

## Open-group valuations

# A proposed new funding method for certain public sector plans

Many public employers that sponsor or participate in pension plans are struggling financially. The required contribution rates to public pension plans have risen dramatically in reaction to the under-performance of capital markets over the last ten years. Employer revenue has often been flat or even decreasing: in the plan we will be modeling later in this paper, the operating revenue of the employer has decreased by 4% per year from June 30, 2010, to June 30, 2012. In this situation, employers need a methodology to fund their plans over the long term with stable and reasonable contribution requirements. We are suggesting that employers with financial problems partly due to increased demands for pension contributions consider a new methodology that, along with the adoption of a new tier of lower benefits or higher employee contributions for future employees, or both, may help them achieve their pension objectives.

### Accounting for public plans

As of June 30, 2014, most public employers will begin to account for their plans under Statement 67 of the Governmental Accounting Standards Board (GASB). As of June 30, 2015, employer accounting for pension plans will follow GASB's Statement 68. The new accounting Statements are not funding standards; in fact GASB has repeatedly said that it does not intend these Statements to be used for funding. Paragraph 159 of Statement No. 68 reads as follows:

*"As noted above, the objective of this Statement is to establish standards of accounting and financial reporting for pensions. The Board concluded that it is not within the scope of its activities to set standards that establish a specific method of financing pensions (that being a policy decision for government officials or other responsible authorities to make) or to regulate a government's compliance with the financing policy or method it adopts. Accordingly, the Board established standards in this Statement within the context of accounting and financial reporting, not within the context of the funding of pensions."*

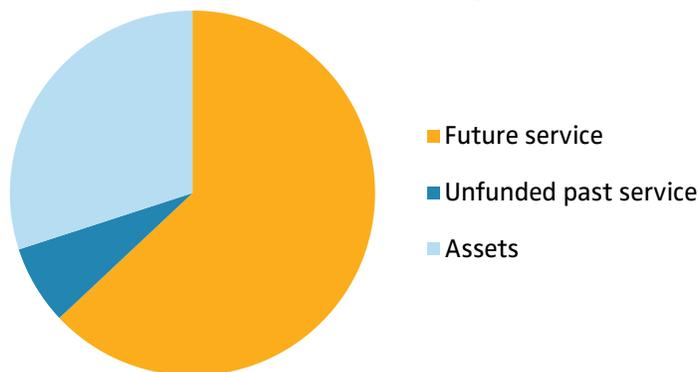
Current Statements 25 and 27, which have been in use since 1995, call for the determination of an "annual required contribution" amount that has in fact served as a funding standard. Statements 25 and 27 permit only closed-group actuarial valuations and allow six traditional funding methods. Therefore, public plans have been obliged to use traditional closed-group valuations to determine both their funding and accounting numbers. With the implementation of the new GASB Statements, public plans will be free to adopt whatever funding methods they choose (subject to state and local law restrictions<sup>1</sup>).

<sup>1</sup>In California, the California Actuarial Advisors Panel (CAAP) has issued draft funding policy recommendations, which do not address the open-group methods we are presenting in this paper. Also, the Public Plans Subcommittee of the American Academy of Actuaries is preparing guidelines (not yet available) for funding methods in the public sector.

## Traditional actuarial valuation methods

Traditional actuarial valuations are point-in-time measurements. As of the valuation date, the actuary determines the accrued liability and normal cost for all current plan members under the funding method chosen. He ignores possible future entrants. The accrued liability is the portion of the present value of future benefits that the method assigns to past service, while the normal cost is the portion that the method assigns to the valuation year. The unfunded accrued liability is the excess of the accrued liability over the actuarial value of plan assets. The actuarial value of plan assets can be at fair value, but usually it is a smoothed value, i.e., one that recognizes investment gains and losses over a period of five years or so. Actuarially determined contribution amounts consist of the normal cost plus amortization of the unfunded accrued liability. Amortization periods cannot be longer than 30 years in the calculation of the annual required contribution under Statements 25 and 27. Amortization payments can be made in level dollar amounts or in amounts that are anticipated to be level as a percentage of pay.

**Chart 1 – How actuarial cost method assigns present value**



In Chart 1, the gold area represents the portion of the present value of total plan benefits that the actuarial cost method assigns to future service, and the blue areas (dark and light) represent its assignment to past service. Future service contributions are determined one year at a time and are called normal costs. Past service liabilities that exceed the assets (the dark blue area above) are amortized.

## Contractual benefits

In many jurisdictions, benefit accruals under a public-sector retirement system are considered a contractual right, and the employer is not permitted to reduce benefits for current employees, even for benefits they will earn in the future. In systems that become badly under-funded, the employer often creates a new tier of lower benefits for future employees. The cost reductions derived from a new tier come about as new employees are hired each year. Since pension liabilities for recent hires are quite small, however, it takes many years for the financial effects of a new tier to become significant.

In the example below, where the new tier is introduced January 1, 2013, the employer contribution rates under a traditional method are projected to be as follows:

Year	Employer contribution rate
2012	30.0%
2013	30.6%
2014	29.6%
2015	29.3%
2016	29.6%

Savings from the new tier do not begin to emerge to any significant degree until after 2016.

Public employers that would benefit greatly in the long run from a new tier of lower benefits may delay or avoid adopting such a tier because the financial effects arise so far in the future. There is immediate pressure on officials in power not to cut pension benefits; the reward for cutting benefits occurs many years (and potentially many changes in leadership) in the future.

### Weaknesses of traditional actuarial valuation methods

Two features of traditional closed-group actuarial methodology have become apparent:

1. Contribution rates have become volatile because investment returns on the risky assets that plans commonly hold today are extremely volatile, and Actuarial Standard of Practice 44 limits the extent of the asset smoothing that an actuary is allowed to use.
2. When plans create a new, lower tier of benefits to apply to future hires, the cost reductions are recognized very gradually. As a result, many systems that might adopt a new tier fail to do so, or delay doing so until their funding situations are bleak.

Traditional methods were designed when computing capacity was, by today's standards, severely limited. Actuaries commonly used group methods, in which normal cost is determined for the entire active population, rather than for each individual, as a way to minimize the number of long-divisions performed, as such operations were expensive. With today's capacity to model both current and estimated future assets and liabilities, there is no practical necessity to rely solely on traditional, fixed-point-in-time valuations. This paper will explore an alternative methodology that focuses on long-range cost and addresses the two short-comings of traditional methods identified above.

### Open-group forecasting method

Open-group valuations include an assumption regarding future plan members, i.e., members who have not yet been hired or have not yet become eligible for plan participation. The assumption includes the number of new hires per year, their expected ages, and, for pay-related plans, their expected pay at hire. One common practice in open-group methods is to assume that the employer hires enough new employees to replace employees who leave each year, called a "level work force" assumption. We can model increasing or decreasing work forces as well, and the effect of variations in the size of the active work force is usually significant. In general, plans with unfunded accrued liabilities can be funded with lower contribution rates when the work force is growing because unfunded accrued liabilities are allocated to a larger payroll.

The method we propose entails an open-group forecast 75 years long, a period of the same length that the Social Security Administration uses to study the long-range balance of its programs. The projection period is long enough for any new tier to become dominant – after 30 years, virtually all of the normal cost is due to new-tier members, and after 60 years, virtually all of the liability is attributable to new-tier members and their beneficiaries. Growth of the active work force should be estimated based on long-term expectations. Assumed ages and pay at hire are usually based on recent experience. At each future valuation date in this 75-year period, we perform a traditional valuation, using all the methods and assumptions that now apply to the plan valuation. Each valuation determines a contribution amount, and we compute the present value of these 75 years of projected contributions. Then we determine the level percentage of payroll that, when applied to each of the future payrolls, yields the same present value. That, subject to one adjustment, is the contribution rate under the open-group method.

The one adjustment is for differences between traditional and open-group contribution amounts. If the open-group method produces a lower initial contribution rate, for example because it reflects a new tier of lower benefits, the difference between the contribution amounts determined by the traditional and open-group method is amortized as a level percentage of pay over a certain number of years. (We will use a 12-year amortization in our example because that is the amortization period that the plan in our case study decided to use in its traditional valuations.) For example, suppose the open-group method calls for a contribution of \$17 million and traditional methods produce \$30 million of contribution in year  $x$ . In year  $x+1$ , the unfunded accrued liability will be \$13 million higher than expected based on year  $x$ 's traditional valuation. We propose amortizing this \$13 million as a level percentage of pay over 12 years, and adding the amortization amounts to the contribution that the open-group method otherwise determines. We make this adjustment because, without it, the contribution relief that this method offers would lead to accumulating additions to unfunded liabilities in traditional methods. These additions would reduce the funded status to levels widely considered unacceptable.

After the first year, the open-group method proceeds in the same manner with a new 75-year period following the new valuation date. Thus, to determine open-group contributions in the 75th year of our projection, we must project 150 years into the future.

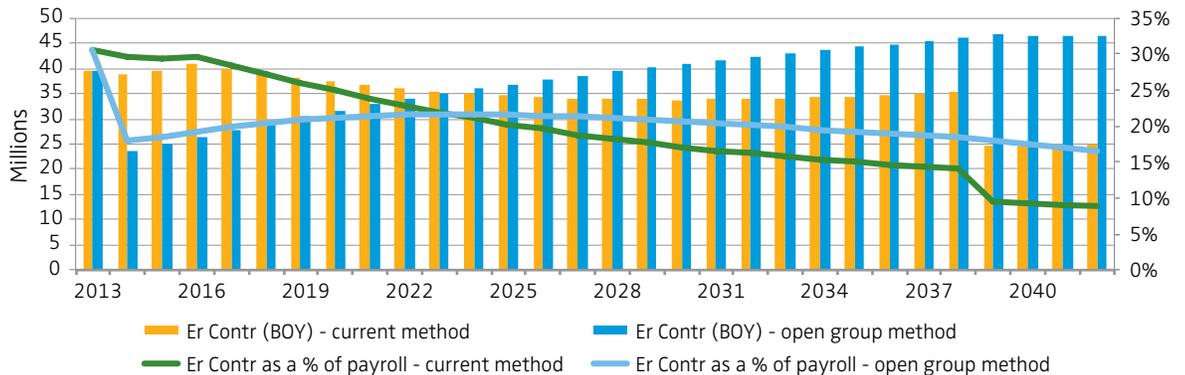
Like traditional methods, the open-group method must specify how to handle increases and decreases in liability caused by actuarial gains and losses, plan amendments, and changes in plan assumptions or methods. Also, investment gains and losses in traditional valuations are commonly subject to smoothing. In the open-group method, we simply add or subtract the appropriate change in liability to our total present value of future contributions over the next 75 years. For example, if a plan experiences an actuarial loss of \$10 million, we would increase the present value of future contributions by \$10 million, and find a revised level contribution rate that produces the increased present value. For investment gains and losses, we illustrate two smoothing methods below: immediate recognition and ten-year smoothing.

### Deterministic forecast

We start with a deterministic forecast, assuming a level work force. In this example, which is based on an actual situation, the employer’s contribution rate has increased rapidly from 10% of payroll in the 2000 valuation to 31% of payroll in the 2012 valuation. The two main reasons for this increase have been improvements in plan benefits and investment losses. The employer has adopted a new tier of lower benefits and higher employee contributions, but the financial effect of these changes will take many years to be fully reflected in traditional valuations. The plan uses a retirement formula based on final average pay, but our proposed method could be adapted to any formula.

In Charts 2 and 3 below, we model the current actuarial assumptions and methods and project their effects over the next 75 years. To provide more detail, we show 30 years of the projection in these charts. In this projection, we determine contribution requirements in each year under the current methods and assumptions, while anticipating new members entering the Plan in sufficient numbers to keep the active work force constant in size. The annual employer contribution requirements, as percentages of payroll, are shown on the green line of Chart 2. These rates decline over the course of the projection from 30.6% in 2013 to 14.1% in 2038, then decline sharply to 9.5% in 2039, and then decline gradually to 8.9% in 2042. We also compute the present value of all 75 years of contributions and then determine the level percentage of payroll contribution rate that would produce the same present value of contributions. This rate, graphed in blue in Chart 2, is a slightly bowed line ranging from 17.9% of payroll in 2014 to 21.7% of payroll in 2024, and then gradually declining to 16.4% in 2042. Thus, over the long term, the Plan will receive the same value from contributions shown on the blue line as it would from the declining pattern of contributions indicated by the green line. Of course, the funded status will be lower in the near future if contribution rates are the lower amounts indicated by the blue line.

**Chart 2 – Annual employer contribution before and after method change**



Projection year	2018	2024	2030	2036	2042
Er Contr (BOY) - current method	38,898,620	34,967,003	33,818,064	34,664,066	25,012,206
Er Contr (BOY) - open group method	29,291,921	35,989,090	40,938,439	44,905,273	46,324,317
Er Contr as a % of payroll - current method	27%	21%	17%	15%	9%
Er Contr as a % of payroll - open group method	20%	22%	21%	19%	16%

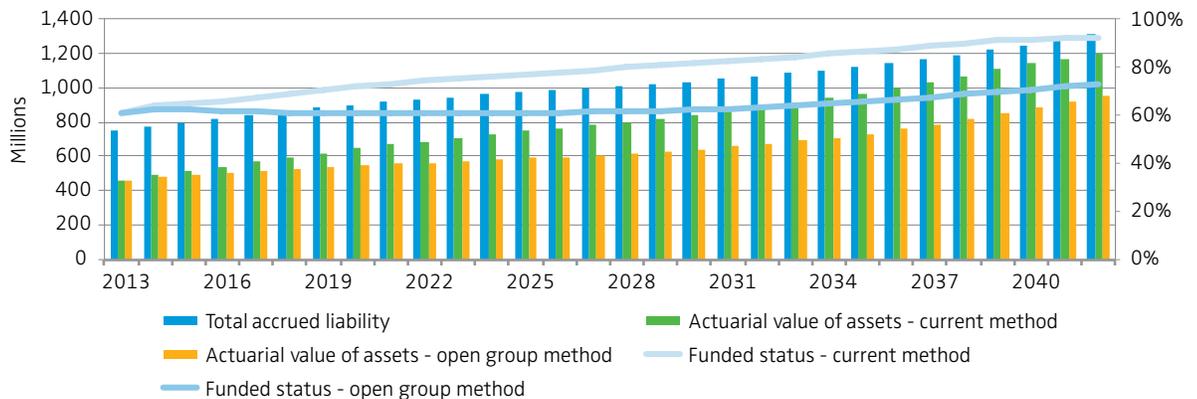
The main reason for the decline in contribution rates of the traditional method over the 75-year period is that the new tier of employees will replace the current tier over the next 25 to 30 years. In fact, the employer’s normal cost rate will decline from 11.8% of payroll to about 4.6% of payroll over the 75-year period. A second reason for the decline is that half of the huge investment loss of 2008 will be fully amortized by 2038, and so this part of the loss will not affect contribution rates after 2038.

The blue line in Chart 2 is slightly bowed because contributing less than the traditional rates in the early years of the projection (17.9% in 2014 versus 29.6%, for example) reduces assets and investment income in future years, thereby increasing the unfunded accrued liability and necessitating an increase in future contributions. The upward trend of the blue line ends when contributions under the alternate method exceed those of the traditional method, around the year 2024.

It is important to note that the alternate method does not save the employer anything in terms of the long-range cost of the Plan. It merely reallocates the cost to different time periods. Such reallocation, however, makes the Plan much more affordable for the employer.

As Chart 3 makes clear, the new methodology will produce lower future funded status percentages than will the current methodology, and it is important for the employer to weigh the advantages of contribution rate stability against this result. Of course, any method that leads to lower contributions in the near future will reduce funded status, and there is always a tension between the objectives of contribution rate stability and the rapid restoration of the Plan to 100% funded status.

**Chart 3 – Funded status before and after contribution method change**



Projection year	2018	2024	2030	2036	2042
Total accrued liability	863,100,017	957,599,418	1,031,662,056	1,140,888,761	1,309,752,157
Actuarial value of assets - current method	594,937,533	727,694,184	839,334,140	996,821,596	1,201,589,668
Actuarial value of assets - open group method	526,876,285	581,731,427	642,049,886	758,099,967	954,447,463
Funded status - current method	69%	76%	81%	87%	92%
Funded status - open group method	61%	61%	62%	66%	73%

Nevertheless, if adherence to the current methodology is doubtful in light of the increased contribution requirements and depressed revenues, attainment of the higher funded percentages is also doubtful. The advantage of the method proposed here is that it substitutes a funding policy that is achievable and, in the long run, adequate, for one that is arguably more adequate but less achievable.

When considering a change to a new and very different funding method, it might be appropriate to review what funded status is and why we pay attention to it. Funded status is the ratio of plan assets (valued in different ways by different systems) to accrued plan liabilities (also valued in different ways by different systems). A funded status of 100% means that assets have accumulated as the funding method and assumptions anticipate, i.e., the plan has assets sufficient to provide the benefits that the method assigns to past service. When pension plans were devised, actuaries persuaded employers to pre-fund their plans, rather than funding them on a pay-as-you-go basis. The reason for pre-funding was to ensure that the pattern of contributions needed was reasonable in view of the employer's ability to contribute. Contributions determined on a pay-as-you-go basis are very low when a plan begins, and grow rapidly as the plan matures. When the plan is fully mature, contributions required under pay-as-you-go funding will quite often exceed amounts that employers can actually make. In other words, the purpose of pre-funding has always been to produce a pattern of realistic and achievable contribution requirements. Our open-group methodology takes the process a step further and produces nearly level contributions as a percentage of pay. The following contrasts employer contribution rates under traditional and open-group methods in our deterministic forecast of our sample plan:

Year	Employer contribution rate	
	Traditional method	Open-group method
2012	31.0%	N/A
2013	30.6%	N/A
2014	29.6%	17.9%
2015	29.3%	18.6%
2016	29.6%	19.2%
2021	23.8%	21.4%
2026	19.6%	21.5%
2031	16.6%	20.4%
2036	14.6%	19.0%
2041	9.1%	17.0%
2046	8.3%	14.7%

Note that the employer contribution rates decline from 31.0% to 8.3% under the traditional method, while the open-group rates are stable through 2036, and then gradually decline.

The employer will also want to investigate the effects that adopting the new methodology would have on its GASB liabilities under new Statements 67 and 68 and to balance those effects against the new methodology's beneficial effects on plan funding. Also, if the employer has been contemplating a change to more conservative assumptions, such as a reduction in the investment return assumption or a strengthening of the mortality table, the open-group method provides a way to offset the increase in contributions that adopting more conservative assumptions would entail.

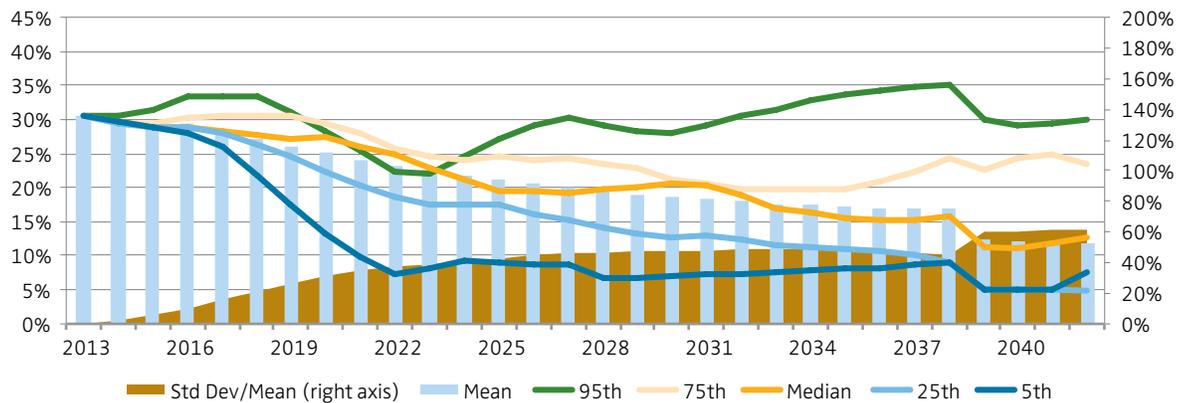
### Stochastic forecast

In our deterministic forecast, we assume that plan assets earn 7.5% each year, consistent with the actuarial assumption. There are no future investment gains or losses. To stress-test the open-group methodology, we must perform stochastic forecasts in which the rate of return varies. We assume that the rate of return comes from a normal distribution with mean 7.5% and standard deviation of 10%. We perform 1,000 test paths, each 75 years in length, where the investment return each year is a random variable taken from this distribution. We compare the results of this forecast for the open-group method under two smoothing scenarios with those of the traditional method.

Charts 4, 5, and 6 below show the stochastic results of our forecast of employer contribution rates for the open-group method with or without smoothing of investment gains and losses. Chart 4 illustrates the employer contribution rates under the traditional method currently in use. Chart 5 illustrates the open-group method without smoothing of investment gains and losses. Chart 6 illustrates the open-group method with smoothing. Charts 7, 8, and 9 give the corresponding information for funded status. In each chart, paths are sorted by the parameter under study. For example, the median path for employer contribution rates is the middle path when all paths are sorted by average employer contribution rates. Funded status charts are sorted by funded status in 2042.

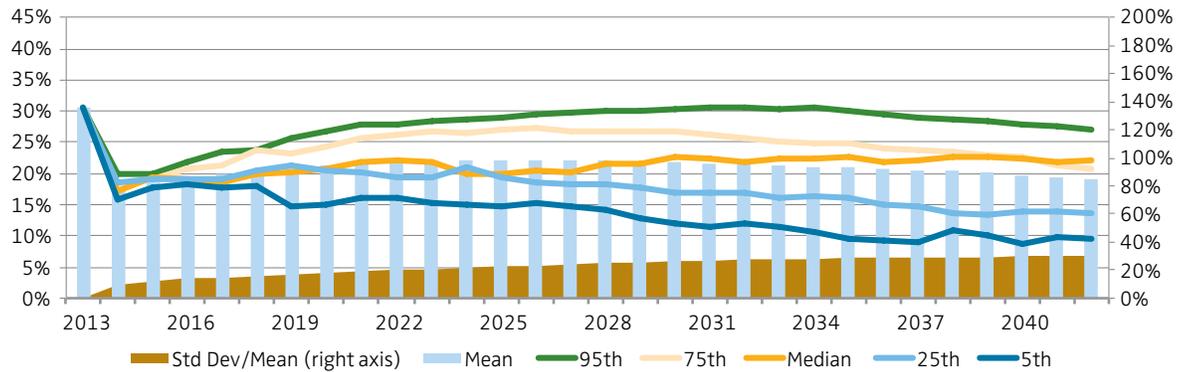
**Chart 4 – Sensitivity analysis – current method employer contribution as % of payroll**

Stochastic results



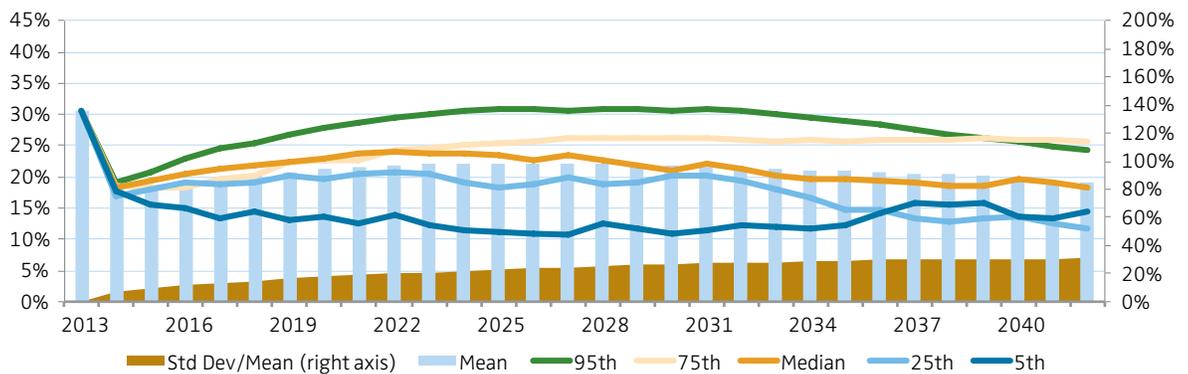
Employer Contribution as % of Payroll	2018	2024	2030	2036	2042
95th	33%	24%	28%	34%	30%
75th	31%	24%	21%	21%	23%
Median	28%	21%	21%	15%	13%
25th	26%	17%	13%	11%	5%
5th	22%	9%	7%	8%	8%
Mean	27%	22%	19%	17%	12%
Std Dev/Mean (right axis)	22%	41%	48%	47%	62%

**Chart 5 – Sensitivity analysis – open group method – employer contribution as % of payroll**  
 No smoothing of investment gains and losses



Employer contribution as % of payroll	2018	2024	2030	2036	2042
95th	24%	29%	30%	30%	27%
75th	24%	27%	27%	24%	21%
Median	20%	20%	23%	22%	22%
25th	20%	21%	17%	15%	14%
5th	18%	15%	12%	9%	10%
Mean	20%	22%	22%	21%	19%
Std Dev/Mean (right axis)	16%	22%	26%	29%	31%

**Chart 6 – Sensitivity analysis – open group method – employer contribution as % of payroll**  
 With smoothing of investment gains and losses



Employer contribution as % of payroll	2018	2024	2030	2036	2042
95th	25%	31%	31%	28%	24%
75th	20%	25%	26%	26%	26%
Median	22%	24%	21%	19%	18%
25th	19%	19%	20%	15%	12%
5th	15%	12%	11%	14%	14%
Mean	20%	22%	22%	21%	19%
Std Dev/Mean (right axis)	15%	22%	27%	30%	31%

As these charts show, contribution rates are much more stable under the open-group method, regardless of whether that method includes smoothing of investment gains and losses. The standard deviation as a percentage of the mean of employer contribution rates ranges between 15% and 31% under the open-group method, compared to 22% to 62% under the traditional method. Smoothing investment gains and losses in the open-group method makes only very small differences in the contribution rates.

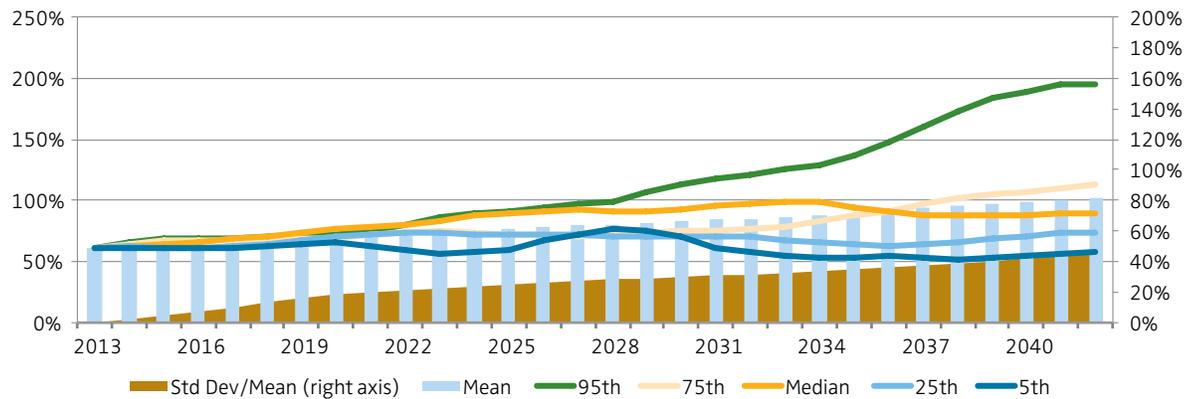
To illustrate the volatility of contribution rates under all three methods, we computed the changes in year-over-year contribution rates under all three methods, ranging over all 1,000 paths for the first 29 years of the projection after 2014 (the first year that the new method is effective):

	Actuarial cost method		
	Traditional	Open group no asset smoothing	Open group with asset smoothing
Average change	-0.63%	0.04%	0.04%
Standard deviation of change	1.84%	1.04%	0.95%

Under the open-group method, the average change is close to zero, and the standard deviation is about 1%. Therefore, in general, the contribution rate for year x is approximately equal to the one for year x-1 -- a very desirable result for budgeting purposes.

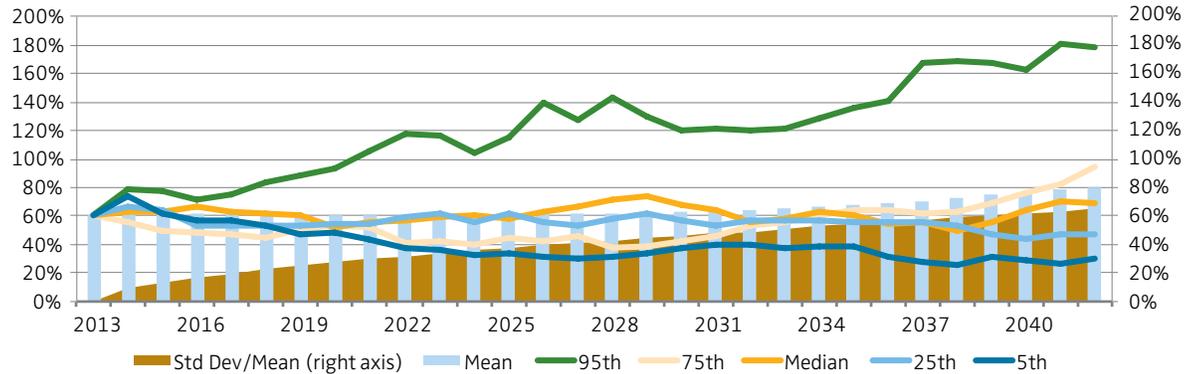
**Chart 7 – Sensitivity analysis – current method funded status**

Stochastic results



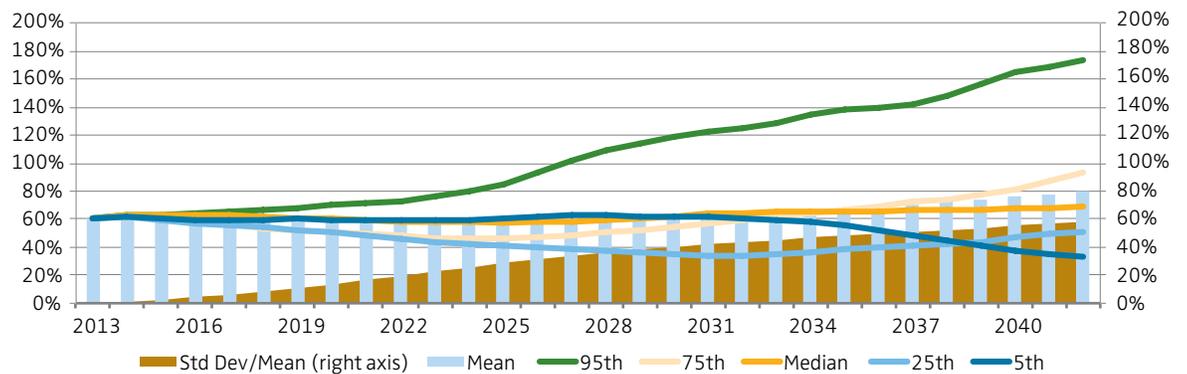
Funded status	2018	2024	2030	2036	2042
95th	71%	89%	114%	147%	195%
75th	68%	73%	75%	92%	112%
Median	71%	87%	93%	90%	90%
25th	65%	73%	70%	63%	74%
5th	62%	57%	70%	55%	58%
Mean	69%	76%	83%	92%	102%
Std Dev/Mean (right axis)	13%	24%	30%	36%	46%

**Chart 8 – Sensitivity analysis – open group method – funded status**  
No smoothing of investment gains and losses



Funded status	2018	2024	2030	2036	2042
95th	84%	105%	121%	140%	179%
75th	45%	40%	42%	64%	94%
Median	62%	61%	67%	54%	69%
25th	54%	55%	57%	56%	47%
5th	53%	32%	38%	31%	30%
Mean	61%	61%	63%	69%	80%
Std Dev/Mean (right axis)	23%	36%	46%	55%	65%

**Chart 9 – Sensitivity analysis – open group method – funded status**  
With smoothing of investment gains and losses



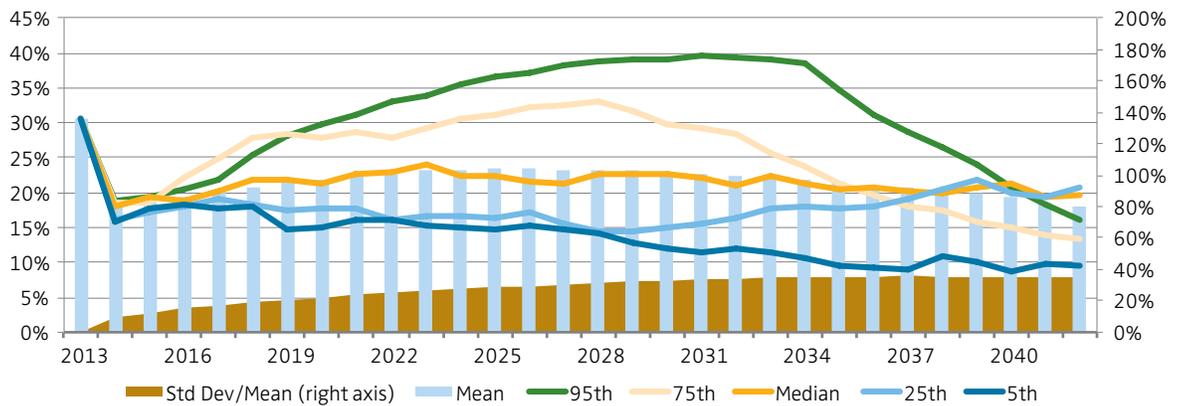
Funded status	2018	2024	2030	2036	2042
95th	67%	80%	118%	140%	173%
75th	54%	46%	54%	69%	93%
Median	62%	58%	62%	66%	69%
25th	54%	42%	35%	40%	51%
5th	59%	60%	62%	52%	33%
Mean	61%	61%	63%	69%	80%
Std Dev/Mean (right axis)	8%	26%	40%	49%	59%

The charts of funded status are all similar in shape, but there is greater variability in the open-group method after the first ten years. While the smoothing of investment gains and losses does have some effect in dampening the variability, it is still higher than that of the traditional method after 20 years. Part of the reason is that the mean funded status is higher under the traditional method, especially late in the projection.

On the 5th percentile lines of the open-group charts, we show some very low funded status percentages, especially in the absence of smoothing. Of course, systems would be aware of their funded status every year and, if necessary, could adopt adjustments to contribution rates to bolster funded status over a period of years. To illustrate the incorporation of such adjustments into the funding method when funded status has become worrisome, we model a threshold method which is identical to the open-group method described above, but adds a proviso that the employer contribution rate is increased by 1% the first year in which the funded status falls below a threshold, by 2% if the funded status remains below that threshold the next year, by 3% the following year, and so on. When the funded status returns to the threshold or better, the percentage additions phase out by 1% per year. The effects of incorporating this method, using thresholds of 50% in set 1 and 60% in set 2, are shown on the following graphs:

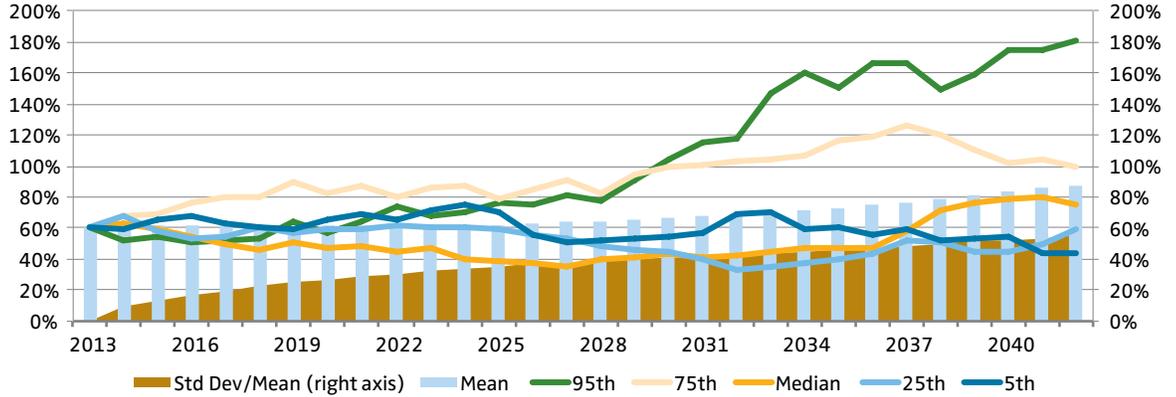
**Chart 10 – Set 1 – 50% threshold**

**10a) Sensitivity analysis - open group method – employer contribution as % of payroll**



Employer contribution as % of payroll	2018	2024	2030	2036	2042
95th	25%	36%	39%	31%	16%
75th	28%	31%	30%	20%	13%
Median	22%	22%	23%	21%	20%
25th	18%	17%	15%	18%	21%
5th	18%	15%	12%	9%	10%
Mean	21%	23%	23%	21%	18%
Std Dev/Mean (right axis)	19%	27%	33%	36%	35%

**10b) Sensitivity analysis – open group method – funded status**

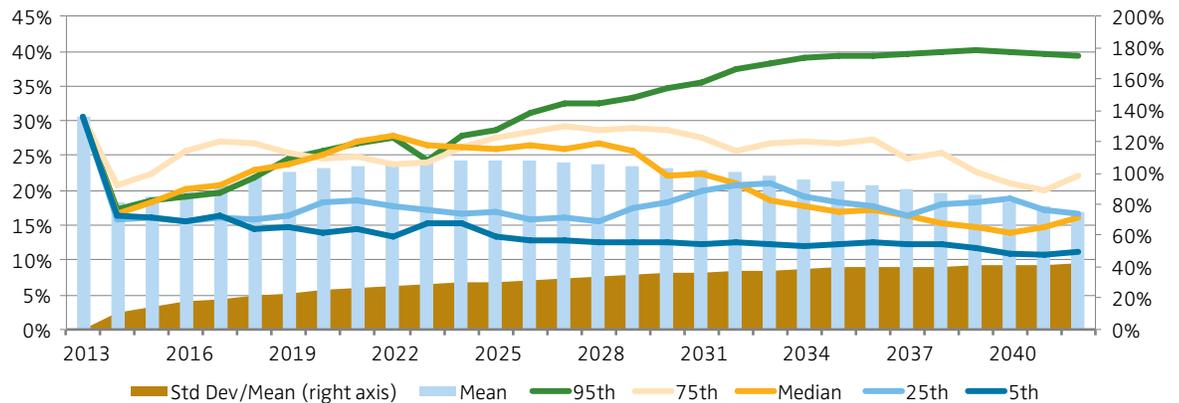


Funded status	2018	2024	2030	2036	2042
95th	53%	70%	104%	166%	181%
75th	80%	87%	99%	119%	100%
Median	47%	40%	43%	47%	75%
25th	61%	60%	44%	43%	59%
5th	61%	75%	54%	55%	44%
Mean	61%	62%	66%	75%	88%
Std Dev/Mean (right axis)	22%	34%	41%	46%	55%

% Funded status less than thresholds	2018	2024	2030	2036	30 Yr Total
50%	20.3%	31.8%	29.5%	22.9%	21.7%
30%	0.4%	2.1%	2.2%	0.8%	1.3%
Employer contribution as % of payroll	Max	Median	Min	Mean	Std Dev
Year to Year Delta	7.4%	0.0%	-5.5%	0.0%	1.4%

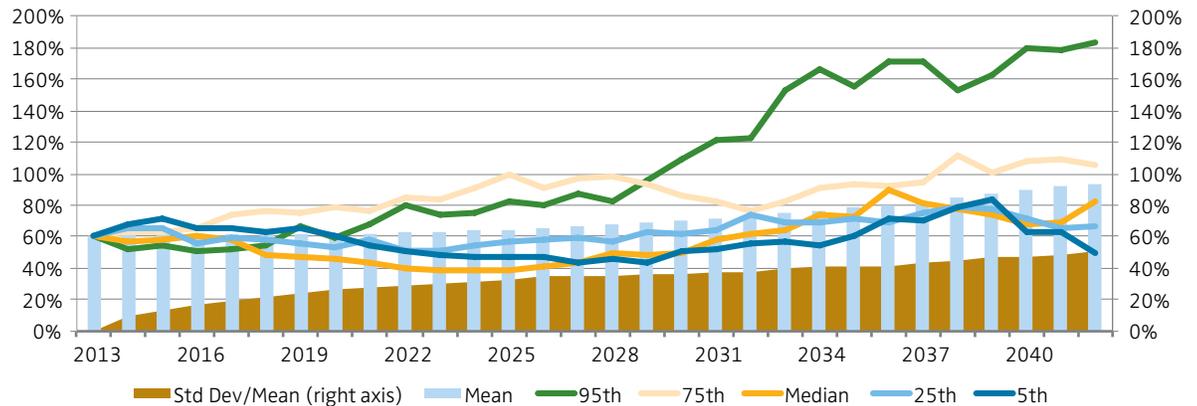
**Chart 11 – Set 2 – 60% threshold**

**11a) Sensitivity analysis – open group method – employer contribution as % of payroll**



Employer contribution as % of payroll	2018	2024	2030	2036	2042
95th	22%	28%	35%	39%	39%
75th	27%	26%	29%	27%	22%
Median	23%	26%	22%	17%	16%
25th	16%	17%	18%	18%	17%
5th	14%	15%	12%	13%	11%
Mean	22%	24%	23%	21%	17%
Std Dev/Mean (right axis)	21%	30%	36%	40%	42%

**11b) Sensitivity analysis – open group method – funded status**



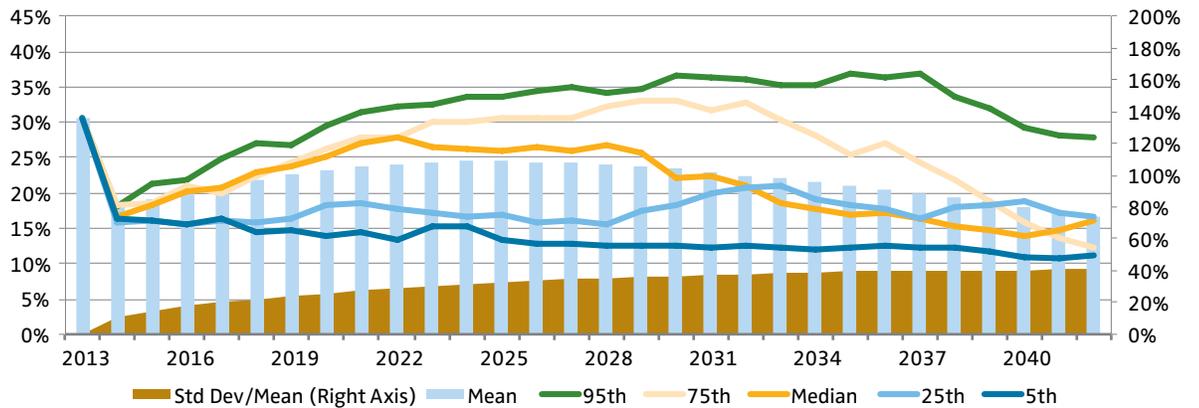
Funded status	2018	2024	2030	2036	2042
95th	55%	75%	109%	171%	184%
75th	77%	90%	86%	92%	106%
Median	49%	39%	49%	89%	82%
25th	58%	55%	62%	69%	66%
5th	63%	47%	51%	71%	49%
Mean	62%	64%	70%	80%	94%
Std Dev/Mean (right axis)	22%	31%	37%	42%	50%

% Funded status less than thresholds	2018	2024	2030	2036	30 Yr Total
60%	51.3%	48.0%	40.2%	28.1%	35.8%
40%	3.1%	7.8%	6.8%	2.4%	4.3%
Employer contribution as % of payroll	Max	Median	Min	Mean	Std Dev
Year to Year Delta	7.4%	0.0%	-6.7%	0.0%	1.6%

Chart 12 models a method with two thresholds – 60% and 40%. The 60% threshold works the same way as illustrated in Set 2 above, but if the funded status drops below 40%, the additions to the employer contribution rates double. For example, if the funded status has been below 60% for three years and in the fourth year falls below 40%, the increase in the employer contribution rate would be 8% (2 x 4%).

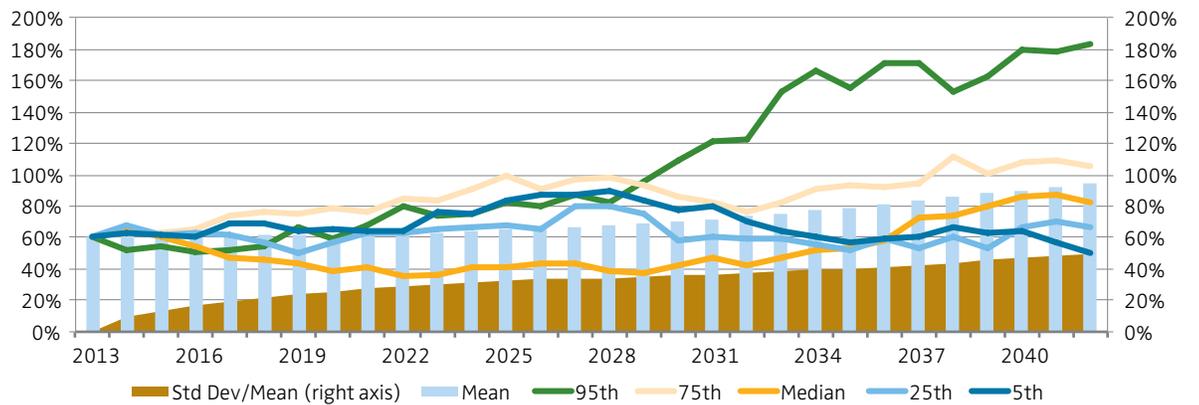
Chart 12 – 60%, 40% threshold

12a) Sensitivity analysis – open group method – employer contribution as % of payroll



Employer contribution as % of payroll	2018	2024	2030	2036	2042
95th	27%	34%	37%	36%	28%
75th	22%	30%	33%	27%	12%
Median	23%	26%	22%	17%	16%
25th	16%	17%	18%	18%	17%
5th	14%	15%	12%	13%	11%
Mean	22%	25%	23%	21%	17%
Std Dev/Mean (right axis)	22%	31%	37%	40%	41%

12b) Sensitivity analysis – open group method – funded status



Funded status	2018	2024	2030	2036	2042
95th	55%	75%	109%	171%	184%
75th	77%	90%	86%	92%	106%
Median	46%	41%	43%	58%	82%
25th	57%	67%	58%	59%	67%
5th	69%	75%	77%	59%	50%
Mean	62%	64%	71%	81%	94%
Std Dev/Mean (right axis)	22%	31%	36%	41%	50%

% Funded status less than thresholds	2018	2024	2030	2036	30 Yr Total
60%	51.3%	48.0%	39.1%	27.0%	35.3%
40%	3.1%	6.7%	5.0%	1.8%	3.6%
Employer contribution as % of payroll	Max	Median	Min	Mean	Std Dev
Year to year delta	7.4%	0.0%	-7.5%	-0.1%	1.7%

Threshold methods do help to prop up funded status through periods of investment losses. This feature comes with the cost of increased contribution rate volatility:

	Open-group				
	Current method	No threshold	50% threshold	60% threshold	60% / 40% thresholds
Change in contribution rates year-over-year – standard deviation as percentage of mean	1.8%	1.0%	1.4%	1.6%	1.7%

### Conclusion

Public sector plans have an opportunity to review their selection of funding methods because accounting standards will no longer require closed-group actuarial valuations for funding purposes. Open-group methods can produce more stable contribution rates over time and recognize the financial effects of adopting a new tier of benefits for future plan participants much more rapidly than traditional methods do. Adopting an open-group method can also mitigate the contribution rate increases that a change to more conservative assumptions would produce. Systems should stress-test their results to see how the new methodology copes with the investment gains and losses that can be expected based on their asset allocations. They will also want to see the effect that adopting such a method will have on the discount rate that they will use for accounting purposes. Relief in the form of a reduction in near-term contribution rates always entails a reduction in funded status, compared to the funded status without such relief. Nevertheless, the purpose of accumulating assets in a pension plan’s trust is to produce a contribution pattern that is realistic for the contributing entities. The open-group method we have modeled here produces a much more practical contribution pattern than any traditional method does.

Systems should change to the new methodology if and only if its beneficial effects on contribution rates outweigh its effects on funded status and accounting information. If funded status is a potential source of worry, the method can incorporate an automatic extra contribution from the employer whenever funded status has declined below a threshold. Under the threshold variation of this method, funded status does not decline as much under poor investment return scenarios, but contribution rates are also less stable than they would be without the variation.

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