PENSION MATH:

How California's Retirement Spending is Squeezing The State Budget

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"There is no doubt that we are going to have to adjust our pensions so that money coming in is going to be equal to what we can expect what the money going out will be. It's not even a matter of higher math. It's fifth-grade arithmetic." [1]

— California Governor Jerry Brown, Oct. 13, 2011

1 Bloomberg, "California Pension Changes to Require Voter Approval, Brown Says," *http://www.businessweek.com/news/2011-10-13/california-pension-changes-to-require-voter-approval-brown-says.html*, retrieved Oct. 14, 2011.

Preface

California's public employee pension problems are well documented. Even under the most optimistic assumptions, the funded ratios for CalPERS, CalSTRS, and the University of California Retirement Plan (UCRP) fall well below accepted standards. Yet there remains little appetite to address the magnitude of these problems, and recent official proposals produce only limited results.

This report examines the current state of California's public employee pension systems. It examines benefit levels, accounting methods and assumptions, projected future costs, measured by contribution rates, and it outlines the likely impact of increased pension spending on California's non-pension expenditures. It briefly examines recent proposals to tackle the pension problem, and it identifies policy options to reduce the magnitude of the problem.

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Acronyms/Glossary

Actuarial Value of Assets	AVA
Bureau of Labor Statistics	BLS
California Pension Reform	CPR
California Public Employees' Retirement System	CalPERS
California State Teachers' Retirement System	CalSTRS
Cash Balance Benefit Program	CB
Comprehensive Annual Financial Report	CAFR
California Employers' Retiree Benefit Trust	CERBT
Consumer Price Index	CPI
Cost Of Living Adjustment	COLA
Defined Benefit	DB
Defined Benefit Supplement	DBS
Defined Contribution	DC
Education Code	EC
Employee Retirement Income Security Act	ERISA
Financial Accounting Standards Board	FASB
General Fund	GF
Governmental Accounting Standards Board	GASB
Judges' Retirement Fund	JRF
Judges' Retirement Fund II	JRF II
Legislators' Retirement Fund	LRF
Market Value of Assets	MVA
Public Employees' Retirement Fund	PERF
Replacement Benefit Program	RB
Stanford Institute for Economic Policy Research	SIEPR
State Teachers' Retirement Plan	STRP
Teachers' Deferred Compensation Fund	TDCF
Teachers' Health Benefits Fund	THBF
Treasury Inflation Protected Security	TIPS
University of California	UC
University of California Office of the President	UCOP
University of California Retirement Plan	UCRP
University of California Retirement System	UCRS

Executive Summary

This report identifies the funding shortfall for three public employee pension systems: the California Public Employees' Retirement System (CalPERS), California State Teachers' Retirement System (CalSTRS), and the University of California Retirement Plan (UCRP). It provides system background, including a discussion of accounting methods and assumptions used by public pension systems, projects future costs, measured by contribution rates,[2] and it identifies how pension spending is likely to crowd out spending in other categories. Finally, it offers policy options to reduce pension system funding shortfalls.

Discount rates, or investment rates of return, have a substantial impact on pension system funded status, defined as the ratio of assets to liabilities. Generally, pension systems strive for a funded status of 100 percent over the long term. At a 6.2 percent discount rate, equal to a 100-year rate of return for a hypothetical mix of equities and fixed income investments, the funded status for CalPERS[3] is 58.3 percent. At the same rate, the funded status for CalPERS is 60.6 percent; it is 72.0 percent for UCRP. Even at a 7.75 percent discount rate, the funded status for CalPERS and CalSTRS remains below 80 percent. Private-sector pension plans are labeled "at risk" if their funded status falls below 80 percent.[4]

The combined unfunded liability for CalPERS, CalSTRS, and UCRP under the 6.2 percent discount rate is $290.6 billion, equal to more than three state General Fund budgets. That figure represents an unfunded amount per household of nearly $24,000. Using a low-risk, or risk-free, discount rate, the combined unfunded liability for these three systems reaches $497.9 billion, or 17 percent more than that calculated in 2010.[5]

Simulations of asset growth indicate that the probability of CalPERS assets falling short of obligations is 82 percent; i.e., there is only an 18 percent chance of assets exceeding liabilities over a 16-year forecast period.[6] In fact, the likelihood is 45 percent that CalPERS will fall short by more than $400 billion, roughly twice its current market value of assets. Even with a less ambitious target, the challenge for CalPERS is tremendous. For example, CalPERS must earn an annual average of 9.0 percent for the next 16 years to achieve even odds that its assets are greater than or equal to 80 percent of liabilities. Outcomes are similar for CalSTRS and UCRP.

State contributions to pension systems are likely to increase substantially over the next few years. Assuming a 6.2 percent discount rate and other minor demographic changes, current state spending on pensions is likely to increase from $4.8 billion in 2011-2012 to $14.6 billion, or the equivalent of 17.3 percent of current General Fund expenditures. Current state pension spending share of the General Fund is 5.7 percent. That increased spending on pensions is virtually certain to continue to crowd out non-pension spending, including education and social services.

The costs of delay to the state are large. At a 6.2 percent discount rate, the annual combined shortfall for CalPERS, CalSTRS, and UCRP is $16.8 billion. The cost of delay over the next year is $1.247 billion, or $3.4 million each day. Those costs increase in subsequent years.

Solutions to the pension crisis include revenue increases and reforms to public employee pension systems. Revenue increases are unlikely to be approved absent pension reforms. Required pension system reforms include benefit reductions, such as prospective reductions for current employees, greater cost sharing, and governance reforms, particularly changes in pension system accounting methods and assumptions.

Although it offers many positive elements, Governor Brown's proposal provides only modest additional cost savings. For example, Governor Brown's proposal appears likely to reduce CalPERS state spending by more than $300 million in the first year and $6.2 billion over 10 years. At a 6.2 percent discount rate, the state's combined annual shortfall for both CalPERS and CalSTRS is about $100 billion over the same period.

2 Employer contribution rates, expressed as a percentage of payroll, determine total pension expenditures.

3 Based on the Market Value of Assets (MVA).

4 See Legal Information Institute, Title 29, Chapter 18, Subchapter 1, Subtitle B, part 3, § 1083, http://www.law.cornell.edu/uscode/129/usc_sec_29_00001082----000-.html, retrieved Nov. 4, 2011.

5 See Howard Borenstein, et al., "Going for Broke: Reforming California's Public Employee Pension Systems," *SIEPR*, April 2010, http://siepr.stanford.edu/publicationsprofile/2123, retrieved Sept. 5, 2011.

6 This 16-year period corresponds to the average duration of liabilities, which is described in detail on page 11. Even at a discount rate of 8.5 percent, the likelihood of assets exceeding liabilities is just 26 percent.

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We assembled an experienced Advisory Panel to provide advice on this very controversial topic. In addition to the list below, many additional persons participated, including representatives from public employee labor organizations, pension boards, and elected officials.

Panel Member	Affiliation
Richard Benson	UFCW (retired)
Jeremy Bulow	Stanford University
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I. Introduction

In April 2010, the Stanford Institute for Economic Policy Research (SIEPR) published "Going for Broke: Reforming California's Public Employee Pension Systems."[7] That policy brief identified the funding shortfall for three state pension systems: California Public Employees' Retirement System (CalPERS), California State Teachers' Retirement System (CalSTRS), and the University of California Retirement Plan (UCRP).[8] This document updates and expands the financial information contained in "Going for Broke," and it explores in greater detail policy options for dealing with current public pension shortfalls and reforming public employee systems.

Two additional SIEPR reports on the financial condition of California public pension systems are forthcoming:

- California's independent, or local pension systems, such as those operating under the County Employees' Retirement Law of 1937 and systems operated by cities and special districts[9]
- San Jose's Federated (miscellaneous employees) and Safety (police and fire) systems.

After providing background on CalPERS, CalSTRS, and UCRP, this report asks these questions:

- What are the accounting methods and assumptions used by public pension systems? How do they affect reported financial health? What are appropriate assumptions regarding discount rates, and investment rates of return?
- What are the current funded positions and funding shortfalls for CalPERS, CalSTRS, and UCRP under different assumptions? Given the funded status of pension systems, what is the likelihood of meeting future obligations?
- How has government spending on pensions changed over time? How do pension expenditures compare with other government spending categories?
- What are recent and projected employer contribution rates,[10] and how do they affect government spending on pensions?
- Is pension spending likely to affect other government expenditures? In particular, what are the likely effects on the state's General Fund?
- What policy options and approaches offer hope to reduce identified shortfalls? Do policy solutions offered in Sacramento by lawmakers and others offer hope of correcting the problem?
- What steps are needed to reform California's public pension system?

This report is structured as follows. Section II provides background on California's three major public employee pension systems, including a discussion of investment rates of return and discount rates. Section III assesses the financial health of public pension systems. Section IV simulates asset growth for pension systems and estimates the probability that system assets will meet or exceed liabilities. Section V creates contribution rate scenarios, based on discount rate and demographic assumptions. Section VI assesses the likely impacts of pension obligations on the state's general fund (GF), on non-pension expenditures, and on the University of California (UC) budget. The final section offers policy options to California's pension crisis, including a brief assessment of recent proposals from Sacramento.

7 See Howard Borenstein, et al., "Going for Broke: Reforming California's Public Employee Pension Systems," *SIEPR*, April 2010, http://siepr.stanford.edu/publicationsprofile/2123, retrieved Sept. 5, 2011.

8 The University of California Retirement System contains three sub-systems: annuitant, insurance, and membership. Unless otherwise indicated, this report focuses on the annuitant sub-system, defined as the UCRP.

9 For an earlier summary report, see Joe Nation, "The Funded Status of Independent Employee Pension Systems in California," SIEPR, Nov. 17, 2010, http://siepr.stanford.edu/publicationsprofile/2241, retrieved Sept. 5, 2011. This report examined only pension systems that at the time held at least $500 million in assets.

10 Employer contribution rates, or government contribution rates, drive total pension expenditures. Rates are typically expressed as a percentage of payroll.

II. Background

Unlike Defined Contribution (DC) plans that are common in the private sector, public employee pensions are predominately Defined Benefit (DB) plans.[11] DB plans offer guaranteed benefits, typically expressed as a percentage of compensation at full retirement age. As noted below, California's three statewide public employee systems, CalPERS, CalSTRS, and UCRP, offer primarily, but not exclusively, DB plans.

Pension System Structure and Benefits

CalPERS

CalPERS, established by voters for state employees in 1932, is the nation's largest public employee pension system. Over time, CalPERS has expanded to include local government employees, school employees (generally excluding teachers), legislators, and judges. Total membership, drawn from 2,600 government entities, is now more than 1.6 million, including more than 440,000 retirees and 806,000 active members. CalPERS administers 15 funds and four DB retirement plans:

- Public Employees' Retirement Fund (PERF)
- Legislators' Retirement Fund (LRF)
- Judges' Retirement Fund (JRF)
- Judges' Retirement Fund II (JRF II).

CalPERS also administers three DC plans, one health care plan, and a number of other smaller plans offering long-term care, deferred compensation, and other benefits.[12] PERF, the focus of this report, is the largest plan, with reported market assets of $219.4 billion on Sept. 30, 2011.[13] PERF constitutes more than 99 percent of total CalPERS assets.

PERF provides retirement benefits in four categories: miscellaneous, safety, state industrial, and state peace office/firefighter. Retirement benefits are based on final compensation, age, years of service, and 14 different benefit formulas (Table 1), expressed as a percentage multiplied by the years of service, e.g., 2 percent at 60.[14] A 30-year employee with this particular benefit formula, retiring at age 60 with final compensation of $50,000, would receive an initial annual retirement benefit of about $30,000.[15] Final compensation is defined as average pay over either a one- or three-year period and may include special compensation, such as uniform allowance, holiday pay, longevity pay, or other items.[16] Nearly two-thirds of CalPERS members pay into and receive Social Security benefits.[17]

Recent collective bargaining agreements have reduced many of the benefit formulas in Table 1 to levels prior to 1999.[18] For example, the 2 percent at 55 formula for State

11 The percentage of private-sector active-worker participants in DB plans only was 7 percent in 2009, down from 62 percent in 1975. The percentage of active private-sector workers with both defined benefit and defined contribution plans fell from 35 percent in 1984 to 27 percent in 2009. The number of current private-sector workers in DB plans may now be even lower. Many active employees in DB plans have seen their benefits frozen, i.e., they have stopped accruing additional benefits. This general trend of private sector sponsor freezing plans has likely continued. "EBRI Databook on Employee Benefits," Employee Benefit Research Institute, updated March 2011, p. 4, http://www.ebri.org/pdf/publications/books/databook/DB.Chapter percent2001.pdf, retrieved Aug. 30, 2011. See also Alicia H. Munnell, Kelly Haverstick, and Mauricio Soto, "Why Have Defined Benefit Plans Survived in the Public Sector?" Center for Retirement Research at Boston College, No. 2, Dec. 2007, p. 2, http://crr.bc.edu/images/stories/Briefs/slp_2.pdf, retrieved Aug. 30, 2011.

12 These other benefit provisions can be significant cost drivers, especially for safety groups. However, they are not addressed in this report.

13 E-mail correspondence from CalPERS Public Information Office, Oct. 11, 2011.

14 Benefit formulas are commonly referred to via the shorthand descriptions in Table 1. However, other features not captured by these descriptions can be crucial to a plan's cost and benefit characteristics. For example, two plans that each use a 2 percent benefit factor when pension payments begin at age 55 (i.e., 2 percent at 55) can provide benefits that differ significantly from one another for ages other than 55. Other features not described by these descriptions, such as provisions for post-retirement cost of living (COLA) increases, are also critical to a plan's ultimate cost.

15 30 years x 2 percent x $50,000. The annual benefit is slightly less because it is based on pay excluding the first $513 per month for state employees.

16 CalPERS, "FAQs - Retirement Benefits," http://www.calpers.ca.gov/index.jsp?bc=/member/retirement/faqs.xml&pst=ACT&pca=ST, retrieved Oct. 22, 2011.

17 According to CalPERS, 74 percent of non-safety members are covered by Social Security. Only 3 percent of Safety members are covered. Average monthly pay for those receiving Social Security is generally reduced by $133 per month. E-mail correspondence from CalPERS, Nov. 16, 2011; CalPERS, "Comprehensive Annual Financial Report Fiscal Year Ended June 30, 2010," pp. 144-147, https://www.calpers.ca.gov/eip-docs/about/pubs/member/calpers-reports/comprehensive-annual-financial/comprehensive-annual-fina-rept-10.pdf, retrieved Oct. 14, 2011.

18 For recent changes in benefit formulas, see CalPERS, "State and Schools Actuarial Valuation As as of June 30, 2010," pp. B-1-B-, http://www.calpers.ca.gov/eip-docs/about/pubs/member/calpers-

Miscellaneous and State Industrial employees (First Tier) and for State Industrial (Tier 1) shifted to 2 percent at 60 for employees hired on or after January 15, 2011. Similarly, State Peace Officers/Firefighters hired on or after this date are subject to a 2.5 percent at 55 formula. Generally, these benefit formula changes either increased the full retirement age, decreased the benefit formula, or both. In addition, reforms now require retirement benefits for all new state employees to be based on their highest annual average salary over a 36-month period.

State CalPERS and school retirees receive annual COLAs of up to 2 to 3 percent; public agency retirees receive up to 2 to 5 percent.[19] If necessary, additional cost of living protections prevent the pension's original purchasing power from falling by more than 20 percent or 25 percent. Employees who work at least one-half time are eligible to earn retirement benefits. Members are vested after five years of service.[20]

Defined benefit plans are financed by employer and member contributions. Employers include state agencies, e.g., Caltrans, CHP, the Legislature, etc., and public agencies, e.g., cities, counties, special districts, and others.

Table 1
CalPERS Benefit Formulas

Member Category	Formula
State Misc. and State Industrial (First Tier)	2 percent at 55
State Misc. and State Industrial (Second Tier)	1.25 percent at 65
State Misc. and State Industrial (separated prior to Jan. 1, 2000, and hired after January 15, 2011)	2 percent at 60
State Safety and Local Safety	2 percent at 55 2.5 percent at 55
State Patrol, Local Safety, and State Peace Office/Firefighter	3 percent at 50
State Peace Officer/Firefighter and Local Safety	3 percent at 55
Schools	2 percent at 55
Local Miscellaneous	2 percent at 60 2 percent at 55 2.5 percent at 55 2.7 percent at 55 3.0 percent at 60
Local Safety	2 percent at 50 Half-pay at 55 with 20 years of service

Source: CalPERS, "Comprehensive Annual Financial Report Fiscal Year Ended June 30, 2010," p. 144-145, https://www.calpers.ca.gov/eip-docs/about/pubs/member/calpers-reports/comprehensive-annual-financial/comprehensive-annual-fina-rept-10.pdf, retrieved Oct. 14, 2011; annual actuarial valuation reports.

The average systemwide employer contribution rate for the year ending June 2009 was 15.7 percent of payroll, consisting of a normal cost average rate of 10.7 percent, plus a 5.0 percent rate for the amortization of unfunded liabilities. Unfunded liabilities occur when system assets fall short of system liabilities. The normal cost rate reflects the annual cost of additional benefits that current employees are expected to earn and generally changes little over time, absent substantial benefit changes.[21] The unfunded rate can vary more dramatically.

According to the most recent CalPERS Comprehensive Annual Financial Report (CAFR), the 2010-2011 systemwide average employer contribution rate was 17.1 percent, including a normal cost rate of 10.8 percent and an unfunded rate of 6.3 percent.[22] The 2011-2012 systemwide average employer contribution rate is not available but has been estimated at 17.6 percent based on reported state, school, and public agency contribution rates weighted by the current estimated payroll for each employee category.[23] The estimated

reports/actuarial-reports/2010-st-body.pdf, retrieved Nov. 28, 2011.

19 CalPERS, "Comprehensive Annual Financial Report Fiscal Year Ended June 30, 2010," p. 66, https://www.calpers.ca.gov/eip-docs/about/pubs/member/calpers-reports/comprehensive-annual-financial/comprehensive-annual-fina-rept-10.pdf, retrieved Oct. 14, 2011.

20 CalPERS, "Comprehensive Annual Financial Report Fiscal Year Ended June 30, 2010," p. 41, https://www.calpers.ca.gov/eip-docs/about/pubs/member/calpers-reports/comprehensive-annual-financial/comprehensive-annual-fina-rept-10.pdf, retrieved Oct. 14, 2011. Second tier members vest after 10 years.

21 These 2009-2010 figures reflect PERF only. CalPERS, "Comprehensive Annual Financial Report Fiscal Year Ended June 30, 2010," p. 62, https://www.calpers.ca.gov/eip-docs/about/pubs/member/calpers-reports/comprehensive-annual-financial/comprehensive-annual-fina-rept-10.pdf, retrieved Oct. 14, 2011.

22 This figure appeared in a partial posting of the CAFR for the year ending June 30, 2011. The full CAFR has not yet been posted.

23 2011-2012 state agency payroll is reported in CalPERS, "Employer Contribution Rates," http://www.calpers.ca.gov/index.jsp?bc=/employer/actuarial-gasb/emp-contrib-rates.xml&pat=STER,

systemwide employer rate for miscellaneous, excluding school employees, is 16.1 percent; it is 14.5 percent, including school employees. The estimated systemwide rate for safety is 27.4 percent.

Member contribution rates are set by statute and/or collective bargaining agreements (Table 2).[24] Recent collective bargaining agreements have increased employee contribution rates modestly.[25] The 2011-2012 state agency employee average contribution rate is 7.4 percent. Neither public agency nor statewide average employee rates are available for the current year. The average systemwide employee contribution rate was 7.6 percent in 2009-2010, the most recent year available.

Employers accounted for 67.3 percent of total contributions for the year ending in 2010, the highest level since 1992. However, because average employer contributions were low in the late 1990s and early 2000s,[26] and employee contributions were relatively constant, the amount contributed by each group over time is closer to parity. Since 1992, employers have contributed 59.5 percent of the total, with employees contributing the balance.

Table 2
Contribution Rate Formulas for Active CalPERS Members

Employee Category	Current Contribution Rate (percent)
State Employees	
Miscellaneous & and Industrial	5-10
Miscellaneous & Industrial — 2nd tier	0
Safety	9-11
Peace Officers and Firefighters	8-11
California Highway Patrol	10
State agency employee average[a]	7.37
Classified School Employees	7
Public Agency Employees	5-9
Systemwide average (2010)	7.6

a Weighted by reported 2011-2012 payroll.

Source: CalPERS, "Comprehensive Annual Financial Report Fiscal Year Ended June 30, 2010," pp. 42, 138, https://www.calpers.ca.gov/eip-docs/about/pubs/member/calpers-reports/comprehensive-annual-financial/comprehensive-annual-fina-rept-10.pdf, retrieved Oct. 14, 2011; CalPERS, "State and Schools Actuarial Valuation As of June 30, 2010," pp. B-1-B-, http://www.calpers.ca.gov/eip-docs/about/pubs/member/calpers-reports/actuarial-reports/2010-st-body.pdf, retrieved Nov. 28, 2011.

The average annual retirement benefit payment for all members, regardless of years of service or the year of retirement, is $25,386.[27] Members who retired in 2010-2011, regardless of the number of years of service, receive an average retirement benefit of $36,780.[28]

Average annual retirement benefits for career retirees, i.e., those with 30 or more years of service, was $66,828 in 2008-2009.[29] The average benefit for all career retirees, regardless of the year retired, is not available.

Average benefit payments for career retirees from 1997 to 2009 have grown at an annual rate of 4.17 percent, compared with average compensation growth of 3.36 percent and a general inflation rate of 2.61 percent (Table 3).[30] Over this 13-year period, career average retiree benefits have increased

retrieved Nov. 17, 2011. Current public agency payroll is based on reported payroll in 2009-2010, plus the equivalent growth experienced by state agencies from 2009-2010 to 2011-2012. CalPERS, "State and Schools Actuarial Valuation As of June 30, 2010," pp. B-1-B-, http://www.calpers.ca.gov/eip-docs/about/pubs/member/calpers-reports/actuarial-reports/2010-st-body.pdf, retrieved Nov. 28, 2011.

24 Government Code sections 20678 and 20683 set local safety member rates and Section 20677 sets rates for local miscellaneous members. Code section 20516 also permits local agencies to require employees to share the costs of "optional" benefits, although this appears to occur rarely.

25 Many employee contribution rates have increased about 2 percentage points.

26 For example, in 2001, the average employer contribution rate was just 1 percent.

27 Based on total payments of $10.886 billion and 428,821 recipients. CalPERS, "Comprehensive Annual Financial Report Fiscal Year Ended June 30, 2010," pp. 142, 149, https://www.calpers.ca.gov/eip-docs/about/pubs/member/calpers-reports/comprehensive-annual-financial/comprehensive-annual-fina-rept-10.pdf, retrieved Oct. 14, 2011.

28 CalPERS, "CalPERS CEO Issues Statement on Governor's Pension Reform Proposal," http://www.calpers.ca.gov/index.jsp?bc=/about/press/pr-2011/oct/pension-reform.xml, retrieved Oct 27, 2011. CalPERS reported earlier in e-mail correspondence on Nov. 16, 2011, that the annual amount for those retiring in 2009-2010 was higher, at $38,376.

29 CalPERS, "Comprehensive Annual Financial Report Fiscal Year Ended June 30, 2010," pp. 151, https://www.calpers.ca.gov/eip-docs/about/pubs/member/calpers-reports/comprehensive-annual-financial/comprehensive-annual-fina-rept-10.pdf, retrieved Oct. 14, 2011.

30 CPI, all items for California, based on Bureau of Labor Statistics (BLS) data from RAND California, http://ca.rand.org/stats/economics/inf.html, retrieved Oct. 22, 2011. It is not clear whether the benefit increases are due to higher wage increases or benefit improvements.

Table 3
CalPERS Retirement Benefit, Compensation Growth, 1997-2009

Credited Service (Years)						
Category	5-10	10-15	15-20	20-15	25-30	30+
Average annual growth, retirement benefit	3.98%	4.56%	4.83%	5.14%	4.09%	4.17%
Annual average growth, compensation	3.67%	3.96%	3.98%	3.93%	3.74%	3.36%
Retirement less compensation growth	0.30%	0.60%	0.85%	1.21%	0.35%	0.81%

Source: CalPERS, "Comprehensive Annual Financial Report Fiscal Year Ended June 30, 2010," p. 151, https://www.calpers.ca.gov/eip-docs/about/pubs/member/calpers-reports/comprehensive-annual-financial/comprehensive-annual-fina-rept-10.pdf, retrieved Oct. 14, 2011.

a total of 70 percent; career average compensation has grown 54 percent; and inflation has increased 40 percent. Average growth in annual benefit payments over this period exceeded compensation growth for all beneficiaries regardless of the length of service.[31]

CalSTRS

CalSTRS is the nation's second largest public employee pension system, providing retirement, disability, and survivor benefits to 852,000 current and former teachers and school administrators from about 1,600 school districts, community colleges, county offices of education, and Regional Occupational Programs.[32] CalSTRS administers retirement, disability, and survivor benefits through four plans:

- State Teachers' Retirement Plan (STRP)
- Pension2 Program
- Teachers' Health Benefits Fund (THBF)
- Teachers' Deferred Compensation Fund (TDCF).

STRP is the largest plan, with estimated total assets of $154.0 billion[33] on June 30, 2011, or 99.8 percent of total CalSTRS net assets. Pension2, a Defined Contribution (DC) program administered by TIAA-CREF, includes 403(b) and 457 defined contribution plans. THBF administers health benefit programs through the Medicare Premium Payment Program (MPP).[34] The Teachers' Deferred Compensation Fund accounts for ancillary services from DC plans.

STRP in turn consists of four programs:

- Defined Benefit (DB)
- Defined Benefit Supplement (DBS)
- Cash Balance Benefit Program (CB)
- Replacement Benefit Program (RB).

The DB program within STRP provides retirement benefits based on final compensation, age, years of service, and a 2 percent at 60 benefit formula. Final compensation is defined as the highest average annual compensation for members with 25 years or more of service. For all others, final compensation is defined as the highest three consecutive years.[35] Upon retirement, benefits can begin as early as age 50 for those with 30 years of service, or as early as age 55 for others. The benefit factor increases from 1.1 percent at age 50 to 2.4 percent at age 63 or older; this factor is increased (but not above 2.4 percent) by adding 0.2 percent for those with 30 years of service. Members who earned at least 30 years of service before 2010 also receive longevity bonuses

31 This excludes those with credited service of 0 to 5 years since they are not vested.

32 A majority of background information is from CalSTRS, "Comprehensive Annual Financial Report for the Fiscal Year Ended June 2010," http://www.calstrs.com/Help/forms_publications/printed/CurrentCAFR/CAFR.aspx, retrieved Oct. 13, 2011. Figures reflect employee and institution count as of June 30, 2009.

33 CalSTRS, "CalSTRS Investment Return Remains Healthy for a Second Year," July 18, 2001, http://www.calstrs.com/Newsroom/2011/news071811.aspx, retrieved Oct. 14, 2011. CalSTRS total assets were reported at $154.3 billion; $154.0 billion is the estimated STRP amount.

34 MPP is funded only if employer contributions to overall DB program exceed that required to finance liabilities. The most recent financial data put MPP assets at $4 million and the Unfunded Actuarial Accrued Liability (UAAL) at $972 million. CalSTRS, "Comprehensive Annual Financial Report for the Fiscal Year Ended June 2010," http://www.calstrs.com/Help/forms_publications/printed/CurrentCAFR/CAFR.aspx, pp. 38, 42, retrieved Oct. 13, 2011.

35 Members may retire early (at age 55) or later with formula adjustments. The maximum benefit formula is 2.4 percent at age 63 or older. CalSTRS, "Comprehensive Annual Financial Report for the Fiscal Year Ended June 2010," p. 34, http://www.calstrs.com/Help/forms_publications/printed/CurrentCAFR/CAFR.aspx, retrieved Oct. 13, 2011.

of up to $400 per month. Retirees receive an automatic 2 percent COLA annually. In addition, retirees are provided "Purchasing Power Protection," which restores purchasing power to 85 percent of the initial monthly allowance. Members are vested after five years of service.

As mandated by current California Teachers' Retirement Law, members contribute 8 percent of earnings[36] and employers contribute 8.25 percent. The state of California contribution share depends on the presence and amount of any unfunded liability, totaling an estimated 5.06 percent of member earnings in 2011-2012.[37]

These contributions are significantly less than the amount required to fully fund the system over a period of 30 years. This required funding contribution equals the normal cost, plus an amount to amortize the unfunded liability. For the year ending June 30, 2011, the required funding contribution was 33.5 percent of payroll, but contributions from members, employers, and the state totaled only about two-thirds that amount. This annual shortfall in total contributions increases both the system's unfunded liability and required contributions in later years, even if all assumptions about discount rate, salary increase, etc., are exactly realized.

Unlike most non-safety CalPERS members, CalSTRS members do not earn Social Security benefits for their covered service,[38] and many retirees do not receive employer-subsidized health benefits.

The DBS, CB, and RB programs are small in comparison to the DB program, with June 30, 2009[39] actuarial assets of $5.2 billion, or less than 4 percent of the STRP total. The DBS program currently credits annual interest of 4.25 percent on certain member contributions, as well as contributions resulting from retirement incentives or limited term enhancements.[40] The CB program is a defined benefit program for eligible employees who work less than one-half time. It also currently credits an annual interest rate of 4.25 percent on employee and employer contributions each equal to 4 percent of the employee's compensation. RB permits STRS to pay benefits that would otherwise be prohibited by IRS Code Section 415, which sets maximum benefit levels.[41]

The average annual retirement DB payment for all members, regardless of the year of retirement, is $39,346.[42] The average defined benefit for all recent retirees, i.e., those who retired in 2009-2010, is $51,072.[43] For all career retirees, i.e., those with 30 or more years of service, the average is $58,932.[44] The average 2009-2010 retiree with 30 to 35 years of service receives $67,980.[45]

UCRP

The University of California Retirement Plan provides benefits[46] for about 233,000 employees, retirees, and beneficiaries, including 56,000 who currently receive retirement benefits. UCRP members include those who work on UC campuses and in medical centers and at three national laboratories. UCRP reported a market value of assets of $41.9 billion on July 1, 2011.[47]

36 CalPERS refers to "earned salaries" instead of pensionable payroll. These terms are used interchangeably in this report.

37 This is based on a projected contribution of $1.259 billion. A second estimate of CalSTRS payroll in Section VI puts the state's current contribution at $1.273 billion. E-mail correspondence with the Department of Finance, June 16, 2011, and CalSTRS, "Comprehensive Annual Financial Report for the Fiscal Year Ended June 2010," p. 127, http://www.calstrs.com/Help/forms_publications/printed/CurrentCAFR/CAFR.aspx, retrieved Oct. 13, 2011.

38 In addition, retirees may have Social Security payments from other employment reduced due to the federal Pension Offset and Windfall Elimination Provision. See CalSTRS, "Comprehensive Annual Financial Report for the Fiscal Year Ended June 2010," p. 7, http://www.calstrs.com/Help/forms_publications/printed/CurrentCAFR/CAFR.aspx, retrieved Oct. 13, 2011.

39 More recent figures are not available.

40 CalSTRS, "Comprehensive Annual Financial Report for the Fiscal Year Ended June 2010," p. 36, http://www.calstrs.com/Help/forms_publications/printed/CurrentCAFR/CAFR.aspx, retrieved Oct. 13, 2011.

41 See CalSTRS, http://www.calstrs.com/help/faqs/teletalk/teletalk655.html, retrieved Oct. 24, 2011.

42 Through the year 2009-2010. Based on total retirement payout ($8,418.2 billion) and total retirees (213,952) as reported in CalSTRS, "Comprehensive Annual Financial Report for the Fiscal Year Ended June 2010," pp. 128, 131, http://www.calstrs.com/Help/forms_publications/printed/CurrentCAFR/CAFR.aspx, retrieved Oct. 13, 2011.

43 CalSTRS, "Comprehensive Annual Financial Report for the Fiscal Year Ended June 2010," p. 135, http://www.calstrs.com/Help/forms_publications/printed/CurrentCAFR/CAFR.aspx, retrieved Oct. 13, 2011. E-mail correspondence on Nov. 15, 2011, from the CalSTRS Newsroom reported a figure of just over $49,000.

44 E-mail correspondence from CalSTRS Newsroom, Nov. 15, 2011.

45 A 2009-2010 retiree with at least 30 years of service receives $73,748. CalSTRS, "Comprehensive Annual Financial Report for the Fiscal Year Ended June 2010," p. 135, http://www.calstrs.com/Help/forms_publications/printed/CurrentCAFR/CAFR.aspx, retrieved Oct. 13, 2011. E-mail correspondence from CalSTRS Newsroom, Nov. 15, 2011, reported a figure of $48,708.

46 Segal, "University of California Retirement Plan Actuarial Valuation Report as of July 1, 2011," p. vi, http://www.universityofcalifornia.edu/regents/regmeet/nov11/f2attach1.pdf, retrieved Nov. 26, 2011.

47 University of California, "Investment Performance Summary," p.

Like some CalPERS and CalSTRS members, UCRP retirees receive annual retirement payments based on their highest three-year salary (in excess of $133/month for members covered by Social Security),[48] the number of years of service, and a traditional DB formula. Average salary is increased by up to 2 percent annually to reflect inflation for the period from separation of service until retirement. Benefits for non-safety members are based on a factor that ranges from 1.1 percent where payments begin at age 50, to 2.5 percent where payments begin at age 60 or later.[49] Benefits for safety members are based on a factor of 3.0 percent where payments begin at age 50 or later.[50] Members covered by Social Security also receive a supplementary pension until age 65, up to $133/month.

All retirees receive up to a 2 percent COLA annually. Retirees can also receive a supplemental annual adjustment, not in excess of 4 percent, equal to three-fourths of the excess of inflation over 4 percent.[51] Employees are vested after five years of service, and part-time employees, defined as those who work at least one-half time, or 1,000 hours in a year, are benefits eligible.[52] Less generous benefits will be provided for those hired after June 30, 2013.

The University of California Board of Regents sets benefits and approves employer and employee contribution rates. Until recently, the employer contribution rate was zero. It is now 7 percent and will increase to 10 percent on July 1, 2012. Members also did not contribute for a number of years until contributions were restarted as of April 2010. The employee rate, now 3.5 percent, is set to increase to 5 percent on July 1, 2012.

The required funding amount consists of the normal cost and an amount to amortize the unfunded liability over a period of 30 years. The total required contribution rate for 2012-2013 is 26.35 percent of payroll, including a 17.83 percent normal cost component and 8.52 percent to amortize unfunded liability.[53] This required amount is substantially greater than the actual 2011-2012 combined contribution rate of 10.5 percent and the projected 2012-2013 rate of 15 percent. The UC president is expected to propose additional contribution rate increases for employer and employees.

The average annual benefit for retired members as of June 30, 2011, was $36,000.[54] Annual benefit amounts for career employees and for recent retirees are not available from UCRP.

Table 4 summarizes benefit formulas and awards, employee contribution rates, and average benefit levels for CalPERS, CalSTRS, and UCRP members.

Governance

CalPERS, CalSTRS, and UCRP pension systems are subject to governing boards that approve actuarial assumptions and methods, such as future investment rates of return, assumed future salary increases, inflation, rates of separation from service, death and retirement at all future ages, methods of asset valuation, and amortization periods for unfunded liabilities. Board members have a fiduciary responsibility to pension system members.[55] CalPERS and CalSTRS board members do not set benefit levels. The UC Board of Regents approves retirement benefits.

State law governs the composition of the CalPERS board, which includes state officials, gubernatorial and legislative appointees, and those elected by active and retired CalPERS members (Table 5). Eleven of the 13 CalPERS board members are beneficiaries.[56] There are no professional or technical qualifications required.

3, http://www.ucop.edu/treasurer/invinfo/Investment_Perf_Summary_06-30-11.pdf, retrieved Dec. 3, 2011.

48 Final compensation includes base salary only but omits add-ons. Segal, "University of California Retirement Plan Actuarial Valuation Report as of July 1, 2010," p. 40, http://www.universityofcalifornia.edu/regents/regmeet/nov10/f3attach1.pdf, retrieved Oct. 20, 2011.

49 For example, the formula is 1.1 percent at 50, 1.8 percent at 55. Segal, "University of California Retirement Plan Actuarial Valuation Report as of July 1, 2010," p. 41, http://www.universityofcalifornia.edu/regents/regmeet/nov10/f3attach1.pdf, retrieved Oct. 20, 2011.

50 Tier II members receive 50 percent of the non-safety benefit levels, however, there are only 15 in the UCRP system. E-mail from University of California Office of the President (UCOP) and Segal, "University of California Retirement Plan Actuarial Valuation Report as of July 1, 2010," p. 41, http://www.universityofcalifornia.edu/regents/regmeet/nov10/f3attach1.pdf, retrieved Oct. 20, 2011.

51 Segal, "University of California Retirement Plan Actuarial Valuation Report as of July 1, 2010," p. 47, http://www.universityofcalifornia.edu/regents/regmeet/nov10/f3attach1.pdf, retrieved Oct. 20, 2011.

52 Part-time workers are assumed to earn full-time service for future years. Segal, "University of California Retirement Plan Actuarial Valuation Report as of July 1, 2010," pp. 35, 40, http://www.universityofcalifornia.edu/regents/regmeet/nov10/f3attach1.pdf, retrieved Oct. 20, 2011.

53 Segal, "University of California Retirement Plan Actuarial Valuation Report as of July 1, 2011," p. 10, http://www.universityofcalifornia.edu/regents/regmeet/nov11/f2attach1.pdf, retrieved Nov. 26, 2011.

54 Segal, "University of California Retirement Plan Actuarial Valuation Report as of July 1, 2011," p. 13, http://www.universityofcalifornia.edu/regents/regmeet/nov11/f2attach1.pdf, retrieved Nov. 26, 2011.

55 This apparent primary fiduciary responsibility to beneficiaries has led some to argue that boards should also include members with the same responsibility to taxpayers and others who providing funding to the system.

56 E-mail correspondence with CalPERS, Nov. 16, 2011.

Table 4
CalPERS, CalSTRS, and UCRP Retirement Benefits Formulas, Employee Contribution Rates, and Average Annual Benefits

Category	CalPERS	CalSTRS	UCRP
Benefit formula	1.25% at 65 to 3% at 50	2% at 60[a]	2.5% at 60[b]
Employee contribution rate (percent)	0-11	8	3.5[c]
Full retirement age	50-65	60	60
COLA (percent)	2-5	2 automatic	2-6
Final salary basis	62 percent of agencies utilize final year[d]	Final year average[e]	Final 3-year average
Social Security	Generally yes for Miscellaneous; no for Safety	No	Generally yes
Special compensation, i.e., salary add-ons	Yes	No	No
Average benefit, all retirees	$25,386	$39,346[f]	$36,000
Average benefit, recent retirees	$36,780[g]	$51,072[f]	NA
Average benefit, all career retirees	NA	$58,932	NA
Average benefit, recent career retirees	$66,828[h]	$67,980[f]	NA

a Excludes longevity bonus.

b Safety members receive 3 percent at 50.

c Increasing to 5 percent in July 2012. The safety rate is 5 percent, increasing to 6 percent in 2012.

d Most recent year available. See John Chiang, "Public Retirement Systems Annual Report for Fiscal Year 2009," May 24, 2011, Office of the State Controller, http://www.sco.ca.gov/Files-ARD-Local/LocRep/retirement0809.pdf, retrieved Sept. 9, 2011.

e For members with 25 or more years of service; final three years for all others.

f 2009-2010.

g 2010-2011.

h 2008-2009.

Sources: Selected CalPERS, CalSTRS CAFR; UCRP actuarial valuation reports, e-mail correspondence with CalPERS, CalSTRS, and UCRP.

CalSTRS board members include state officials and teacher, retiree, school board, and public representatives (Table 6). Members are either appointed by the governor or elected by members. Four of the 12 board members are CalSTRS beneficiaries. There are no professional or technical qualifications required.

The UC Board of Regents is the acting administrative body for UCRP. Regents are appointed by the governor, but none is typically a system beneficiary. There are no professional or technical qualifications required.

Accounting Methods and Assumptions

Accounting methods and demographic and financial assumptions can have tremendous impacts on the reported financial condition of pension systems. This section summarizes several key methods and assumptions utilized currently by CalPERS, CalSTRS, UCRP; discusses their effects on funded status; and compares these briefly with those in the private sector.

Discount Rates

The single most powerful assumption concerns the time value of money: the annual rate used to discount pensions expected to be paid in the future to current dollars, known as the "discount rate." Relatively small changes in discount rates can result in large changes in funded status and other measures of pension fund condition. (See the sidebar "How Discount Rates Drive Funded Status.")

Table 5
CalPERS Board of Administration Members

Board Member	Number	Selection	CalPERS Beneficiary
State Personnel Board	1	Selected by board	Yes
Director, Department of Personnel Administration[a]	1	NA	No
State controller[a]	1	NA	Yes
State treasurer[a]	1	NA	Yes
Local government representative	1	Appointed by governor	No
Insurance industry representative[a]	1	Appointed by governor	Yes
Public representative	1	Appointed by Assembly speaker and Senate pro tem	Yes
Member representative	2	Elected by members	Yes
State representative	1	Elected by state members	Yes
School representative	1	Elected by active school members	Yes
Non-school representative	1	Elected by non-school members	Yes
Retired representative	1	Elected by retired members	Yes

a Ex Officio.

Source: California Government Code Sections 20090; E-mail correspondence with CalPERS, Nov. 16, 2011.

Table 6
CalSTRS Board of Administration Members

Board Member	Number	Selection	CalSTRS Beneficiary
Superintendent of public instruction	1	NA	No
State controller	1	NA	No
State treasurer	1	NA	No
Director of finance	1	NA	No
Retiree representative	1	Appointed by governor	Yes
K-12 classroom teacher	2	Elected by K-12 members	Yes
School board representative	1	Appointed by governor	No
Public representative	3	Appointed by governor	No
Community college representative	1	Elected by community college members	Yes

Source: California Government Code Sections 22200.

How Discount Rates Drive Funded Status

Assessing the funded status of pensions is relatively straightforward. Consider a public pension system with exactly $300 million in market assets and nominal dollar payments of $900 million due to pensioners over future years. Assume that the duration of liabilities to all beneficiaries is 16 years.[a] If the $900 million in liabilities are discounted at a relatively low rate of 5.0 percent, as most economists suggest, the actuarial, or present value of liabilities is $412 million, calculated by ($900 million/(1+.05)^16. Since the current market value of assets is only $300 million, this system appears to be underfunded by $112 million.

An alternative view of the same system by most public sector pension sponsors and many actuaries might discount the $900 million in nominal dollar liabilities at a higher rate of 7.75 percent. The actuarial, or present value, of liabilities becomes $900 million/(1+.0775)^16, or $273 million. With $300 million in current market assets, this system now appears to be $27 million overfunded.

a The duration of liabilities reflects all liabilities in the pension system, weighted by the fraction of total payments due each year. It includes the weighted value of liabilities to current retirees, current separated former employees, and current active workers; it does not include liabilities associated with future hires. For current employees, it might include all expected benefits or only the portion earned to date. The duration can be thought of, roughly, as the number of years until the "midpoint" of the weighted overall stream of future pension payments will be reached.

In the private sector, federal law[57] requires that pension systems use a discount rate that reflects current yields on high-quality, long-term corporate bonds, *regardless of a private plan's investment policy* and regardless of what the sponsor or actuary expects the plan's rate of investment return to be.[58] In short, there is no connection between the discount rate, now generally less than 5 percent,[59] and the expected rate of return. Many argue that this low discount rate is appropriate for any DB system in which payments are viewed as largely guaranteed.

This means that a private pension system with an investment strategy that focuses on equities, hedge funds, and other riskier investments uses the same discount rate as a second system, which uses a conservative investment strategy concentrated in high-grade corporate bonds or similar instruments. The first plan is taking a riskier path—and it may achieve greater rewards over the long term. But it cannot base its current required contributions on investment income that it *might* realize in the future. If its riskier strategy is successful, it will be able to recognize its enhanced returns ex post, i.e., after the returns actually materialize. At that time, this risk-taking private system will be able to increase benefits, reduce system costs, or take other actions that reflect its market experience.

However, the practice within the public sector is exactly the opposite. Pension systems set the discount rate ex ante, i.e., to an expected long-term rate of investment return. That expected high rate of return allows public pension systems to offer higher benefits today for expected higher returns in the future.[60] Benefit enhancements do not come from actual higher investment returns, but from the *assumption of higher investment returns in the future*. California governments typically use a discount rate of 7.75 percent.

There are clearly positive and negative aspects to the public-sector approaches, which are summarized in the sidebar "The Case for—and Against—Public Pension Systems Using High Discount Rates." That sidebar addresses perspectives about equity, risk, and other issues that are unlikely to be resolved soon, particularly in this report. Instead, the next section of this report focuses on an area on which there is some agreement and that is more amenable to a data-driven debate—setting the appropriate investment rate of return, which we refer to henceforth as the discount rate.

Setting the Right Investment Rate of Return

Proponents of high discount rates point to investment performance over the last two or three decades and often highlight strong returns in the last year or two. According to the most recent CalPERS investment data, the average annual return from 1990 to 2010 was just under 7.8 percent.[61] In October of this year, CalPERS reported a net

57 The Financial Accounting Standards Board (FASB) sets forth the rules that these sponsors must use for income statement and balance sheet purposes.

58 Pension law actually requires the simultaneous use of three different discount rates by private-sector plans: one rate applicable to benefits scheduled to be paid within the next five years, a second rate applicable to other benefits expected to be paid within the next 20 years, and a third rate applicable to all other scheduled payments; each rate reflects fixed income yields of a comparable duration as of one of the months immediately prior to the annual valuation. This makes it impossible to cite a specific single mandated discount rate.

59 See Yahoo Finance, "Bond Center," http://finance.yahoo.com/bonds/composite_bond_rates, retrieved Dec. 3, 2011.

60 CalPERS argues that it is the legislature and employers that set benefits. That is technically correct. However, benefits are determined based on accounting information, e.g., funded levels, etc., provided by pension governing boards.

61 See "Facts at a Glance," *CalPERS*, August 2011, pp. 2-3, http://www.calpers.ca.gov/eip-docs/about/facts/general.pdf, retrieved Sept. 9,

The Case for—and Against—Public Pension Systems Using High Discount Rates

Issue	For	Against
The historical record	Pension systems have almost always hit their investment return targets, so high discount rates are appropriate.	The last 30 years have been good, but the last ten have been less impressive. Moreover, the 30-year time horizon is too short.
Investment returns	Setting a low discount rate implies seeking low investment returns, i.e., leaving money on the table.	Using a low discount rate doesn't imply a risk-free investment strategy.
Plan B (if things go wrong)	Pension system sponsors are always there as a backstop; they can inject revenues if needed.	Pension system sponsors may not always be there or may face bankruptcy. And gambling with public money in the hopes of higher investment returns isn't appropriate.
The equity argument	Low discount rates require today's workers and taxpayers to shoulder a disproportionate burden for the benefits that will actually be paid.	High discount rates ensure the opposite, i.e., that the next generation will bear an unfair burden.
Political factors	Using a low discount rate, assuming historical investment returns means system surpluses will occur. Taxpayers will demand refunds.	If surpluses occur, systems can refund, increase benefits, or take other appropriate actions.
Reasonable risk	Using high discount rates reflects a balanced, reasonable risk for current and future workers and taxpayers.	The risk is borne mostly by sponsoring governments and taxpayers and may even encourage pension administrators to raise rates further, increase benefits without current revenues, or pursue even riskier investments.

20.7 percent asset rate of return for the year ending June 30, 2011.[62]

CalSTRS reports an 8.1 percent average annual return for the last 20 years.[63] Recently, CalSTRS showed even higher recent investment performance, registering a gross 23.1 percent return for the year ending June 30, 2011.[64] For the 20-year period ending in December 2009, UCRP's net average rate of return was 8.97 percent.[65] UCRP reported a net 20.3 percent rate of return for the year ending June 30, 2011.[66]

CalPERS, CalSTRS, and UCRP rates are not out of the ordinary for public pension systems nationwide. Fitch reported recently that nearly one-half of public pension system respondents assume 8 percent.[67] A few assume as high at 8.5 percent, while the lowest are at 7.0 percent.

Over the last 10 years, public pension investment rates of return have been universally lower. In 2010, CalPERS reported a net, recent 10-year rate of return of 2.6 percent; that figure has been updated to 5.3 percent in recent publications.[68] Similarly, CalSTRS reported a 10-year 2.6

2011. 1982-1989 investment performance data comes from e-mail correspondence with CalPERS, Nov. 16, 2011.

62 CalPERS, "CalPERS Reports Preliminary 2010-11 Fiscal Year Gain of 20.7 Percent," http://www.calpers.ca.gov/index.jsp?bc=/about/press/pr-2011/july/fy-2010-11-returns.xml, retrieved Oct. 25, 2011.

63 CalSTRS, "CalSTRS Investment Return Remains Healthy for a Second Year," July 18, 2001, http://www.calstrs.com/Newsroom/2011/news071811.aspx, retrieved Oct. 14, 2011.

64 CalSTRS, "CalSTRS Investment Return Remains Healthy for a Second Year," July 18, 2011, http://www.calstrs.com/Newsroom/2011/news071811.aspx, retrieved Oct. 16, 2011.

65 Segal, "University of California Retirement Plan Actuarial Valuation Report as of July 1, 2010," pp. 30, 58, http://www.universityofcalifornia.edu/regents/regmeet/nov10/f3attach1.pdf, retrieved Oct. 20, 2011. Task Force Final Report, "History of UCRP Investment Returns," July 2010, http://ucrpfuture.universityofcalifornia.edu/files/2010/09/peb_ax_l-04-history-of-ucrp-investment-returns_0910.pdf, retrieved Oct. 30, 2011.

66 UCOP, "Memo to Members of the Committee on Finance for Meeting of Nov. 17, 2010," p. F4, http://www.universityofcalifornia.edu/regents/regmeet/nov10/f3.pdf, retrieved Oct. 30, 2011.

67 "The Reporting of U.S. State and Local Government Pension Obligations," Fitch Ratings, Feb. 23, 2011, p. 3.

68 CalPERS, "Comprehensive Annual Financial Report Fiscal Year Ended June 30, 2010," pp. 88, 91, https://www.calpers.ca.gov/eip-docs/about/pubs/member/calpers-reports/comprehensive-annual-financial/comprehensive-annual-fina-rept-10.pdf, retrieved Oct. 14, 2011. For the most recent figure, see *CalPERS*, "Facts at Glance: Investments," CalPERS, November 2011, pp. 2-3, http://www.calpers.ca.gov/eip-docs/about/facts/investments.pdf, retrieved Nov. 19, 2011.

percent rate in 2010,[69] and subsequently reduced its expected rate of return from 8.0 to 7.75 percent. Generally, changes in outlook have led some to consider lower investment rates of return.[70] Recently, some ratings agencies have begun to factor in their expectation that future investment returns will be lower than the rates now assumed by public-sector plans.[71] There is widespread disagreement over whether these lower investment rates of return are temporary or long lasting.

CalPERS has conducted extensive discussions about investment outlook changes. In March 2011, CalPERS considered reducing its expected investment rate of return from 7.75 percent to 7.5 percent, but the Benefits and Program Administration Committee rejected the change. At that time, CalPERS projected net 20-year expected returns of 7.8 percent, based on an expected rate of return of 7.38 percent for the next 10 years,[72] followed by 8.5 percent for the second 10 years. According to CalPERS, this projected rate reflects the 50th percentile, suggesting an even chance for returns of at least 7.8 percent.

Earlier in 2011, CalPERS estimated a 20-year forward-looking average of 7.61 percent for its California Employers' Retiree Benefit Trust (CERBT) program, based on an asset allocation of 66 percent global equity, 18 percent U.S. nominal bonds, 8 percent global real estate, 5 percent inflation-linked bonds, and 3 percent commodities.[73] The estimated rate for a less aggressive allocation mix (50 percent global equity, 24 percent U.S. nominal bonds, 15 percent inflation-linked bonds, 8 percent global real estate, and 3 percent commodities) was 7.06 percent.

CalPERS, CalSTRS, UCRP, and other pension systems throughout California appear to be counting on future returns closely resembling returns over the last 20 or 30 years, but not the last 10. Given the long duration of pension obligations, e.g., an employee hired today might receive benefits 60 or more years into the future, a closer look at investment returns over many decades may be more appropriate.

That longer-term perspective suggests strong returns in U.S. equity and income markets, but with a composite rate of 6.0 to 6.5 percent, rather than 7 or 8 percent. This 6.0 to 6.5 percent figure is based on the performance of a hypothetical fund containing 80 percent equity[74] and 20 percent income instruments between 1900 and 1999.[75] It assumes an equity[76] rate based on the 20th-century Dow Jones industrial annual average of 5.3 percent, plus 2 percent in dividends, less 0.5 percent in fees.[77] Combined with income instruments with a net rate of return of 4.5 percent, this hypothetical fund would have earned an average annual rate of 6.2 percent. While this modest annual difference of 1.5 to 2.0 percentage points may initially appear minor, total asset performance over the long term confirms the notion that compound interest may indeed be one of the most powerful forces in the universe.[78]

Section III assesses the pension systems' health under five investment or discount rate scenarios, which range from very ambitious (higher rates of return, with associated low confidence in achieving these rates) to very cautious

69 CalPERS, "Comprehensive Annual Financial Report Fiscal Year Ended June 30, 2010," p. 91, https://www.calpers.ca.gov/eip-docs/about/pubs/member/calpers-reports/comprehensive-annual-financial/comprehensive-annual-fina-rept-10.pdf, retrieved Oct. 14, 2011.

70 As one recent example, see CNBC, "5% Returns Will Be 'Upper Echelon' for Years: Gross," http://www.cnbc.com/id/45474748, retrieved Nov. 29, 2011. See also Berkshire Hathaway, Inc., "2010 Annual Report," http://www.berkshirehathaway.com/2010ar/2010ar.pdf, p. 60, retrieved Nov. 3, 2011.

71 Bloomberg, "Health Care Bigger Worry for State Governments Than Pensions, Millard Says," http://www.bloomberg.com/news/2011-11-02/health-care-bigger-worry-for-states-than-pensions-millard-says.html, retrieved Nov. 2, 2011.

72 The estimate also included administrative expenses of 0.15 percent. CalPERS, "Discount Rate Unchanged," March 15, 2011, http://www.calpers.ca.gov/index.jsp?bc=/about/press/pr-2011/mar/pers-discnt-rate.xml, retrieved Nov. 19, 2011.

73 CalPERS, "Memorandum to Members of the Benefits and Program Administration Committee, Agenda Item 7c," March 15, 2011, http://www.calpers.ca.gov/eip-docs/about/board-cal-agenda/agendas/bpac/201103/item7c-0.pdf, retrieved Nov. 19, 2011

74 Including public equity, private equity, real assets, real estate, etc.

75 CalPERS reported holdings are 49 percent public equity, 14 percent private equity, 18 percent fixed income, 9 percent real assets, 3 percent inflation-linked, and 7 percent other as of July 31, 2011. CalPERS, "Asset Allocation," http://www.calpers.ca.gov/index.jsp?bc=/investments/assets/assetallocation.xml, retrieved Nov. 19, 2011. CalSTRS reports 50 percent global equity, 12 percent private equity, 12 percent real estate, 20 percent fixed income, and 6 percent other. CalPERS reports CalSTRS, "Current Investment Portfolio," http://www.calstrs.com/investments/Invport.asp, retrieved Nov. 19, 2011.

76 Including public equity, private equity.

77 Based on Berkshire Hathaway, "Buffett letter to shareholders," p. 19, http://www.berkshirehathaway.com/letters/2007ltr.pdf, accessed June 4, 2011.

78 This is typically attributed to Albert Einstein, although there is little evidence to suggest that he actually said it. For an example of this universal force, consider that the value of a $100 investment compounded at 6.0 percent annually for 30 years is $574; for the same $100 investment at 8.0 percent, the value is nearly double at $1,006, i.e., a 33 percent increase in the rate yields a nearly 100 percent increase in return.

(lower rates of return, with associated high confidence in achieving these rates) (Table 7). The probability of meeting or exceeding these rates of return is based on observed CalPERS investment performance from 1982 to 2010. As indicated, *if the next 30 years mirror roughly the last 30,* CalPERS has about a 50/50 chance of earning at least at 7.1 percent compounded rate per year. However, most recent outlooks strongly doubt that the near future will resemble the recent past. Of note in Table 7, the "low risk" rate offers an 80 percent chance of meeting or exceeding the 4.5 percent. In short, even that case is not "risk free" given typical public pension asset holdings.

Table 7
Discount Rate Scenarios

Rate	Scenario	Probability of Meeting Or Exceeding Rate
9.50%	Higher than recent CalPERS and CalSTRS 20-year rates	21.7%
7.75%	Current	42.1%
7.10%	High private-sector rate	50.7%
6.20%	Blended 20th Century fund	62.6%
4.50%	Low-risk, or Treasury rate	80.9%

Source: Author's calculations, based on annual 1982-2010 reported CalPERS investment returns. 25,000 simulations.

CalPERS, CalSTRS, and UCRP Amortization Periods and Asset Valuation

In addition to significant differences in discount rates, public pension systems utilize different assumptions for the amortization of unfunded liabilities and for the valuation of assets. These, too, can have a significant impact on reported pension health.

Pension systems typically amortize unfunded liabilities over a period of years. The cost of amortization is measured by annual contributions and associated increases in contribution rates.[79]

Currently, the Governmental Accounting Standards Board (GASB) suggests a maximum 30-year amortization period.[80] Long amortization periods depress contribution rates in the near term but almost guarantee higher rates in later years.[81] CalPERS, CalSTRS, and UCRP utilize 30-year amortization periods for some or all portions of unfunded liability.[82] The average amortization period for large public pension systems is 24 years.[83] In contrast, private-sector funding rules use a 7-year amortization period.[84]

Virtually all public pension systems use methods that modify the reported market value of assets for rate-setting purposes. Typically, public systems use an actuarial value of assets that deviates from market value by deferring the recognition of recent differences between actual investment experience and what was expected per the assumed discount rate.

As one example, most pension systems reported asset losses of about 25 percent in 2008-2009. Since assets were assumed to grow by nearly 8 percent annually, this meant an investment loss in excess of 30 percent, i.e., the difference between what was expected to happen and what did happen. Rather than immediately recognizing these

79 The increase in contributions to eliminate unfunded liabilities can be substantial. As noted earlier, in 2009-2010, about one-third of CalPERS employer contributions was to eliminate unfunded liabilities.

80 "Summary of Statement No. 45," Governmental Accounting Standards Board, http://www.gasb.org/cs/ContentServer?c=Pronouncement_C&pagename=GASB percent2FPronouncement_C percent2FGASBSummaryPage&cid=1176156700943, retrieved Aug. 31, 2011. Previously, GASB suggested a 40-year maximum. These amortization periods may either be "closed" or "open." Under the more conservative closed method, the unfunded amount is paid off over a fixed number of years. Under the open method, the unfunded amount is re-amortized over the same number of years, creating a potentially infinite amortization period. For more discussion, see "The Reporting of U.S. State and Local Government Pension Obligations," Fitch Ratings, Feb. 23, 2011, pp. 5-6.

81 As noted in Section VII, public-sector pension systems typically use a level percentage of payroll rather than a level dollar amount to calculate unfunded contribution rates. Furthermore, they generally assume a 3.25 percent increase in payroll each year. Combined, that approach results in lower unfunded contribution rates in earlier years, but higher rates for the duration of the amortization period. For example, consider a starting unfunded rate of 5.0 percent. In year 20, that rate will have increased to 9.5 percent (based on 5.0 percent* (1.0325)^20). This assumes all other assumptions are held constant.

82 In some cases, the 30-year period restarts anew every year, effectively meaning that amortization will never complete unless future experience is more favorable than expected.

83 "The Reporting of U.S. State and Local Government Pension Obligations," Fitch Ratings, Feb. 23, 2011, pp. 5-6.

84 Internal Revenue Code Section 430, http://www.taxalmanac.org/index.php/Internal_Revenue_Code:Sec._430._Minimum_Funding_Standards_for_Single-Employer_Defined_Benefit_Pension_Plans, retrieved Nov. 3, 2011. Provided certain requirements are met, the portion of unfunded liability associated with experience during 2008-2009 can be amortized over 15 years.

differences, plans phase in losses gradually over future periods. For example, CalPERS does this by recognizing 1/15 of the difference between the actuarial (smoothed) value expected on the basis of the prior year's actuarial value and the actual current market value; CalSTRS and UCRP use different smoothing techniques that tend to recognize these gains and losses more rapidly—over three and five years, respectively. Private- sector plans are permitted to smooth assets over a period of up to two years.

Most public pension systems also utilize asset corridors that limit the amount by which the smoothed actuarial value of the funds' assets can differ from their market values. CalPERS utilizes a 20 percent corridor—although it made a special exception to allow use of an actuarial value of assets that is up to 140 percent of actual market value in determining contributions for the year ending in 2011, and up to 130 percent for the year ending in 2012, rather than the 120 percent limit that would otherwise have applied. Neither CalSTRS nor UCRP imposes an asset corridor. In the private sector, the actuarial value of assets is restricted to a 10 percent corridor.[85]

Because these actuarial asset values often differ from the current value of pension system assets, the following section examines and estimates the funded status of CalPERS, CalSTRS, and UCRS using market rather than actuarial values. CalPERS has expressed support for this approach, noting that "funded status on a market value of assets basis is reported since it represents the true measure of the plan's ability to pay benefits at a given point in time."[86]

Other Public and Private-Sector Pension Differences

Other significant differences between private and public pensions systems exist. For example, private-sector pension systems (technically, the plan sponsor) are subject to significant financial or criminal penalties if they fail to contribute the full cost assigned to the current year by federal pension law. In contrast, government sponsors of some public pension systems are able to contribute less than even the amount called for under their own funding policies and assumptions, further increasing the burden to be borne by future taxpayers.[87]

In 2008, ERISA added operational restrictions for private pension systems that are funded below specified levels. For example, if the funded status—measured using the discount rate tied to fixed income yields and assets subject to the 10 percent corridor—falls below 60 percent, private-sector systems must freeze plan benefits, regardless of collective bargaining agreements. A funded status of less than 80 percent precludes systems from improving benefits or making payments in accelerated forms (such as the lump-sum option within UCRP) that are otherwise available.[88] None of these restrictions applies to public-sector pension systems.

Actuarial assumptions and methods for CalPERS, CalSTRS, UCRP, and the private sector are show in Table 8. In short, public pension systems utilize assumptions and methods supporting a consistent theme of understating liabilities, overstating assets, and pushing costs into the future.

85 Internal Revenue Code Section 430, 436, http://www.taxalmanac.org/index.php/Internal_Revenue_Code:Sec._430._Minimum_Funding_Standards_for_Single-Employer_Defined_Benefit_Pension_Plans, retrieved Nov. 3, 2011.

86 CalPERS, "Comprehensive Annual Financial Report Fiscal Year Ended June 30, 2010," p. 70, https://www.calpers.ca.gov/eip-docs/about/pubs/member/calpers-reports/comprehensive-annual-financial/comprehensive-annual-fina-rept-10.pdf, retrieved Oct. 14, 2011. In other words, while CalPERS uses the smoothed actuarial value of assets in determining contribution results, it reports funded status (e.g., "70 percent funded") using market value.

87 CalPERS funding policy does not permit this, but CalSTRS and UCRP, as evidenced earlier in this report, contribute less than is required to fully fund their systems.

88 Internal Revenue Code Section 430, 436, http://www.taxalmanac.org/index.php/Internal_Revenue_Code:Sec._430._Minimum_Funding_Standards_for_Single-Employer_Defined_Benefit_Pension_Plans, retrieved Nov. 3, 2011.

Table 8
CalPERS, CalSTRS, UCRP, and Private-Sector Actuarial Assumptions and Methods

Assumption or Method	CalPERS (PERF)	CalSTRS[a]	UCRP	Private Sector
Discount rate (percent)	7.75	7.75[b]	7.5	Roughly 6 or less (current)
Amortization period (years)	30[c]	30	30[d]	7
Asset valuation method: smoothing recognition period (years)	15	3	5	2
Asset corridor	20 percent	None	None	10 percent

a DB program only.

b Reduced in 2010 from 8.0 percent

c Open for gains and losses, except those incurred in FY 2009-FY 2011. 20 years for unfunded liability attributable to changes in plan provisions or actuarial assumptions.

d Increased from 15.

Sources: CalPERS, "Comprehensive Annual Financial Report Fiscal Year Ended June 30, 2010," p. 41, https://www.calpers.ca.gov/eip-docs/about/pubs/member/calpers-reports/comprehensive-annual-financial/comprehensive-annual-fina-rept-10.pdf, retrieved Oct. 14, 2011; Milliman, "Defined Benefit Program Actuarial Valuation as of June 30, 2010," pp. 43. 51, http://www.calstrs.com/help/forms_publications/printed/2010_mppp_valuation.pdf, March 22, 2011, retrieved Oct. 14, 2011; Segal, "University of California Retirement Plan Actuarial Valuation Report as of July 1, 2010," pp. 30, 58, http://www.universityofcalifornia.edu/regents/regmeet/nov10/f3attach1.pdf, retrieved Oct. 20, 2011; Internal Revenue Code Section 430, 436, http://www.taxalmanac.org/index.php/Internal_Revenue_Code:Sec._430._Minimum_Funding_Standards_for_Single-Employer_Defined_Benefit_Pension_Plans, retrieved Nov. 3, 2011.

III. CalPERS, CalSTRS, and UCRP Current Funded Status

The most common measure used to assess pension system financial health is the funded ratio, which measures the ratio of assets to liabilities. For the reasons stated in Section II, this section reports funded ratios on a market value of assets basis.

There is considerable debate about appropriate funded levels. Private-sector pension plans are labeled "at risk" if their funded status is below 80 percent.[89] Some argue that the trend in funded status is equally important.[90] CalPERS argues for a higher standard: "The funded ratios vary from year to year but are expected to approach 100 percent in the long run."[91]

As discussed above, pension funded ratios can vary widely, depending on the assumptions and methods used to value pension assets and liabilities. This section presents funded ratios using a range of discount rates (Table 9):

- 9.5 percent, slightly higher than recent CalPERS and CalSTRS 20-year investment return rates
- 7.5 to 7.75 percent, the current assumed rate for UCRP and CalPERS/CalSTRS, respectively
- 7.1 percent, roughly the 50th percentile for the past 30 years
- 6.2 percent, based on a 100-year return for a hypothetical mix of equities and fixed income investments
- 4.5 to 5.0 percent, similar to relatively "risk-free" long-term Treasury or municipal bond yields.

The lowest rate, 4.5 percent, is calculated based on the estimated value of a hypothetical 16-year Treasury Inflation Protected Security (TIPS) plus the assumed inflation rate for each system; this rate varies from 4.5 to 5.0 percent due to different inflation return assumptions. All calculations assume a 16-year duration for liabilities.[92]

As indicated, funded ratios range from 45.1 percent for CalPERS in the lowest, i.e., 4.5 percent discount rate case, to 114.0 percent for UCRP in the highest, i.e., 9.5 percent. The 7.1 percent case, with a roughly even chance of meeting this investment rate based on performance in the most recent 30 years, shows 66.7 and 68.8 percent funded ratios for CalPERS and CalSTRS, respectively.[93] The UCRP ratios are the highest across all scenarios.

Table 9
June 2011 Estimated CalPERS, CalSTRS, and UCRP Funded Ratios, Market Basis

Investment Rate	Probability of Meeting or Exceeding Rate	CalPERS	CalSTRS	UCRP
9.5%	21.7%	95.1	95.9	114.0
7.75%[a]	42.1%	73.5	75.3	86.5
7.1%	50.7%	66.7	68.8	81.8
6.2%	62.6%	58.3	60.6	72.0
4.5%[b]	80.9%	45.1	47.6	60.8

Source: Author's calculations. CalPERS and CalSTRS June 2011 liabilities are estimated based on reported 2009 figures, adjusted for recent annual growth less 50 percent. UCRP June 2011 liabilities are based on 2010 figures, adjusted for recent annual growth less 50 percent. If liabilities are higher, funded ratios will decline.

a 7.5 percent for UCRP.

b Low is based on the assumed rate of inflation and recent, hypothetical 16-year Treasury Inflation Protected Security (TIPS) equivalent rate (Oct. 17, 2011). The low-risk rate for CalPERS and CalSTRS is 4.504 percent; for UCRP, it is 5.004.

89 See Legal Information Institute, Title 29, Chapter 18, Subchapter 1, Subtitle B, part 3, § 1083, http://www.law.cornell.edu/uscode/129/usc_sec_29_00001082----000-.html, retrieved Nov. 4, 2011.

90 For example, a funded ratio of 80 percent, with a long-term trend upward, would generally be viewed as better than an 85 percent ratio that is trending downward.

91 See "Facts at a Glance," CalPERS, August 2011, p. 4, http://www.calpers.ca.gov/eip-docs/about/facts/general.pdf, retrieved Sept. 9, 2011.

92 The duration of liabilities reflects all liabilities in the pension system, weighted by the fraction of total payments due each year. This figure is based on informal conversations with CalPERS and other pension system officials. A slightly higher or lower average duration does not appreciably change funded ratios. For more discussion about average duration, see the sidebar on page 27.

93 CalSTRS funded ratio was at its lowest historical level in 1975 at 29 percent. It did not reach a level of at least 80 percent until 1993. Milliman, "Defined Benefit Program Actuarial Valuation as of June 30, 2010," p. 24, http://www.calstrs.com/help/forms_publications/printed/db_valuation_2010.pdf, retrieved Oct. 17, 2011.

The current funded status for CalPERS, 73.5 percent under the 7.75 percent case, is higher than the 62.8 percent reported in June 2010,[94] but otherwise represents its lowest point since about 1990.[95] At an 9.5 percent discount rate, the CalPERS funded ratio is 95.1 percent.[96] With the market decline since June 2011, the CalPERS funded ratio is now at about 67 percent. The most recent funded status figures by CalPERS plan, i.e., employee category, show little variation among the plans, with the CHP plan at 57.6 percent, the lowest funded ratio.

The funded status for CalSTRS with a 7.75 percent discount rate, 70.8 percent, reflects its lowest level since the late 1980s, although CalSTRS funded status in the 1970s and 1980s averaged less than 40 percent and about 50 percent, respectively.[97] UCRP's funded status using a 7.75 percent discount rate, 86.5 percent, is its lowest level since 1982, when it registered 85.2 percent.[98]

Table 10 lists the unfunded liability amounts for each system in each case, and it also lists unfunded liabilities per California household. The aggregate shortfall ranges from $10.3 billion in the 9.5 percent discount rate case to $497.9 billion using a 4.5 percent discount rate.[99] The unfunded shortfall per household ranges from $855 to $40,850. At a 6.2 percent discount rate, the total shortfall is $290.6 billion, equivalent to $23,852 per household. To provide some perspective, this shortfall is equal to between three and four annual state General Fund budgets. These figures exclude unfunded liabilities of independent pension systems and those due to unfunded health care at both the state and local levels.

94 CalPERS, "State & Schools Actuarial Valuation as of June 30, 2006, p. 12, http://www.calpers.ca.gov/eip-docs/about/pubs/member/calpers-reports/actuarial-reports/2006-st-body.pdf, retrieved Nov. 16, 2011.

95 This figure uses a market value basis as reported by CalPERS. CalPERS, "State & Schools Actuarial Valuation as of June 30, 2006, p. 43, http://www.calpers.ca.gov/eip-docs/about/pubs/member/calpers-reports/actuarial-reports/2006-st-body.pdf, retrieved Nov. 16, 2011.

96 At an 8.5 percent discount rate (equal roughly to a 7.75 percent geometric rate), the CalPERS funded ratio is 82.2 percent. See Section IV for further discussion regarding arithmetic and geometric rates.

97 Teachers' Retirement Board Investment Committee, "Chief Investment Officer's Report, Item 9, April 2, 2009," p. 5, http://www.calstrs.com/publicdocs/Page/CommonPage.aspx?PageName=DocumentDownload&Id=651a87a6-a135-4770-a51c-8149fdf30d55, retrieved Nov. 17, 2011.

98 Susan Gallick, et al., "UCRP in Context: State Obligation to UC," p. 28, http://www.uclafaculty.org/FASite/Home_files/UCRPinContextFinal.pdf, retrieved Nov. 17, 2011.

99 In theory, the unfunded liability at the expected rate of return, using the actuarial value of assets, should result in zero unfunded liability. The unfunded liabilities shown in Table 10 at 7.75 percent (7.5 percent for UCRP) are greater than zero in part since these calculations use market values of assets.

Table 10
June 30, 2011, CalPERS, CalSTRS, and UCRP Unfunded Liability, Unfunded Liability Per Household,[a] Market Value Basis

	CalPERS	CalSTRS	UCRP	Total
9.5% discount rate				
Unfunded liability (billions)	$12.1	$4.0	-$5.8	$10.3
Unfunded liability per household	$996	$332	-$473	$855
7.75% discount rate[b]				
Unfunded liability	$85.5	$50.6	$6.5	142.6
Unfunded liability per household	$7,018	$4,152	$533	11,703
7.1% discount rate				
Unfunded liability	$118.4	$71.4	$9.4	$199.2
Unfunded liability per household	$9,713	$5,861	$775	$16,349
6.2% discount rate				
Unfunded liability	$169.8	$104.0	$16.8	$290.6
Unfunded liability per household	$13,934	$8,539	$1,379	$23,852
4.5% discount rate[c]				
Unfunded liability	$289.5	$180.0	$28.4	$497.9
Unfunded liability per household	$23,753	$14,767	$2,330	$40,850

Source: Author's calculations.
a 12,187,191 households statewide. U.S. Bureau of the Census, "State and County QuickFacts," http://quickfacts.census.gov/qfd/states/06000.html, retrieved Oct. 26, 2011.
b 7 .5% for UCRP.
c 5.0% for UCRP.

IV. Probability of Meeting System Obligations

The discussion in Section III highlighted the serious financial challenges faced by the state's largest public employee pension funds. Even if the system earns 7.75 percent each year and all other actuarial assumptions are realized, CalPERS and CalSTRS are only about three-fourths funded.

Using a high discount rate actually understates what is required because it ignores market volatility. Simulations of asset growth can demonstrate these effects and the even higher return required for California's public pension systems. The reason for this higher requirement is that annual investment returns are not arithmetically but geometrically compounded. In short, if investment return is negative 10 percent in year one and positive 10 percent in year two, or positive 10 percent in year one and negative 10 percent in year two, the net result is an investment loss, even though the arithmetic return (i.e., the average of minus 10 and plus 10) is zero. (See the sidebar "Arithmetic vs. Geometric Rates of Returns.")

These asset simulations assume annual average arithmetic growth of 7.75 percent for CalPERS and CalSTRS and 7.5 percent for UCRP. (CalPERS has noted that they assume a 7.75 percent geometric rate, which we estimate translates into an annual arithmetic rate of 8.5 percent.) The simulations further assume a 12 percent standard deviation around the investment return average, which approximates the standard deviation for CalPERS and CalSTRS.[100] As above, the simulations assume pension liabilities of 16 years' duration.

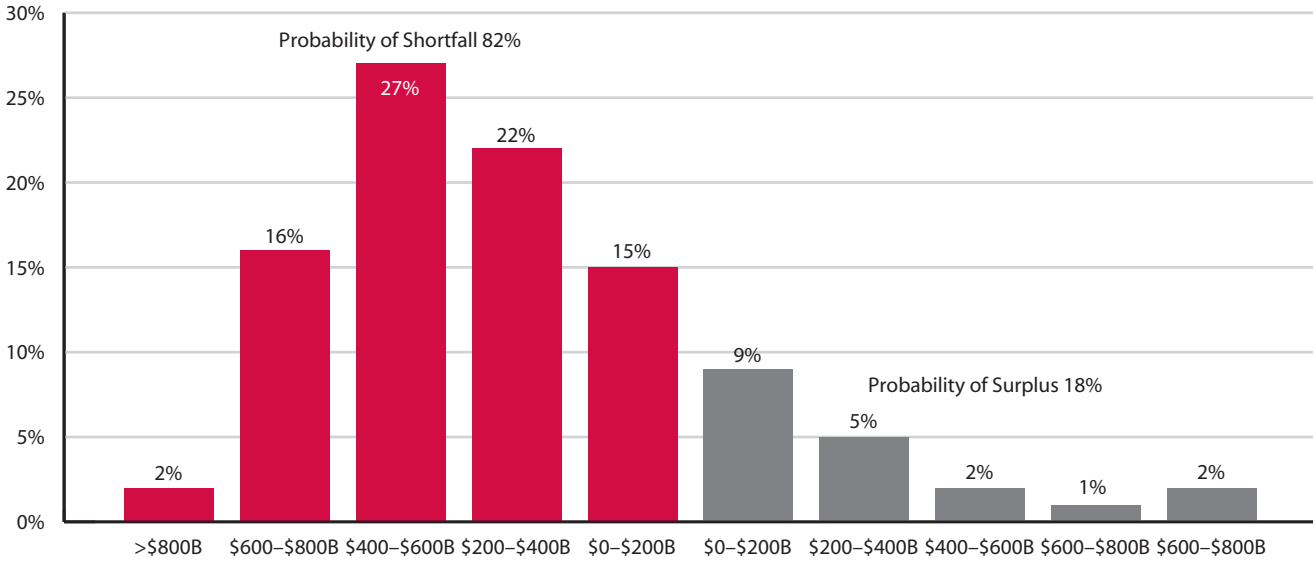
Simulation results indicate that the probability of CalPERS assets falling short of obligations is 82 percent, i.e., there is only an 18 percent chance of assets exceeding liabilities at the end of this 16-year forecast period. (Using an arithmetic return of 8.5 percent increases the chance that assets will exceed liabilities to 26 percent.) At a 7.75 percent arithmetic rate of return, the likelihood is 45 percent that CalPERS will fall short by more than $400 billion, or nearly twice its current market value of assets. To achieve a 75 percent chance of fully meeting its obligations, i.e., assets greater than or equal to liabilities, CalPERS would need an average annual arithmetic return of 12.5 percent for the next 16 years. Even with a less ambitious target, the challenge for CalPERS is tremendous. For example, CalPERS must earn an annual arithmetic average of 9.0 percent for the next 16 years to achieve even odds that its assets are greater than or equal to 80 percent of liabilities.

The probability of a shortfall over the same time period for CalSTRS is 79 percent, with a probability of 52 percent that CalSTRS will fall short by more than $200 billion. To achieve a 75 percent chance of meeting or exceeding obligations, CalSTRS would need an average annual arithmetic return of 12.4 percent for the next 16 years. As with CalPERS, even with a less ambitious target, the challenge for CalSTRS is steep. CalSTRS must earn an annual arithmetic average of 8.8 percent for the next 16 years to achieve even odds that its assets are greater than or equal to 80 percent of liabilities.

UCRP is in better shape but only slightly. The probability of a shortfall for UCRP is 70 percent, with a probability of 36 percent that the system will fall short by more than $50 billion. To achieve a 75 percent chance of meeting obligations, UCRS would need an average annual arithmetic return of 11.1 percent for the next 16 years. To achieve a 50 percent probability that its assets are greater than or equal to 80 percent of liabilities in 16 years, UCRP must earn an annual arithmetic average of 7.8 percent.

100 Based on available data, CalPERS standard deviation is just below 12 percent; CalSTRS is 11.99 percent. Data for UCRP are not available. Each case includes 10,000 simulations.

Figure 1
Probability of CalPERS Shortfall, Surplus Over 16 Years

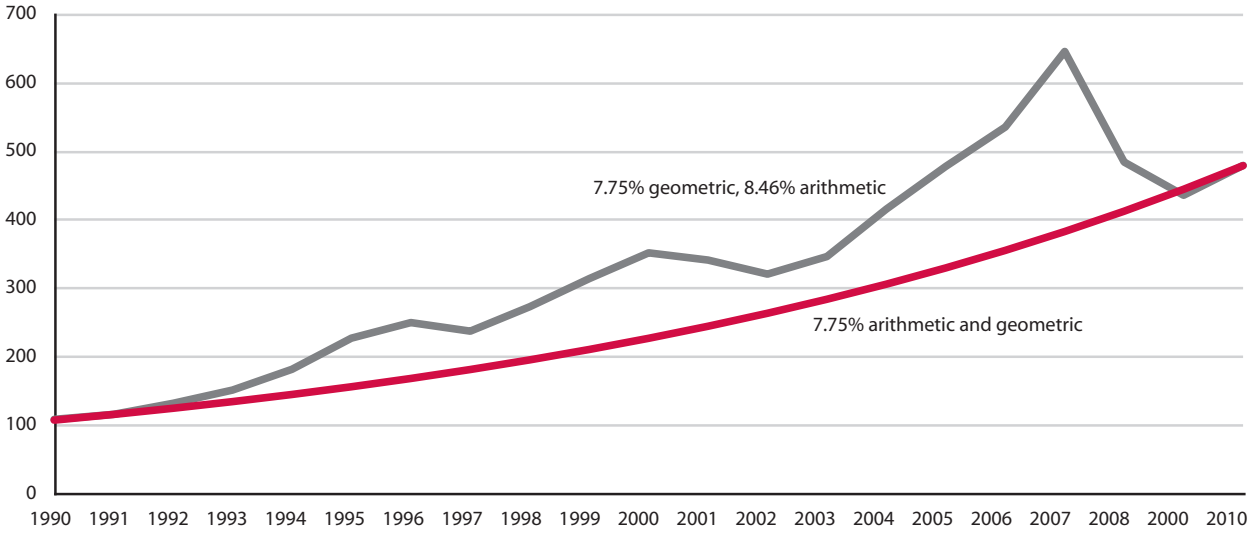


Source: Author's calculations based on June 2011 MVA, 7.75 percent annual rate of return, standard deviation of 12 percent. 16-year duration. 10,000 simulations.

Arithmetic vs. Geometric Rates of Returns

Which fund performs better? The one with an arithmetical average annual return of 8.46 percent? Or the one with a geometric average annual return of 7.75 percent? The answer: It depends. They can wind up in the same place.

The arithmetic, i.e., average annual return of the first fund (in gray) is 8.46 percent, but its geometric, or compounded return is 7.75 percent, exactly equal to the second fund. Both start at $100 in 1990 and end in 2010 at $480. Most important, because of the wide variance around the annual average, the first fund must earn an arithmetic return of nearly 8.5 percent annually to achieve a long-term, geometric rate of 7.75 percent.



V. Pension System Revenue and Contribution Rates

As discussed above, CalPERS and CalSTRS sponsors or employers provide revenue to pension systems based on actuarial-determined amounts each year, expressed typically as a contribution share of payroll.[101] CalPERS and CalSTRS employees contribute through rates that are set by collective bargaining agreements or by existing law.[102] The UC Board of Regents determines both UCRP employer and employee contribution rates.

At the local level, CalPERS public agency employers include cities, counties, special districts, and others with CalPERS members. These local agencies make annual payments, which cover both normal costs, i.e., the ongoing costs of providing retirement benefits, and the cost to amortize any unfunded liability.

At the state level, CalPERS employer agencies include the CHP, Caltrans, the Legislature, and so on. The state of California, through General Fund and special fund expenditures, provides annual payments to CalPERS. Because CalPERS has a guaranteed draw on state funds, it simply submits a bill that the state must pay.

The situation for CalSTRS is different. Like CalPERS public agency employees, CalSTRS employee contribution rates are set by law. Unlike CalPERS, however, employer contribution rates are not determined by annual actuarial assessments of what the system needs to be fully funded, but also by law. CalSTRS employers contribute 8.25 percent of payroll, employees 8 percent, and the state currently contributes about 5 percent. CalSTRS also differs, perhaps most important, in that it has no guaranteed draw on supplemental state funds. Should CalSTRS require supplemental funding, it simply requests it, which the state may or may not pay.

State general and special fund expenditures to CalPERS and CalSTRS have increased substantially over the last few years. In fiscal year 2011-2012, the state of California is projected to contribute $4.9 billion, including $3.6 billion and nearly $1.3 billion to CalPERS and CalSTRS, respectively (Figure 2). The total contribution to CalPERS remains a small share, equal to 2.5 percent of General Fund and 3.0 percent of all fund spending. State spending on CalSTRS represents 1.5 percent of General Fund spending. Since 1982, total state spending, i.e., GF and other funds, on CalPERS and CalSTRS has averaged the equivalent of 2.6 and 1.3 percent of General Fund spending, respectively.[103] Combined CalPERS and CalSTRS spending reached its peak not in the current year at 5.7 percent, but in 1997-1998 at 6.0 percent of all state spending.[104] The 1997-1998 totals are boosted by an over $1 billion payment stemming from a court decision involving past state contributions reductions to the fund.

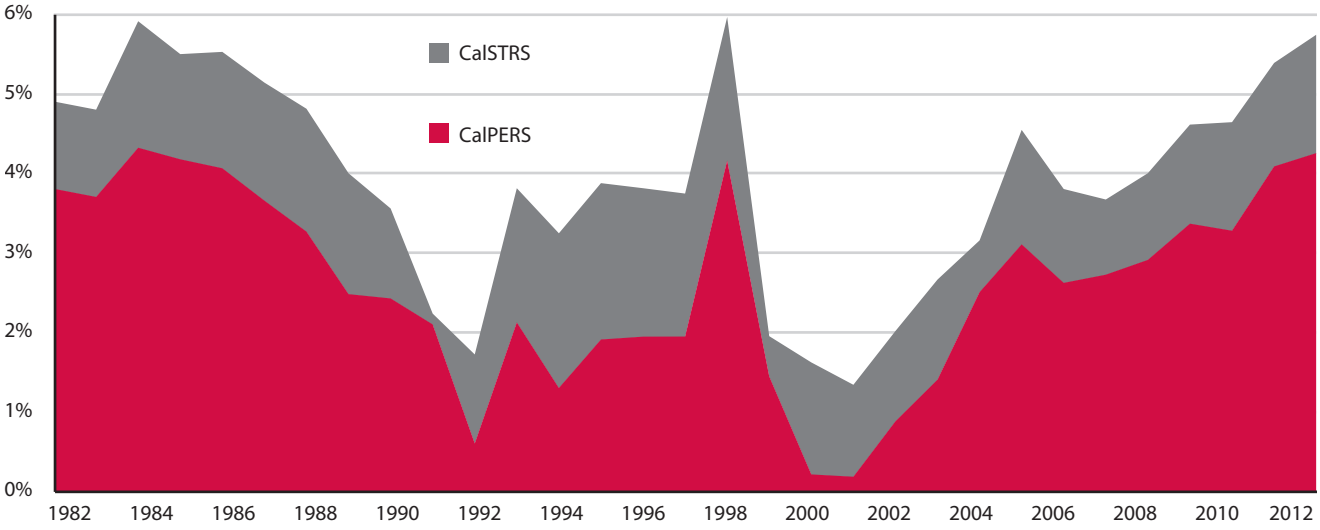
101 Contribution rates are typically expressed as a percentage of *covered* or pensionable payroll. Covered payroll typically includes salaries and wages but excludes benefits and overtime.

102 This ignores any "pick up" of employee contributions by CalPERS agencies. For example, existing law may require a public agency employee to contribute 9 percent, but that public agency may "pick up" or cover that amount as part of an agreement.

103 E-mail correspondence with the Department of Finance, June 16, 2011. State contributions reported by DOF are typically close but not identical to those reported by CalPERS. See CalPERS, "State & Schools Actuarial Valuation as of June 30, 2006, p. 12, http://www.calpers.ca.gov/eip-docs/about/pubs/member/calpers-reports/actuarial-reports/2006-st-body.pdf, retrieved Nov. 16, 2011. This relatively low contribution reflects the practice of using cash basis accounting for retirement costs. That practice, in contrast to an accrual basis, artificially depresses the true costs to the state.

104 The state makes only General Fund contributions to CalSTRS.

Figure 2
State Spending on CalPERS, CalSTRS Expressed as Share of GF



Source: Author's calculations based on Department of Finance data.
Note: CalPERS FY 98 GF expenditures include $1.1 billion from lawsuit loss; CalSTRS FY 08 expenditures exclude repayment of $500 million from FY 2004 lawsuit loss.
FY 2011 is estimated; FY 2012 is projected.

CalPERS

As noted in the Section II, the systemwide average CalPERS employer contribution rate (i.e., the combined rate for state and local CalPERS agencies) for the year ending June 2009 was 15.7 percent, consisting of a normal cost of 10.7 percent and 5.0 percent for the amortization of unfunded liabilities. According to the CalPERS CAFR for the year ending June 30, 2010, changes in demographic assumptions were expected to increase state contributions in 2010-2011 by between 1.0 and 2.4 percent and contributions by school employers by 0.42 percent.[105] The 2010-2011 systemwide average employer contribution rate was 17.1 percent, including a normal cost rate of 10.8 percent and an unfunded rate of 6.3 percent.[106]

The 2011-2012 systemwide employer contribution rate is not available but has been estimated at 17.6 percent (Table 11). This estimate is based on reported state agency and school employer rates, reported state agency payroll, reported public agency employer rates, and estimated public agency payroll. Public agency payroll is assumed to have increased at the same rate as state agency payroll.

The 2011-2012 systemwide employer rate likely contains a slight decrease from 2010-2011 in employer normal costs, due in part to increased state agency employee contribution rates resulting from collective bargaining agreements. The 2011-2012 employer rate also likely contains an increase in unfunded costs, due to recognition of recent market losses.

Because public agency normal cost rates are not available, we are unable to precisely estimate systemwide employer rate components. However, for the purposes of assessing the effects of changes in discount rates and demographic factors below, we assume that the systemwide normal cost rate in 2011-2012 is 10.0 percent and the unfunded rate is 7.6 percent.[107]

105 E-mail correspondence with the Department of Finance, June 16, 2011. State contributions reported by DOF are typically close but not identical to those reported by CalPERS. See CalPERS, "State & Schools Actuarial Valuation as of June 30, 2006, p. 12, http://www.calpers.ca.gov/eip-docs/about/pubs/member/calpers-reports/actuarial-reports/2006-st-body.pdf, retrieved Nov. 16, 2011. This relatively low contribution reflects the practice of using cash basis accounting for retirement costs. That practice, in contrast to an accrual basis, artificially depresses the true costs to the state.

106 This figure appeared in a partial posting of the CAFR for the year ending June 30, 2011. The full CAFR has not yet been posted.

107 The state agency employer unfunded rate in 2011-2012 is reported at 9.9 percent.

Table 11
CalPERS Employer Contribution Rates, 2011-2012

	Systemwide	State Agency	Public Agency[a] including School
Total	17.6	20.3	16.1
Miscellaneous	14.5[a]	18.0	13.0
Safety	27.4	24.4	31.1

a Including school employees.

Estimated based on 2011-2012 reported state agency employer rates and employer category share of 2009-2010 payroll. CalPERS, "Employer Contribution Rates," http://www.calpers.ca.gov/index.jsp?bc=/employer/actuarial-gasb/emp-contrib-rates.xml&pat=STER, retrieved Nov. 16, 2011; CalPERS, "Agenda Item 5d to Members of the Benefits and Administration Committee," Dec. 14, 2010, p. 4.

Effects of Changing Assumptions on Contribution Rates

Current systemwide employer contribution rates assume a 7.75 percent discount rate, a current normal cost rate, i.e., no changes due to changes in demographic assumptions, and no change in the amortization rate for unfunded liabilities. This is referred to as the CalPERS baseline contribution case.

However, as discussed above, the state's required contribution rate will increase if there are changes in discount rates,[108] changes in demographic assumptions. In this section we provide examples of how two key factors affecting the funded status—investment returns and average longevity—can affect rates. To do this, we relied on sensitivity estimates developed by CalPERS and augmented them, where appropriate, with our own model estimates relating changes in contribution rates to changes in discount rates and demographic factors. For more details on the CalPERS estimates, see the sidebar "CalPERS Estimates of Discount Rate Change Effects."

Table 13 summarizes contribution rates under the baseline case and three alternatives, which are described below.[109] As indicated in the bottom two rows, Table 13 assumes that the effects of discount rate and demographic changes are the same across state and public CalPERS agencies. This is an oversimplification but still provides insight into contribution rate changes and to associated changes in pension expenditures.

Table 12
Contribution Rate Effects of 1/4 Percentage Point Discount Rate Decrease

Employee Category	Increase in Employer Contribution Rate
State agency employees	
State Miscellaneous (First Tier)	2.3%
State Miscellaneous (Second Tier)	2.3%
State Industrial First and Second Tier	2.0%
State safety	1.7%
CHP	3.8%
State Peace Office/Firefighters	3.3%
Weighted average, all state employees	2.5%
Weighted average, misc. state employees	2.3%
Weighted average, safety state employees	2.8%
Public agency employees	
Miscellaneous	2.3%
Safety	4.0%
Weighted average, local employees	2.5%
Systemwide employees	
Systemwide by gross category	
Miscellaneous	2.3%
Safety	3.4%
Weighted average, systemwide employees	2.5%

Source: CalPERS, "Agenda Item 7a to Members of the Benefits and Administration Committee," Attachment 2, Mar. 15, 2010, http://www.calpers.ca.gov/eip-docs/about/board-cal-agenda/agendas/bpac/201103/item7a-0.pdf, retrieved Nov. 20, 2011.

As indicated, the weighted average for systemwide employees indicates a 2.5 percent increase in the contribution rate per 0.25 percentage point decrease in the

108 State agency average employer normal costs fell to 10.3 percent. See CalPERS, "State & Schools Actuarial Valuation as of June 30, 2006, pp. 17-22, http://www.calpers.ca.gov/eip-docs/about/pubs/member/calpers-reports/actuarial-reports/2006-st-body.pdf, retrieved Nov. 16, 2011.

109 Other possible scenarios that are not included for the sake of clarity and brevity. For example, one could combine a middle investment scenario (6.2 percent annually) with no other demographic effects or with other effects on the rate for unfunded liabilities. This and subsequent contribution rate cases are intended to demonstrate reasonable bounds for changes in contribution rates.

discount rate. To simplify, we assume that each 1 percentage point decrease in the discount rate increases contribution rates systemwide an average of 10.0 percent.[110] This 10:1 ratio indicates the approximate effects on contribution rates from the existing CalPERS baseline rate of 7.75 percent to, say, 7.1 percent. An identical decrease from a lower initial discount rate, say, 5.75 percent, to 5.1 percent would result in a greater contribution rate increase. In short, these effects are most reliable for initial changes from the current 7.75 percent discount rate.

NOTES: CalPERS Chief Actuary, Municipal Management Association of Northern California conference, Oct. 17, 2010.

The effects are greater as we move down the discount ladder since the relative change is greater on those lower rungs. For example, a decrease from 7.75 to 7.1 percentage points (.65 percent) reflects an 8.4 percent decrease. A 0.65 percentage point decrease from 6 percent reflects a 10,8 percent decrease.

Table 13
CalPERS Systemwide Employer Contribution Rate Cases

	Baseline	Low	Middle	High
Discount rate	7.75%	7.1%	6.2%	4.5%
Baseline contribution rate	17.6%	17.6%	17.6%	17.6%
Discount rate effect on normal cost	0%	1.7%	15.5%	32.5%
Discount rate effect on unfunded	0%	1.3%	NA[a]	NA[a]
Effect of demographic changes	0%	0.3%	0.8%	2.3%
Systemwide rate	17.6%	20.9%	33.9%	52.4%
State agency rate	20.3%	23.6%	36.6%	55.1%
Public agency rate, including schools	16.1%	19.4%	32.4%	50.9%

a Included in effect on normal cost.

Source: Author's calculations.

Low Contribution Case

This case shows the impact of using a discount rate of 7.1 percent and a longevity factor that is one year greater than the CalPERS assumption. As previously noted, based on approximately the most recent 30 years of experience, 7.1 percent reflects the rate that CalPERS has a 50 percent chance of exceeding. However, recent experience and long-term investment history suggest this rate may be overly optimistic.

For this low contribution case, we use the results from our simple model, which estimates smaller effects than those reported by CalPERS.[111] Based on our model, the increase to the normal cost contribution rate is 1.7 percent. We also estimate the effects of this discount rate decrease on the unfunded contribution rate, assuming a 20-year amortization period. As a result, the contribution rate for unfunded liabilities rises 1.3 percent.[112] Finally, we assume a 0.3 percent increase in normal costs due to a one-year increase in longevity[113] and other demographic factors.[114] In sum, the systemwide employer contribution rate increases from 17.6 to 20.9 percent.

Middle Contribution Case

This case assumes a 6.2 percent discount rate and a two-year increase from the base case in average longevity. As noted above, the 6.2 percent rate is the average return on a hypothetical pension portfolio invested over the past 100 years.

In this case, we rely on the effects on normal costs and unfunded costs reported by CalPERS, i.e., each 1 percent decline in the investment rate of return leads to a 10.0 percent

110 New York state reports a virtually identical effect. See Michael R. Dutcher, Retirement Systems Actuary, "Annual Report to the Comptroller on Actuarial Assumptions," Aug. 2010, p. 22.

111 We estimate that normal cost increases 2.6 percent for each 1 percent decrease in the investment rate of return. This increase is based on an average CalPERS member who works 21 years, earns annual real salary increases of 1.18 percent, receives a 2 percent annual retirement COLA, and has a benefit equal to 54.12 percent of final salary. The percentage of final salary is based on 21 years of service multiplied by a benefit level formula of 77.32 percent, which is the weighted benefit formula based on the payroll share of employees by category.

112 This assumes that a current UAAL (AVA basis) of $65 billion. The discount rate reduction leads to an $8.3 billion increase in the UAAL, which is amortized over a 20-year period. As a result, the unfunded rate increases 1.3 percent on a level percent of assumed future payroll. The unfunded amount due is expected to increase 3.25 percent per year, i.e., at the same rate as assumed payroll growth. In other words, this estimate provides an optimistic assessment of changes in the unfunded rate due to a decrease in the discount rate.

113 U.S. longevity is increasing each decade by roughly 1.5 years. See CDC, "National Vital Statistics Reports," Volume 59, Number 9, Sept. 28, 2011, pp. 52-53, http://www.cdc.gov/nchs/data/nvsr/nvsr59/nvsr59_09.pdf, retrieved Nov. 5, 2011.

114 This is much less than the 2.3 percentage point increase since 2000 and also less than the recently adopted one-year increase of 0.42 percentage points in 2010-2011. Based on CalPERS, Comprehensive Annual Financial Reports, 2001-2010.

contribution rate increase. Based on a decrease in the discount rate from 7.75 to 6.2 percent, the contribution rate increases by at least 15.5 percentage points.[115] In addition, we assume an increase in the normal cost of 0.8 percentage points resulting from a two-year increase in longevity and other demographic factors.[116] In sum, the middle-case contribution rate increases from 17.6 to 33.9 percent.

High Contribution Case

In this case, we assume a low-risk discount rate of 4.5 percent and a three-year increase from the base case in average longevity. We again assume contribution rate effects identical to those reported by CalPERS. Based on a net discount rate decrease of 3.25 percent, the contribution rate increases by at least 32.5 percentage points. In addition, we assume a 2.3 percent increase in the normal cost, due to a three-year increase in longevity and other demographic changes. As a result of these changes, the total contribution rate in this high contribution case rises to 52.4 percent.

The middle and high cases result in substantial increases in state employer contributions to CalPERS. But it is worth noting that the increases would be even larger if CalPERS adhered to stricter accounting methods and assumptions.

As one example, assume a CalPERS UAAL estimate of $65 billion, followed by a discount rate cut from 7.75 to 6.2 percent. This increases the UAAL about $60 billion. If CalPERS were to combine this new unfunded liability with its existing unfunded amount, the total UAAL would reach $125 billion, with an initial amortization charge of $8.2 billion, or nearly 20 percent of payroll. If amortized over a seven-year period on a level annual payment basis, however, the CalPERS contribution rate for unfunded liabilities only would reach roughly 50 percent of payroll, compared with about 10 percent today.

CalSTRS

As noted above, employers, employees, and the state contribute to the CalSTRS DB plan at amounts determined by state law.[117] CalSTRS members contribute 8 percent of earnings, and employers contribute 8.25 percent. The total contribution from the state of California, 4.77 percent in 2011-2012, includes

- 2.017 percent for the Defined Benefit plan
- 2.5 percent designated for Purchasing Power Protection (less $72 million)[118]
- A supplemental amount determined by the presence of any unfunded liability.[119]

The estimated total CalSTRS contribution rate in 2011-2012 is 21.02 percent, including 8.0 percent from CalSTRS employees.[120] The normal cost is approximately 17.7 percent, leaving the balance for the amortization of CalSTRS' unfunded liability. This modest contribution rate for the amortization of unfunded liabilities is insufficient to amortize the current unfunded liability. Absent large increases in contribution rates or other revenues, under current assumptions, CalSTRS' assets are projected to fall to zero by 2044 at the latest.

Additional state contributions to CalSTRS began on July 1, 2011 (Table 14). As noted, these supplemental contributions will reach a maximum of 1.5 percent of payroll in 2015 and will average 1.2 percent over a 30-year period. Based on this supplemental payment schedule and other current assumptions, the state of California will be required by law to contribute on average 5.45 percent of payroll to CalSTRS over the next 30 years.[121] Combined with 8.0

115 The increase is at least 15.5 percentage points based on an assumed greater effect as we move down the discount ladder, as discussed above.

116 The contribution rate increase due to a two-year increase in longevity is more than twice that estimated for a one-year longevity increase because of the effects of the lower discount rate.

117 Milliman, "Defined Benefit Program Actuarial Valuation as of June 30, 2009," p. 3, http://www.calstrs.com/help/forms_publications/printed/FY08-09_DB_Valuation.pdf, retrieved Oct. 16, 2011.

118 For example, if payroll were $10 billion, the state contribution would total 2.5 percent x $10 billion less $72 million, or $250 million less $72 million, or $178 million.

119 Under Education Code (EC) §22955(b), the state must contribute supplemental funds if the employer and employee contribution shares are insufficient to cover normal costs or if the Actuarial Value of Assets associated with benefits effective July 1, 1990, are less than actuarial obligations. In the last fiscal year (2010-2011), neither condition was met and no additional state contribution was required. As described below, that has now changed.

120 The calculated state contribution, consisting of (2.017 percent DB) plus 2.5 percent less $72 million (PPP), plus 1.206 percent (30-year unfunded contribution) indicates a 2011-2012 amount of $1.273 billion. However, the Department of Finance estimates $1.259 billion. We assume that the calculated figure from CalPERS is the more accurate one. Contribution rates are presented to one decimal place after this reference for consistency. Some contribution rate and contribution amount numbers are rounded.

121 Assumes a total state rate of 5.72 percent, consisting of (2.017 percent DB) plus 2.5 percent less $72 million (PPP), plus 1.206 percent (30-year unfunded contribution), or $5.791 billion, which reflects 5.45 percent of estimated 2011-2012 payroll of $26.681 billion.

percent employee and 8.25 percent employer contributions, the average total contribution rate over the next 30 years is 21.7 percent.[122] The average annual state contribution over that 30-year period is $1.455 billion, an increase of $182 million above the current state amount.

Table 14
Supplemental State Contribution Rate to CalSTRS

Fiscal Year	Percent of Payroll
2011-2012	0.524
2012-2013	0.774
2013-2014	1.024
2014-2015	1.274
2015--2016 and subsequent	1.505
Estimated 30-year average	1.206

Source: Milliman, "Defined Benefit Program Actuarial Valuation as of June 30, 2010," p. 3, http://www.calstrs.com/help/forms_publications/printed/db_valuation_2010.pdf, retrieved 17, 2011.

Supplemental state contributions will reduce CalSTRS unfunded liability, but they will not eliminate it. CalPERS estimated in its 2010 valuation a 30-year required contribution rate of 33.5 percent, compared with a projected actual 30-year average of 21.7 percent. In short, the required average contribution rate exceeds the 2011-2012 rate by 11.8 percent (Table 15). Based on current payroll, the annual *additional* CalSTRS revenue requirement is $3.147 billion, based on estimated 2012 payroll. This estimated revenue requirement is based on current actuarial and other assumptions, including stated normal costs and an expected 7.75 percent discount rate.

Table 15
Required Total CalSTRS Contribution Rates[a]

Contribution Rate Category (percent)	2009	2010	2012-2031
Normal cost rate[b]	17.3	17.7	17.7
Amortization rate available	0.6	1.6	4.0
Total funds available	18.0	19.3	21.7
Total rate required	31.9	33.5	33.5
Additional contribution rate required	13.9	14.2	11.8

a Some numbers are rounded. Includes 8 percent employee contribution.

b Assumes unchanged normal cost from 2013-2031.

Source: Milliman, "Defined Benefit Program Actuarial Valuation as of June 30, 2010," p. 1, 9, http://www.calstrs.com/help/forms_publications/printed/db_valuation_2010.pdf, retrieved 17, 2011.

CalSTRS initial challenge is to increase the total contribution rate by at least an average of 11.8 percentage points each year over the long term. We assume that CalSTRS convinces the Legislature and others of that need in the near future. For the sake of simplicity, we also assume that the state contributes this entire amount; i.e., there is no match from local school districts. In short, in all discount rate cases, we assume an increase in the state's contribution rate of 11.8 percent, plus any additional increases due to changes in the discount rate and/or the normal cost.

However, as discussed above, the state's required contribution rate will increase if there are changes in discount rates or changes in demographic assumptions. Similar to the CalPERS discussion above, we provide examples of how changes in the discount rate and average longevity can affect contribution rates. We relied on sensitivity estimates developed by CalSTRS actuary, augmented with our own model estimates.

Low Contribution Case

In this case, we assume a decline in the discount rate from 7.75 to 7.1 percent. Based on our simple model, we estimate that this discount rate decrease leads to a normal cost contribution rate increase of 1.9 percent.[123] We also assume that this decrease in the discount rate increases the

122 This assumes unchanged payroll, making it a conservative estimate of the state's obligation.

123 This assumes that a 1 percent decrease in the discount rate leads to a 2.9 percent increase in the normal cost contribution rate. This is based on an employee starting at age 30, earning real salary

contribution rate for unfunded liabilities by 1.6 percent.[124] We assume also a one-year increase in longevity and other demographic factors, which increases the normal cost rate an additional 0.3 percent, bringing the employer contribution rate to 21.3 percent.

Middle Contribution Case

In the CalSTRS middle contribution case, we assume a discount rate of 6.2 percent and slightly greater costs due to demographic changes. However, in this case, we incorporate the effects of discount rate changes reported by CalSTRS.[125] Specifically, we assume that 1 percentage point decrease in the discount rate increases the normal cost and unfunded cost rates a combined total of 8.7 percent. With an assumed decrease from 7.75 to 6.2 percent, the contribution rate increases 13.6 percent. We assume also a two-year increase in longevity and other demographic factors, increasing the normal cost rate an additional 0.9 percent and bringing the final rate to 31.0 percent.

High Contribution Case

In the final, high contribution case, we assume a 4.5 percent discount rate and repeat the contribution rates effects reported by CalSTRS. This decrease in the discount rate results in a contribution rate increase of 28.3 percent. We also assume demographic factors equivalent to a three-year increase in longevity that lead to a 2.6 percent increase. In total, the CalSTRS employer contribution rate increases to 47.4 percent. Table 16 summarizes these three CalSTRS contribution rate cases.

Table 16
CalSTRS Employer Contribution Rate Cases

	Baseline	Low	Middle	High
Discount rate	7.75	7.1	6.2	4.5
Baseline rate	13.0	24.8[a]	24.8 a	24.8[a]
Discount rate effect on normal cost rate	0	2.9	13.6	28.3
Discount rate effect on unfunded rate	0	1.6	NA[b]	NA[b]
Effect of demographic changes	0	0.3	0.9	2.6
Total employer rate	13.0	29.6	39.3	55.7
— less local employer rate	8.3	8.3	8.3	8.3
Total state rate	4.7	21.3	31.0	47.4

a These revised baseline rates include an 11.8 percent additional funding requirement per the discussion surrounding Table 15.

b Included in effect on normal cost.

Source: Author's calculations.

UCRP

As noted above, the total required contribution amount for UCRP in 2011-12 is $1.868 billion, or 23.3 percent of payroll.[126] That amount is based on a normal cost rate of 16.9 percent and a rate of 5.5 percent to amortize the unfunded liability.[127] Contributions include an employee rate, currently 3.5 percent, and an employer rate, currently 7 percent. In short, total 2011-2012 contribution rates, about 10.5 percent, now cover only one-half of the required contribution amount.

Employee and employer contributions are set to increase in July 2012. Employee rates will increase to 5 percent (with safety employees contributing 6 percent), and the employer rate is scheduled to increase to 10 percent, for a total of slightly more than 15 percent. Based on an estimated required amount of 23.3 percent,[128] contributions remain

increases of 1 percent per year, an initial retirement benefit of 54.1 percent of final salary, a 2 percent annual COLA in retirement, with the retiree living 25 years beyond retirement age. This is less than the contribution rate effect reported by CalSTRS.

124 This increases CalSTRS unfunded liability by $8.2 billion. On a level percentage basis, this results in a 1.6 percent increase in the first year with additional increases thereafter. On a level percentage basis, this would result in a 2.5 percent increase.

125 Milliman, "Defined Benefit Program Actuarial Valuation as of June 30, 2010," p. 7, http://www.calstrs.com/help/forms_publications/printed/db_valuation_2010.pdf, retrieved Oct. 17, 2011.

126 Some numbers are rounded. Based on payroll of $8.034 billion.

127 In the previous year, the rate for the amortization of unfunded liabilities was 2.66 percent and was based on a 15-year amortization period. See Segal, "University of California Retirement Plan Actuarial Valuation Report as of July 1, 2010," p. 33, http://www.universityofcalifornia.edu/regents/regmeet/nov10/f3attach1.pdf, retrieved Oct. 20, 2011.

128 This reflects the 2011-2012 contribution rate. The 2012-2013 rate is 26.35 percent.

below requirements to fully fund the system. UCRP has indicated that any shortfall in the current year will be covered through internal borrowing.

The UCRP baseline case of 23.3 percent incorporates current actuarial and other assumptions, including stated normal costs and an expected 7.5 percent discount rate. Similar to the CalPERS discussion above, we provide examples of how changes in the discount rate and average longevity can affect contribution rates. In the absence of specific sensitivity data from UCRP, we utilized estimates developed by CalSTRS, which has a similar benefit structure. We augmented these CalSTRS figures with our own model estimates.

Low Contribution Case

Under this case, we assume a reduction in the discount rate from 7.5 to 7.1 percent. Based on our simple model, we estimate that this discount rate decrease leads to a normal cost contribution rate increase of 1.7 percent.[129] We also assume an unfunded cost contribution rate increase of 0.5 percent.[130] This low case also assumes a 0.4 percent increase in normal costs due to demographic changes, including a one-year increase in longevity.[131] The resulting total contribution rate is 25.9 percent, which includes an employer rate of 20.9 percent.[132]

Middle Contribution Case

This assumes a discount rate of 6.2 percent. Based on the identical contribution rate effect reported by CalSTRS, we assume that this leads to a combined normal cost and amortization rate increase of 11.3 percent. This middle case also assumes a normal cost increase of 1.2 percent due to a one-year increase in longevity and other demographic assumption changes. In total, the employer contribution rate reaches 30.8 percent.

High Contribution Case

This assumes a 5.0 percent discount rate.[133] Using the reported impacts as in the middle case, the new contribution rate increases by 21.8 percentage points. We also assume a 3.7 percent increase in the normal cost rate due demographic factors, which include a three-year increase in longevity. The total contribution rate rises to 48.8 percent, including a 43.8 percent employer rate. Table 17 summarizes these UCRP contribution rate cases. Table 18 summarizes the CalPERS, CalSTRS, and UCRP contribution rate cases.

CalPERS and CalSTRS contribution rate increases, even in the low contribution case, will exert pressure on state and local non-pension expenditures. UCRP contribution rate increases will put similar pressure on the University of California. To better understand which non-pension expenditures are likely to be squeezed, the next section contains budget summaries for the state of California and the University of California. Unfortunately, a close examination of budgets for CalPERS public agency sponsors, i.e., cities, counties, and school and special districts, is beyond the scope of this report.

129 This assumes a 4.3 percent increase in contribution rates resulting from a 1 percent decrease in the discount rate. It is based on an employee starting at age 30, retiring after 30 years, earning real salary increases of 2.15 percent per year, an initial retirement benefit of 75 percent of final salary, a 2 percent annual COLA in retirement, with the retiree living 20 years beyond retirement age. The real salary increase is the average rate noted in Segal, "University of California Retirement Plan Actuarial Valuation Report as of July 1, 2010," pp. 30, 58, http://www.universityofcalifornia.edu/regents/regmeet/nov10/f3attach1.pdf, retrieved Oct. 20, 2011.

130 The decrease in the investment rate of return increases UCRP's unfunded liability by nearly $500 million. On a level percentage basis, this translates into 0.5 percent of payroll. On a level annual payment basis, this is 0.7 percent of payroll.

131 This rate increase is less than the normal cost rate increase between 2001 and 2010, which totaled 2.03 percent. UCOP, "Memo to Members of the Committee on Finance," Nov. 17, 2010, p. 9, http://www.universityofcalifornia.edu/regents/regmeet/nov10/f3.pdf, retrieved Oct. 31, 2011.

132 This assumes that the average employee rate is 5 percent, i.e., that the higher rate for safety employees is a small fraction of the total.

133 As noted earlier, this UCRP "low-risk" rate is 5.004 percent, based on a hypothetical 16-year TIPS rate of 1.504 percent plus the UCRP assumed inflation rate of 3.5 percent.

Table 17
UCRP Employer Contribution Rate Cases

	Baseline	Low	Middle	High
Discount rate	7.75%	7.10%	6.20%	4.50%
Baseline rate	23.3%	23.3%	23.3%	23.3%
Discount rate effect on normal cost rate	0	1.7%	11.3%	21.8%
Discount rate effect on unfunded rate	0	0.5%	NA[a]	NA[a]
Effect of demographic changes	0	0.4%	1.2%	3.7%
Total	23.3%	25.9%	35.8%	48.8%
—less employee contribution	3.5%	5.0%	5.0%	5.0%
Total Employer Rate	19.8%[b]	20.9%	30.8%	43.8%

a Included in effect on normal cost.

b Required employer rate. Actual current employer rate is 7.0 percent.

Source: Author's calculations. Assumes earned payroll of $8.034 billion, based on Segal, "University of California Retirement Plan Actuarial Valuation Report as of July 1, 2010," p. v, http://www.universityofcalifornia.edu/regents/regmeet/nov10/f3attach1.pdf, retrieved Oct. 20, 2011.

Table 18
CalPERS, CalSTRS, and UCRP Employer Contribution Rate Cases

	Baseline	Low	Middle	High
CalPERS[a]	17.6%	20.9%	33.9%	55.3%
CalSTRS	13.0%	21.3%	31.0%	47.4%
UCRP	19.8%	20.9%	30.8%	43.8%

a Systemwide.

VI. The Impact of Increased Pension Spending on State General Fund and UC Budgets

State of California Expenditures

An earlier section illustrated the relatively small share of pension expenditures in California's GF budget. State general and special fund expenditures to CalPERS and CalSTRS, although higher than in recent years, will total $4.9 billion in 2011-2012, reflecting a combined total equivalent to 5.7 percent of California's GF budget.

Whether pension spending is a large or small share of state spending depends on perspective. For example, had GF revenues increased at their 1990s rate since 2000, California's 2012 GF revenues would today exceed $131 billion, not the current $84.6 billion. Assuming the same nominal pension contributions, pension contributions in this higher revenue scenario would total about 2.6 percent, just below the historical average share since 1982.

However, wishing for a different present state of affairs does not change the reality that state spending on pensions is at an all-time high in both nominal terms and it is also at its highest point as a share of total spending.[134] Pension spending, now more than four times its 1999-2000 level, if a separate category, would exceed spending by many state agencies (Figure 3).

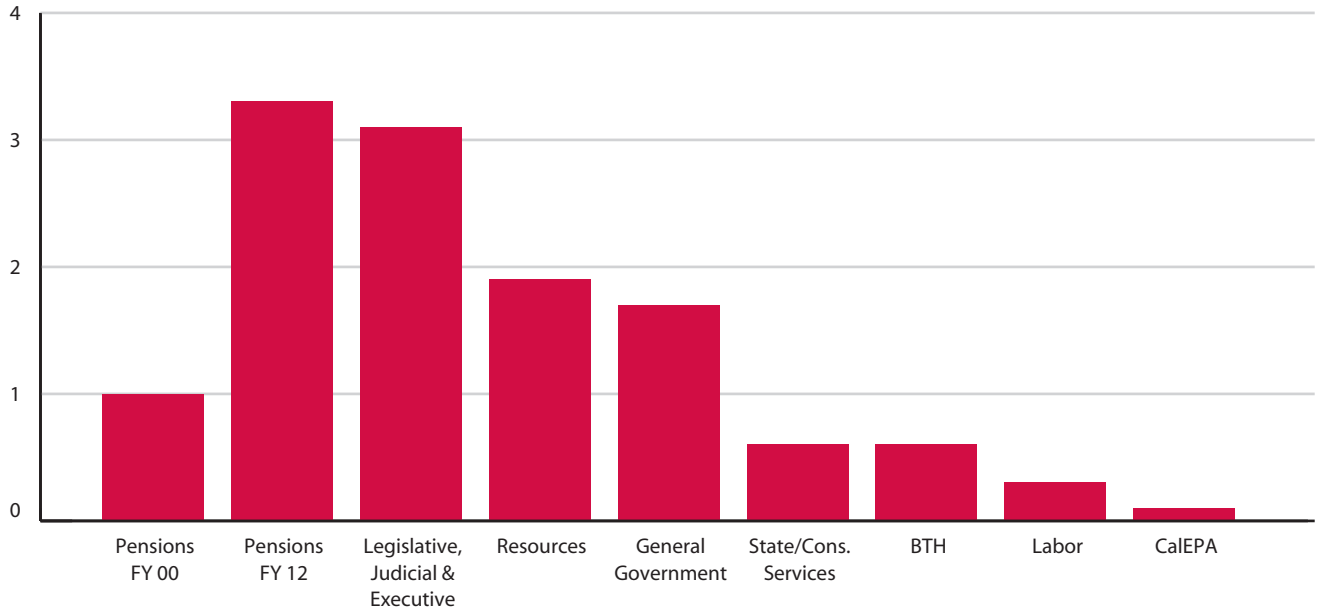
Concerns about pension spending focus on two areas. Has pension spending been responsible for recent reductions in other spending categories? And, more important, will the growth of pension spending result in future crowding out of other categories?

Since the year 2000, California's General Fund expenditures have increased from $66.5 to $84.6 billion,[135] an increase of 27.3 percent in nominal terms. Annual spending by agency (Figure 4) illustrates areas where expenditures have increased and those where spending has remained flat, or even decreased. Not surprisingly, Youth and Adult Corrections spending roughly doubled. Other agency spending (e.g., Legislative, Judicial and Executive, K-12, and others) increased slightly. Spending on General Government and CalEPA saw the largest relative decline. General Fund pension spending, however, more than tripled, suggesting that pensions may be a higher state priority, based on contractual obligations in part, than other spending.

134 This excludes 1998, when a special payment to CalPERS caused combined pension spending to reach 4.7 percent of all state spending.

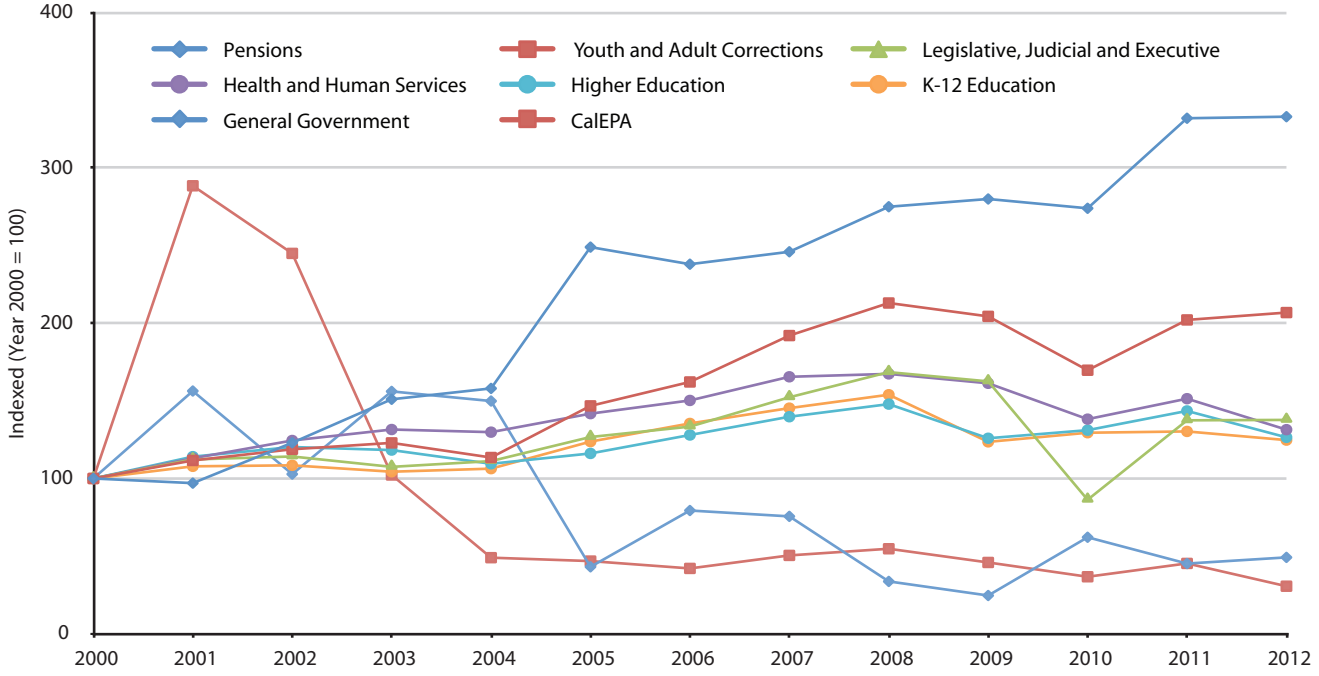
135 The LAO reports $85.9 billion. DOF projects $84.6 billion. However, these do not reflect likely mid-year budget reductions.

Figure 3
2011-2012 Pension Spending Compared with Selected State Agencies



Source: Legislative Analysts's Office, "Historical Data," http://lao.ca.gov/laoapp/laomenus/lao_menu_economics.aspx, retrieved Nov. 6, 2011

Figure 4
General Fund Spending by Agency, 2000-2012



Source: Legislative Analyst's Office, "Historical Data," http://lao.ca.gov/laoapp/laomenus/lao_menu_economics.aspx, retrieved Nov. 6, 2011.

Pension Spending Based on Contribution Rate Cases

The trajectory of California's future pension spending can be estimated using the contribution rate cases developed in the previous section. As discussed, contribution rate cases or scenarios, multiplied by CalPERS and CalSTRS payroll amounts, reflect required state spending on pensions. They can also be used to represent California state agency spending on pensions in the immediate and distant future. Pension spending by individual public agencies, i.e., local governments with CalPERS employee members, varies dramatically and is beyond the scope of this report.

CalPERS

Current or baseline state contributions to CalPERS are estimated as the product of the state agency average contribution rate, 20.3 percent, and estimated state payroll of $17.357 billion, or $3.515 billion. This estimated contribution amount is $86 million lower (about 2 percent) than that projected by the Department of Finance.[136] This may reflect the early nature of the DOF projection, or minor differences in state agency payroll, the average state contribution rate, or both. In any case, this may slightly overstate estimated funding shortfalls that result from increased pension expenditures in each of the CalPERS contribution cases below.[137]

The application of alternative contribution rates estimates results in annual increases in state spending on pensions (Table 19). To simplify the analysis, we assume that future payroll levels are unchanged from today.[138] The 7.1 percent discount rate case indicates an increase in spending above the current amount by $581 million per year. That figure increases to $2.838 billion in the 6.2 percent discount rate case and to $6.552 in the 4.5 percent discount rate case. In short, using 6.2 percent discount case assumptions indicates that California state government will spend $2.8 billion more on CalPERS pensions than the current amount. That will likely require reductions in other spending. Alternatively, of course, the state could seek to increase revenues of that amount.

Contribution rate cases also permit an estimate of the increased spending by public agency CalPERS members, including schools with CalPERS members (Table 20).[139] Based on estimated public agency contribution rates in these three cases, public agency spending on pensions in the 7.1 percent discount case increases $1.0 billion above the current amount.[140] In the 6.2 and 4.5 percent discount rate cases, public agency pension spending increases $5.0 and $10.6 billion per year above estimated 2012 levels. CalPERS systemwide annual pension expenditures are illustrated in Table 21. In the middle case, for example, spending on pensions increases $7.8 billion above current levels.

Table 19
State Agency CalPERS Expenditures, Alternative Contribution Rate Cases

Discount Rate	State Agency Employer Contribution Rate	Annual Pension Expenditures[a]	Increase Above 2011-2012 Amount ($ billions)
7.1 percent	23.6 percent	4.096	0.581
6.2 percent	36.6 percent	6.353	2.838
4.5 percent	58.0 percent	10.067	6.552

a Based on covered state agency payroll of $17.357 billion.

136 E-mail correspondence with the Department of Finance.

137 Assume that the DOF state agency contribution amount of $3.601 billion is correct. Under the middle contribution case below, annual state pension spending would increase from $3.601 to $6.353 (36.6 percent x $17.357 billion), suggesting an increase over the 2011-2012 amount by $2.752 billion. Alternatively, assume that the $3.515 billion more accurately reflects the current state contribution amount, reflecting an increase of $2.838 billion. The difference in additional spending is small, about 3 percent.

138 This is less important than some might think since pension contributions are expressed as a percentage of payroll.

139 This requires the assumption that 2011-2012 public agency payroll has increased since 2009-2010 at 6.3 percent, the same rate as the state agency payroll.

140 This assumes a current public agency CalPERS payroll of $30.558 billion.

Table 20
Public Agency CalPERS Expenditures, Including Schools, Alternative Contribution Rate Cases

Discount Rate	Public Agency Employer Contribution Rate	Annual Pension Expenditures[a]	Increase Above 2011-2012 Amount ($ billions)
7.1 percent	19.4 percent	5.928	1.008
6.2 percent	32.4 percent	9.901	4.981
4.5 percent	50.9 percent	15.445	10.634

a Based on covered school and public agency payroll of $30.558 billion.

Table 21
Total State and Public Agency CalPERS Expenditures, Alternative Contribution Rate Cases

Investment Rate	Annual Pension Expenditures[a]	Increase Above 2011-2012 Amount ($ billions)
7.1 percent	10.025	1.590
6.2 percent	16.253	7.819
4.5 percent	25.621	17.186

a Based on covered state and public agency payroll of $47.915 billion.

CalSTRS

The same process can be used to estimate annual pension expenditures for CalSTRS. As noted earlier, we assume that additional contributions are provided only by the state; i.e., there is no match from local school districts. While that assumption may overstate eventual state spending, it accurately reflects annual increases on pension expenditures, whether borne by state or local governments.

Current total state contributions to CalSTRS are estimated as the product of the current 4.77 percent employer and estimated current CalSTRS payroll, or $1.273 billion.[141] In the 7.1 percent discount rate case, annual state spending on CalSTRS increases $4.4 billion to a total of $5.7 billion (Table 22).[142] In the 6.2 percent case, annual pension spending increases $7.0 billion above the current amount. In the 4.5 percent case, spending increases by $11.4 billion per year.

Table 22
CalSTRS Expenditures, Alternative Contribution Rate Cases

Discount Rate	State Contribution Rate	Annual Pension Expenditures[a]	Increase Above 2011-2012 Amount
7.1 percent	21.3	5.683	4.410
6.2 percent	31.0	8.271	6.998
4.5 percent	47.4	12.647	11.374

a Some numbers are rounded.

Based on earned payroll of $26.681 billion.

The combined increase in state spending on CalPERS and CalSTRS pensions is substantial (Table 23). In the 7.1 percent discount rate case, state spending on CalPERS and CalSTRS doubles to $9.8 billion. In the 6.2 percent discount case, total state spending on pensions triples to $14.6 billion. In the 4.5 percent discount case, total state spending on pensions increases by a factor of more than four, from its current level of $4.8 billion to $22.7 billion. Table 23 also reports pension spending as a share of the current General Fund budget. Current state pension spending share of the GF is 5.7 percent.

Table 23
State CalPERS and CalSTRS Expenditures, Alternative Contribution Rate Cases

Discount Rate	Annual Pension Expenditures	Annual Pension Share of current GF[a]	Increase Above 2011-2012 Amount
7.1 percent	9.779	11.6%	4.992
6.2 percent	14.624	17.3%	9.836
4.5 percent	22.714	26.8%	17.926

a Assumes GF spending of $84.6 billion and state pension expenditures of $4.788 in 2011-2012. Current pension share of GF is 5.7 percent.

141 This is virtually identical to the $1.259 billion state expenditure for CalSTRS in 2011-2012 projected by the DOF.

142 The majority of these increases result from the state currently contributing less than the required amount to fund CalPERS.

These figures exclude additional pension spending by public agencies, which are substantial. For example, in the 6.2 percent discount rate case, additional pension spending by public agencies is nearly $5.0 billion. Combined with state spending, state and local agency government pension spending, including schools, increases annually by more than $14.8 billion, from a current level of $9.7 to $24.5 billion.

As pension obligations increase, state government[143] will face increased fiscal pressures. Potential responses include

- Decreasing pension spending
- Increasing local government contributions
- Increasing general revenues
- Decreasing other, non-pension spending
- (Unfortunately) delaying reforms.

Because of the perceived contractual obligations associated with DB pensions, political pressure, and legal challenges, the state's initial efforts to reduce pension spending will likely be minimal. State employers will continue to press for greater employee contributions, as evidenced by reforms in 2010.

State government may also attempt to increase General Fund and other revenues. But supermajority requirements and political pressures to avoid revenue increases suggest this is unlikely.

As evidenced by state spending trends since 2000, pension spending appears to be crowding out other expenditures. This is likely to continue, if not accelerate, as evidenced by current mid-year spending reduction efforts. Pension reductions are not on the table. Instead, budget cuts, if enacted, reduce K-12 $1.4 billion, higher education $230 million, Developmental Services $100 million, In Home Support Services $110 million, and other programs almost $200 million.[144]

Finally, state government will likely respond by failing to respond, i.e., by delaying. Unfortunately, as discussed in the final section of this report, delay will result in even higher costs.

University of California Expenditures

The current University of California operating budget totals $22.5 billon, including $2.4 billion in support from the state's General Fund.[145] Total covered payroll for pensions is currently $8.034 billion.[146] The total required contribution rate, 23.3 percent, results in a scheduled contribution of $1.868 billion. However, as noted earlier, actual contributions will be less. Estimated employer contributions in 2011-2012 total $562 million, and employee contributions total $281 million, for a combined amount of $843 million. (We assume that employees pay at a rate of 5 percent starting July 1, 2012, reducing the UC employer amount.) UCRP intends to pay the remainder of the total required amount through internal borrowing.

Alternative contribution rate cases illustrate increases in UC spending on pensions. In the 7.1 percent discount rate case, annual employer spending on pension increases from $562 million to a total of $1.679 billion, i.e., an increase of $1.117 billion (Table 24). In the 6.2 percent case, employer spending increases $1.912 billion above the current amount. In the 4.5 percent discount rate case, spending increases by $2.957 billion.

Table 24
UCRP Expenditures, Alternative Contribution Rate Cases

Discount Rate	UC Contribution Rate	Annual Pension Expenditures ($ billions)	Increase Above 2011-2012 Amount ($ billions)[a]
7.1 percent	20.9%	1.679	1.117
6.2 percent	30.8%	2.474	1.912
4.5 percent	43.8%	3.519	2.957

a Assumes annual pension contributions of $844 million, the product of the total contribution rate of 10.5 percent and payroll. Excludes internal borrowing.
Based on earned payroll of $8.034 billion.

143 Local government will face these same pressures. However, our primary focus remains on state spending.

144 LAO, "The 2012-2013 Budget: California's Fiscal Outlook," Nov. 16, 2011, http://lao.ca.gov/reports/2011/bud/fiscal_outlook/fiscal_outlook_2011.aspx, retrieved Nov. 21, 2011.

145 University of California, "Budget for Current Operations," p. 45, http://budget.universityofcalifornia.edu/files/2011/11/2012-13_budget.pdf, retrieved Nov. 21, 2011.

146 Segal, "University of California Retirement Plan Actuarial Valuation Report as of July 1, 2010," p. v, http://www.universityofcalifornia.edu/regents/regmeet/nov10/f3attach1.pdf, retrieved Oct. 20, 2011.

It is less clear how UC will respond to these increased pension costs, but they are substantial, compared with spending on other operations. For example, the increase in pension spending in the 6.2 percent discount rate case is more than triple the current UC research budget ($585 million), eight times that of academic support libraries ($236 million), and 50 percent greater than current student financial aid ($1.256 billion).

VII. Climbing Out

For all of the mystery, complexity (and occasional boredom) associated with public employee pensions, the solution is remarkably straightforward:

- Recognize the problem, particularly its magnitude
- Realize that delay increases costs significantly
- Raise pension system revenues
- Reduce pension system costs
- Reform the system, including governance.

Recognize the Problem

Even under optimistic assumptions, state and local pension obligations will increase substantially in the near term and likely more sharply in the long term. Yet there remains reluctance both to acknowledge the problem and to identify creative solutions.

As a first step, political leaders and others across California should acknowledge the depth of the current financial hole and the magnitude of what is to come. As this analysis demonstrates, even if pension systems assume and earn 7.5 to 7.75 percent annually on investments, funded levels are 73.5 and 75.3 percent for CalPERS and CalSTRS, respectively. (UCRP is in better shape at 86.5 percent.) In the private sector, funded levels of less than 80 percent result in a formal recognition that the pensions are "at risk." The sponsors of such plans are required to calculate the plans' funded status using more conservative actuarial assumptions, thereby raising calculated unfunded liabilities and accelerating required contributions until the funded status is restored to more than 80 percent. Private plans experiencing further reductions in funded status are required to freeze benefits and are faced with other restrictions.

Aggregate shortfalls also demonstrate the depth of the crisis, even under the best of assumptions. At a 7.75 percent discount rate (7.5 percent for UCRP), the aggregate 16-year[147] present value shortfall facing California state government is $142.6 billion,[148] more than annual state spending. At an assumed 7.1 percent discount rate, that figure increases to $199.2 billion. At 6.2 percent, it increases to $290.6 billion, more than triple the current General Fund budget. State pension expenditures, now the equivalent of 5.7 percent of GF expenditures, double to a GF share equivalent of 11.6 percent with a 7.1 percent discount rate assumption, 17.3 percent assuming a rate of 6.2 percent, and 26.8 percent at 4.5 percent. Recent spending patterns, combined with the high priority given to pension spending, demonstrate the effects on education, social services, and other state spending categories.

According to simulations of asset growth for each system, it is also clear that pension systems will be unable to invest their way out of the current situation. CalPERS would require an annual arithmetic investment rate of return of 12.5 percent each year for 16 years to achieve a 75 percent likelihood of meeting its obligations. CalSTRS faces a similar hurdle, requiring a 12.4 percent annual rate. UCRP requires 11.1 percent. Even with less ambitious targets, the systems are likely to fall short. For example, CalPERS must earn an annual average of 9.0 percent for the next 16 years to achieve even odds that its assets will be greater than or equal to 80 percent of liabilities. CalSTRS must earn 8.8 percent, and UCRP must earn 7.8 percent.

California may also wish to look to Rhode Island for a successful model of reform.[149] In late November, the Rhode Island Legislature approved, and the governor signed into law, sweeping reforms that appear to put that state's pension system back on fiscally sustainable paths. The Rhode Island plan,[150] spearheaded by the state treasurer, raises employee contributions and increases the retirement age to 67, institutes a hybrid plan with a DC component, suspends COLAs until systems reach minimum funded levels (as occurs in the private sector), and refinances pension debt. The lopsided victories in both Rhode Island houses started from an acknowledgement of the severity of the financial conditions of its pension systems. If this is, as Governor

147 Corresponding to the average duration of liabilities.

148 See Table 10 for a breakdown of this shortfall total for each system.

149 Fitch, the reporting agency, applauded the Rhode Island agreement, saying that "it increases financial stability for the state and may set a precedent for other states." Go Local Prov, "Ron Horowitz: RI Leads the Way on Pension Reform," Nov. 22, http://www.golocalprov.com/politics/ron-horowitz-ri-leads-the-way-on-pension-reform/, retrieved Nov. 22, 2011.

150 Office of the General Treasurer, "The Rhode Island Retirement Security Act of 2011 (RIRSA)," http://www.treasury.ri.gov/secure-path-ri/legislation.php, retrieved Nov. 22, 2011.

Brown said, fifth-grade arithmetic, California should follow Rhode Island's lead in acknowledging financial realities.

Equally important to acknowledging the severity of the pension crisis, pension reformers must recognize the dangers in going too far. Calls to abandon DB plans ignore the impacts of reform on the recruitment and retention of highly skilled public workers. As evidenced in Rhode Island, the political middle ground, demonstrated by a continued commitment to a DB component in a broader retirement plan, resulted in lopsided wins in both legislative houses and support from a Democratic governor with strong union backing.

Delay Increases Costs

California's pension debt continues to grow because of political inaction. That is disappointing and tragic, but it is also expensive. For every year that leaders fail to act, the eventual cost rises—to the state, to its citizens, and potentially to the public workers to whom pensions are owed. The phenomenon is similar to a negative amortization loan, in which a homeowner pays too little to reduce the principal owed and ends up in a poorer financial position.

The costs of delay to the state over the next year can be estimated on any underfunded amount. At a 6.2 percent discount rate, the annual shortfall for CalPERS systemwide, CalSTRS, and UCRP combined is $16.8 billion. The annual cost of delay is $1.247 billion, or $3.4 million each day. Under the more optimistic 7.1 percent discount rate scenario, the annual shortfall is $7.117 billion, suggesting an annual cost of delay of $579 million, or $1.60 million per day.

CalSTRS' actuary similarly estimated the cost of delay for that system. Over the next two or three years, the increase in required contributions is about 0.4 percentage points per year. In other words, the required additional contribution to fully fund CalSTRS, now approaching 15.0 percent, will climb to 16.3 percent by 2015 and to nearly 20 percent by 2020.[151] Put another way, the cost of failing to fully fund CalSTRS is about $450,000 per day. Notably, these estimates assume what many view as an unrealistic 7.75 percent rate of return on investments. A more realistic figure between 6 and 7 percent pushes the cost of delay higher.

Raise Pension System Revenues

Given the magnitude of pension system shortfalls and the pressure on non-pension expenditures, leaders should consider at least three ways to increase revenues: increased employer contributions, increased employee contributions, and general revenue, including new taxes.

The CalPERS systemwide employer contribution rate has increased from an average of near zero in the late 1990s and the early part of the last decade to 17.6 percent today. CalSTRS employer funding rates, set by statute, have remained unchanged, while UCRP employer rates have risen sharply. Employer contribution rates are likely to continue this upward trend.

Employee contributions have remained relatively low across all three systems, in part due to legal constraints on raising contribution rates for public agency employees. The average CalPERS employee contribution has climbed from about 6 percent in the year 2000 to about 8 percent today. CalSTRS employee contributions have also remained steady. UCRP employee contribution rates are expected to increase again in 2013-2014. State officials should provide additional flexibility to public agencies to modify employee contribution rates.

Given likely increases in employer and employee contributions, an appropriate question is the share of total contributions paid by each group. For example, employers now pay about two-thirds of CalPERS contributions. CalSTRS employers and employees pay roughly equal shares, but that masks the system's unfunded liability, which (in essence) no one is currently paying. Employees explicitly contribute only to normal costs; i.e., they do not contribute to reduce unfunded liabilities. A more equitable solution would require employees to cover 50 percent of actual pension costs, i.e., to contribute 50 percent of both normal costs and any costs to address unfunded liabilities.

Given the large size of California's pension problem, along with other budget challenges, additional revenues are essential. That "grand bargain" is likely to include at least a temporary tax increase. A one-cent sales tax would raise about $2.5 billion per year, only one-fourth of the state's annual shortfall in the 6.2 percent contribution case. An across-the-board income tax increase of 5 percent would raise a similar amount. But the challenges to tax measures are obvious and substantial, coming from both lawmakers who have taken anti-tax pledges and from other interests

151 Milliman, "Defined Benefit Program Actuarial Valuation as of June 30, 2010," p. 6, http://www.calstrs.com/help/forms_publications/printed/2010_mppp_valuation.pdf, March 22, 2011, retrieved Oct. 14, 2011

who would likely object to tax increases for the purposes of supporting what many view as a broken system with excessive benefits.[152] Leaders should also consider flexibility in raising local revenues to address pension problems, although legislative opposition also seems to make this path difficult.

Finally, there may be opportunities to raise revenues for retirees who begin to collect benefits before the traditional retirement age, currently 66. This approach, similar to that used for Social Security beneficiaries, would either tax retirement benefits received before retirement age or reduce payments to beneficiaries who retire before age 66. An additional variant of this approach would be to implement a surtax on public employee retirement benefits for traditional "double-dippers," i.e., those who leave public employment but continue to work.

Reduce Pension System Costs

Reducing the cost of pensions typically involves reducing employee and possibly retiree benefits. But it can also include other cost savings, such as offering discounted lump- sum payments to beneficiaries, which is discussed below.

Most observers argue that benefits earned by public employees are contractually guaranteed and cannot be reduced. That suggests that only benefits for new employees can be reduced. Others argue that benefits accrued to date should be protected, but that accruals going forward should be reduced, as occurs in the private sector. A few argue for more aggressive measures, reducing benefits not only for current workers but also for current retirees. Those who contend that accrued benefits be reduced point to the magnitude of general fiscal stress and the prospects for continued reductions in non-pension expenditures.

In advance of any discussion concerning the legal protections involving public employee retirement benefits, a logical question is the relative contribution of including current retirees and/or current workers. If benefits can be reduced only for new employees, then pension savings will be based on the current employee attrition rate and the rate at which new workers are hired. Assuming an annual attrition rate of 3.2 percent,[153] and an extreme case in which the state contributes only minimally to new employee retirement, pension costs would fall at a rate of just over 3 percent per year. The tipping point, at which the number of new employees with reduced benefits would exceed the number of current employees, occurs in about the year 2033. Clearly, this approach provides long-term savings but does little in the short term.

According to CalPERS, CalSTRS, and UCRP, one-half of current total liabilities are apportioned to retirees and one-half to current workers.[154] If reductions to retirees are both legally and politically insurmountable, reducing prospective retirement benefits for current employees is likely necessary. But because any reductions would apply only *prospectively*, this also offers limited opportunities for savings.

Reducing benefits for current employees faces stiff legal challenges. Most observers suggest that past benefits for current employees are vested rights and may not be changed. Others argue that prospective benefits are also vested rights and can't be changed, although that position seems less certain. Most legal scholars suggest that a state constitutional amendment is necessary before prospective benefit reductions can be implemented.

Two key court decisions affect California public employee benefits. *Kern v. City of Long Beach* (1947) states that "..... public employment gives rise to certain obligations which are protected by the contract clause of the Constitution, including the right to the payment of salary which has been earned. Since a pension right is 'an integral portion of contemplated compensation'..... it cannot be destroyed, once it has vested, without impairing a contractual

152 In a similar situation, Illinois increased taxes without enacting substantial pension reform. If California commits that same mistake, new tax revenues will support pension benefits, and state services (e.g., education, social services, etc.) are unlikely to see any benefit.

153 This was the 2009 rate for CalPERS. CalPERS, "Comprehensive Annual Financial Report Fiscal Year Ended June 30, 2010," pp. 149, 151, https://www.calpers.ca.gov/eip-docs/about/pubs/member/calpers-reports/comprehensive-annual-financial/comprehensive-annual-fina-rept-10.pdf, retrieved Oct. 14, 2011.

154 CalPERS liability to retired workers was $148.9 billion in 2009, compared with a total liability of $298.2 billion. For CalSTRS, the 2009 figures were $99.1 billion to retirees, with a total liability of $196.3 billion. UCRP liability to retirees in 2010 was $18.7 billion, with a total liability of $47.5 billion. UCRP figures including future benefits to active members increase the UCRP ratio to 57.4 percent. CalPERS, "Comprehensive Annual Financial Report Fiscal Year Ended June 30, 2010," p. 117, https://www.calpers.ca.gov/eip-docs/about/pubs/member/calpers-reports/comprehensive-annual-financial/comprehensive-annual-fina-rept-10.pdf, retrieved Oct. 14, 2011; Milliman, "Defined Benefit Program Actuarial Valuation as of June 30, 2010," p. 9, http://www.calstrs.com/help/forms_publications/printed/2010_mppp_valuation.pdf, March 22, 2011, retrieved Oct. 14, 2011; Segal, "University of California Retirement Plan Actuarial Valuation Report as of July 1, 2010," p. 22, http://www.universityofcalifornia.edu/regents/regmeet/nov10/f3attach1.pdf, retrieved Oct. 20, 2011.

obligation." In *Allen v. City of Long Beach* (1955), the court further opined that ".....to be sustained as reasonable, alterations of employees' pension rights must bear some material relations to the theory of a pension system and its successful operation, and changes in a pension plan which result in disadvantage to employees should be accompanied by comparable new advantages."

Having identified these clear legal challenges, there are two paths to those examining reform measures. The first is to assume that the legal challenges are so great that challenges are futile. The second, and more likely case, is to argue that benefit reductions, particularly for future accruals of current employees, are required to avoid deep cuts in core government services, including social and health services, education, and others. A forthcoming report on San Jose's pension problem concludes that pension pressures, absent reforms, will force the city to eliminate literally all services, e.g., community, parks and recreation, libraries, planning, street maintenance, economic development, etc., with the exception of its already reduced public safety services.

Benefit Reductions

If one assumes that current employee benefits can or should be reduced, what are the associated cost savings? It is very difficult to estimate the impacts from a number of benefit changes without extensive modeling, which is beyond the scope of this report. For example, a reduction in the COLA depends on Purchasing Power Protection Adjustments and other factors, but they are likely substantial.[155] Similarly, savings from the elimination of items that add to pensionable payroll are difficult to quantify in the absence of specific item details. Instead, we offer the following limited discussion of these benefit changes:

- Increasing the age of retirement
- Reducing benefit formulas (beyond that agreed to in 2010)
- Requiring a hybrid system (i.e., a combined DB, DC plan).

The discussion below relies on simple models that estimate the general effects of policy changes. Because they do not include specific demographic, salary, and other information for any pension system, they are simply estimates. In addition, it is difficult to assess the reaction of current employees to benefit modifications: i.e., how they might affect retirement decisions, assuming that they are subject to these changes.

Increasing the Retirement Age

Depending on how it is implemented, the proposal increasing the full retirement age could have a substantial effect on future liabilities and hence future normal cost rates.[156] An increase in the retirement age means fewer years of retirement payments for those retiring at the later dates and lower benefit levels for those retiring prior to the new full retirement age. The ultimate impact of such a proposal would clearly depend on how new benefit formulas were structured—for example, how sharply benefit factors fall off for early retirement—as well as how the increased full retirement age affects the retirement behavior. As a rough indication of the potential savings,[157] CalPERS recently reported average public agency employer contribution rates for miscellaneous employees under both 2 percent at 55 and 2 percent at 60 formulas. The average rate for 2 percent at 55 is 12.6 percent, compared with 9.1 percent for the 2 percent at 60 formula.[158] Similarly, CalPERS reported an average public employer rate for safety employees under both 3 percent at 50 (33.2 percent) and 3 percent at 55 (28.3 percent) formulas. Although this does not necessarily translate into specific savings from higher retirement ages, it does provide some evidence that public agencies with higher retirement ages show lower normal costs and, in doing so, lower employer contributions.

Based on a simple model that highlights required contribution rates per various retirement ages, we estimate a 6.0 percent decrease in the total contribution rates for a five-year increase in the retirement age for a safety employee.[159] For non-safety employees it is a similar 5.9

155 As on example, we estimated that a COLA reduction from 2 percent to 1 percent for new CHP CalPERS members reduces normal costs by almost 10 percent. The elimination or modification of automatic COLAs appear to result in very large savings.

156 This prospective retirement age change would affect future, but not accrued benefits.

157 Most of the examples in this section pertain only to CalPERS since it contains a large number of benefit formulas.

158 CalPERS, "Agenda Item 5d to Members of the Benefits and Administration Committee," Attachment 2, Dec. 14, 2010, http://www.calpers.ca.gov/eip-docs/about/board-cal-agenda/agendas/bpac/201012/item5d-0.pdf, retrieved Nov. 16, 2011.

159 The safety model estimates required contributions under identical benefit formulas but with different years of work and different retirement ages. Specifically, it assumes one case in which the

Table 25
Reported CalPERS Public Agency Employer Contribution Rates Under Various Benefit Formulas

Category	Age	Formula	2011-2012 Employer Contribution Rate
Miscellaneous	60	3%	20.30%
	60	2%	9.10%
Rate difference			11.20%
Miscellaneous	55	2.50%	17.00%
	55	2.00%	12.60%
Rate difference			4.40%
Safety	55	3%	28.30%
	55	2%	19.30%
Rate difference			9.00%
Safety	50	3%	33.20%
	50	2%	32.60%
Rate difference			0.60%

Source: CalPERS, "Agenda Item 5d to Members of the Benefits and Administration Committee," Attachment 2, Dec. 14, 2010, http://www.calpers.ca.gov/eip-docs/about/board-cal-agenda/agendas/bpac/201012/item5d-0.pdf, retrieved Nov. 16, 2011.

percent decrease in the total contribution rates for a five-year increase the retirement age. These estimates do not indicate specific contribution rate effects from changes in full retirement ages, but they suggest that effects are likely to be significant. Though not measured specifically here, we note that the increase in full retirement age would also have a substantial effect on retiree health care costs, to the extent the higher age for full benefits will result in fewer retirements prior to age 65, when Medicare takes effect.

Benefit Formula Changes

CalPERS contains 14 different benefit formulas for members. Most public safety members earn 3 percent at age 50 or 55, and miscellaneous earn a wide range, as described earlier. CalPERS has reported average public agency contribution rates for different benefit formulas.[160] As one example, the current average employer contribution rate for miscellaneous employees under a 3 percent at 60 formula is 20.3 percent. Under a 2 percent at 60 formula, the employer contribution rate falls to 9.1 percent. Reported public agency employer contribution rates are highlighted in Table 25. Some insight into employer cost savings can be estimated based on these reported contribution rates.

Implementing a DC Hybrid Plan

A mandatory defined contribution hybrid plan has the potential to reduce employer contributions substantially, but the magnitude of savings depends on the type of hybrid plan and employer contributions to that plan. (See the discussion below on recent reform proposals.) A hybrid plan shifts some of the cost and responsibility to employees, reducing employer costs and risks. However, the cost savings from a hybrid plan will be somewhat limited since these plans do not affect contribution rate requirements for unfunded liabilities. Instead, they reduce normal cost contributions.

As one example, consider the introduction of an expanded hybrid plan to CalSTRS. A hybrid plan would

employee works 30 years and enjoys 30 years of retirement and a second case in which the employee works 35 years and is retired for 25 years.

160 CalPERS, "Agenda Item 5d to Members of the Benefits and Administration Committee," Attachment 2, Dec. 14, 2010, http://www.calpers.ca.gov/eip-docs/about/board-cal-agenda/agendas/bpac/201012/item5d-0.pdf, retrieved Nov. 16, 2011.

reduce the current normal cost requirement of 17.7 percent, perhaps even cutting it in half or more, but it would not affect the required contribution for unfunded liabilities.

Other Cost Savings

As noted earlier, UCRP allows retirees to accept a lump-sum cash payment rather than a stream of income. Under this option, eligible employees receive a lump-sum payment, discounted at 7.5 percent annually. Members who chose this payment option forfeit all other retirement benefits, including health and dental, sick leave credit, any temporary Social Security supplement. In the last year, about one-seventh of UCRP retirees chose this option.[161]

CalPERS and CalSTRS should consider offering lump-sum payments but at higher discount rates than their current assumed rate of return. Each system should carefully design this lump-sum offer by setting a maximum discount rate and by ensuring that recipients are pre-screened[162] and aware of the risks. Savings depend on the discounts offered and the number of retirees who participate, but a lump-sum approach would likely reduce net liabilities by billions of dollars. To maximize the efficiency of the offer, pension systems should consider auctioning these lump-sum payments.

It should be emphasized that major reductions to public employee pension benefits should be viewed as substantial changes to compensation and may have larger labor market effects. Lower pension benefits will result in lower overall compensation and could significantly affect public employment retention and recruitment. Moreover, there are undoubtedly cases where bargaining units gave up retirement benefits in exchange for higher salaries. In short, benefit reduction efforts should include an examination of bargaining unit history individually and should also be cognizant of the potential for larger labor market effects.

Reform the System, Including Accounting Principles and Governance

Changing public pension accounting standards and governance reform are critical. Reforms should occur in at least three areas:

- Accounting methods and assumptions
- Risk sharing between pension beneficiaries and taxpayers
- Pension board governance.

State lawmakers should reform public pension accounting standards and methods. While GASB standards are often required for financial reporting, pension systems should also produce alternative financial statements and reports that use alternative methods and assumptions. CalPERS, for example, took an important step recently by agreeing to provide alternative financial information based on various discount rates. This action could push up both unfunded liabilities and contribution rates[163] and in doing so will provide an earlier warning to financial dangers than the current flawed process.[164]

But accounting reform should go beyond adopting more realistic discount rates. For example, as summarized earlier, most pension systems employ methods that push large expenditures into the future, as evidenced by the calculation of contribution rates for unfunded liabilities. In the private sector, pension funds amortize any unfunded amount over a seven-year period using a level dollar method. Public systems utilize a level percentage approach assuming continued growth in payroll. That approach depresses contribution rates in the early years but ensures much higher rates in later years. If payroll costs do not grow as expected, total costs increase even more.

Accounting methods and assumptions also exacerbate the risk imbalance that exists among pension beneficiaries, government employers, and taxpayers. Linking investment

161 Segal, "University of California Retirement Plan Actuarial Valuation Report as of July 1, 2010," pp. 38, http://www.universityofcalifornia.edu/regents/regmeet/nov10/f3attach1.pdf, retrieved Oct. 20, 2011; University of California, "University of California Retirement Plan," April 2007, http://atyourservice.ucop.edu/forms_pubs/spd/ucrpspdtiertwo.pdf, p. 10, retrieved Oct. 30, 2011

162 Savings also depend on the selection of retirees who participate. If only unhealthy individuals chose this option, this policy could actually be costly.

163 Providing alternative financial information doesn't, by itself, drive up rates. Pension governing boards must change methodologies (discount rates, amortization periods, etc.) resulting from these alternative analyses.

164 The failure to disclose the size of unfunded liabilities is similar to actions that led to the Great Recession. Had AIG, Lehman, and other financial firms, for example, disclosed the extent of their debt, both on- and off-balance sheet, the ensuing financial panic and consequent economic damage might have been less. One can argue convincingly that we have made and continue to make the same mistake with pubic employee pensions.

returns and discount rates has two adverse effects. First, it likely leads pension governing boards to set unrealistically high discount rates since those rates understate liabilities. Second, governing boards (and pension fund mangers) must undertake ever riskier investments to meet those high discount rates. Since virtually all public systems provide benefits that are viewed as guaranteed, beneficiaries bear virtually none of the risk. Pension systems perform well, and beneficiaries are guaranteed benefits. If systems perform poorly, beneficiaries are guaranteed the same benefits. Regardless of whether pension boards make good investments—or bad ones—beneficiaries remain protected. But governments and taxpayers who provide revenues are not protected. A hybrid system, such as that proposed by Governor Brown, would re-establish a balance. Equal contributions by employers and employees, including contributions for unfunded liabilities, would also appropriately share the risk between beneficiaries, sponsoring government employers, and taxpayers.

Finally, pension boards require significant reforms. As discussed earlier, remarkably, there are no requirements for technical expertise on the CalPERS, CalSTRS, or UCRP governing boards. Future reforms should require that a majority of members possess minimum educational levels (such as degrees in accounting, economics, investment management, etc.) and/or professional expertise in these fields. Perhaps the best example of successful, appropriate reform exists in San Jose, where city leaders restructured both pension boards to require a majority of members with at least 12 years of relevant experience, in addition to a professional degree.

Public employee pension boards should include representatives from active workers and retirees. However, the majority positions should not include members with direct financial interests in benefit levels and/or contribution rates. As one example of the current problem, consider a current employee serving as a board member who votes to set discount rates, which in turn affect employer and employee contribution requirements. That member receives a direct benefit from keeping discount rates high and member contribution rates low, knowing that any future shortfall to provide his/her guaranteed benefit will almost certainly be made up by future workers or increased employer contributions.

Proposals for Reform

This section summarizes recent proposals from Governor Jerry Brown and from California Pension Reform (CPR), which is considering placing a pension reform measure on the 2012 General Election ballot.

Governor Brown's Twelve-Point Plan

In October, Governor Brown proposed a "twelve-point" pension reform plan to "provide a fair but sustainable income security plan."[165] It is his intention that the reform plan apply to all new state, local, school, and other public employees and to current employees as permitted by law.[166] The governor's twelve points[167] can be grouped into three broad areas:

- Benefit reductions
- Contribution increases
- Governance.

Despite the positive elements, Governor Brown's proposal provides only modest cost savings.[168] For example, the proposed ban on pension holidays is a worthwhile policy shift, as is a prohibition on retroactive pension increases. But given that pension holidays and retroactive increases are highly unlikely considering the financial status of public pension systems, they do not reduce existing or future liabilities. Adding public members to the CalPERS Board of Administration is an appropriate, if insufficient, policy shift, but it also does not result in cost savings. Moreover, the addition of only two "independent" members to the current 13-member board is unlikely to have any appreciable effect.[169]

Two measures, the mandatory use of three-year average salaries to determine retirement payments and the limitation of that salary to an employee's base rate (i.e., base salary without add-ons, such a uniform allowance, K-9 duty, etc.),

165 Office of Governor Jerry Brown, "Governor Brown Unveils Pension Reform Plan," Oct. 27, 2011, retrieved from http://gov.ca.gov/video.php?id=44, Nov. 1, 2011.

166 Office of Governor Jerry Brown, "Twelve-Point Pension Reform Plan," Oct. 27, 2011, http://gov.ca.gov/docs/Twelve_Point_Pension_Reform_10.27.11.pdf, retrieved Oct. 27, 2011.

167 One measure deals with health care costs and is excluded from this discussion.

168 The Governor's staff argues strongly that vested rights limitations restrict the opportunities for savings.

169 The Governor and his staff have indicated that the addition of these two independent members is only a start.

Table 26
Governor Brown's Twelve-Point Pension Reform Plan

Reform measure	New employees	All employees
Benefit reductions	Requires hybrid plan Increases retirement age Requires three-year salary basis to avoid "spiking" Limits final salary to base rate, i.e., base salary only	Felons forfeit pensions, if related to official business Prohibition on retroactive pension increases Prohibition of service credit purchases Limits post-retirement employment
Contributions	NA	Requires employees to contribute at least 50 percent of normal costs Prohibits pension holidays
Governance/other	NA	Adds public members to CalPERS

Source: Office of Governor Jerry Brown, "Twelve-Point Pension Reform Plan," Oct. 27, 2011, http://gov.ca.gov/docs/Twelve_Point_Pension_Reform_10.27.11.pdf, retrieved Oct. 27, 2011.

are intended to limit pension "spiking." While this will result in savings over the next 20- to 30-year period, it will not result in savings in the next decade because it applies only to new employees. Many new employees hired in 2012, for example, will not be eligible for retirement until 2042, the first year in which any appreciable savings would be realized. For the same reason, the increase in retirement age will also not provide meaningful savings for a least two to three decades.

Limits on post-retirement employment and prohibitions on pensions for felons appear unlikely to result in substantial cost savings in the short or long term. The number of CalPERS retirees convicted of a felony related to official business is probably close to zero.[170] Proposed post-retirement employment restrictions for all employees, which would prohibit double-dipping, address some of the perceived abuses of the system and also likely result in minimal savings. But they are arguably misguided. There is nothing inherently wrong with a skilled, former public employee continuing to work after retirement. Better targets for savings include increasing the retirement age and reducing benefit levels.

The prohibition of service credit purchases for all employees appears to offer only modest cost savings since only about 47,000 CalPERS members have taken advantage of "air time" purchases.[171] (Air time allows workers to purchase additional service credit and be guaranteed a 7.75 percent rate of return on that investment.) CalPERS is unable to provide a precise estimate of costs but has asserted previously that air time is cost neutral. That assertion assumes at a minimum that CalPERS earns 7.75 percent on its assets and that the cost of the airtime purchases will fully cover additional benefits of the participating employees. For this to occur, CalPERS must make accurate assumptions about the participating employees' rates of retirement, future wage progression, and other factors, including whether they will differ from the covered workforce in general. In response to a recent analysis, CalPERS increased purchase rates for air time credits. If the new rates indeed reflect realistic assumptions about those purchasing the credits, then elimination of the program will likely have modest impacts under existing actuarial assumptions. However, the additional credits will result in significant losses to the fund if investment returns fall short of assumed rates.

170 The number of convicted felons is not currently available.

171 Orange County Register, "Reformers zeroing in on public employee retirement "air time", http://taxdollars.ocregister.com/2011/02/16/reformers-zeroing-in-on-public-employ'e-retirement-air-time/75711/, retrieved Nov. 6, 2011.

Elements of Governor Brown's plan with some prospects for cost savings include the hybrid plan for new employees and the requirement that all employees contribute at least 50 percent of the annual cost of their pensions.

The proposed hybrid plan would shift new employees from the current DB system to one divided equally into defined benefit and defined contribution components. For those not covered by Social Security, the proposal would provide for an additional defined benefit component providing employer replacement of Social Security payments. Details on the proposed hybrid plan are limited but could reduce state agencies' contributions for new employees modestly in the first few years and more in later years. We assume a 3.2 percent annual replacement rate of existing employees with new ones. We assume that employers contribute 2.5 percent, equal to one-half of the normal cost for new employees,[172] an additional 2.5 percent to a DC component, and 6.2 percent as the employers' share of Social Security (weighted by the number of new Social Security participants), for a total contribution rate of 7.1 percent. We assume that employers continue to contribute the current 20.3 percent for existing employees.

Under these assumptions, this hybrid plan reduces state agency CalPERS pension spending by about $73 million in the first year, increasing to $633 million in year 10. Average annual savings under these assumptions equal $365 million over a 10-year period.

The governor's plan includes a sharing of 50/50 normal costs for all employees, but it is unclear whether that cost sharing also includes contributions for any unfunded amount. Assuming that the governor's proposal covers normal costs only, as suggested by the DOF,[173] this reduces the current average state agency employer normal cost contribution rate from 10.3 to 8.8 percent, resulting in $255 million of savings in the first year. Savings from this sharing of normal costs are small, since state agency employees in 2011-2012 on average are already contributing 42 percent of normal costs. A similar situation exists for CalSTRS, where employees and employers almost evenly share normal costs.

In his proposal, Governor Brown urged that this 50/50 cost-sharing arrangement be extended to public agency CalPERS members and to independent pension systems. This could result in very large savings for many, particularly those experiencing high public safety costs. Savings would be higher if the 50/50 cost sharing applies to both normal and unfunded costs. And, of course, for these to materialize for CalPERS public agency employers, the Legislature must increase the current caps on employee contribution rates.[174]

In sum, Governor Brown's proposal could reduce CalPERS state agency savings by more than $300 million in the first year and $6.2 billion over 10 years.[175] (We assume limited CalSTRS savings since employees and employers largely share normal cost contributions and because any hybrid for new teachers would likely result in savings comparable to those estimated for the CalPERS hybrid component.) While a step in the right direction, these savings are relatively small compared with the estimated cost increases projected earlier in this report. For example, in the 6.2 percent discount rate case, the state's annual shortfall for CalPERS and CalSTRS totals about $100 billion over 10 years. As such, Governor Brown's proposal addresses a relatively small share of the likely state shortfall.

Proposed Initiatives

Recently, California Pension Reform (CPR) filed two ballot proposals that, if enacted, would reform California's public pension systems. One promotes a hybrid plan, in which employees would participate in both DB and DC systems. The second eliminates public employee DB plans altogether and is not discussed in this report.

The CPR hybrid proposal contains many of the provisions offered by Governor Brown: cost-sharing, increased retirement ages, the mandatory use of three-year average salaries to determine retirement payments, the limitation of that salary to an employee's base rate of pay, a prohibition on benefit payments to convicted felons,

172 The DB component assumes a benefit of 25 percent of final salary for a 35-year worker retiring at age 67 who earns a real wage increase annually of 1.18 percent.

173 A representative from the Department of Finance confirmed recently that the 50/50 cost-sharing excludes unfunded costs. That suggests minimal cost savings for the state. More important, it ensures that the incentives of pension boards will change little. Specifically, boards will likely continue to adopt aggressive assumptions about discount rates, putting future unfunded liabilities on the taxpayer's credit card. Alternatively, if future unfunded liabilities were shared by employers and employees, boards would be less inclined to adopt those aggressive assumptions.

174 An additional issue for public agencies is the employer pickup of some or all of employee contributions, which is permitted for CalPERS contracting agencies.

175 As another frame of reference, recent increased contributions from state employees have reduce state spending by about $350 million per year, about one-half the estimated annual savings here.

and the elimination of service credit purchases. Similar to Governor Brown's proposal, many of these provisions will save only modest amounts. Unlike Governor Brown's proposal, however, the CPR hybrid proposal applies to all employees. In doing so, it offers higher cost savings, and it guarantees legal challenges.

For simplicity's sake, we assume that the CPR hybrid is similar to that contained in Governor Brown's proposal but that it extends to new and current employees. We assume that the CPR proposal reduces the average CalPERS state agency normal cost rate by one-half, to 5.2 percent, and that the unfunded rate remains at 9.9 percent. With the current employee average cost contribution of 7.4 percent, the total contribution rate is 22.5 percent. If shared equally between employer and employee, the state's contribution rate becomes 11.2 percent, reducing state agency pension expenditures $1.6 billion in the first year, eliminating more than one-half of the CalPERS shortfall in the 6.2 percent discount rate case. If the CPR proposal applied to public agencies, systemwide savings would likely exceed $5 billion per year.

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