



Few Reach the Peaks:

How to Fix Colorado's Teacher Pensions

Chad Aldeman and Michelle Welch



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About TeacherPensions.org

Teacherpensions.org provides high-quality information and analysis to help stakeholders—especially teachers and policymakers—understand the teacher pension issue and the trade-offs among various options for reform. We believe there is a need for additional analysis of and communication about teacher pensions—an issue that has not yet gained sufficient traction nationally, despite its seriousness and immediacy. We aim to make the issues around teacher pensions more accessible and relevant to the general public, more compelling to policymakers, and more understandable for current teachers.

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Introduction

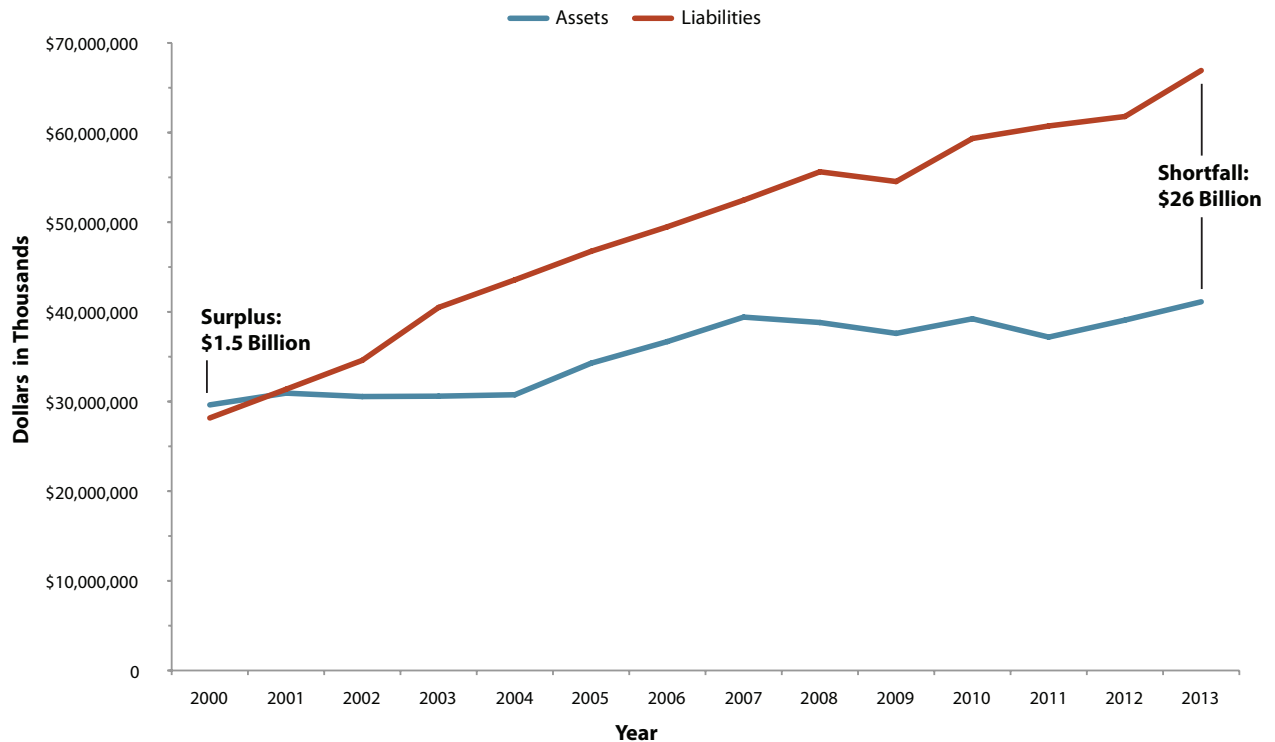
Colorado's rising pension debt is shortchanging the state's teachers and having a negative impact on the quality of education for Colorado's students. To keep up with growing pension costs, the state has directed money away from the classroom and cut benefits for current teachers, retirees, and those who are entering the teaching profession. In order to protect the quality of education its schools can deliver, Colorado must adopt sustainable funding policies and address the underlying structural problems that leave the vast majority of teachers without adequate retirement savings.

The vast majority of Colorado's teachers and other public school workers will leave without adequate retirement savings.

Today, the Colorado Public Employees' Retirement Association (PERA)—a pension plan with over 200,000 active members including teachers, state and city employees, as well as judges—is just 61 percent funded.¹ This means that for every dollar Colorado will owe in future benefits, it has saved only 61 cents. PERA's School Division alone has an unfunded liability of more than \$14

billion (or about \$118,000 for every active member). These challenges didn't arise overnight. In 2000, the PERA system had accrued \$1.5 billion beyond what actuaries said it would need to pay for retirement benefits in the future (**See Figure 1**). But after more than a decade of economic downturns and insufficient funding policies, that surplus is gone. The state currently has a total pension debt of \$26 billion.

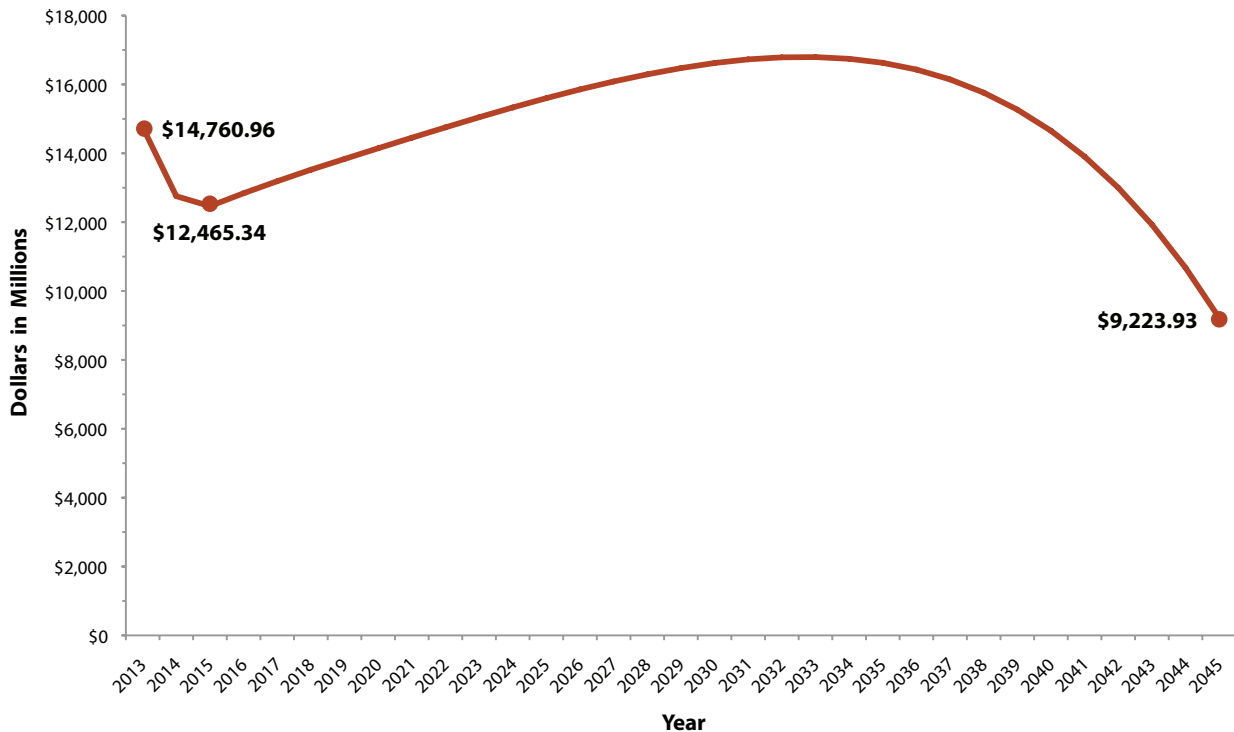
Figure 1 Poor Funding Practices and Two Recessions Widened the Gap Between Assets and Liabilities



Source: Colorado's Public Employee Retirement Association Comprehensive Annual Financial Report (1997 to 2013).

The Colorado General Assembly, in coordination with PERA's leadership, has taken meaningful action to address the plan's fiscal position. However, despite the recent legislative changes that attempted to address the funding shortfall, significant challenges remain. The state has a plan to pay down the debt, but it is dependent on strong, regular investment returns and rising contribution rates from schools and their employees. Even under the best of conditions, the debt is not projected to decrease until the year 2043 (See Figure 2).²

Figure 2 Despite Senate Bill 10-001, Unfunded Liabilities Won't Fall Below Current Levels Until 2043



Source: Authors' calculations based on Cavanaugh MacDonald projections provided by Colorado's Public Employee Retirement Association on August 7, 2014 (COPERA – 2014 LAC Presentation – Projection Datapoints).

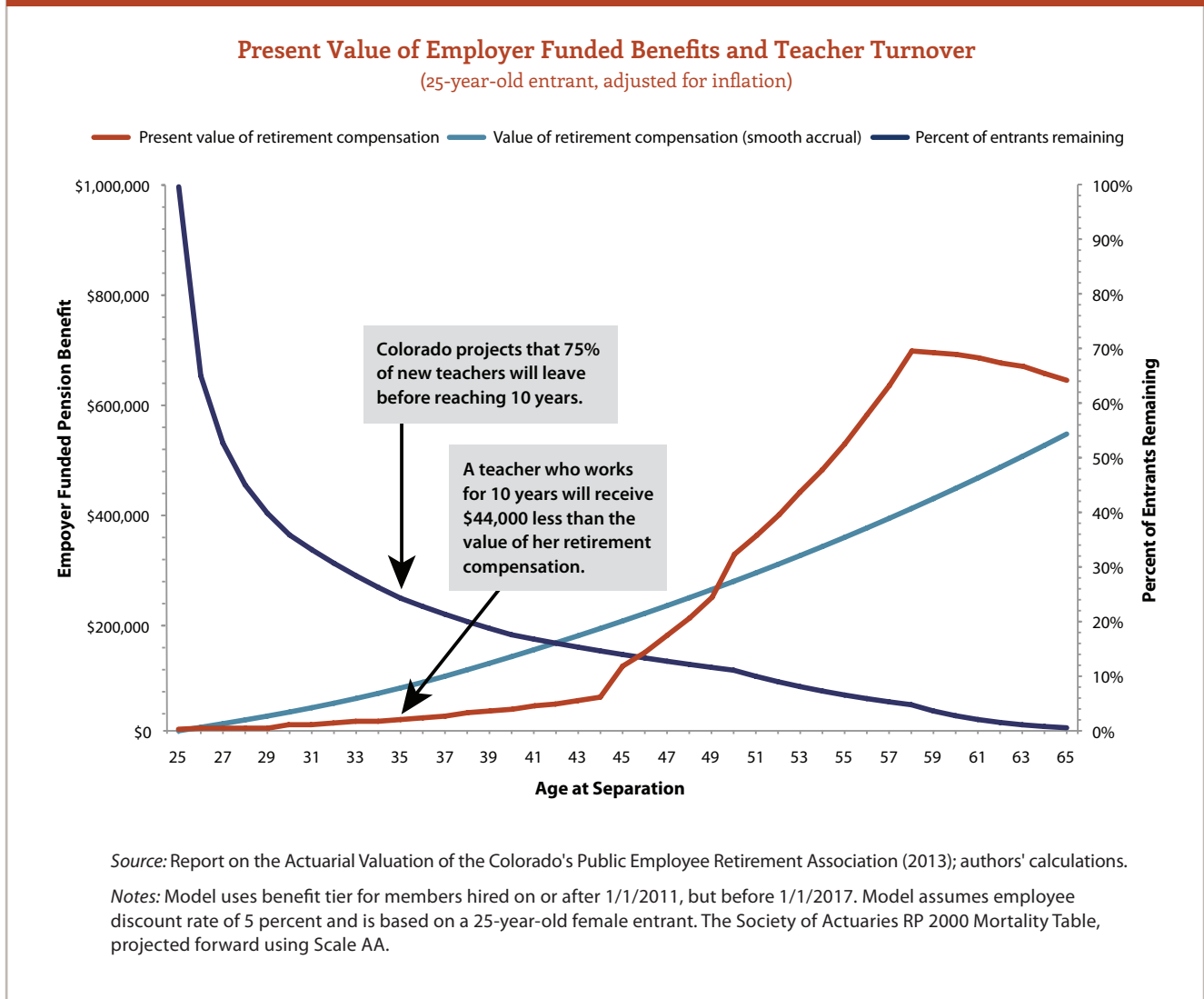
More importantly, the recent legislation has had a negative effect on public employees, and many educators who are devoting years of their lives to serving Colorado's children will leave without adequate retirement savings. Colorado public school districts are collectively one of the largest employers in the state, with approximately 133,000 active members in PERA. To put these educators on the path to retirement security, the state's plan should offer all workers sufficient retirement compensation for each year of service. This is not currently the case. Today, 85 percent of teachers and other school workers will leave public employment with insufficient retirement savings and no Social Security benefit.

Colorado's Pension Plan is Not Meeting the Retirement Needs of its Educators

Colorado is one of 15 states where teachers cannot participate in Social Security. As such, they are wholly dependent on the state pension plan. While the system is often perceived as providing workers with significant retirement savings, that is only true for the small fraction of teachers who spend their entire career with an employer that is a member of PERA. Instead, the majority of teachers will leave PERA with retirement compensation that is substantially less than the amount their employer contributed on their behalf (**See Figure 3**). This is because pension benefits grow only modestly during the early and middle portions of a person's career. For example, according to the latest report from PERA, the average annual benefit for teachers who retired in 2013 was \$29,899.³ But teachers who retired after working a full career with a PERA employer (more than 25 years), on average, received \$49,732—more than 1.5 times the average benefit.⁴ On the other hand, teachers who spent roughly one-third of their careers (six to 15 years) with PERA employers received on average only one-sixth (\$8,652) of the full-career benefit.⁵

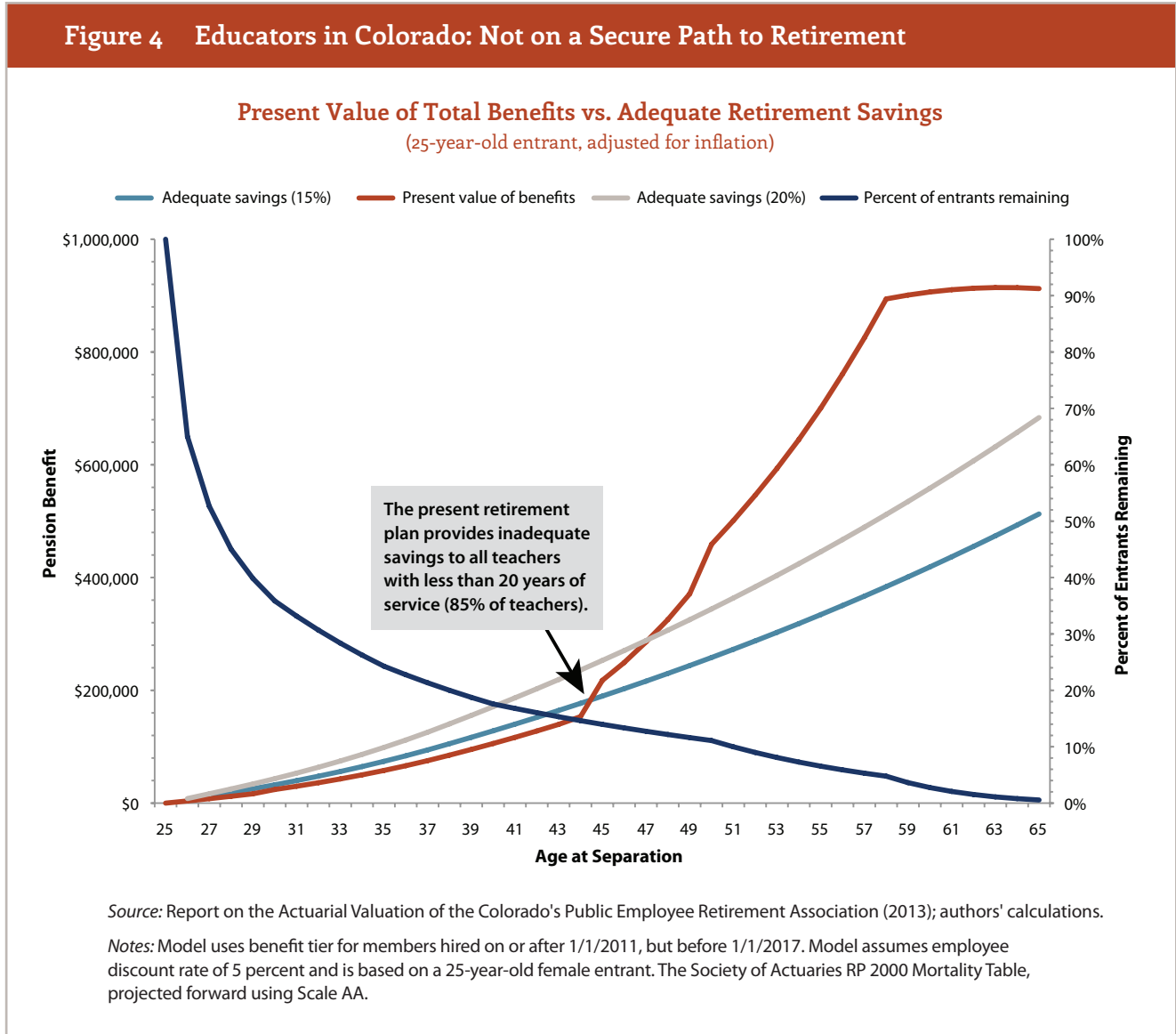
The problem is further compounded by Colorado's high teacher turnover rates. According to PERA's own assumptions, 64 out of every 100 new educators will leave before reaching five years of service. It is not unusual for turnover to be high among people who are in the early years of their teaching career. Yet, Colorado also has significant turnover among mid-career teachers. Out of the 36 teachers who remain on the job for five years, 12 will leave before 10 years of service, and 10 more will leave before 20 years. Only 14 educators from the original group will remain in the system for 20 or more years.⁶ This means that a 25-year-old entering the teaching profession has only a 1-in-20 chance of being eligible for early retirement at age 55. He or she has less than a 1-in-50 chance of staying in the system until the regular retirement age of 58.⁷

Figure 3 Retirement Compensation is Low During the Early & Middle Portions of a Career



In other words, despite serving students for five, 10, or even 20 years, the majority of public school workers will find it difficult to achieve a secure retirement under the current system. Most retirement experts recommend workers save 10 to 12 percent of their annual salary, plus Social Security contributions.⁸ Since Colorado teachers are not enrolled in Social Security, they need to save 15 to 20 percent of their salary for each year they work, and that money must compound and grow over time. **Figure 4** compares these recommended thresholds with PERA's pension plan accumulations.⁹

Figure 4 Educators in Colorado: Not on a Secure Path to Retirement



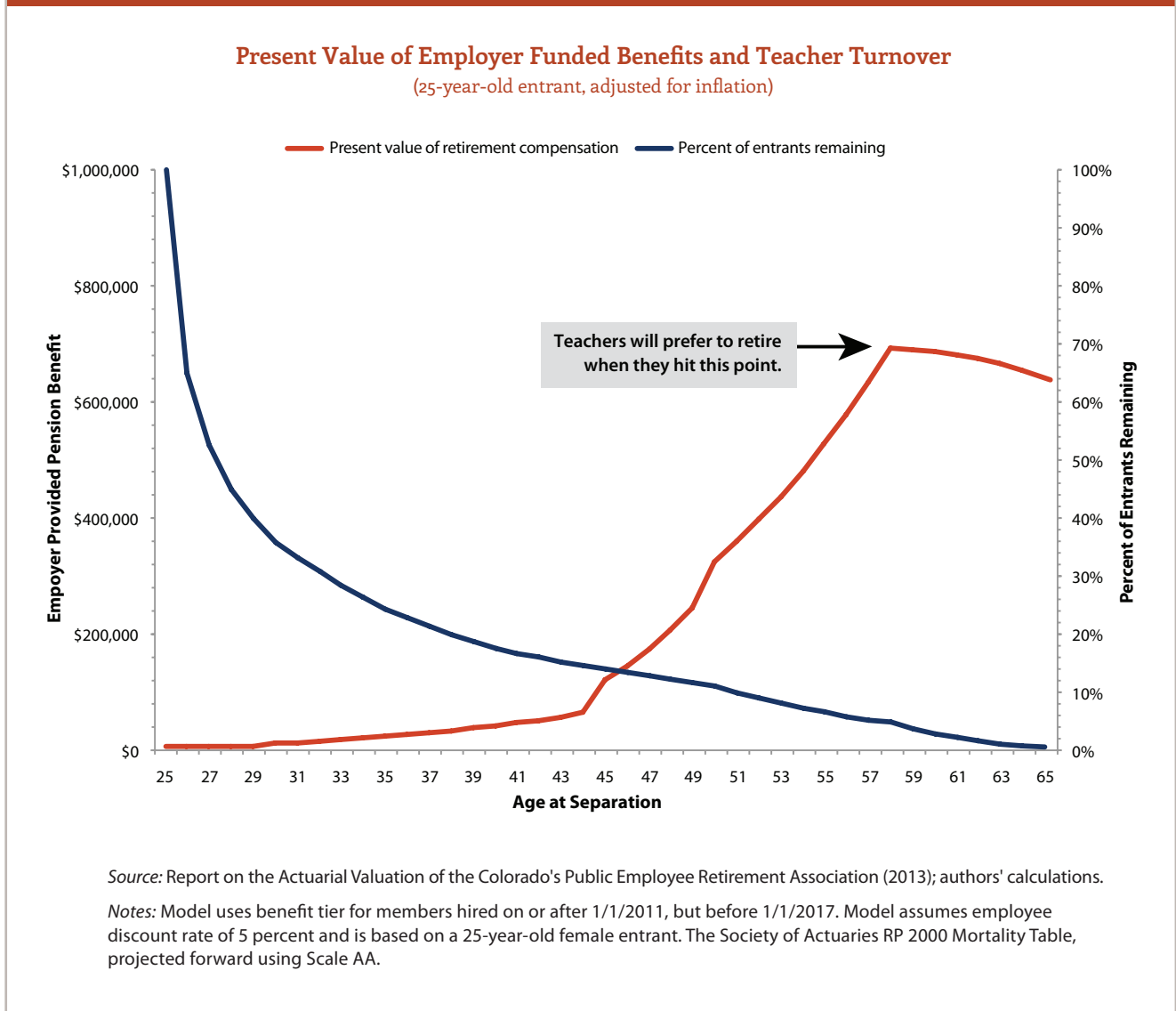
As the figure illustrates, more than four out of every five educators in Colorado will leave the system with less than even the minimally recommended savings necessary for a secure retirement. To put this in perspective, of 100 teachers that enter the system at age 25, only 15 will save enough for retirement during their employment with Colorado public schools. The remaining 85 teachers will need to significantly increase their personal savings across the remainder of their careers to achieve retirement security. Even those who have worked in the system for nearly two decades could fall short of the savings they need. This presents a considerable challenge for those who realize the situation late in their careers, as they are left with little time to make up the difference.

In order to further understand the savings penalty associated with leaving PERA during the early or middle stages of a teacher's career, consider this: A teacher who spent 15 years working for a Colorado school district would need to save at least 20 percent of his or her salary each year after leaving PERA to be able to retire securely at age 65.¹⁰ Alternatively, if the teacher had remained in PERA for an entire career, he or she would have been able to retire at age 58 with an equal retirement benefit. Not only does this teacher need to work an additional seven years while continuing to save large amounts of money, but he or she must also forgo seven years of pension benefits.

This is not to say that all teachers who serve a full career in Colorado schools benefit from the current system. Even teachers who spend their entire career with a PERA employer may lose out under the existing formula-based system. This is because rather than treating all years of work equally and letting individual teachers decide when it makes sense to retire, the current rules penalize teachers who continue working after a certain age. Pension benefits spike dramatically at PERA's designated retirement age. This encourages teachers to stay only until they reach the peak. After that, each additional year that they spend in the classroom is a year they could have been retired and drawn a pension, so the value of their lifetime pension benefit decreases **(See Figure 5)**. A teacher who enters the profession at age 25 reaches the pension "peak" at age 58. Even if this person would prefer to keep teaching and is positively affecting students' lives, he or she might leave the classroom in order to avoid diminishing retirement benefits.

Evidence from California, Missouri, and Arkansas suggests that teachers respond to these significant financial penalties.¹¹ Instead of helping to retain highly-effective workers, back-loaded pension plans incentivize all late-career teachers to retire at the optimal moment financially, regardless of their desire to keep teaching or their effectiveness in the classroom.¹² Colorado may be losing some of its most outstanding, experienced teachers who would have otherwise taught for many more years. In this way, the state's steep pension peaks can deprive its students of exceptional teachers.

Figure 5 Back-Loaded Benefit Encourages Retirement of All Late-Career Teachers



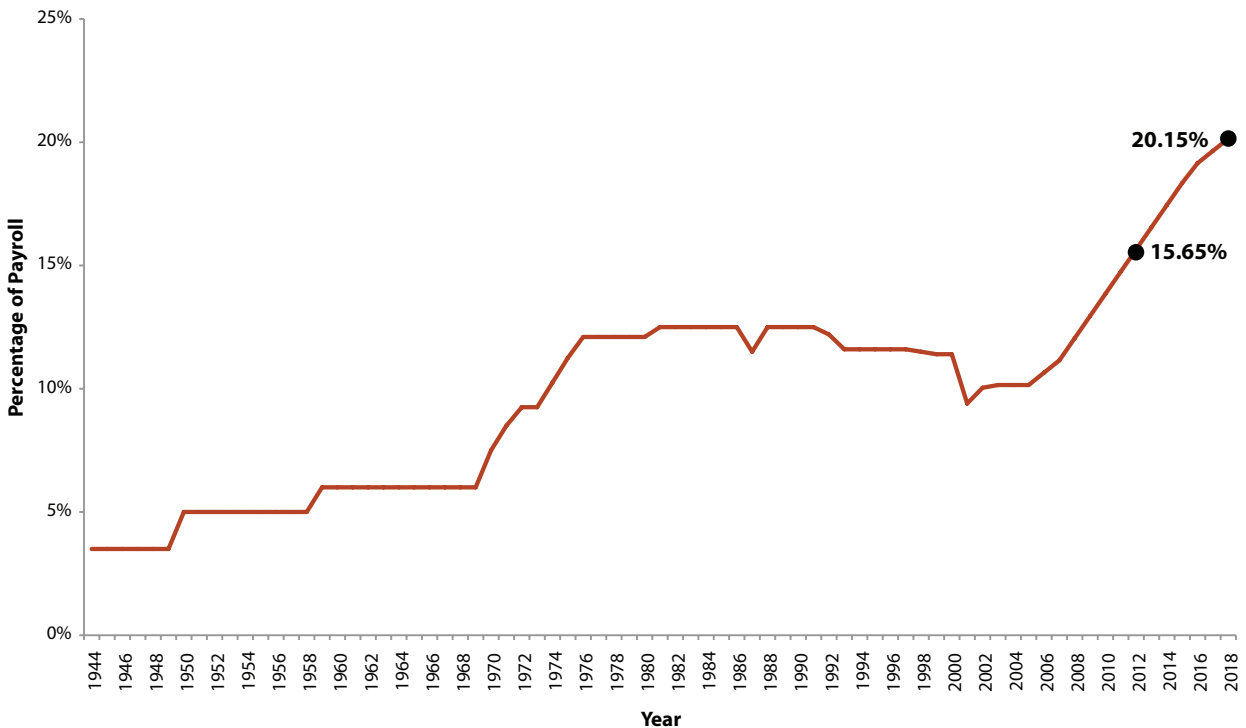
Teachers and Students are Paying for Colorado's Pension Debt

Since PERA's School Division was created in 1944, school districts have paid some percentage of employee salaries into the pension plan, and that percentage has risen over time. It began at a relatively modest 3.5 percent in the 1940s and grew to 6 percent in the 1960s, increasing into the double digits beginning in 1974. In the past 10 years, this percentage has reached unprecedented levels, but it is still not enough to responsibly pay off the pension debt. In the 2014 school year, districts are paying 15.65 percent of each employee's salary into the state pension plan, and the legislature has already indicated that the rate will increase to 20.15 percent by 2020 (see **Figure 6**).¹³

In 2013, for every dollar that school districts were required to contribute to the pension fund, only 16 cents went to paying the actual cost of benefits earned by workers in that year.

These costs are growing primarily because the state for years has failed to make sufficient contributions, and public employers are now required to pay substantially more into the retirement system than in years past. Even if school districts would prefer to give teachers raises, hire more employees, or make other critical investments to support Colorado's children, districts have no choice but to make pension contributions at the rates set by state legislators.

Figure 6 Employer Contributions Have Risen to Unprecedented Levels



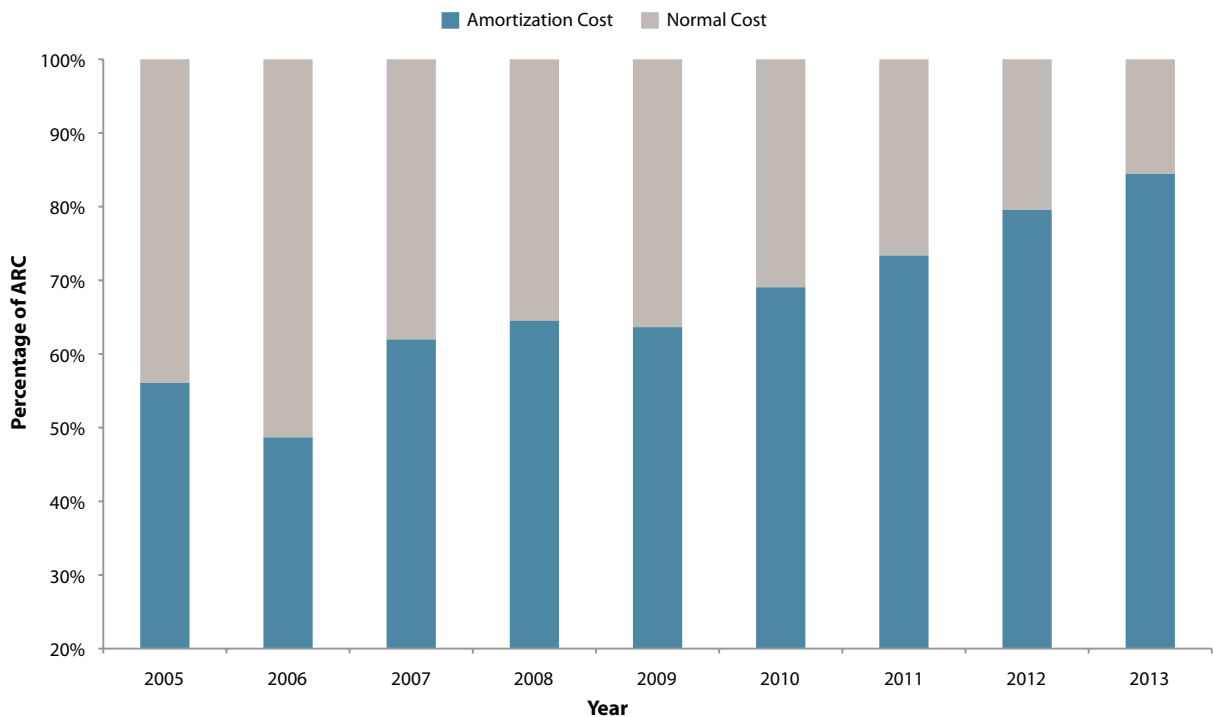
Source: Historical contribution rates (until 2015) provided by Colorado PERA, [https://www.copera.org/pera/employer/contributionrates.htm#School Employers](https://www.copera.org/pera/employer/contributionrates.htm#School%20Employers). Projected contribution rates (until 2018) also provided by Colorado PERA, <https://www.copera.org/pdf/5/5-123.pdf>.

Note: Contribution rates are lagged. In 2014, employers will pay the 2012 contribution rate. In 2020, employers will pay the 2018 contribution rate.

In 2013, for every dollar that school districts were required to contribute to the pension fund, only 16 cents went to paying the actual cost of benefits earned by workers in that year (called the plan's "normal cost"). The remaining 84 cents was set aside to pay down the long-term unfunded liability (also known as "amortization"). Like a consumer who only made the minimum credit-card payment, school district contributions are now mainly being used to pay down interest on the ever-growing debt (**See Figure 7**).

Figure 7 In 2013, the State Paid More for Debt (84%) Than for Teacher Benefits (16%)

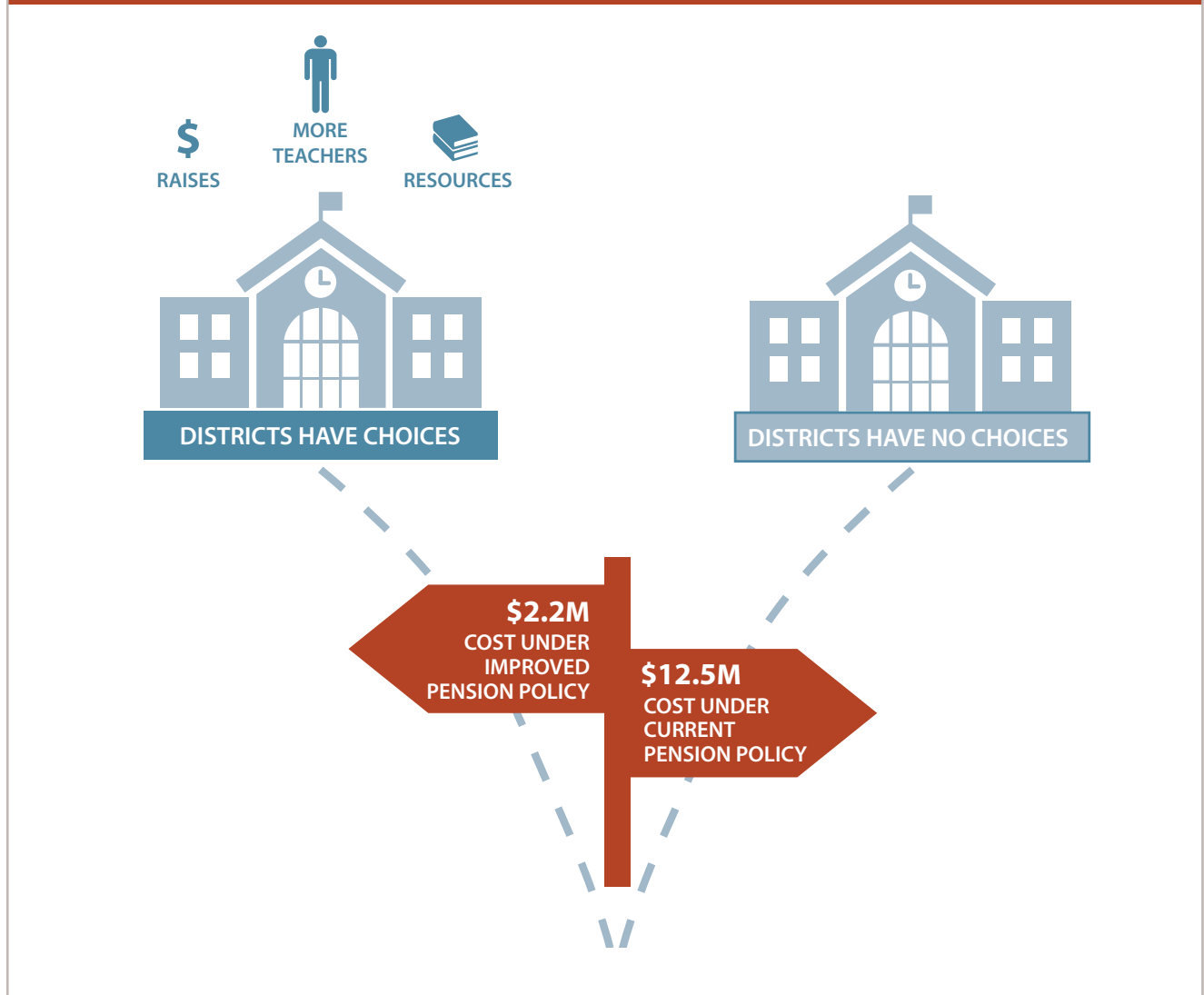
Amortization cost and normal cost as a percentage of the annual required contribution (ARC)



Source: Report on the Actuarial Valuation of the Colorado's Public Employee Retirement Association (2005 to 2013).

This has real consequences for district budgets. For example, in the 2013-14 school year, the Colorado Springs School District employed 1,710 teachers with an average annual salary of \$45,255.¹⁴ Given PERA's 2014 employer contribution rate, the district paid approximately \$12.5 million into the pension fund on behalf of its teachers. Comparatively, if the state had made responsible payments in the past and there was no debt to pay down, the district would have contributed only about \$2.2 million.¹⁵ The difference between these two figures would have allowed the district to hire 227 more teachers at the same average salary, give each of the current teachers a \$6,014 raise, or purchase 20,605 iPads—nearly enough to provide one to each student (See Figure 8).¹⁶

Figure 8 Pension Costs Limit the Options of Colorado School Districts



Districts have to consider this full cost—not just the normal cost—whenever they make decisions about salaries or personnel. To put this in perspective, in 2002, a Colorado school would have contributed \$3,120 on behalf of a teacher earning \$40,000. That entire amount would have gone toward his or her retirement benefit. In 2013, the district is paying almost twice that amount, but only a fraction of the money—one-fifth—is going toward the teacher’s retirement benefit. The rest is earmarked to pay down the pension debt.¹⁷

Without additional funding, rising pension costs will force districts to choose between reducing staffing levels, limiting salaries, increasing class sizes, or cutting programs like music, library, advanced math, and foreign languages.

Without additional funding from state or local taxes, rising pension costs will force districts to choose between reducing staffing levels, limiting salaries, increasing class sizes, or cutting programs like music, library, advanced math, and foreign languages. The quality of education provided to Colorado's children will be at risk, which is of particular concern considering that the state already ranks 42nd in the U.S. in per-pupil spending and in the bottom half of states in terms of teacher salary levels.^{18, 19}

In 2013, a coalition of education advocates, business leaders, policymakers, and civil rights advocates aimed to minimize these consequences for public education by sponsoring an amendment (Amendment 66) to reform school finance allocations and increase the tax base for education.²⁰ But the amendment failed, and without future voter approval of education funding measures, school districts' budgets will remain strained. Colorado's only option to pay down the pension debt going forward, at least in the near term, is to continue to rely on high, yet insufficient, contributions from school districts. In turn, rising pension debt will force further cuts and erode the quality of education for Colorado's students.

Potential Solutions to Colorado's Problems

The state should look for solutions to address both the existing \$26 billion pension debt and the structural problems that plague the current defined benefit plan. While policymakers are to be commended for passing pension reform legislation, especially in a stressful budgetary environment, Colorado must do more to ensure that its public workers can achieve a secure retirement. The problems outlined in this brief can and must be solved immediately.

Colorado must also acknowledge that the pension debt was not caused by teachers or schools, and legislators should not expect them to bear the full burden of the unfunded liability.

The first step is to mitigate the consequences of the pension debt for students and teachers. To do this, the state must develop a sound funding policy that will alleviate the existing unfunded liability in less than 30 years. A best practice would be for the state to implement a forward-looking method for choosing the investment rate of return assumption (i.e. the discount rate) and to amortize existing pension debt over a closed 20-year period, a step recommended by the National Society of Actuaries Blue Ribbon Panel.²¹ Legislators should also plan

for an uncertain future by ensuring that the state will pay in full the normal cost and amount needed to pay off the debt (or amortization cost) even during economic booms and busts.

Colorado must also acknowledge that the pension debt was not caused by teachers or schools, and legislators should not expect them to bear the full burden of the unfunded liability. Public workers' retirement benefits have already been cut, and funds are already being diverted away from the classroom. As such, the state must explore alternative approaches to reduce the pension debt in a manner that is comprehensive and fair. The prudent fiscal measures discussed above will require the state to contribute more money to avoid higher costs in the future. The state should be prepared to dedicate revenue to solving the problem. Given the state's Taxpayer Bill of Rights (TABOR), this means considering propositions like Amendment 66, the 2013 ballot measure focused on directing more money to public education.

Colorado must make structural changes to the pension plan so that all public workers can achieve a secure retirement.

Second, Colorado must make structural changes to the pension plan so that all public workers can achieve a secure retirement. One option for the state to consider is a cash balance defined benefit plan. Beyond providing retirement security for all workers, a cash balance plan also offers greater transparency since workers own their accounts and can see their balances rising. In addition, it provides greater predictability for employers since they agree in advance to annual contribution amounts.

In fact, one component of the state's current retirement system is a cash balance defined benefit called a money purchase plan. It provides a minimal level of benefits to all workers.²² Legislators actually allow PERA to set the interest rate for the money purchase plan at up to 5 percent, but PERA's Board of Trustees reduced the interest rate to only 3 percent, an amount too low to provide teachers with a secure retirement.²³ If PERA increased the money purchase plan's interest rate from the current 3 percent to the maximum 5 percent, retirement benefits for early- and mid-career workers would improve substantially (**see Figure 9**).

Figure 9 Increasing the Interest Rate on the Money Purchase Plan Would Improve Retirement Benefits for All Workers

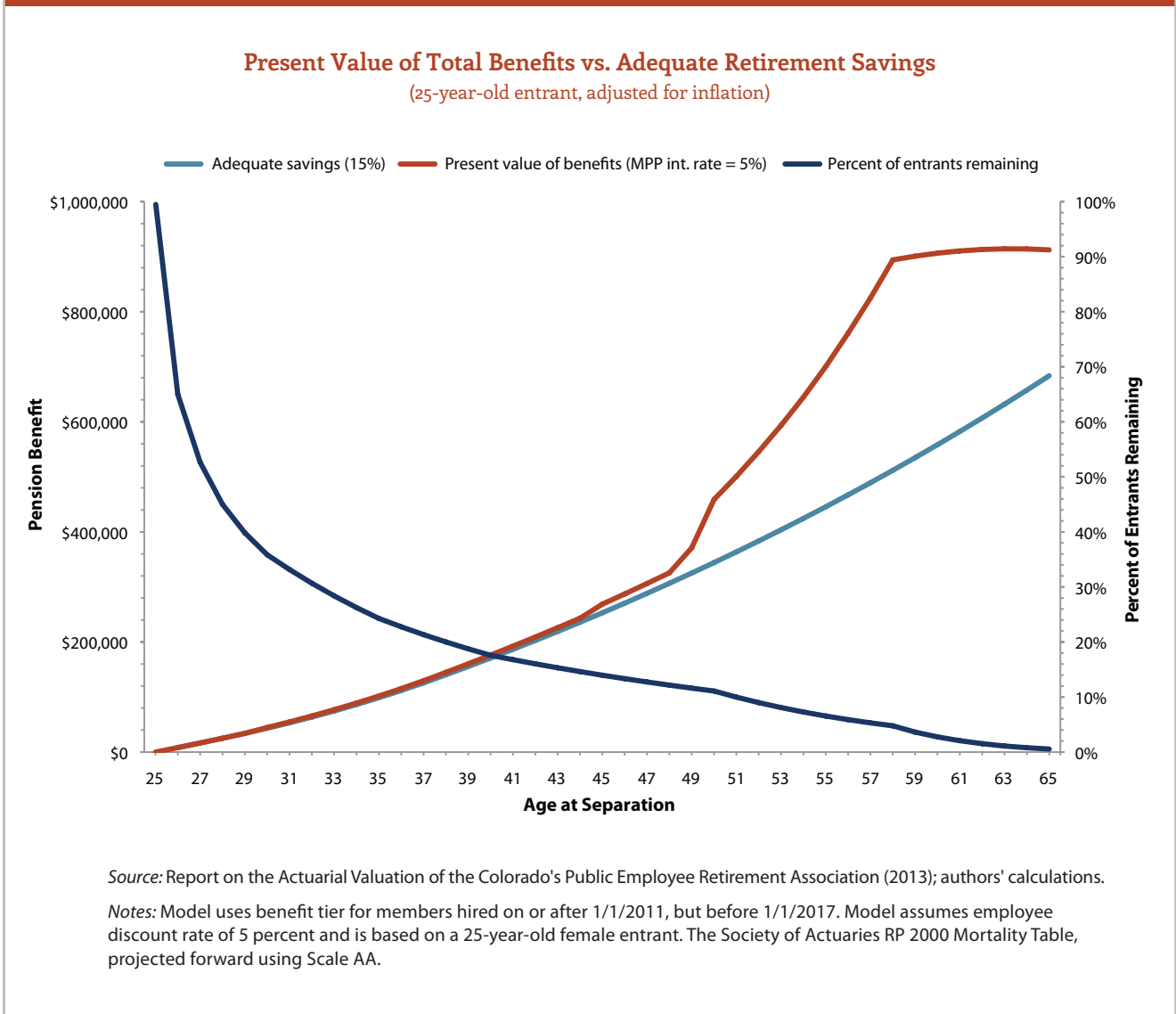
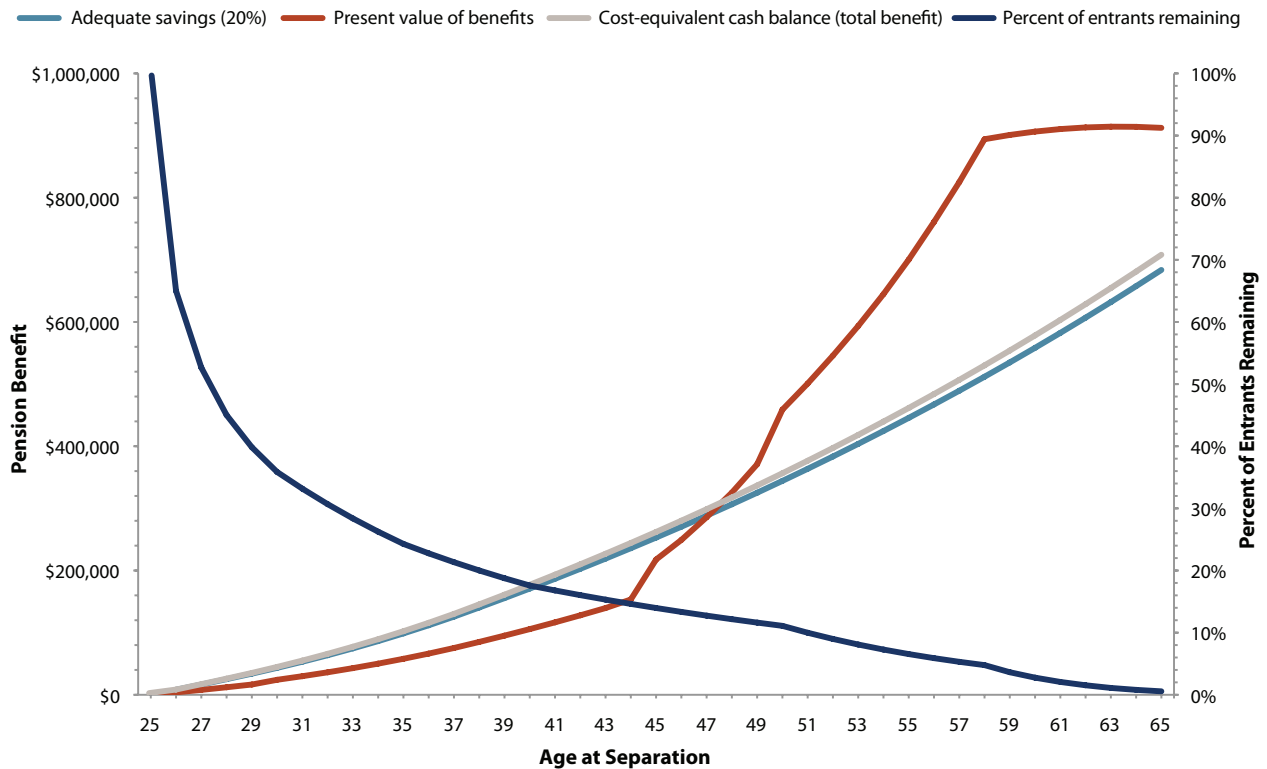


Figure 10 models another cash balance plan that would cost the state no more than it currently pays but would put all public workers on the path to a secure retirement.²⁴

In addition, Colorado could allow its public school workers to take advantage of something it already offers to state and community college employees. Those workers have a choice between participating in the state’s traditional hybrid defined benefit plan (PERA DB) and

Figure 10 Cost-Equivalent Cash Balance System Provides All Workers a Secure Retirement

Present Value of Total Benefits vs. Total Benefits from Cash Balance Plan
 (25-year-old entrant, adjusted for inflation)



Source: Report on the Actuarial Valuation of the Colorado's Public Employee Retirement Association (2013); authors' calculations.

Notes: Model uses benefit tier for members hired on or after 1/1/2011, but before 1/1/2017. Model assumes employee discount rate of 5 percent and is based on a 25-year-old female entrant. The Society of Actuaries RP 2000 Mortality Table, projected forward using Scale AA.

the PERA defined contribution plan (PERA DC). This choice is not currently available to school employees or teachers, but PERA DC is a well-structured plan with the option to convert savings into lifetime annuities, early vesting, and low-fee and life-cycle fund investment options.²⁵ The DC option would provide the majority of workers who leave the system before reaching retirement eligibility with more savings and greater career flexibility since it does not include penalties for rolling over savings into retirement plans offered by their next employer.

Finally, Colorado should adopt a plan to enroll all new workers in Social Security. While Social Security has its own set of challenges, it is another avenue to provide benefits to a mobile workforce. It is a national retirement security program, and, as such, provides the most portable benefit that Colorado could offer its employees. Social Security is also progressive, meaning it provides higher benefits in proportion to contributions for low-wage workers than for higher-paid workers, which is especially important considering Colorado's low salary levels for teachers. The addition of Social Security would provide another important piece of retirement security.

Colorado's onerous fiscal situation must be addressed. The state's position is neither desirable nor sustainable. Colorado legislators passed a 2010 bill seeking to address the funding shortfall by reducing benefits for early-career workers, limiting the amount that pensions can adjust to rising inflation over time, and increasing employer contributions to accelerate the payoff of debt. But those actions have not been sufficient, and school districts continue to face rising costs. State legislators should continue taking steps to ensure fiscal stability. In doing so, they

Colorado must take bold steps to pay down its pension debt and adopt a retirement savings system that is affordable, sustainable, and secure.

should also consider the quality of teacher benefits and whether they lead to a sufficient, stable retirement for all teachers. Under today's existing defined benefit pension plans, too many Colorado educators do not reach the peak and are left without a sufficient retirement benefit. For the sake of its students, teachers, school workers, and the state's economy, Colorado must take bold steps to pay down its pension debt and adopt a retirement savings system that is affordable, sustainable, and secure.

Technical Appendix²⁶

Calculations for benefits and turnover rates in Colorado's Public Employees' Retirement Association (PERA) were generated using benefit parameters for new hires as established in the Colorado Revised Statutes (outlined in Table 1).²⁷ To summarize, a teacher earns a retirement benefit (PERA-DB) that is the larger of the state's final average salary defined benefit plan (FAS-DB) or money purchase plan (MPP). The MPP provides early- to mid-career teachers with greater retirement benefits than they would receive under a purely FAS-DB plan, but it is still difficult for these public servants to ever reach a secure retirement.²⁸

Using benefit provisions from the state statute (Table 1) as input, the model generates pension benefits earned by the example teacher who begins teaching at age 25 at each point in the teacher's career.²⁹

Table 1.a Benefit Calculation Parameters—Provisions from the Colorado State Statute

	PERA FAS-DB	PERA Money Purchase Plan (MPP)
Member Contribution Rate ³²	8%	8%
Interest on PERA Member Contribution Accounts ³³	3%	3%
Annuitization Rate ³⁴	N/A	7.5%
Vesting ³⁵	5 years	Immediate vesting
Eligibility Thresholds ³⁶	Unreduced: Age ≥ 65 and Service ≥ 5 or Age ≥ 58 and Age + Service ≥ 88 or Service ≥ 35 Reduced: Age ≥ 60 and Service ≥ 5 or Age ≥ 55 and Service ≥ 20 or Age ≥ 50 and Service ≥ 25	Age ≥ 65 or Age ≥ 60 and Service ≥ 5 or Age ≥ 65 and Service ≥ 5 or Age ≥ 55 and Service ≥ 20 or Age ≥ 50 and Service ≥ 25 or Age ≥ 58 and Age + Service ≥ 88 or Service ≥ 35
Early Retirement Reduction ³⁷	Reduced by an actuarially determined percentage provided in Table 7 (page 26) of the Colorado PERA Retirement Process Booklet	None
Benefit Multiplier ³⁸	2.5%	N/A
Cost of Living Adjustment ³⁹	2.0%	2.0%
Highest Average Salary ⁴⁰	The highest three years of salary	N/A
Employer Match ⁴¹	N/A	No-Refund: 100% of employee contributions and interest once the worker reaches retirement eligibility Refund: 50% of employee contributions and interest before the worker reaches retirement eligibility (if service greater than five years) 100% of employee contributions and interest once the worker reaches retirement eligibility

Table 1.b Benefit Calculation Parameters—Economic Assumptions

	PERA FAS-DB	PERA Money Purchase Plan (MPP)
Inflation ⁴²	2.8%	2.8%
Member Discount Rate ⁴³	5%	5%

Cohort Survival Probability

Separation and retirement hazard rates for the School Division are used to determine the percentage of public workers that leave before reaching different career milestones (i.e., the turnover rate). In each Comprehensive Annual Financial Report (CAFR),³⁰ PERA reports withdrawal and retirement hazard rates in buckets by age and years of service for its member population.³¹ From these hazard rates, the turnover rate is generated.

The first step is to expand the hazard rates provided by PERA. To do this, we simply assume the rate holds for each year within the bucket. For example, let $h_{[a,b]}$ represent the rate from year a to year b . If the plan reports a rate, x , for the range a to b , the rate in a will be x and the rate in b will also be x . To be clear: $h_{[a,b]}=x$ and so $h_a=x$ and $h_b=x$.

The second step is to combine hazard rates. Specifically for each age/year of service combination, the separation hazard rate is used when the member *is not* eligible ($e=0$) for retirement and the retirement hazard rate is used when the member *is* eligible for retirement ($e=1$).

$$\text{total hazard}_{a, \text{yos}} = h_{a, \text{yos}}^{\text{separation}} \text{ if } e = 0$$

$$\text{total hazard}_{a, \text{yos}} = h_{a, \text{yos}}^{\text{retirement}} \text{ if } e = 1$$

The final step is to calculate the survival rate for a cohort with the same entry age (or the percent of the cohort who remain in PERA after each year of service) from the total hazard rate, where the initial hazard rate begins at the age of entry, a_e , and 0 years of service. The second value of the hazard rate will be at one plus the entry age and one year of service. The third value of the hazard rate will be at two plus the entry age and two years of service, and so on. The initial survival rate at the age of entry is 1. From there on, the survival rate equals the rate in the previous year multiplied by the previous year's total hazard rate subtracted from 1. Note that the cohort's years of service are equal to the difference between the cohort's age today, a , and its entry age. After calculating the survival rate, it is easy to find the turnover rate.

$$\text{Survival Rate}_{a_e} = 1$$

$$\text{Survival Rate}_a = \text{Survival Rate}_{a-1, a > a_e} * (1 - \text{total hazard}_{a-1})$$

$$\text{Turnover Rate}_a = 1 - \text{Survival Rate}_a$$





Endnotes

- ¹ The Public Employee Retirement Association of Colorado, Comprehensive Annual Financial Report, prepared as of December 31, 2013, page 174.
- ² The pension debt will decrease beyond its 2015 level by 2021, after adjusting for inflation. Note, in this case, the unfunded liability is based on the market value of assets, and not the actuarial value of assets that is commonly represented.
- ³ The Public Employee Retirement Association of Colorado, Comprehensive Annual Financial Report, prepared as of December 31, 2013, page 184. Averages are weighted by the number of service retirees.
- ⁴ Ibid.
- ⁵ Ibid.
- ⁶ Note that the rates used are specific to the School Division, but include all occupations employed by school districts, and not just teachers. These rates are consistent with those published specifically for teachers: Teacher Attrition and Mobility: Results from the 2008-09 Teacher Follow-up Survey. National Center for Education Statistics, Institute of Education Sciences. 2010-353. See Technical Appendix for an explanation of how to calculate these rates.
- ⁷ High teacher turnover rates are a human capital problem that many school districts aspire to address. But ironically, if districts are able to reduce teacher turnover, they will increase the actuarial cost for pension benefits and lead to even higher employer contributions. The only way out of this paradox is for the state to make structural changes to the way it offers retirement benefits.
- ⁸ See Munnell, et al. (2014), "How much should people save?," *Center for Retirement Research at Boston College*, Number 14-11. Andrew G. Biggs (March 2014), "Not So Modest: Pension Benefits for Full-Career State Government Employees," *AEI Economic Perspectives*. Bruce A. Palmer (2008), "2008 GSU/Aon RETIRE Project Report." Research Report Series 08-1. J. Mack Robinson College of Business, Georgia State University.
- ⁹ The risk profile of these savings is equivalent to the risk profile of PERA's Final Average Salary Defined Benefit (FAS-DB) plan. Both models assume the employee discount rate to be 5 percent. In the adequate savings model, this rate is used to accumulate savings over time, and in the FAS-DB model to discount retirement benefits to present value.
- ¹⁰ She would have an annual retirement income worth 75 percent of her pre-retirement salary.
- ¹¹ See, for example, Kristine Brown, "The Link Between Pensions and Retirement Timing: Lessons from California Teachers" (paper presented at the conference, "Rethinking Teacher Retirement Benefit Systems," Nashville, TN, February 19–20, 2009); and Robert Costrell and Josh McGee, "Teacher Pension Incentives, Retirement Behavior, and Potential for Reform in Arkansas," *Education Finance and Policy*, Fall 2010 (Vol. 5, no. 4).
- ¹² See Maria D. Fitzpatrick and Michael F. Lovenheim, "Early Retirement Incentives and Student Achievement" (NBER Working Paper No. 19281, August 2013); and Cory Koedel, Michael Podgursky, and Shishan Shi, "Teacher Pension Systems, the Composition of the Teaching Workforce, and Teacher Quality," *Journal of Policy Analysis and Management* 32, no. 3 (2013): 574–96.
- ¹³ PERA's historical contribution rates are available at: <https://www.copera.org/pera/employer/contributionrates.htm>. Note, contribution rates are lagged. Districts pay the 2012 rate in 2014 and the 2018 rate in 2020. In addition, the 2014 rate also includes contributions to the Health Care Trust Fund and the Annual Increase Reserve. Contributions to just the pension fund for the School Division will be 16.17 percent in 2014. The Colorado legislature has also set contribution rates through 2018, which can be found at: <https://www.copera.org/pdf/5/5-123.pdf>. When netting out contributions to the Health Care Trust Fund and the Annual Increase Reserve, contributions to the pension fund for the School Division will be slightly below 20 percent.
- ¹⁴ See: <http://www.cde.state.co.us/cdereval/2013teacherfteveragesalaryandaveragedailyratepdf>.
- ¹⁵ Report on the Actuarial Valuation of the Public Employees' Retirement Association of Colorado, prepared as of December 31, 2012, page 27. Employer normal cost was 2.88 percent. Total employer contributions were 16.17 percent.
- ¹⁶ A 16GB iPad Air with Wi-Fi was priced at \$499 in September 2014 at <https://www.apple.com/ipad/compare/>. Enrollment figures come from: <http://www.d11.org/edss/Enrollment%20Reports/Ten%20Year%20Historical%20Pupil%20Count.pdf>.

- ¹⁷ There was no legacy cost in 2002, and the school districts' annual contribution of 7.8 percent went directly to fund benefits earned by the teacher in that year. In 2013, school districts contributed a total of 15.31 percent into the fund on the teachers' behalf, but only 2.9 percent went toward teachers' benefits earned in that year.
- ¹⁸ National Center for Education Statistics, Revenues and Expenditures for Public Elementary and Secondary Education accessed through <http://www.edcounts.org/createtable/step1.php>.
- ¹⁹ National Education Association, Estimates of School Statistics, 1969-70 through 2012-13. (This table was prepared April 2013.)
- ²⁰ Amendment 66 proposed to increase taxes by \$950 million – to increase funds for Colorado K-12 education, http://www.denverpost.com/breakingnews/ci_24461186/colorado-tax-school-finance-amendment-66-rejected.
- ²¹ "Report of the Blue Ribbon Panel on Public Pension Plan Funding," the National Society of Actuaries Blue Ribbon Panel, February 2014.
- ²² A teacher earns a retirement benefit that is the larger of the state's final average salary defined benefit plan or a money purchase plan (MPP). The money purchase plan is a cash balance defined benefit plan. See the Technical Appendix section for more details.
- ²³ See "Tax-Deferred Interest on PERA Member Contribution Accounts," available at: <https://www.copera.org/pera/active/interest.htm>.
- ²⁴ The cost-equivalent cash balance plan costs the same and has the same investment and longevity protection as the PERA-DB plan. The method for calculating the cost-equivalent cash balance plan is documented in detail in the Appendix.
- ²⁵ PERA DC has an option to annuitize the account balance, low fees, and good investment returns (https://www.copera.org/pdf/9_16/14-27-12.pdf).
- ²⁶ For a more detailed description, see White Paper: Modeling Pension Benefits for Colorado PERA, available at http://coloradopensionproject.com/wp-content/uploads/2014/10/WhitePaper_BenefitModel_Personas.pdf.
- ²⁷ The benefit tier for teachers who were hired after January 1, 2011, and before January 1, 2017, was used. For teachers hired on or after January 1, 2017, one of the retirement eligibility thresholds changed slightly (from Age ≥ 58 and Service ≥ 30 to Age ≥ 60 and Service ≥ 30). See Section 24-51-602(1.5)(a) and Section 24-51-602(1.7)(a). Reference made to "Sections" herein and within subsequent footnotes are statutory sections of Colorado's Public Employees' Retirement Association (PERA) law, codified in Title 24, Article 51, of the Colorado Revised Statutes (effective June 30, 2011), available at <https://www.copera.org/pdf/5/5-6.pdf>.
- ²⁸ The current limiting factor for the value of the money purchase benefit is the low 3 percent annual interest rate.
- ²⁹ Salaries for the member profiles are based on the salary schedule of a teacher with a master's degree working in Denver Public Schools. See National Council on Teacher Quality, *Denver ProComp Salary Setting 2013-2014*, http://www.nctq.org/docs/Denver_ProComp_Salary_Info_2013-2014.pdf.
- ³⁰ See Comprehensive Annual Financial Reports, 2001-2013, available at <https://www.copera.org/pera/formspubs/reports.htm#peracaf>.
- ³¹ See 2013 Comprehensive Annual Financial Report, *Actuarial Section, Exhibit A and F (132-134)*, available at <https://www.copera.org/pdf/5/5-20-13.pdf#page=129>. Note that the rates used are specific to the School Division, but include all occupations employed by school districts, and not just teachers. The rates are not provided for only teachers.
- ³² Member contribution rates are specified in the state statute. See Section 24-51-401(1.7)(a), footnote 27, at 34.
- ³³ Members earn interest at a rate specified by the board that shall not exceed 5 percent compounded annually. See Section 24-51-407(4), footnote 27, at 43-44. The current rate set by the board is 3 percent. See Tax-Deferred Interest on PERA Member Contribution Accounts, January 1, 2009 – present.
- ³⁴ The annuitization rate for the MPP is assumed to be the plan's expected rate of return on assets (7.5%) as described in state statute. See Section 24-51-101(1) and Part 8: Benefit Options, footnote 27, at 1, 76-77.
- ³⁵ A worker is vested upon completion of five years of service credit. See Section 24-51-101(51), footnote 27, at 10. Section 24-51-602(2) and Section 24-51-602(2.5) imply that members with less than five years of service that leave their contributions in the system until they are 65 will receive the state's MPP worth 200% of their contributions (plus interest). See footnote 27, at 64.
- ³⁶ Retirement age for the MPP is based on eligibility thresholds defined by the state statute. Sections 24-51-602 (1.5)(a), 24-51-602(2), and 24-51-602(2.5) imply that members with less than five years of service are eligible to receive the money purchase benefit upon reaching 65 years of age. See footnote 27, at 62, 64.

- ³⁷ Section 24-51-605 (4.a.), footnote 27, at 67, contains information on early retirement reductions for the FAS-DB plan. The actuarially determined percentage is provided in Table 7 (page 26) of the Colorado PERA Retirement Process Booklet. The money purchase plan is not subject to an early retirement reduction.
- ³⁸ See Section 24-51-603(1)(a), footnote 27, at 64.
- ³⁹ The actual annual increase earned by a worker is the lesser of 2 percent or the average monthly CPI for that year. See Section 24-51-1009(4)(c), footnote 27, at 90.
- ⁴⁰ See Section 24-51-603(1)(a), footnote 27, at 64.
- ⁴¹ Sections 24-51-602(2), 24-51-602(2.5), and 24-51-605.5 imply that members that leave their contributions in PERA until retirement will receive a 100 percent employer match on contributions. See footnote 27, at 64, 68. For workers who receive a refund, Section 24-51-408(2 to 2.5) implies that members hired after January 1, 2011, who are vested, and who are not retirement eligible will receive a 50 percent match on contributions plus interest; members hired after January 1, 2011, who are vested, and who are retirement eligible will receive a 100 percent match on contributions plus interest; and members hired after January 1, 2011, who are not vested will receive only their contributions plus interest.
- ⁴² Public Employees' Retirement Association of Colorado, Actuarial Valuation (2013), page 68 (see Price Inflation).
- ⁴³ For the present value calculations, we use a nominal interest rate of 5 percent, to measure the value of the benefit to the worker.

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