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Decision-Useful Risk Measures for Public Pensions

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Actuarial Standard of Practice (ASOP) No. 51 governs the "Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions. ASOP 51 is now effective and requires identification and assessment of funding risks in actuarial valuation. This article will address the new requirements with an emphasis on providing useful information to public pension stakeholders. The authors include consulting actuaries, a public pension system actuary and a rating agency actuary, who will bring three different perspectives to the topic.

Other ASOPs are relevant to pension plan actuarial valuations and include the following:

- ASOP 4—Measuring Pension Obligations and Determining Pension Plan Costs or Contributions
- ASOP 27—Selection of Economic Assumptions for Measuring Pension Obligations
- ASOP 35—Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations
- ASOP 44—Selection and Use of Asset Valuation Methods for Pension Valuations

ASOP 4 has a proposed revision that includes "Investment Risk Defeasement Measure" (IRDM). This will be contrasted somewhat with various Decision-Useful Risk Measures used by practitioners and presented in this article.

ASOP 51 presents several recommended practices:

- Identify risks that may be anticipated to significantly affect plan's future financial condition
- Assess these risks including potential effects
- Recommend additional assessment if significantly beneficial
- Calculate plan maturity measures that are significant to understanding risks
- Identify historical measures that are significant to understanding risks

The risks to be evaluated under ASOP 51 are:

a. Investment Risks (different returns from expected)
b. Asset Liability Mismatch Risk (changes in asset values not matched by changes in liabilities)
c. Interest Rate Risk (different from expected)
d. Longevity and Other Demographic Risks (different from expected)
e. Contribution Risk (not received)

Several risk-assessment methods are discussed in the ASOP and will be presented in more detail in this article. These include:

- Scenario Tests
- Sensitivity Tests
- Stochastic Modeling

ASOP 51 is now effective and requires identification and assessment of funding risks in actuarial valuation.

- Stress Tests
- Comparison of Present Values With Those Calculated at Minimal-Risk Discount Rates

Likewise, several plan maturity measures are discussed in the ASOP and are presented in this article, including:

f. Ratio of Market Value of Assets to Active Payroll
g. Ratio of Retiree Liability to Total Actuarial Liability
h. Ratio of Cash Flow to Market Value of Assets
i. Ratio of Benefit Payments to Contributions
j. Duration of Actuarial Liability

Finally, ASOP 51 suggests certain historical measures incorporating risk:

a. Plan Maturity Measures
b. Funded Status
c. Actuarially Determined Contribution
d. Actuarial Gains and Losses
e. Normal Cost
f. Plan Settlement Liability

In the pages that follow, three practitioners share their Decision-Useful Risk Measures for Public Pensions.

PRACTICAL EXAMPLES

This section presents some quantitative risk assessment tools we have used with municipal (city and county) retirement systems that, by law, are funded based on an actuarially determined contribution rate. These systems generally have enjoyed a high level of Board involvement and stakeholder interest in actuarial decisions and results. These systems already have some qualitative and quantitative ASOP 51 risk assessment information in their actuarial reports, for example, the volatility ratios discussed a little later in this article. However, the more detailed quantitative risk assessments have been performed only for some of the systems, and are generally provided outside the actuarial reports. We expect that ASOP 51 may spur additional interest and discussion of the more detailed quantitative risk assessments.

Volatility Ratios—Plan Maturity Measure and Quantitative Risk Assessment

Volatility ratios (sometimes called volatility indexes) are an easy-to-calculate measure of the relative sensitivity of employer contributions to changes in assets or liabilities. There are two common volatility ratios:

1. Asset Volatility Ratio (AVR): Assets/Payroll
2. Liability Volatility Ratio (LVR): Accrued Liability/Payroll

These ratios are most commonly thought of as maturity measures, along with ratios of retired to active members and ratios of benefit payments to contributions. In particular, ASOP 51 lists (only) the AVR as an example of a plan maturity measure.

We find that the AVR and LVR give a more quantitative indication of future cost volatility than headcount ratios, and thus are more useful as a risk assessment than some other plan maturity measures. Also, while the AVR gets more attention (such as being listed in ASOP 51) we find that the Liability Volatility Ratio better captures intrinsic plan volatility. One way to see this is to note that, as the plan approaches 100 percent funding, the AVR approaches the LVR.

We have found that the volatility ratios take some getting used to, and it takes some practice explaining them to trustees and stakeholders. However, we find they are worth the effort for communicating directional trends in cost volatility and especially for explaining the relative volatility for different tiers or plans.

Here is a simple LVR example. Consider an employer with a general and a safety plan, or a single plan with separate general and safety tiers and costs. Suppose the General Plan has an LVR of 5 and the Safety Plan has an LVR of 10. Then suppose the plan has an assumption change that increases the Actuarial Accrued Liability (AAL) of both plans by 10 percent.

For the General Plan: AAL = 5 x Payroll, so Δ AAL = 50% of payroll
For the Safety Plan: AAL = 10 x Payroll, so Δ AAL = 100% of payroll

This shows that the impact of the assumption change on the employer's contribution rates will be roughly twice as great for Safety compared to General. A similar example using the AVR will show the relative impact of investment experience on the employer contribution rates for the two plans.

For a live example, Table 1 shows the progression of these ratios over time for the General and Safety tiers of a particular county retirement system.

Table 1
Progression of Ratios Over Time

Year	General		Safety	
	AVR	LVR	AVR	LVR
2017	**6.4**	**9.0**	**12.9**	**13.8**
2016	6.0	8.9	12.2	13.4
2015	6.2	8.9	12.3	13.1
2014	6.2	8.6	12.1	12.9
2013	5.5	8.1	10.8	12.9

Here we see that the AVRs and LVRs are substantially higher for Safety than for General. Using the 2017 results we can observe that, comparing Safety to General:

10% asset loss is **129% vs 64%** of payroll—so Safety rates will be twice as volatile

10% change in AAL is **138% vs 90%** of payroll—so Safety rate impact is over 50% greater

Practical Investment Return Scenario Test

ASOP 51 lists several quantitative risk assessment methods:

Scenario Tests—impact of future experience ("events")

Sensitivity Tests—impact of assumption changes

Stochastic Modeling—distribution of future experience

Stress Tests—impact of "adverse changes in factors affecting a plan's financial condition" (i.e., experience)

Comparison of valuation present values with present value "using a discount rate derived from minimal-risk investments"

Here is a particular type of deterministic investment return scenario test we have found very accessible and useful for both trustees and employers. It illustrates the projected effect of a single year of investment returns above or below the assumed investment return.

Baseline: assets earn expected return every year

Bad news scenario: one-year return of 0%

Good news scenario: one-year return of 2 times assumed return

Note this is a relatively mild "stress test" compared to some recent proposals that would show multiple years of returns less

than assumed by some specific amount. In practice, we find this particular set of scenarios has several advantages:

- It does not introduce a new and arbitrary good news / bad news assumption parameter like "3% above or below the assumed rate," which makes it look less like a prediction. Also we find everybody intuitively understands "zero" and "double."

- Because it is a one-year variation, we find it is more credible than a specific multiyear variation because it shows a realistic range of outcomes. However, because it is a fairly mild "stress test," it may not be an adequate risk assessment for systems that are already seen as financially stressed.

- Because it is a one-year variation, it can be used by employers to estimate next year's contribution requirements for budgeting by interpolating based on actual returns as they emerge during the year.

In Figures 1, 2 (Pg. 9) and 3 (Pg. 10), we show the effect of these three scenarios on the funded ratio, the unfunded actuarial accrued liability or UAAL (both on a smoothed assets basis) and the employer contribution rate (aggregating all tiers together).

Finally, while we have not illustrated it here, we sometimes include a graph showing the new baseline scenario together with baseline projection from last year. This shows very clearly the projected effect of one year of actual investment and demographic experience.

Figure 1
Projected Funded Ratios (Actuarial Value of Assets Basis)
Under Three Market Return Scenarios for 2018/2019

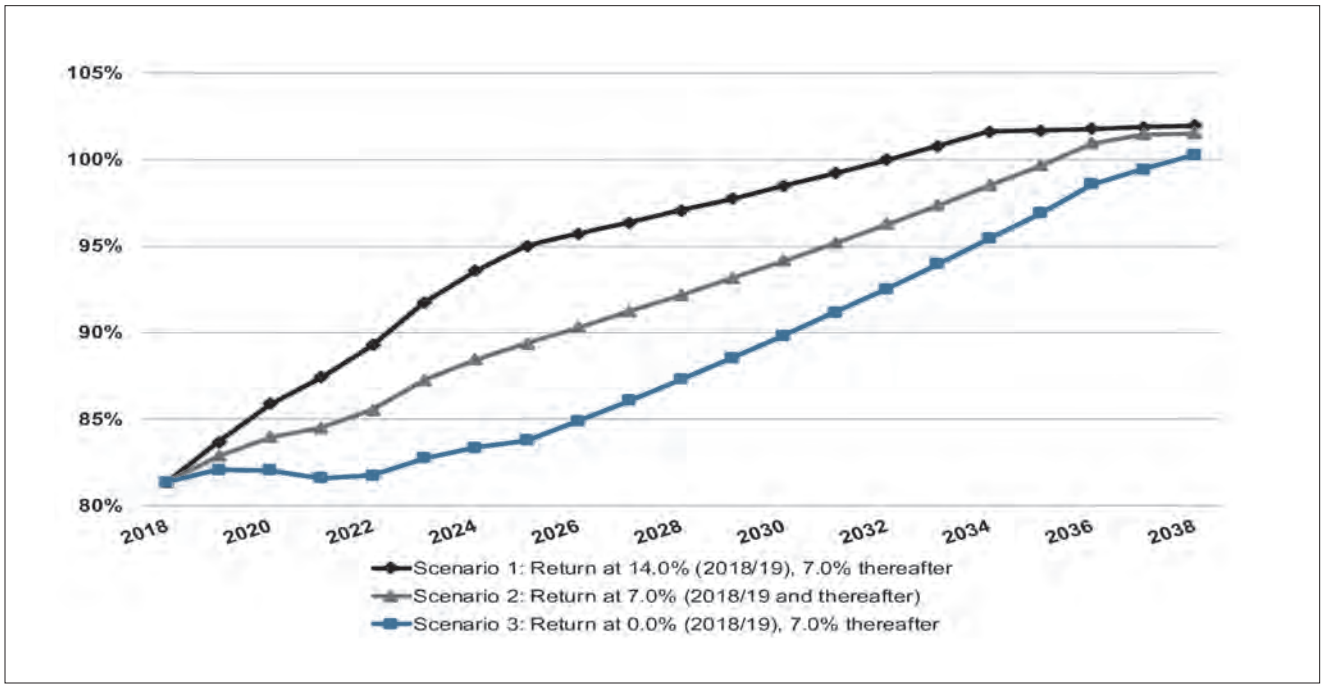


Figure 2
Projected UAAL (on Actuarial Value of Assets Basis)
Under Three Market Return Scenarios for 2018/2019 ($ Millions)

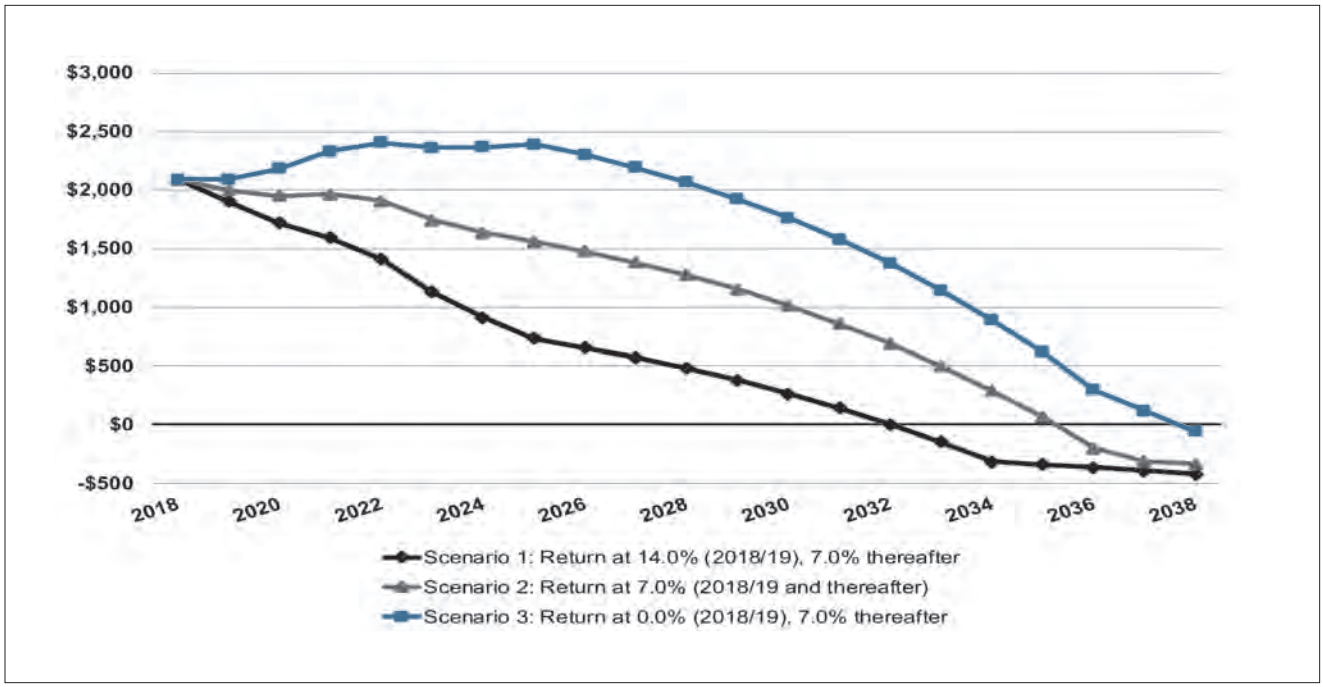
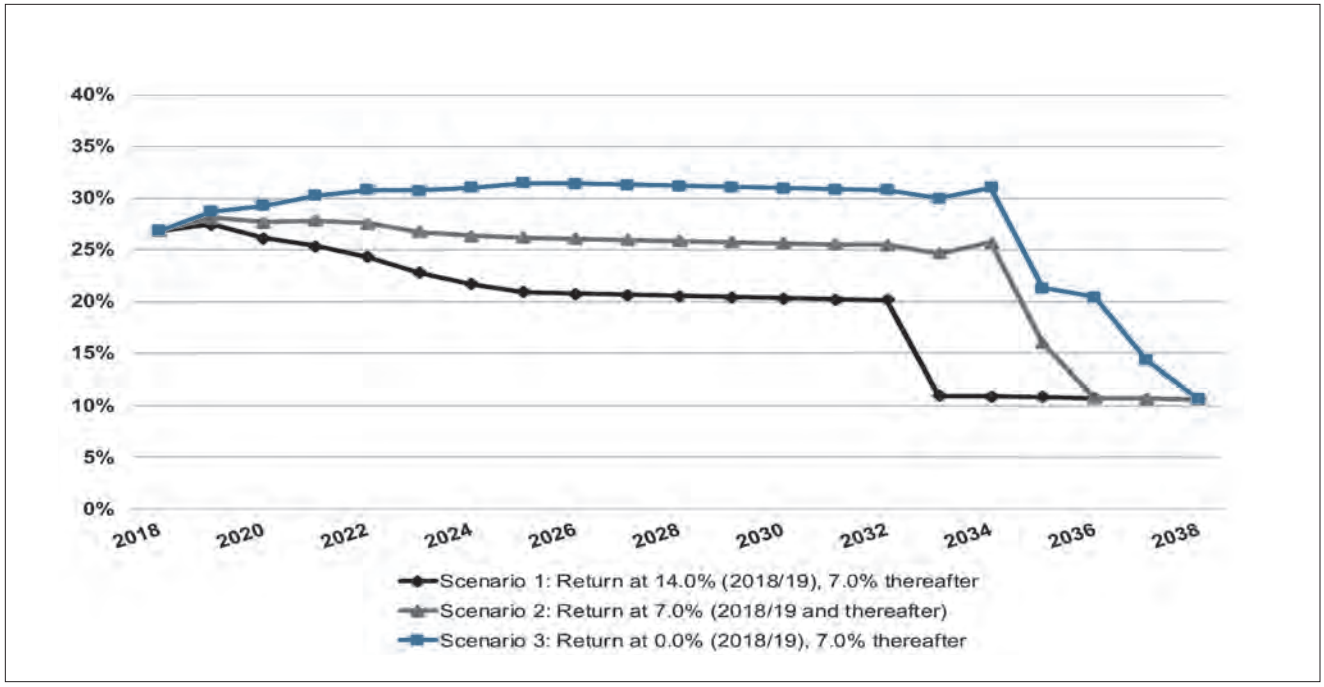


Figure 3
Projected Employer Contribution Rates
Under Three Market Return Scenarios for 2018/2019 (% of pay)



Stochastic Modeling

A stochastic modeling projection shows a probability distribution of future outcomes based on a specific matrix of capital market assumptions. This gives a quantified estimate of the likelihood of both relatively normal and extreme outcomes.

We advise retirement systems that, like deterministic projections, stochastic modeling outcomes are also entirely dependent on assumptions, but that dependence is not as apparent as it is with deterministic projections. For example, users of stochastic modeling should consider:

> How fat are your tails? The probability of extreme outcomes may be difficult to know with any reliability. If a stochastic model shows that your "probability of ruin" (however defined) is 5 percent, different capital market assumptions with fatter or narrower tails could show results of 7 percent or 3 percent, respectively.

> What is an acceptable probability of ruin? Stochastic modeling can assign a likelihood to undesirable outcomes, but cannot say what likelihood is acceptable. This means that stochastic modeling may be more illustrative than specifically decision useful.

While a stochastic modeling report will usually include graphs of the full distribution of stochastic outcomes, it is also helpful to summarize some specific probability results from the full distribution, as in Table 2. The CalPERS case study that follows in the next section also includes examples of such probability summaries.

In conclusion, Figures 4 (Pg. 11), 5 and 6 (Pg. 12) show the full distribution of stochastic outcomes for funded ratio, UAAL and employer contribution rates. We show the 95th, 75th, 50th, 25th, and 5th percentile outcomes, along with the baseline deterministic projection.

Table 2
Specific Probability Results

	Any time in the next 20 years Total Employer Rate Increases by at least		
	5% of Payroll (to 32% of Payroll)	10% of Payroll (to 37% of Payroll)	15% of Payroll (to 42% of Payroll)
Probability	30%	22%	16%
	Any time in the next 20 years Total Employer Rate Spikes in a Single Year by		
	3% of Payroll	5% of Payroll	7% of Payroll
Probability	10%	3%	2%

Figure 4
Projected Funded Ratios (Actuarial Value of Assets Basis)

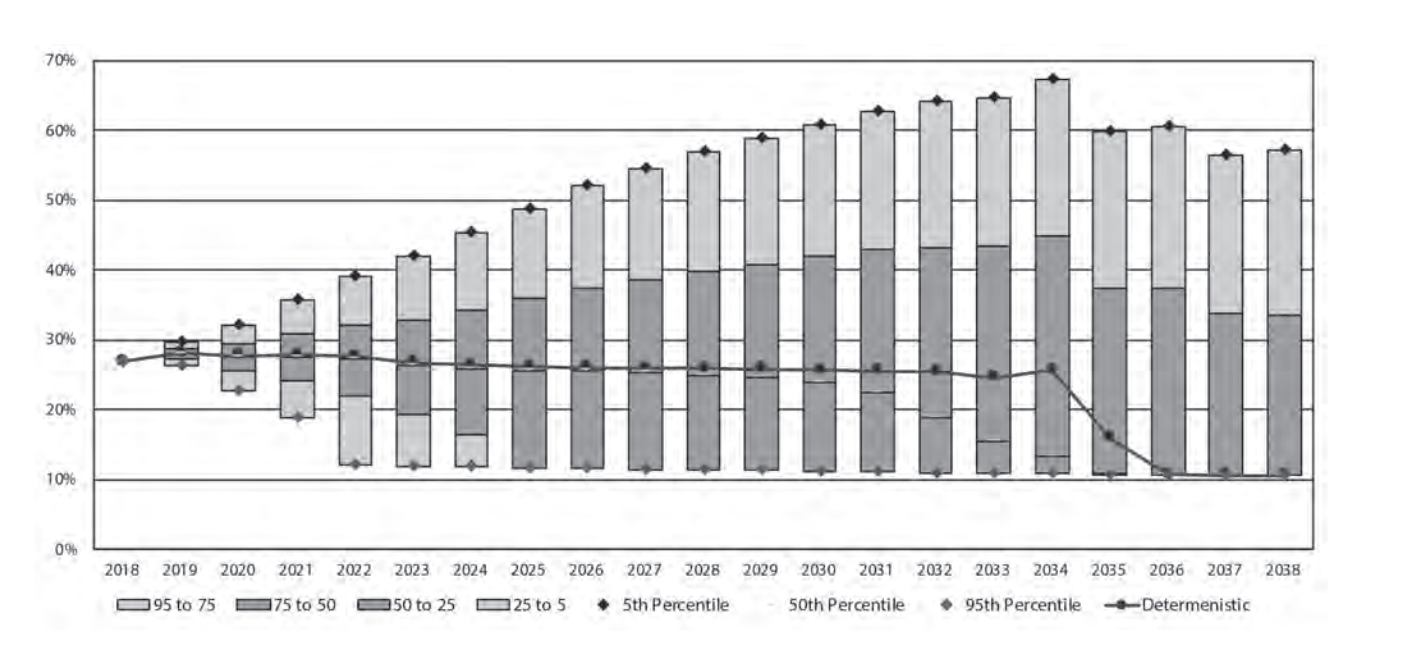


Figure 5
Projected UAAL (Actuarial Value of Asset Basis) ($ Millions)

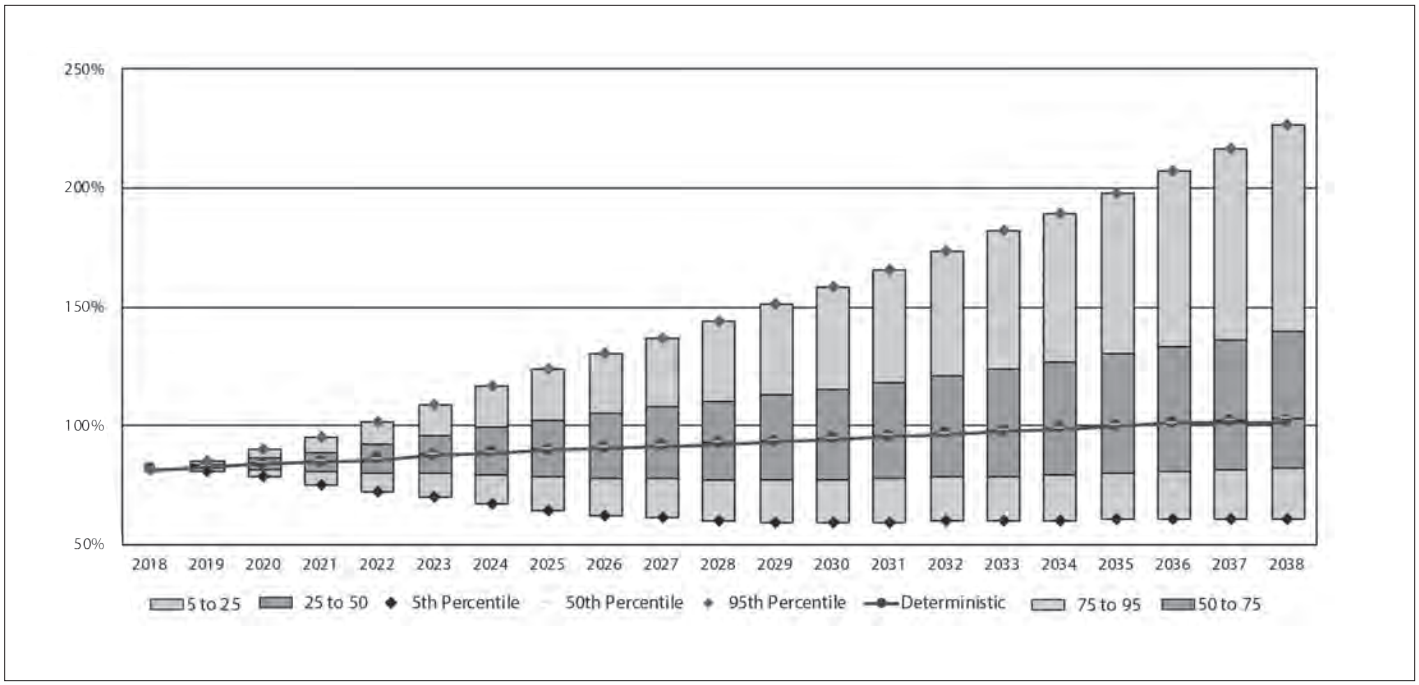
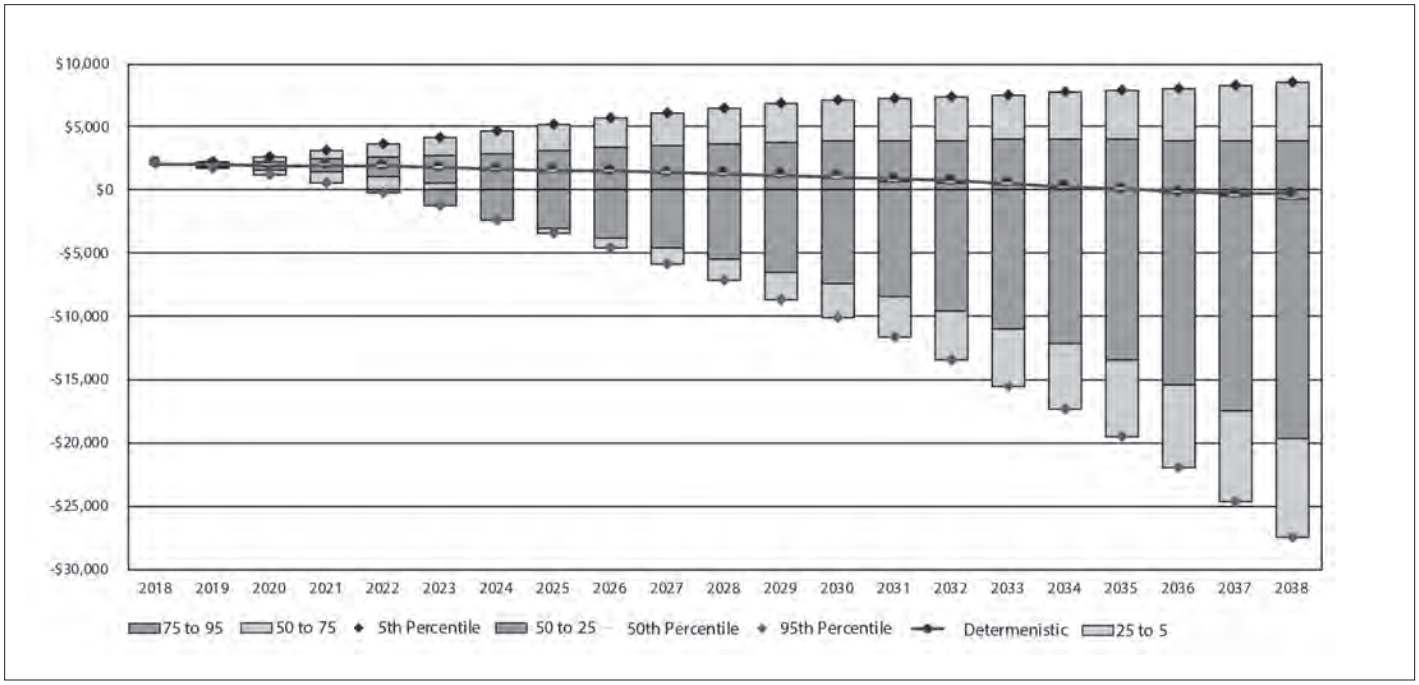


Figure 6
Projected Employer Contribution Rates



CASE STUDY—CALIFORNIA PUBLIC EMPLOYEES' RETIREMENT SYSTEM (CALPERS)

CalPERS strives to provide comprehensive risk assessments regarding plan funding and sustainability consistent with the Board of Administration's pension and investment beliefs. Our 4,000-plus annual valuation reports include metrics on plan maturity, sensitivity analysis, and risk analysis to aid in the understanding of how plans are affected by investment return volatility and other factors.

Below is a summary of the specific items included in the CalPERS public agency reports intended to assess and disclose risks associated with the plans. In addition to the annual reports for public agencies, CalPERS produces an Annual Review of Funding Levels and Risks report that looks at the system as a whole. Exhibits from that report are also included below.

Public Agency Annual Valuation Reports

Many of the risk measures and accompanying text within our public agency reports were provided before the effective date of ASOP No. 51. However, others were added recently based on recommendations with ASOP No. 51.

Our participating agencies use this information for short- and long-term budgeting purposes as well as to assist them in making plan-related decisions including:

- Whether to make contributions to CalPERS in excess of minimum requirements
- Benefit-related decisions (limited to the addition of new tiers or minor adjustments to certain plan provisions)
- Whether to contribute to a section 115 trust and the selection of the investment mix for such assets
- Whether to terminate the CalPERS contract
- Whether to request short-term contribution relief
- Staffing decisions (potentially)

Investment Risk

All public agency reports include a four-year projection of required employer contributions under various investment return assumptions. The alternate investment return scenarios are based on the 5th, 25th, 75th and 95th percentile average returns for the projection period. This provides some indication of the likelihood of the alternate scenarios in addition to their impact on required contributions.

Since the projections in Table 3 do not illustrate the impact of a single year "shock" scenario, we also provide the following accompanying text from our valuation reports.

Table 3
Single Year "Shock" Scenario

Assumed Annual Return From 2018–20 through 2021–22	Projected Employer Contributions			
	2021–22	2022–23	2023–24	2024–25
1.0%				
Normal Cost	11.1%	11.1%	11.1%	11.1%
UAL Contribution	$7,527,000	$7,665,000	$8,766,000	$10,051,000
4.0%				
Normal Cost	11.1%	11.1%	11.1%	11.1%
UAL Contribution	$7,417,000	$7,339,000	$8,122,000	$8,988,000
7.0%				
Normal Cost	11.1%	11.1%	11.1%	11.1%
UAL Contribution	$7,307,000	$7,007,000	$7,450,000	$7,857,000
9.0%				
Normal Cost	11.3%	11.5%	11.8%	12.0%
UAL Contribution	$7,128,000	$6,618,000	$6,815,000	$6,936,000
12.0%				
Normal Cost	11.3%	11.5%	11.8%	12.0%
UAL Contribution	$6,671,000	$5,652,000	$5,276,000	$4,752,000

"Required contributions outside of this range are also possible. In particular, whereas it is unlikely that investment returns will average less than 1.0 percent or greater than 12.0 percent over this four-year period, the possibility of a single investment return less than 1.0 percent or greater than 12.0 percent in any given year is much greater."

Sensitivity Tests

Tables 4, 5 and 6 are provided in all public agency valuation reports to provide agencies with expected impacts should long-term experience vary from the actuarial assumptions.

Contribution Risk

CalPERS agencies have the ability to voluntarily terminate their contract. In addition, agencies that do not make minimum

Table 4
Discount Rate

Sensitivity Analysis				
As of June 30, 2018	Plan's Normal Cost	Accrued Liability	Unfunded Accrued Liability	Funded Status
7.00% (current discount rate)	18.529%	$233,633,623	$85,963,182	63.2%
6.0%	22.941%	$263,189,076	$115,518,635	56.1%
8.0%	15.123%	$209,050,385	$61,379,944	70.6%

Table 5
Inflation (discount rate held constant)

As of June 30, 2018	Current Inflation Rate	-1% Inflation Rate	+1% Inflation Rate
a) Accrued Liability	$233,633,623	$219,159,383	$244,076,865
b) Market Value of Assets	$147,670,441	$147,670,441	$147,670,441
c) Unfunded Liability (Surplus) [(a)-(b)]	$85,963,182	$71,488,942	$96,406,424
d) Funded Ratio	63.2%	67.4%	60.5%

Table 6
Post-Retirement Mortality

As of June 30, 2018	Current Mortality	10% Lower Mortality Rates	10% Higher Mortality Rates
a) Accrued Liability	$233,633,623	$238,220,223	$229,397,264
b) Market Value of Assets	$147,670,441	$147,670,441	147,670,441
c) Unfunded Liability (Surplus) [(a)-(b)]	$85,963,182	$90,549,782	$81,726,823
d) Funded Ratio	63.2%	62.0%	64.4%

required contributions are generally terminated involuntarily. If unfunded liability exists at the time of termination, by law future member benefits—including those of existing retirees—are reduced by the percentage necessary to bring liabilities in line with assets. Table 7 provides information regarding the potential reduction in member benefits should the plan voluntarily or involuntarily terminate.

Given the liabilities in this exhibit are determined using Treasury rates, they also provide information regarding investment risk.

Maturity Measures

Each CalPERS public agency valuation report contains maturity measures (see Tables 8, 9 and 10). As suggested in ASOP No. 51, commentary is also provided to aid the user in understanding the significance of the measures.

Annual Review of Funding Levels and Risks

A few months after the completion of the annual reports that establish required contributions for our agencies, CalPERS actuaries produced the Annual Review of Funding Levels and

Table 7
Potential Reduction in Member Benefits

Market Value of Assets (MVA)	Hypothetical Termination Liability[1,2] @ 2.50%	Funded Status	Unfunded Termination Liability @ 2.50%	Hypothetical Termination Liability[1,2] @ 3.25%	Funded Status	Unfunded Termination Liability @ 3.25%
$147,670,441	$387,818,335	38.1%	$240,147,894	$356,508,322	41.4%	$208,837,881

Table 8

Support Ratio	As of June 30, 2017	As of June 30, 2018
1. Number of Actives	262	261
2. Number of Retirees	398	420
3. Support Ratio [(1) / (2)]	0.66	0.62

Table 9

Ratio of Retiree Accrued Liability to Total Accrued Liability	As of June 30, 2017	As of June 30, 2018
1. Retired Accrued Liability	135,944,167	152,706,032
2. Total Accrued Liability	215,445,500	233,633,623
3. Ratio of Retiree AL to Total AL [(1) / (2)]	63%	65%

Table 10

Contribution Volatility	As of June 30, 2017	As of June 30, 2018
1. Market Value of Assets without Receivables	$ 138,650,368	$ 147,419,950
2. Payroll	20,779,907	21,276,242
3. Asset Volatility Ratio (AVR) [(1) / (2)]	6.7	6.9
4. Accrued Liability	$ 215,445,500	$ 233,633,623
5. Liability Volatility Ratio (LVR) [(4) / (2)]	10.4	11.0

Risks report that is presented to our Board. This report provides systemwide results that the Board uses to make decisions regarding:

- Investment policy
- Funding policy (including amortization policy)
- Selection of actuarial assumptions (primarily economic)

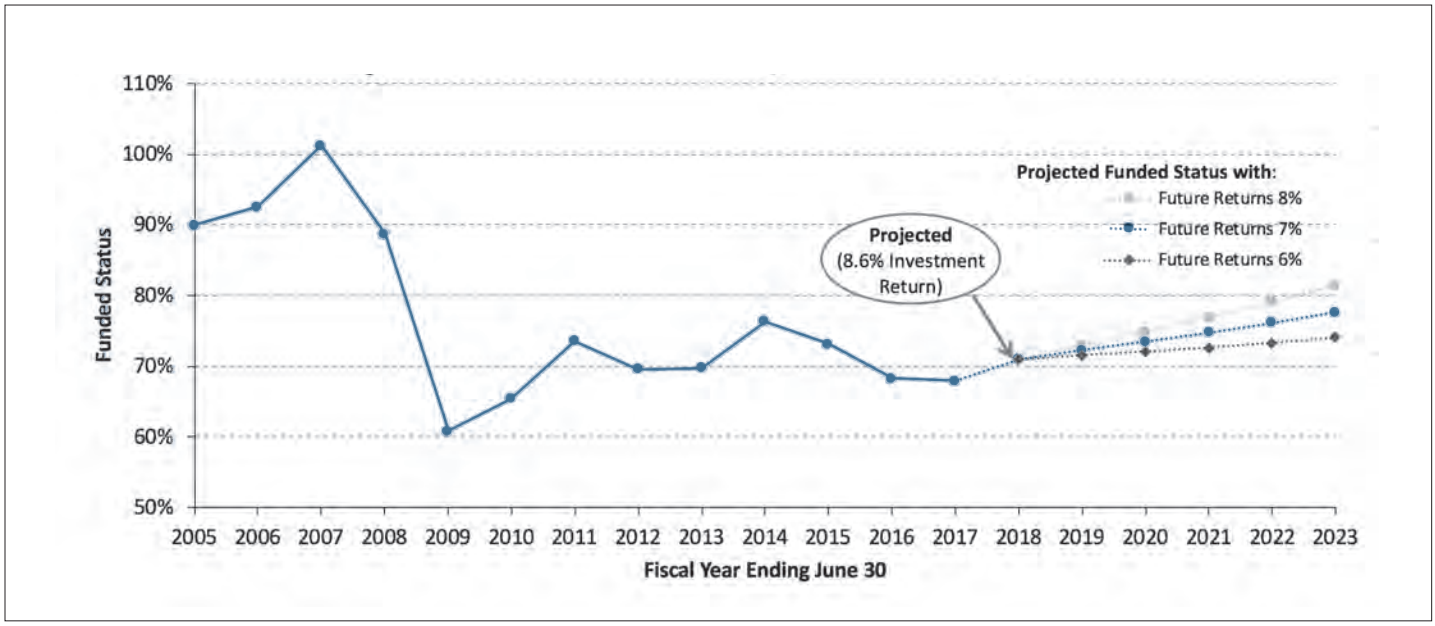
Figures 7, 8, 9 (Pg. 17) and 10 (Pg. 18) illustrate the results.

Stochastic Analysis

Stochastic analysis is used extensively in the Annual Review of Funding Levels and Risk report to determine the likelihood of future events regarding funded status levels, contribution levels and contribution volatility. This analysis was used recently by the Board to assist in the analysis of proposed changes to the amortization policy which were presented and approved in February 2018.

Projections of Funded Status

Figure 7
PERF Funded Status Based on Market Value of Assets (June 30, 2005 to June 30, 2018)



Maturity Measures

Figure 8
Ratio of Active to Retirees

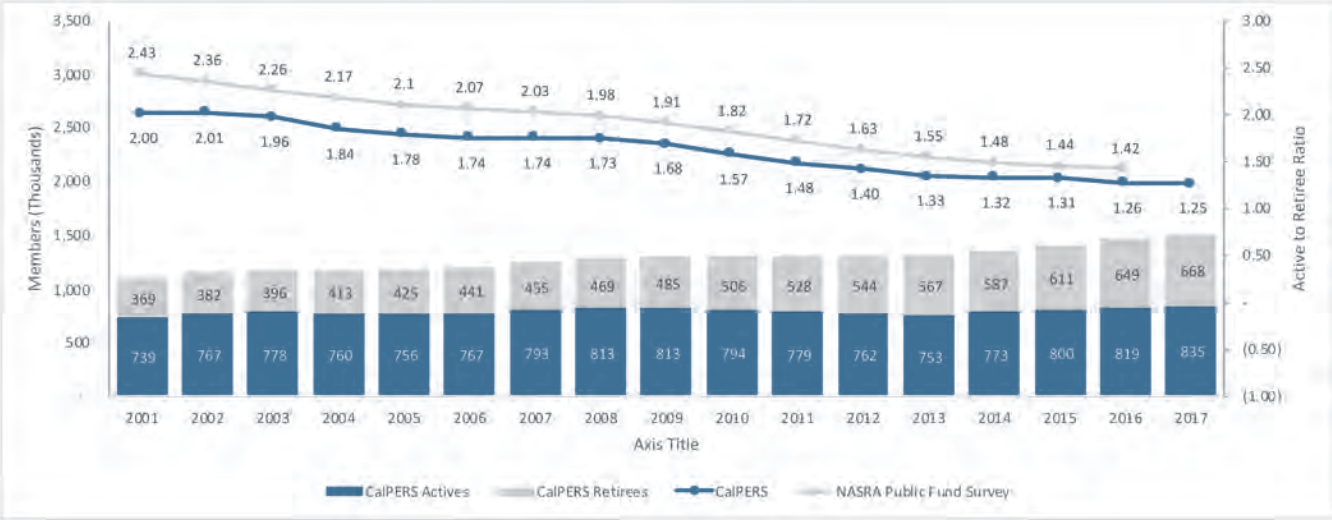


Figure 9
Ratio of Retiree Accrued Liability to Total Accrued Liability

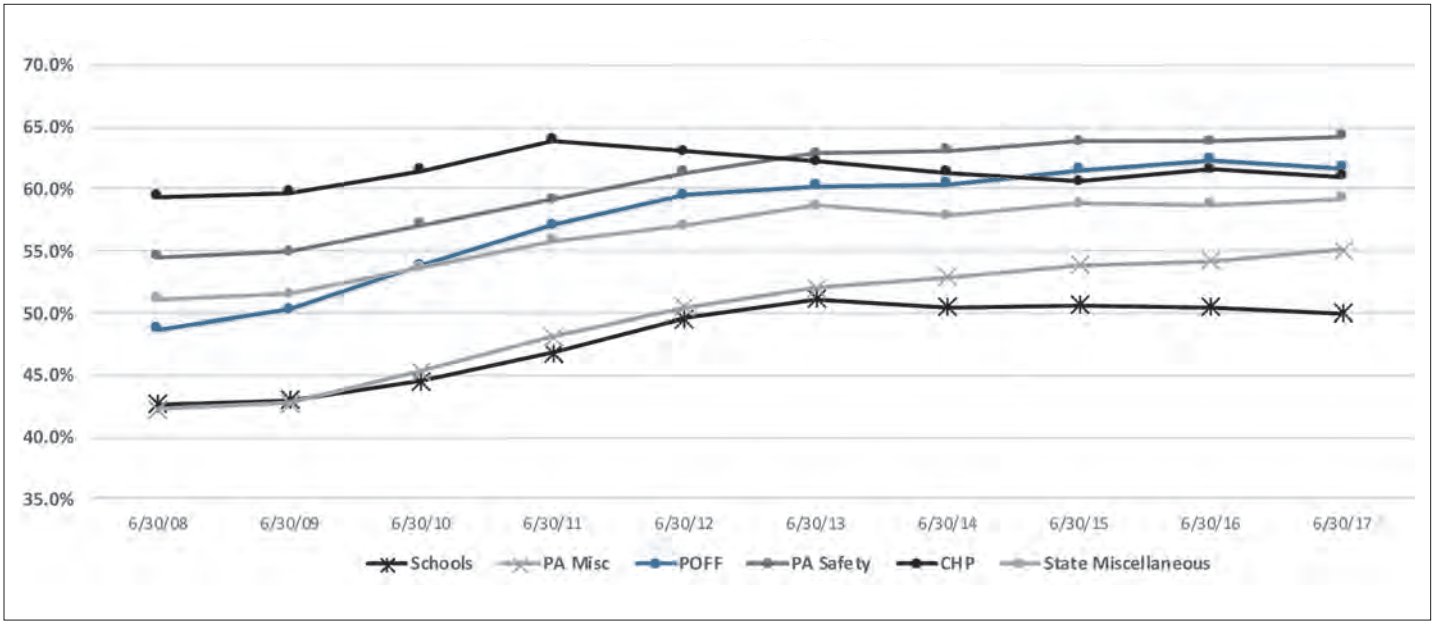


Figure 10
Asset Volatility Ration (MVA to Payroll)

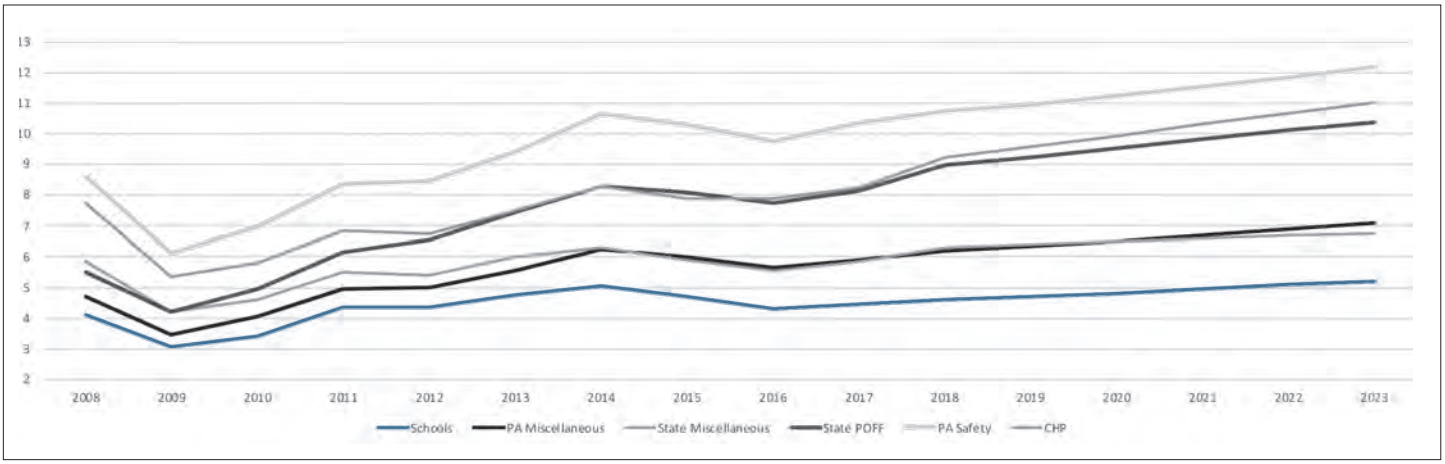


Table 11
Probability of Falling Below Given Funding Level (at any point in next 30 years)

Plan	40%		50%		60%	
	2017	2018	2017	2018	2017	2018
State Miscellaneous	< 1%	< 1%	6%	1%	48%	24%
Schools	< 1%	< 1%	3%	1%	33%	22%
CHP	< 1%	< 1%	15%	2%	100%	100%
POFF	< 1%	< 1%	6%	1%	52%	26%
PA Miscellaneous	< 1%	< 1%	5%	2%	38%	27%
PA Safety	< 1%	< 1%	9%	4%	54%	43%

Table 12
Probability of Employer Contribution Rates Exceeding Given Level (at any point in next 30 years)

Plan	30% of Payroll		35% of Payroll		40% of Payroll	
	2017	2018	2017	2018	2017	2018
State Miscellaneous	100%	100%	73%	56%	32%	28%
Schools	25%	36%	4%	11%	< 1%	1%
PA Miscellaneous	45%	53%	11%	23%	1%	6%
Plan	**50% of Payroll**		**55% of Payroll**		**60% of Payroll**	
	2017	2018	2017	2018	2017	2018
CHP	100%	100%	100%	100%	100%	87%
POFF	97%	80%	69%	52%	38%	32%
PA Safety	97%	100%	78%	79%	54%	61%

Figure 13
Probability of Employer Contribution Rate Increases of Selected Magnitudes (at any point in next 30 years)

Plan	3% of Payroll		5% of Payroll		7% of Payroll	
	2017	2018	2017	2018	2017	2018
State Miscellaneous	18%	53%	< 1%	12%	< 1%	6%
Schools	21%	41%	< 1%	7%	< 1%	4%
PA Miscellaneous	3%	40%	< 1%	9%	< 1%	5%
Plan	**5% of Payroll**		**7% of Payroll**		**9% of Payroll**	
	2017	2018	2017	2018	2017	2018
CHP	25%	59%	1%	27%	< 1%	12%
POFF	8%	47%	< 1%	18%	< 1%	9%
PA Safety	12%	55%	< 1%	20%	< 1%	10%

Actual exhibits from the 2018 report are provided in Tables 11, 12 and 13.

The report templates used by the CalPERS actuaries are reviewed annually. We continually discuss possible additions or improvements—especially in the critical area of risk analysis—internally as staff and with our outside stakeholders.

RATING AGENCY PERSPECTIVE

As a credit rating agency, S&P Global Ratings provides intelligence to the marketplace on the potential ability and willingness of an issuer to meet its financial debt obligations in full and on time, a concept we identify as creditworthiness. For U.S. state and local governments, evaluation of creditworthiness encompasses several factors beyond an entity's ability to meet its pension promises. However, pensions play a key role in our assessment of creditworthiness because of their continual and increasing pressure on states' and municipalities' finances, especially when considering the legal and political protections generally afforded pensions.

Our pension assessment starts with an examination of the current funded position and size of liabilities and contributions, but quickly focuses in on funding discipline metrics such as prudent assumptions, contribution practices, effective amortization of the unfunded liability, and related risk metrics including demographics. We are interested in knowing what kinds of historical decisions and practices have led to today's position, and similarly how today's policies will drive potential progress and cost trajectory going forward. In short, we endeavor to anticipate the potential for and scale of accelerating payments and increasing budgetary stress over time in light of a municipality's complete financial profile.

To aid us in this determination, we use several risk metrics of our own, two of which will be highlighted here. The first, described in S&P Global Ratings' U.S. States Methodology, is our minimum funding progress (MFP) metric, which compares total contributions to the sum of the service cost, interest cost on the NPL, and 1/30th of the NPL, as an annual snapshot of contribution effectiveness. We generally view negative amortization or even static funding poorly in credit analysis, especially when it lingers over a period of time. Figure 11 displays that recently only nine out of 50 states have met or exceeded this metric. Given that we consider the MFP a measure of "minimum progress," it is clear that in our view there is room for significant improvement within contribution practices. We also examine whether or not (indicated by gray or blue respectively) all state plans in aggregate consistently and fully follow actuarially based contributions as another indicator of liability management over time.

Figure 12 examines the discount rate, asset allocation mix, and plan maturity for the largest pension plan in each state. Investment volatility is constantly in the news as a major driver of cost variation for pension plans, but we firmly hold that a plan's tolerance to that investment volatility depends on many factors, including but not limited to the demographic profile of the plan. This is one of the reasons why we believe there is little analytical support for us to adjust all plans by one single uniform discount rate, even under the level cost method. And as plans grow more mature, the contribution rate sensitivity to investment volatility increases, even as plans have been increasing their allocation to complex and risky assets. The top left corner of Figure 12 represents high risk plans that are both more mature and have more risky investment portfolios.

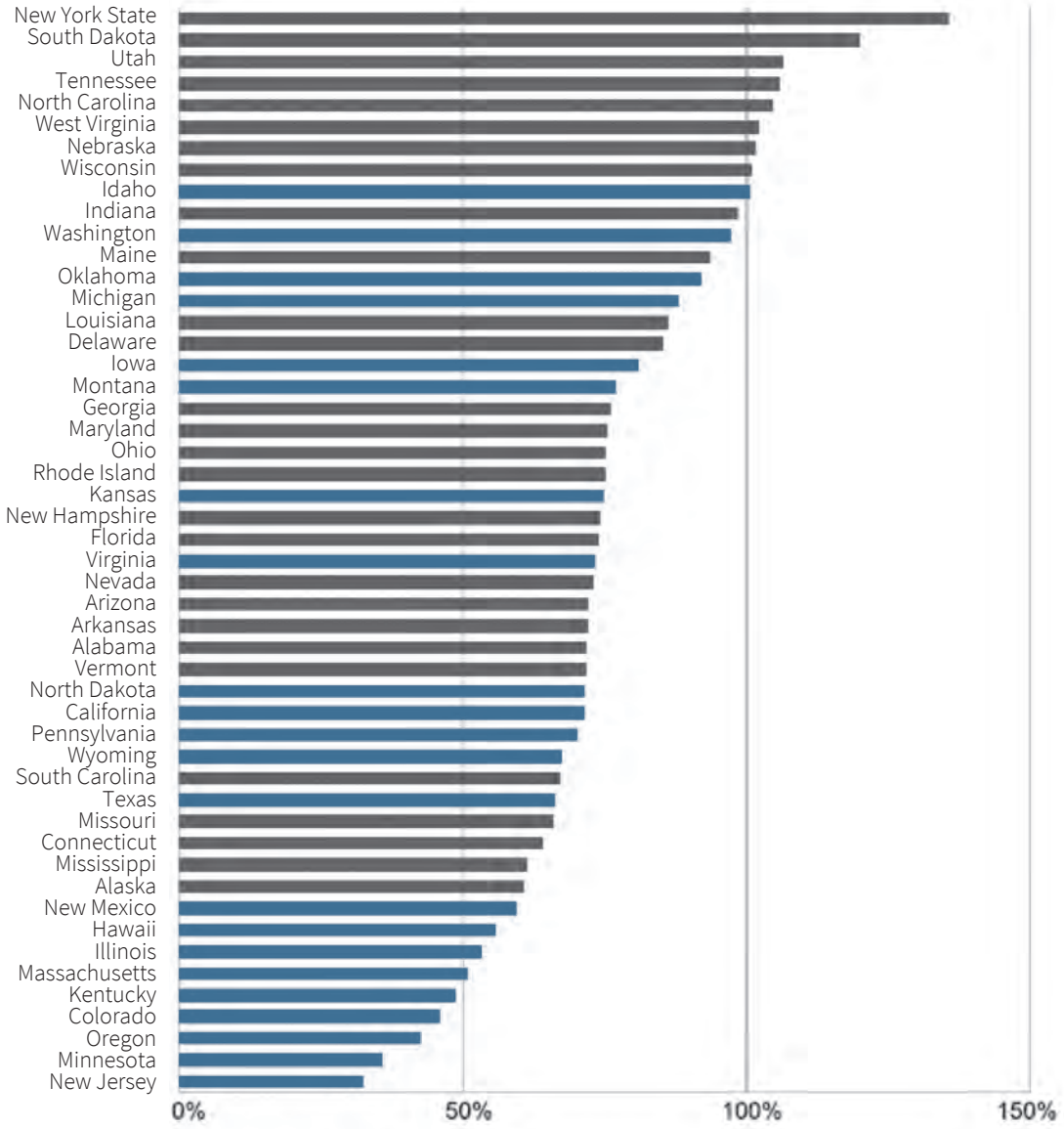
> We endeavor to anticipate the potential for and scale of accelerating payments and increasing budgetary stress over time in light of a municipality's complete financial profile.

While both assessments shown here are survey-based and not necessarily reflective of future deviations from expected values, the provisions of ASOP 51 still fit well into our forward-looking assessment of cost trajectory. In fact, we even have a score adjustment based on whether or not the issuer has a "credible plan" in place to understand and address pension risk, which in my opinion speaks directly to the heart of the ASOP.

As pension risk always ties back to current and future financial impact for us, we especially see great value in full baseline and stressed projections of liabilities and costs going forward. It's surprising how many plan sponsors don't know what their estimated costs would be in five or ten years even if all assumptions are met. That lack of information can lead not only to poor financial planning over time, but also to potentially ill-informed perspectives and choices in benefits or funding practices that could have cost ramifications for decades to come.

The more ASOP 51 causes real and growing pension risks to be taken seriously, discussed in earnest, understood, and ultimately acted on from both the plan and plan sponsor perspective, the better the outlook will be for all parties involved.

Figure 11
State Plan Minimum Funding Progress



Total plan contributions to accounting measures for annual minimum funding progress

Blue: Pension contributions do not have an actuarial basis or are not usually fully funded. **Gray:** Pension plan contributions are actuarially based and usually meet or exceed required levels. *Alabama pension figures include the Alabama Employees' Retirement System agent plan measured as of fiscal 2016 as reported in the state's unaudited fiscal 2017 comprehensive annual financial report (CAFR). §The funded ratio for Tennessee reflects 2016 plan information for the state's agent plans as reported in Tennessee's fiscal 2017 CAFR.

Source: S&P Global Ratings.
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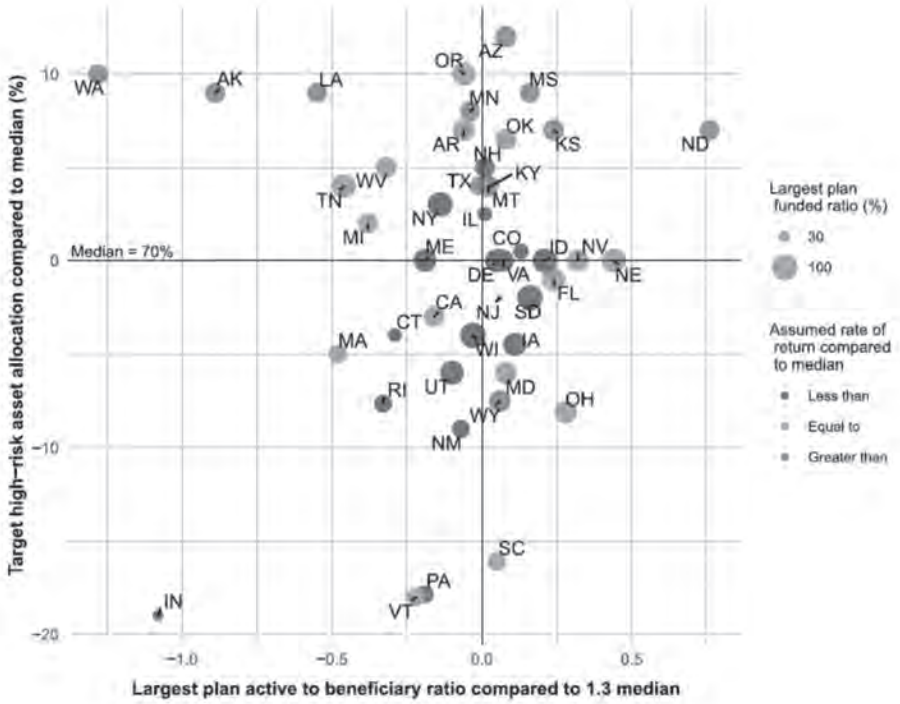
Chart 12
Plan Demographics and Target Asset Allocations Largest State Pension Plans

Indiana's pre-1996 Teacher's Retirement Fund and Washington's Public Employees' Retirement System (PERS) Plan 1 are closed to new entrants. This Figure excludes information for Alabama, Georgia, Hawaii, and North Carolina because 2012 or 2017 targeted asset allocations for the largest plan were not available in the Public Plans Database (PPD). Missouri State Employees' Retirement Systems is an outlier, with a 25 percent reduction in its targeted high-risk asset allocation since 2012 and falls outside the chart plot area.

Source: Pension plan and state reports. Investment allocation information from PPD. Copyright ©2018 by Standard & Poor's Financial Services LLC. All rights reserved.



CONCLUSIONS

ASOP 51 requires identification and assessment of funding risks in actuarial valuation. The purpose is to provide useful information to public pension stakeholders. The various approaches illustrated above have been found to be useful by these experienced practitioners. As ASOP 51 is implemented, these measures and other risk assessment measures will be incorporated to enhance the understanding of public pensions. ■

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