SOCIETY OF ACTUARIES

Contribution Indices
U.S. Single Employer Pension Plans

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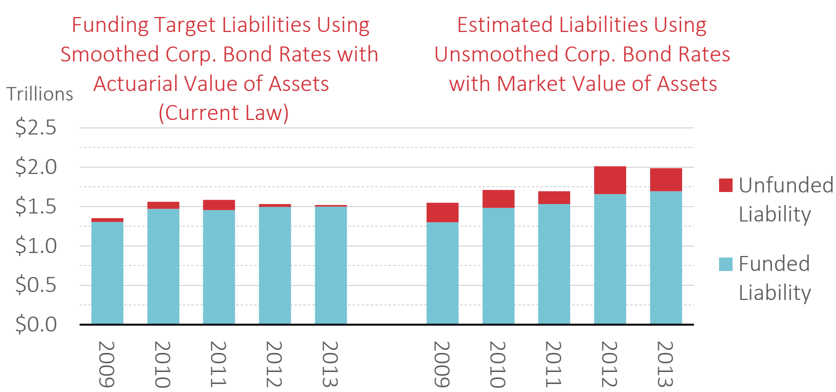
The Society of Actuaries (SOA) recently introduced *contribution indices*, metrics that compare pension plan contributions to benchmarks that represent the contribution level needed to meet a specific funding pace or to satisfy a specific requirement.[1] This article explores various contribution indices for the ongoing single employer defined benefit pension system in the United States over 2009–2014 plan years.[2] Here are some highlights of the results:

- Employer contributions for more than 99% of the system met or exceeded the minimum required contributions under federal law.[3]
- When valuing liabilities using the smoothed discount rates allowed by federal law for minimum required contributions, approximately 96% of the system exceeded their seven-year funding pace benchmarks for 2013.
- For 2013, when discounting liabilities at lower, unsmoothed corporate bond rates:[4]
  - Roughly 80% of the system fell short of their seven-year funding pace benchmarks.
  - Contributions for roughly 60% of the system failed to meet the benchmark for maintaining existing unfunded liabilities.

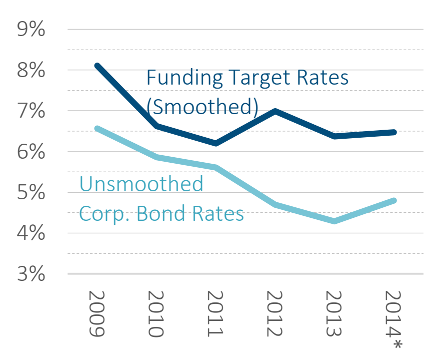
System Funded Status

Current federal minimum funding rules for this system discount liabilities at a smoothed curve of high-quality corporate bond rates and allow smoothing techniques for assets.[3] For 2013, the aggregate unfunded "Funding Target" liability was $20 billion. When estimated using unsmoothed, high-quality corporate bond rates and the market value of assets, it was $290 billion.[4] Presentation of these values is not intended to provide commentary on the appropriateness of these approaches for funding pension plans or any other purpose.

AGGREGATE LIABILITIES AND FUNDED STATUS



MEDIAN EFFECTIVE DISCOUNT RATES



* Data as of Jan. 5, 2016, reflecting approximately 75% of plans reporting.

[1] Society of Actuaries, "Multiemployer Pension Plan Contribution Analysis," March 2016, http://www.soa.org/Research/Research-Projects/Pension/2016-multiemployer-pension-plan-analysis.aspx.
[2] Analysis is based on Department of Labor Form 5500 database as of Jan. 5, 2016; approximately 75% of plans have reported for 2014.
[3] Internal Revenue Code section 430 and accompanying regulations define the minimum required contribution for these plans, including the smoothing techniques applied to corporate bond rates for use in valuing liabilities.
[4] Estimated liabilities are based on a yield curve of monthly average spot rates for high-quality market corporate bonds published by the Internal Revenue Service at https://www.irs.gov/Retirement-Plans/Monthly-Yield-Curve-Tables.

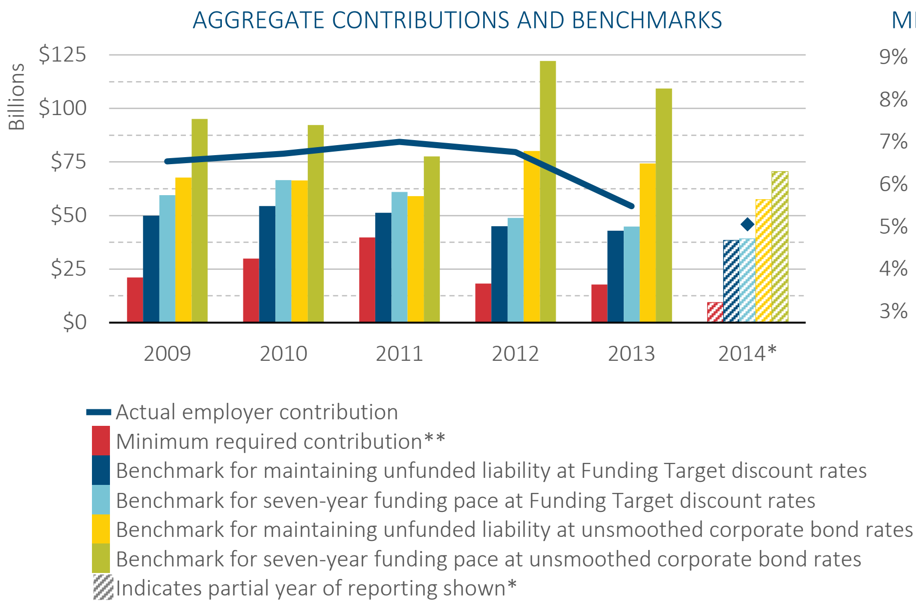
Aggregate Contributions

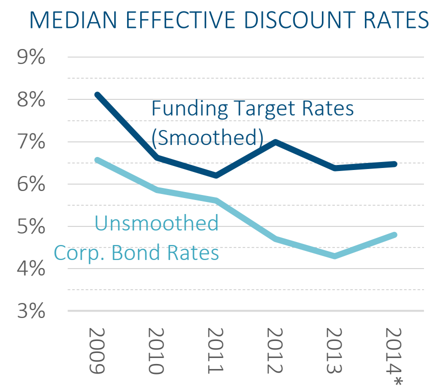
The graph below compares the system's aggregate employer contributions to the aggregate minimum required contributions under federal law after allowable offsets.[5] It also compares actual and minimum required contributions to four contribution benchmarks that represent specific funding perspectives. The funding perspective benchmarks represent contribution levels needed to meet two specific funding paces: to maintain the existing unfunded liability and to fund the unfunded liability over seven years.

The benchmark representing the contribution level needed to maintain the existing unfunded liability is the cost of current benefit accruals (normal cost) plus interest on any unfunded liability. The seven-year funding pace benchmark is the normal cost plus a seven-year amortization of any unfunded liability; unfunded liability is measured using the Unit Credit cost method and the market value of assets.[6]

A seven-year funding pace was selected for this analysis because it is a simplified approach to the basic concept behind current federal minimum required funding rules for this system. Among other differences from federal minimum funding rules, the seven-year funding pace benchmark disregards the sources of unfunded liabilities and their dates of creation, and, more significantly, optional offsets such as "carryover" and "prefunding" balances.

Neither the authors nor the SOA intend these benchmarks as commentary on the appropriateness of funding these or any other pension plans using these or any other methods or assumptions.





* Data as of Jan. 5, 2016, reflecting approximately 75% of plans reporting.
**The minimum required contribution is based on current law, regardless of the discount rate used in funding perspective benchmarks.

Through 2013 (the most recent complete year of reporting), aggregate employer contributions significantly exceeded aggregate minimum required contributions.

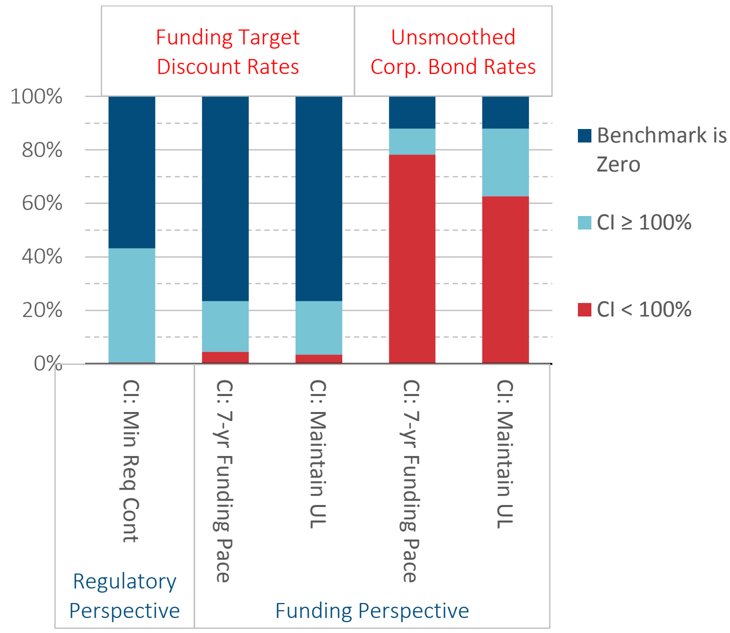
From a funding perspective, aggregate contributions also significantly exceeded both aggregate funding pace benchmarks computed using Funding Target liabilities, although by declining margins since 2011. However, using unsmoothed corporate bond rates, aggregate contributions generally exceeded the levels needed to maintain existing unfunded liabilities, but fell short—often significantly short—of a seven-year funding pace.[7] Based on roughly 75% of plans reporting for 2014, results appear likely to be similar to 2013.

[5] *Supra,* note 3.
[6] If the sum of normal cost and unfunded liability is negative, a funding perspective benchmark is considered to be zero.
[7] Consideration of contribution benchmarks based on unsmoothed discount rates may be unfamiliar to some readers.

Contribution Indices

Shifting from an aggregate view, the graph below shows how the system's plans stack up against various benchmarks or 2013. That is, it shows various contribution indices and the percentage of the system that meets each benchmark. In order to better represent the system, the distribution of plans is weighted by liabilities for this analysis. The appendix shows details for the contribution indices for all years studied.

PERCENTAGE OF SYSTEM IN VARIOUS CI RANGES FOR 2013



From a regulatory perspective, nearly the whole system met minimum funding requirements. For 2013, out of more than 27,000 plans, plans with fewer than 1% of the system's liabilities failed to meet their minimum required contributions. In addition, many plans have no minimum required contribution—for 2013, plans representing approximately 60% of the system's liabilities had no minimum required contributions. On the other end of the spectrum, plans representing nearly 20% of the system's liabilities contributed at least twice the amount of their minimum required contributions for 2013.

From a funding perspective, on a Funding Target basis, most of the system's contributions met or exceeded a seven-year funding pace. However, most of the plans that were not meeting a seven-year pace were also not contributing enough to maintain their existing unfunded liability—while 4% of the system failed the seven-year pace for 2013, 3% of the system failed to maintain their existing unfunded liability. The median discount rate for 2013 was 6.37%.

Without smoothing of the discount rates, the funding perspective story is quite different. For 2013, the median effective discount rate on an unsmoothed high-quality corporate bond basis was 4.29%, more than 200 basis points lower than the median effective Funding Target discount rate. For 2013, nearly 80% of the system's contributions failed to meet a seven-year funding pace while roughly 60% of the system failed to maintain their existing unfunded liabilities.

Data and Methods

Analysis is based on publicly available data from the Department of Labor Form 5500 as of Jan. 5, 2016. Plans identified as frozen were excluded. Other than adjustments for obvious errors, data were used as reported. The use of the reported values is not intended to provide commentary on the appropriateness of the underlying assumptions for funding these plans or any other purpose.

Liabilities were estimated by adjusting plans' reported Current Liabilities for reported plan actuaries' discount rates using assumptions for duration and convexity that were developed to represent the MEPP system as a whole and may not be appropriate for any given plan. Modifications to the assumptions and methods used may result in different numerical outcomes, but the overall conclusions are likely to be similar. Different assumptions and methods may be more appropriate for analysis of a specific plan or small set of plans.

Appendix

System Overview

The single employer defined benefit pension plan system is summarized below.[8]

In $billions[9]	2009	2010	2011	2012	2013	*2014[10]*
Number of Plans	29,110	28,436	27,954	27,262	27,133	*25,214*
Number of Participants (millions)						
Active	12.0	11.5	10.9	10.2	9.1	*7.7*
Terminated Vested	7.8	8.1	7.5	7.4	6.5	*5.6*
Retired	7.9	8.0	7.7	7.9	7.6	*6.7*
Total[11]	27.7	27.6	26.1	25.6	23.1	*20.0*
Actuarial Value of Assets (AVA)	$1,441	$1,575	$1,515	$1,673	$1,693	*$1,589*
Market Value of Assets (MVA)	1,334	1,529	1,595	1,682	1,726	*1,649*
Funding Target Discount Rate Basis						
Liability-weighted Median Discount Rate	8.11%	6.62%	6.20%	6.99%	6.37%	*6.47%*
Total Liabilities	$1,351	$1,559	$1,585	$1,533	$1,520	*$1,368*
Unfunded Liabilities (AVA)	46	90	131	39	22	*11*
Unfunded Liabilities (MVA)	91	112	87	37	18	*7*
Normal Cost	43	47	46	43	42	*38*
Unsmoothed Corporate Bond Rate Basis						
Liability-weighted Median Discount Rate	6.57%	5.86%	5.61%	4.70%	4.29%	*4.80%*
Total Liabilities	$1,547	$1,711	$1,695	$2,011	$1,986	*$1,687*
Unfunded Liabilities (MVA)	248	227	162	354	291	*111*
Normal Cost	53	54	51	65	62	*52*

[8] Includes multiple employer plans, which are reported in the same way as single employer plans; terminated plans are excluded.
[9] Some figures may not add due to rounding.
[10] Data as of Jan. 5, 2016, reflecting approximately 75% of plans reporting.
[11] Numbers may not add due to rounding.

Contribution Indices Detail[12]

	2009	2010	2011	2012	2013	*2014**
Funding Target Discount Rate Basis						
CI: Minimum Required Contribution						
Benchmark Is Zero	45%	45%	29%	57%	57%	*72%*
CI ≥ 200%	**35%**	**31%**	**29%**	**24%**	**18%**	***17%***
150% ≥ CI > 200%	**4%**	**4%**	**9%**	**3%**	**8%**	***2%***
100% ≥ CI > 150%	**16%**	**20%**	**33%**	**15%**	**16%**	***9%***
50% ≥ CI > 100%	0%	0%	1%	0%	0%	*0%*
0% > CI > 50%	0%	0%	0%	0%	0%	*0%*
0% (No Contribution)	0%	0%	0%	0%	0%	*0%*
CI: Seven-year Funding Pace						
Benchmark Is Zero	37%	40%	45%	63%	77%	*90%*
CI ≥ 200%	**23%**	**16%**	**16%**	**16%**	**10%**	***3%***
150% ≥ CI > 200%	**7%**	**7%**	**6%**	**5%**	**5%**	***1%***
100% ≥ CI > 150%	**7%**	**11%**	**16%**	**6%**	**4%**	***3%***
50% ≥ CI > 100%	11%	11%	12%	2%	1%	*1%*
0% > CI > 50%	4%	4%	2%	2%	1%	*0%*
0% (No Contribution)	11%	11%	2%	6%	2%	*2%*
CI: Maintain Unfunded Liability						
Benchmark Is Zero	37%	40%	45%	63%	77%	*90%*
CI ≥ 200%	**30%**	**25%**	**27%**	**21%**	**14%**	***4%***
150% ≥ CI > 200%	**6%**	**7%**	**9%**	**4%**	**4%**	***2%***
100% ≥ CI > 150%	**8%**	**9%**	**9%**	**3%**	**3%**	***1%***
50% ≥ CI > 100%	7%	5%	7%	1%	1%	*1%*
0% > CI > 50%	2%	3%	2%	2%	0%	*0%*
0% (No Contribution)	11%	11%	2%	6%	2%	*2%*
Unsmoothed Corporate Bond Rate Basis						
CI: Seven-year Funding Pace						
Benchmark Is Zero	22%	26%	26%	10%	12%	*28%*
CI ≥ 200%	**7%**	**11%**	**15%**	**6%**	**3%**	***6%***
150% ≥ CI > 200%	**7%**	**6%**	**7%**	**2%**	**1%**	***4%***
100% ≥ CI > 150%	**16%**	**10%**	**14%**	**11%**	**5%**	***8%***
50% ≥ CI > 100%	19%	18%	20%	24%	26%	*16%*
0% > CI > 50%	13%	11%	13%	22%	23%	*14%*
0% (No Contribution)	17%	18%	5%	24%	30%	*24%*
CI: Maintain Unfunded Liability						
Benchmark Is Zero	22%	26%	26%	10%	12%	*28%*
CI ≥ 200%	**21%**	**19%**	**27%**	**14%**	**8%**	***11%***
150% ≥ CI > 200%	**8%**	**11%**	**9%**	**10%**	**5%**	***5%***
100% ≥ CI > 150%	**12%**	**11%**	**13%**	**13%**	**12%**	***9%***
50% ≥ CI > 100%	14%	10%	14%	22%	22%	*13%*
0% > CI > 50%	6%	5%	6%	8%	11%	*10%*
0% (No Contribution)	17%	18%	5%	24%	30%	*24%*

[12] Some percentages may not add to 100% due to rounding.

About the Society of Actuaries

The Society of Actuaries (SOA), formed in 1949, is one of the largest actuarial professional organizations in the world dedicated to serving 24,000 actuarial members and the public in the United States, Canada and worldwide. In line with the SOA Vision Statement, actuaries act as business leaders who develop and use mathematical models to measure and manage risk in support of financial security for individuals, organizations and the public.

The SOA supports actuaries and advances knowledge through research and education. As part of its work, the SOA seeks to inform public policy development and public understanding through research. The SOA aspires to be a trusted source of objective, data-driven research and analysis with an actuarial perspective for its members, industry, policymakers and the public. This distinct perspective comes from the SOA as an association of actuaries, who have a rigorous formal education and direct experience as practitioners as they perform applied research. The SOA also welcomes the opportunity to partner with other organizations in our work where appropriate.

The SOA has a history of working with public policymakers and regulators in developing historical experience studies and projection techniques as well as individual reports on health care, retirement, and other topics. The SOA's research is intended to aid the work of policymakers and regulators and follow certain core principles:

Objectivity: The SOA's research informs and provides analysis that can be relied upon by other individuals or organizations involved in public policy discussions. The SOA does not take advocacy positions or lobby specific policy proposals.

Quality: The SOA aspires to the highest ethical and quality standards in all of its research and analysis. Our research process is overseen by experienced actuaries and non-actuaries from a range of industry sectors and organizations. A rigorous peer-review process ensures the quality and integrity of our work.

Relevance: The SOA provides timely research on public policy issues. Our research advances actuarial knowledge while providing critical insights on key policy issues, and thereby provides value to stakeholders and decision makers.

Quantification: The SOA leverages the diverse skill sets of actuaries to provide research and findings that are driven by the best available data and methods. Actuaries use detailed modeling to analyze financial risk and provide distinct insight and quantification. Further, actuarial standards require transparency and the disclosure of the assumptions and analytic approach underlying the work.

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