achieve.

As a result of such a determined defense, PERA has managed to turn its shareholders into an effective lobbying arm on its behalf. Either together, or in some combination, PERA and other public employee groups have opposed all of these, as well as other reform bills introduced in 2013 (see table 1).[32]

Table 1. Interest Group Opposition to Colorado PERA Reform Legislation, 2012-13

Bill	PERA	Wins	AARP	CASE	AFL-CIO	AFT	CEA
HB13-1040: Highest Avg. Salary	X	X	X				
SB13-055: Actuarial Soundness	X		X	X			X
HB12-1142: All Opt Into DC	X	X	X	X	X	X	X
HB12-1179: Board Composition	X		X	X			X
SB12-016: Local Contrib. Option	X		X	X	X	X	
HB12-1250: Health Care Costs	X	X	X			X	
SB12-082: Social Sec. Age	X	X	X	X	X	X	X
SB12-119: 30-Yr. Amortization	X	X				X	
SB12-136: Costs in Biennial Rpt.		X					

PERA: Public Employees Retirement Association
Wins: Colorado WINS (Colorado Workers for Innovative and New Solutions, a state employees' union)
AARP: American Association of Retired People
CASE: Colorado Association of School Executives
AFT: American Federation of Teachers
CEA: Colorado Education Association

Nevertheless, experience in other states suggests that alliances across traditional ideological lines may be possible. In both New York and New Jersey, private sector unions, recognizing the threat that increasing contributions to public sector pensions pose to their own members' livelihoods in the form of public works, have joined with governors to implement changes to the system.[33]

There is also the possibility that pension funds' investments in riskier assets in order to meet investment targets will lead to resentment among those who distrust Wall Street investment firms.[34] PERA does not face immediate catastrophe. It does need immediate steps to prevent eventual default.

Were such default to occur, those most hurt would be those least able to make adjustments in their personal finances – those already retired, and those nearing retirement. The situation facing current retirees in Detroit need not be Colorado's future. It can be avoided given reasonable and commonsense changes now.

This paper is part of the Fiscal Policy Center's PERA Project.

Endnotes

1 Bureau of Economic Analysis, "Widespread economic growth across states in 2011," June 5, 2012, http://www.bea.gov/newsreleases/regional/gdp_state/2012/pdf/gsp0612.pdf.

2 Mary Williams Walsh and Danny Hakim, "Public Pensions Faulted for Bets on Rosy Returns," *New York Times, May 27, 2012.*

3 Moody's Investor Service, "Adjusted Pension Liability Medians for U.S. States," June 27, 2013.

4 Mary Williams Walsh, "New Rules on Pension Funds Seek Better Disclosure," *New York Times, June 24, 2012.*

5 Alicia H. Munnell, et. al., "How Would GASB Proposals Affect State and Local Pension Reporting?" CRR Working Paper 2012-18 (June 2012), http://crr.bc.edu/wp-content/uploads/2012/06/wp_2012-17.pdf

6 Andrew Biggs, "Public Sector Pensions, How Well Funded Are They, Really?" State Budget Solutions (July 2012), http://www.statebudgetsolutions.org/publications/detail/public-sector-pensions-how-well-funded-are-they-really.

7 Monte Carlo simulations use repeated random sampling to obtain results. Such a simulation for a pension fund would vary investment returns over time, to see how often the fund goes broke.

8 Andrew Biggs, "An Options Pricing Method for Calculating the Market Price of Public Sector Pension Liabilities," American Enterprise Institute Working Paper #164, February 26, 2010, http://www.aei.org/files/2010/02/26/Biggs-WP-164.pdf.

9 Michael V. Mannino and Elizabeth S. Cooperman, "Benefit Enhancement in Public Employee Defined Benefit Pension Plans: Evidence From Three Sources," University of Colorado Denver, Business School, January 24, 2013.

10 PERA CAFR, 2000.

11 "Pension Fund Actuarial Required Contributions (ARC)," The Civic Federation, February 14, 2007.

12 PERA CAFRs, 2001-2012.

13 Jefferson County Public Schools, Comprehensive Annual Financial Reports, 2005-2011, Budget 2012, online at http://www.jeffcopublicschools.org/finance; Aurora Public Schools, Comprehensive Annual Financial Reports, 2005-2011, Budget 2012, online at http://aurorak12.org/about-aps/finances/; Cherry Creek School District, Comprehensive Annual Financial Reports, 2006-2011, Budget 2012, online at http://www.cherrycreekschools.org/FiscalServices/Financial-Transparency/Pages/default.aspx; Adams 12 School District, Comprehensive Annual Financial Reports, 2005-2011, Budget 2012, online at http://www.adams12.org/financial_accountability/financial_transparency.

14 Roger Lowenstein, "The Next Crisis: Public Pension Funds," *New York Times Magazine, June 25, 2010.*

15 Andrew Biggs, "Public Pension Deficits Are Worse Thank You Think," *Wall Street Journal, March 22, 2010.*

16 Biggs, "An Options Pricing Method for Calculating the Market Price of Public Sector Pension Liabilities."

17 Michael Corkery, "Illinois Pension Fund May Cut Return Target," *Wall Street Journal, June 27, 2012.*

18 John Seiler, "CalPERS Funding Might Be Only 40%," CalWatchdog.com, March 22, 2012, http://www.calwatchdog.com/2012/03/22/calpers-funding-might-be-only-40-percent/.

19 Randy Diamond, "CalSTRS' unfunded liability rises 13%; funding ratio falls to 69.4%," *Pensions & Investing, April 9, 2012.*

20 Joey Ferguson, "Unions, pensions drove Stockton, California to bankruptcy," *Deseret News, June 29, 2012.*

21 Hazel Bradford, "Strapped state pension funds take scalpel to COLAs for relief," *Pensions & Investing, June 11, 2012.*

22 Erika Niedowski, "Providence pension deal OK is headed to judge," AP, *San Francisco Chronicle, June 25, 2012.*

23 Associated Press, "2 California cities approve pension cuts," June 6, 2012.

24 Amy Monahan, "Understanding the Legal Limits on Public Pension Reform," American Enterprise Institute, May 2013.

25 Steven Greenhut, "Tackling the Pension Problem," City Journal website, July 17, 2013, http://www.city-journal.org/2013/cjc0717sg.html.

26 "Judge orders Snyder to withdraw bankruptcy filing, saying it's unconstitutional," Crain's Detroit Business website, July 19, 2013, http://www.crainsdetroit.com/article/20130719/NEWS/130719769/judge-orders-snyder-to-withdraw-bankruptcy-filing-saying-its.

27 Barbara A. Butrica, Howard M Iams, Karen E. Smith, and Eric K. Toder, "The Disappearing Defined Benefit Pension and Its Potential Impact on the Retirement Incomes of Baby Boomers," U.S. Social Security Administration, *Social Security Bulletin 69, No. 3 (2009)*, http://www.ssa.gov/policy/docs/ssb/v69n3/v69n3p1.html.

28 Josh B. McGee, "The Transition Cost Mirage – False Arguments Distract from Real Pension Reform Debates," Laura and John Arnold Foundation, March 2013.

29 Barry Poulson, "Solving the Funding Crises in PERA," Independence Institute Issue Paper 5-2012 (May 2012), http://tax.i2i.org/2012/05/18/solving-the-funding-crises-in-pera/.

30 http://tax.i2i.org/citizens-budget/.

[31] PERA Shareholder Meeting, November 22, 2010, http://www.youtube.com/watch?v=lCpW8R39Mt0&t=840s.

[32] TRACER Search, June 17, 2013; The Colorado Secretary of State requires lobbyists to register on TRACER, and to record any time they are instructed by a client to take a position favoring, opposing, or monitoring a bill

[33] Nicholas Confessore, "Donations to Key Cuomo Ally Show a Rift Among Unions," *New York Times, June 7, 2012; Angela Delli Santi and Beth DeFalco, "NJ gov, Senate leader, reach union benefits deal," AP, June 8, 2011.*

[34] Walter Russell Mead, "Time to Occupy State Pensions?" Via Meadia Blog, The American Interest, June 25, 2012.

INDEPENDENCE INSTITUTE is a non-profit, non-partisan Colorado think tank. It is governed by a statewide board of trustees and holds a 501(c)(3) tax exemption from the IRS. Its public policy research focuses on economic growth, education reform, local government effectiveness, and constitutional rights.

JON CALDARA is President of the Independence Institute.

DAVID KOPEL is Research Director of the Independence Institute.

JOSHUA SHARF is a policy analyst for the Fiscal Policy Center. A web developer in private practice, his professional background includes intelligence and defense analysis, and he holds an MBA and an MS in Finance from the University of Denver. He was twice a candidate for the Colorado House of Representatives from the Denver area.

ADDITIONAL RESOURCES on this subject can be found at: http://www.independenceinstitute.org/