PBC and PBCR: Two Stress Metrics for U.S. Multiemployer Pension Plans

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Introduction and Executive Summary

Multiemployer pension plans (MEPPs) in the United States generally cover unionized participants from more than one participating private sector employer. While some MEPPs are in good financial condition, others are financially stressed. Actuaries employ any number of metrics for gauging financial stress among MEPPs. The Society of Actuaries (SOA) is pleased to update its longitudinal study of Previous Benefit Cost (PBC) and Previous Benefit Cost Ratio (PBCR), two metrics for measuring the financial stress on multiemployer pension plans resulting from the combination of unfunded liabilities and declining numbers of active participants.

The PBC represents a plan's annualized cost, per active participant, of eliminating its unfunded liability over 15 years. More specifically, it is the 15-year, level-amount amortization payment on the unfunded liability divided by the number of active participants.

The PBCR represents the share of a plan's total annualized cost that is attributable to eliminating its unfunded liability over 15 years, where total annualized cost includes the cost of current benefit accruals, administrative expenses and 15-year amortization of the unfunded liability. In technical terms, the PBCR is 15-year, level-amount amortization payment on the unfunded liability divided by the sum of the 15-year, level-amount amortization payment on the unfunded liability; the cost of current benefit accruals; and administrative expenses.[1]

This study presents PBCs and PBCRs across MEPPs for the 1999–2016 plan years, as well as preliminary results for 2017, based on a partial year of reporting. Analysis is based on publicly available Department of Labor Form 5500 data as Dec. 6, 2018. Data for 2016 include approximately 1,200 plans covering roughly 10 million participants and roughly 200,000 employers. Data for 2017 show about 55% of plans reporting, representing roughly 70% of total MEPP liabilities.[2]

Here are highlights of the updated results:

- The annualized per-active-participant cost of reducing unfunded liabilities generally increased from 2015 to 2016. When computing PBCs with funding discount rates, in 2016, 8% of plans covering 8% of MEPP participants had PBCs of $20,000 or greater, up from 6% of plans covering 7% of participants in 2015. And the percentage of plans with PBCs of $2,000 or less decreased from 40% of plans covering 46% of MEPP participants in 2015 to 34% of plans covering 33% of participants in 2016.

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[1] PBC and PBCR use the unit credit actuarial cost method and the market value of assets. Previous studies are available at https://www.soa.org/research-reports/2016/2016-multi-pension-plan-stress-metrics/.
[2] Refer to the Data and Methods section of this report for further information about the data used in this study.

- The plan-weighted median PBC increased from $3,138 in 2015 to $4,052 in 2016, and the participant-weighted median increased from $2,119 in 2015 to $3,047 in 2016.[3]

- From 2015 to 2016, the portion of total pension costs attributable to reducing unfunded liabilities increased. When computed with funding discount rates, the plan-weighted median PBCR increased from 49% in 2015 to 55% in 2016.

- Over half of MEPP participants were in plans for which the cost of reducing unfunded liabilities exceeded the cost of benefits earned by active participants, and the percentage of such participants increased from 2015 to 2016. The participant-weighted median PBCR increased from 54% in 2015 to 58% in 2016.

- The reason for PBC and PBCR increases from 2015 to 2016 is likely a combination of various economic and demographic factors that vary by plan.

- Using lower Current Liability discount rates, the plan-weighted median PBC increased from $14,412 for 2015 to $15,622 for 2016, and the participant-weighted median PBC increased from $11,271 for 2015 to $12,069 for 2016. In addition to economic and demographic factors affecting funding-discount-rate PBC increases, Current Liability discount rates for 2016 were slightly lower than for 2015. Lower discount rates generate greater liabilities, hence greater unfunded liabilities and greater PBCs.[4]

Previous Benefit Cost

As previously mentioned, a plan's PBC represents a the 15-year amortization payment on a plan's unfunded liability per active participant.[5] Figure 1 shows the percentage of PBCs that fall within given ranges when PBCs are computed using the discount rates that plans use for minimum funding purposes.[6] Refer to Figure 11 for further information about the discount rates. The distribution is presented under two weightings: by participants and by plan. Under participant-weighting, larger plans take up more space in the distribution than do smaller plans, and under plan-weighting, each plan takes up the same amount of space. The two distributions in Figure 1 are similar but are not identical.

Using funding discount rates, the percentage of plans with a PBC exceeding $20,000 have increased slightly during the past few years. In 2009, 4% of plans had PBCs exceeding $20,000, and less than 1.5% of plans had PBCs in excess of $30,000. By 2016, 8% of plans had a PBC of $20,000 or greater, and 4% of plans had PBCs greater than $30,000. Both percentages were up from 2015, when 6% of plans had a PBC exceeding $20,000, and 2% of plans' PBCs exceeded $30,000.

In 2009, 2% of MEPP participants were in plans with a PBC exceeding $20,000. In 2010, that percentage increased to 7% and has remained between 7% and 8% since then. However, the percentage of participants in plans with PBCs of $30,000 or greater increased from less than one-half of 1% (0.5%) in 2010 to 6% in 2016.
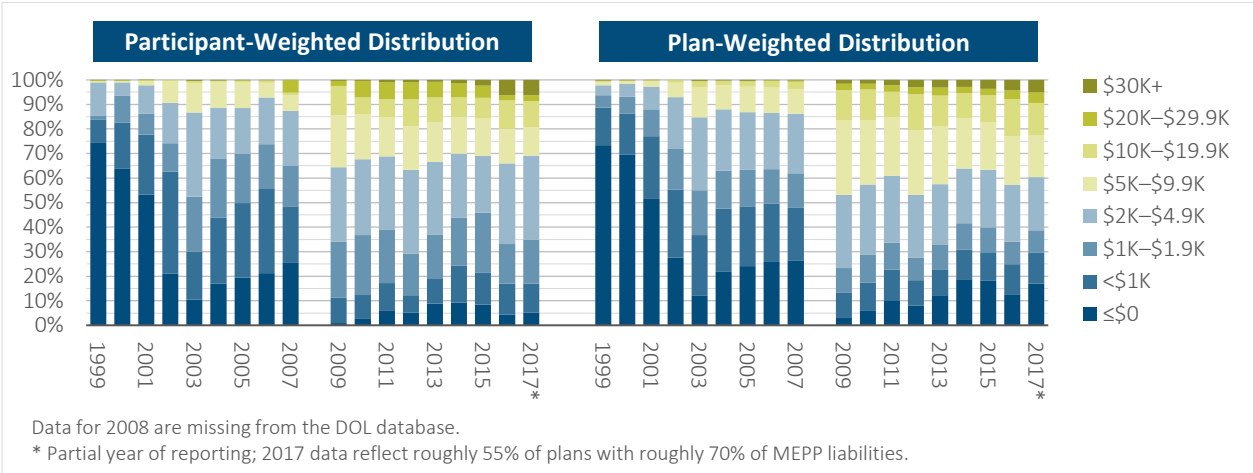
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[3] Form 5500 database shows plan-level data. Therefore, plan-weighted distributions may also be considered unweighted distributions.

[4] Discount rates used to compute Current Liability are based on an average of Treasury rates, which roughly approximates a risk-free rate. In addition, Current Liability reflects prescribed mortality assumptions that were developed largely from single employer (corporate) plan experience. Internal Revenue Code §431(c)(6)(D) governs the assumptions and methods used to compute Current Liability for MEPPs.

[5] PBC and PBCR measure unfunded liability using the unit credit actuarial cost method and market value of assets.

[6] Internal Revenue Code §§431–432 and accompanying regulations govern minimum funding requirements for MEPPs.

Figure 1
DISTRIBUTION OF PBC RANGES USING FUNDING DISCOUNT RATES

Data for 2008 are missing from the DOL database.
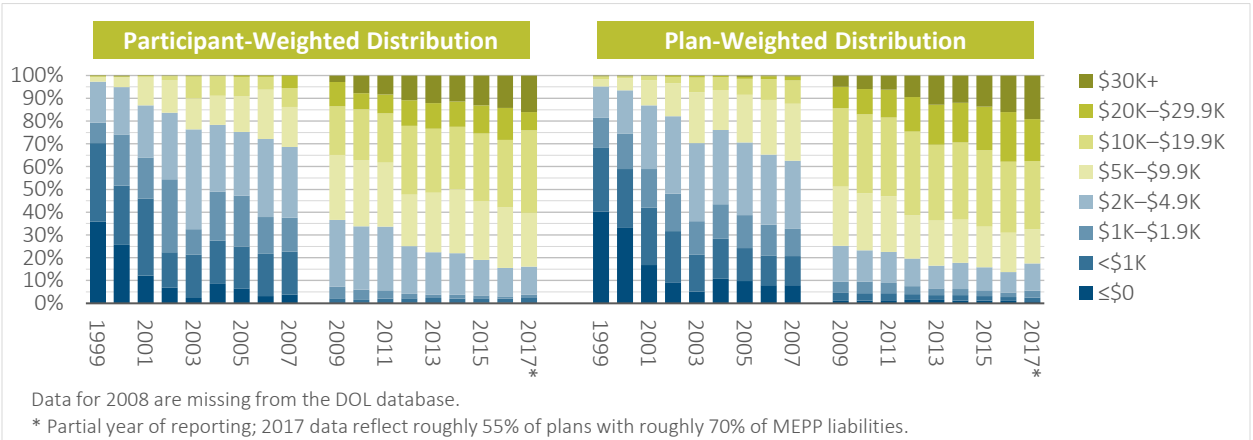* Partial year of reporting; 2017 data reflect roughly 55% of plans with roughly 70% of MEPP liabilities.

At the lowest three ranges, the percentage of plans whose PBC was less than $2,000 increased from 23% in 2009 to 40% in 2015 but dropped to 34% in 2016. During the same period, the percentage of MEPP participants who were in such plans was 34% in 2009 and generally increased to 46% in 2015 before falling back to 33% in 2016.

And the percentage of plans with PBCs less than $1,000 increased from 13% in 2009 to 30% in 2015 but fell to 25% in 2016. The percentage of participants in MEPPs with PBCs less than $1,000 increased from 11% in 2009 to 24% in 2014, but subsequently fell to 21% in 2015 and 17% in 2016.

Figure 2 shows equivalent distributions of PBCs computed using Current Liability discount rates. Current Liability discount rates are lower than the rates used for funding purposes, so liabilities and unfunded liabilities are greater.[7] Refer to Figure 11 for further information about the discount rates.

Figure 2
DISTRIBUTION OF PBC RANGES USING CURRENT LIABILITY DISCOUNT RATES

Data for 2008 are missing from the DOL database.
* Partial year of reporting; 2017 data reflect roughly 55% of plans with roughly 70% of MEPP liabilities.

[7] Discount rates used to compute Current Liability are based on an average of Treasury rates, which roughly approximates a risk-free rate. In addition, Current Liability reflects prescribed mortality assumptions that were developed largely from single employer (corporate) plan experience. Internal Revenue Code §431(c)(6)(D) governs the assumptions and methods used to compute Current Liability for MEPPs.

Using the lower Current Liability discount rates, many more plans fall into the highest ranges of PBCs. The percentage of plans with PBCs greater than $20,000 increased from 14% in 2009 to 38% in 2016, while the percentage of MEPP participants in such plans increased 14% in 2009 to 28% in 2016. Meanwhile, the percentage of plans with PBCs among the lowest levels has steadily fallen. In 2009, 9% of MEPPs covering 7% of MEPP participants had PBCs under $2,000. By 2016, less than 5% of plans covering 3% of participants had PBCs under $2,000.

Across the period studied, Current Liability discount rates generally fell steadily while funding discount rates declined only slightly. Lower discount rates generate greater liabilities, hence greater unfunded liabilities. Refer to Figure 11 for the average discount rates over this period.

Offering a different perspective on the span of PBCs across MEPPs, Figure 3 and Figure 4 show percentile distributions of PBCs. The percentile distributions convey better the dramatic range of PBCs at the higher end of the distributions. Figure 3 shows PBCs using funding discount rates and Figure 4 shows PBCs computed with Current Liability discount rates.

Figure 3
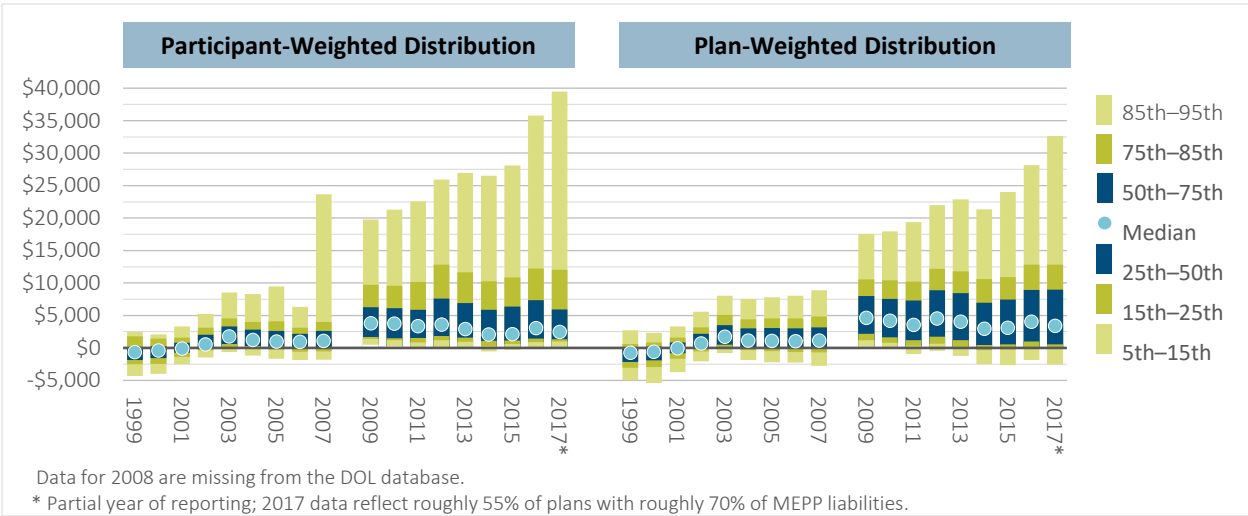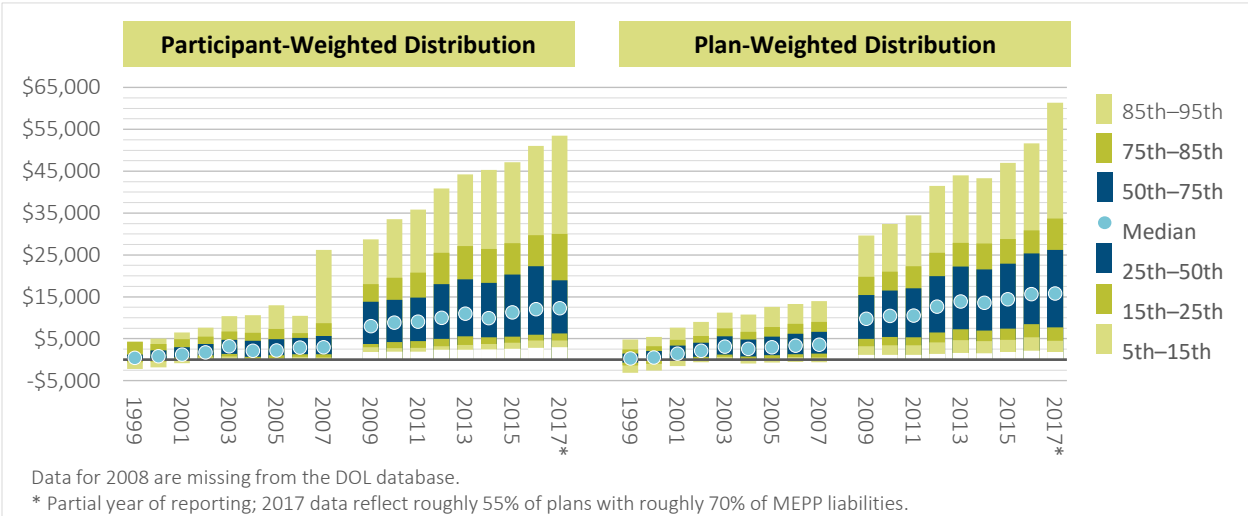PBC PERCENTILE DISTRIBUTION USING FUNDING DISCOUNT RATES

Data for 2008 are missing from the DOL database.
* Partial year of reporting; 2017 data reflect roughly 55% of plans with roughly 70% of MEPP liabilities.

Figure 4
PBC PERCENTILE DISTRIBUTION USING CURRENT LIABILITY DISCOUNT RATES

Data for 2008 are missing from the DOL database.
* Partial year of reporting; 2017 data reflect roughly 55% of plans with roughly 70% of MEPP liabilities.

Using funding discount rates (Figure 3), in 1999 the participant-weighted median PBC was –$621 and the plan-weighted median was –$752. Negative PBCs indicate a funding surplus rather than an unfunded liability. The participant-weighted median PBC peaked at $3,799 in 2009 and then generally declined to $2,119 in 2015 before increasing to $3,047 in 2016.Plan-weighted median PBCs were generally slightly higher than participant-weighted median PBCs. The plan-weighted median PBC increased from $3,138 in 2015 to $4,052 in 2016.

Preliminary results for 2017 indicate generally declining PBCs, likely in part because of better than-assumed investment returns during 2016.
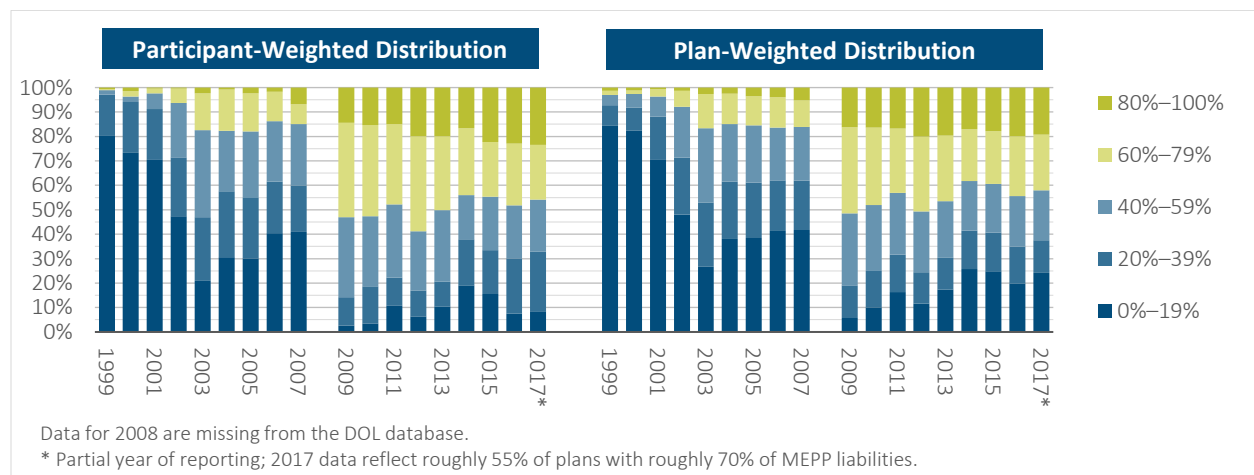
When computed with Current Liability discount rates (Figure 4), median PBCs generally increased from 1999 to 2016. In 1999, the participant-weighted median PBC was $465 and the plan-weighted median PBC was $286. In 2016, the participant-weighted median was $12,069 and the plan-weighted median was $15,622.

Previous Benefit Cost Ratio

A plan's PBCR represents the annualized cost of its unfunded liability as a portion of its total annualized cost, including the cost of current benefit accruals and administrative expenses.[8] A PBCR of 0% indicates no unfunded liability. A PBCR above 50% indicates that funding the unfunded liability makes up more than half of the annualized cost to fund a plan over 15 years.
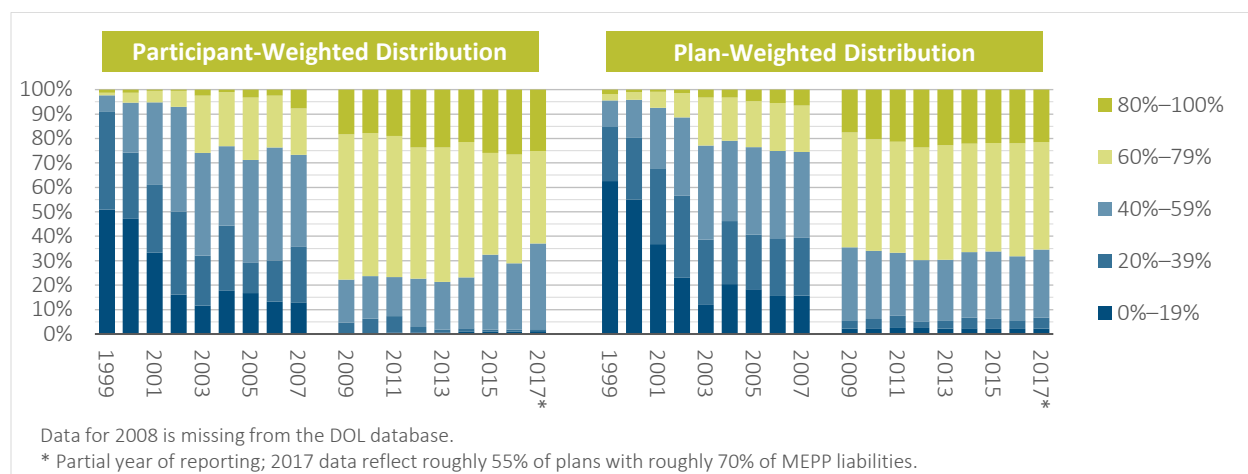
Figure 5 shows two PBCR distributions from 1999–2017, one weighted by number of participants and the other weighted by number of plans. For Figure 5, PBCRs are computed using the discount rates used by plan actuaries for funding purposes. Figure 6 shows equivalent distributions of PBCRs that are computed using Current Liability discount rates.[9]

Figure 5

PBCR RANGE DISTRIBUTION USING FUNDING DISCOUNT RATES

Data for 2008 are missing from the DOL database.
* Partial year of reporting; 2017 data reflect roughly 55% of plans with roughly 70% of MEPP liabilities.

[8] PBC and PBCR measure unfunded liability using the unit credit cost method and market value of assets; annualized cost of the unfunded liability is defined as a 15-year level-dollar amortization payment on the unfunded liability. The use of these methods for these metrics is not intended to provide commentary on their appropriateness for funding these plans or any other purpose.
[9] Discount rates used to compute Current Liability are based on an average of Treasury rates, which roughly approximates a risk-free rate. In addition, Current Liability reflects prescribed mortality assumptions that were developed largely from single employer (corporate) plan experience. Internal Revenue Code §431(c)(6)(D) governs the assumptions and methods used to compute Current Liability for MEPPs.

Figure 6
PBCR RANGE DISTRIBUTION USING CURRENT LIABILITY DISCOUNT RATES

Data for 2008 is missing from the DOL database.
* Partial year of reporting; 2017 data reflect roughly 55% of plans with roughly 70% of MEPP liabilities.

In 1999, 3% of plans and 1% of participants were in plans that had PBCRs of 60% or higher. In 2009, after the market crash, 51% of plans and 53% of participants were in plans with PBCRs of 60% or more. Since 2009, those percentages have generally fallen. By 2016, 44% of plans and 48% of participants were in plans whose PBCR was 60% of greater.

Using funding discount rates, the percentage of participants in plans with PBCRs of less than 20% dropped from 80% in 1999 to a low of 3% in 2009, before increasing to 16% in 2015 and then falling to 8% in 2016. The plan-weighted distribution was very similar through 2007. In 2009, 6% of plans had PBCRs below 20%, and the percentage generally increased to 25% in 2015 before dropping to 20% in 2016.

Using the lower Current Liability discount rates for the same period, PBCRs were much greater, indicating that the share of annualized cost attributable to reducing the unfunded liability was much greater. In 2009, 65% of plans covering 78% of plan participants had PBCRs greater than 60%. By 2015, 66% of plans covering 68% of participants saw PBCRs of 60% or more. In 2016, PBCRs exceeding 60% were attributable to 68% of plans covering 71% of plan participants.

At the highest range of PBCRs studied, in 1999, 2% of plans covering 1% of participants had PBCRs of 80% or more. In 2015, those figures had increased to 22% of plans covering 26% of participants, and 2016 percentages were about the same, with 22% of plans covering 27% of participants in plans with PBCRs exceeding 80%.

The percentile distributions in Figure 7 and Figure 8 provide additional insights to PBCR distributions across MEPPs. Percentile distributions of the PBCR provide additional insight, especially at the extreme ends of the distributions.

Distributions of both discount rates show that in 2015 and 2016, the PBCR at the 95th percentile of plans as well as at the 95th percentile of participants exceeded 90%. In other words, for at least 5% of plans, $9 out of every $10 spent to fund the pension plan was attributable to reducing the unfunded liability, and only $1 out of every $10 was attributable to the cost of benefits earned during the year.

The percentile distributions using funding discount rates also show that since 2009 half or more of plans covering half or more of MEPP participants had PBCRs of 50% or more, indicating that they spent as much or more to reduce unfunded liabilities as they paid to fund benefits earned during the year.

Using Current Liability discount rates, since 2009 half or more of plans covering half or more of MEPP participants had PBCRs of roughly 67% or more, indicating that they spent $2 of every $3 to reduce unfunded liabilities, and $1 of every $3 to pay for benefits earned during the year.

Figure 7

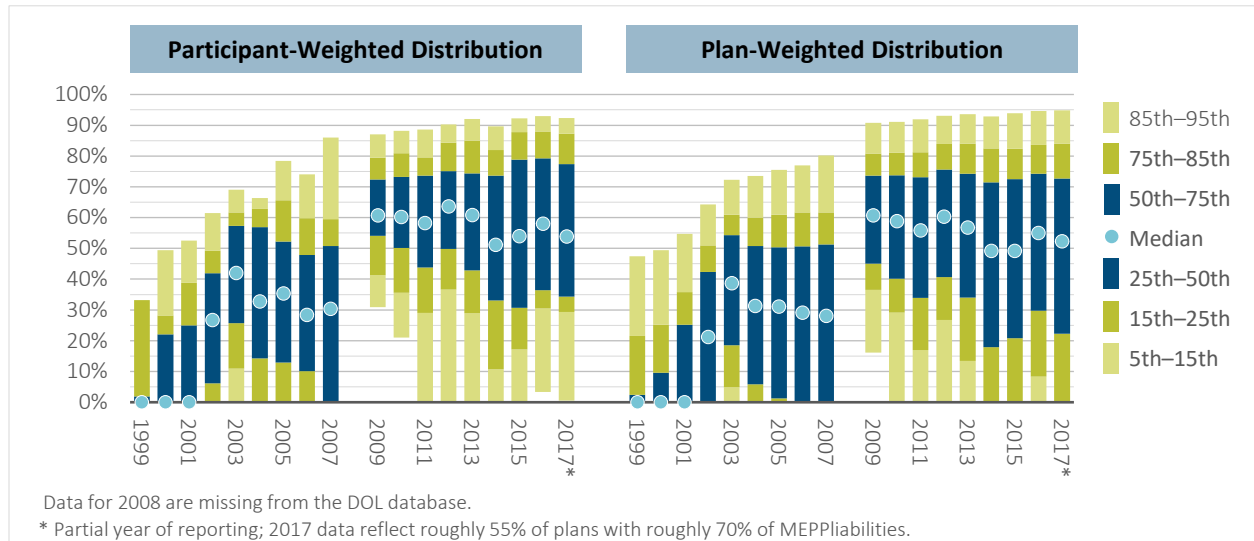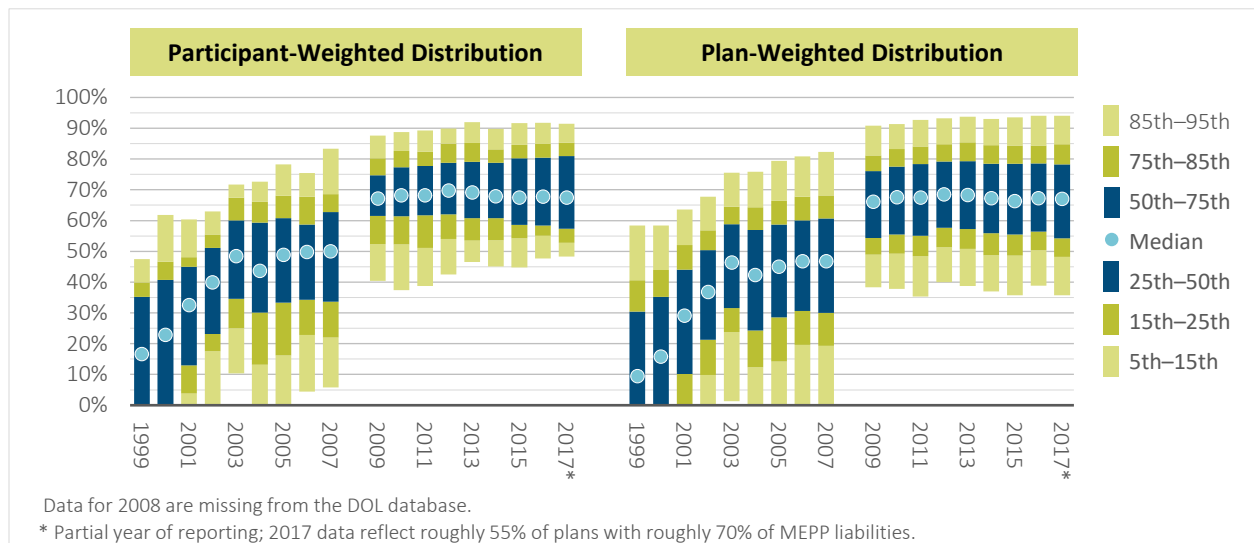PBCR PERCENTILE DISTRIBUTION USING FUNDING DISCOUNT RATES

Data for 2008 are missing from the DOL database.
* Partial year of reporting; 2017 data reflect roughly 55% of plans with roughly 70% of MEPPliabilities.

Figure 8

PBCR PERCENTILE DISTRIBUTION USING CURRENT LIABILITY DISCOUNT RATES

Data for 2008 are missing from the DOL database.
* Partial year of reporting; 2017 data reflect roughly 55% of plans with roughly 70% of MEPP liabilities.
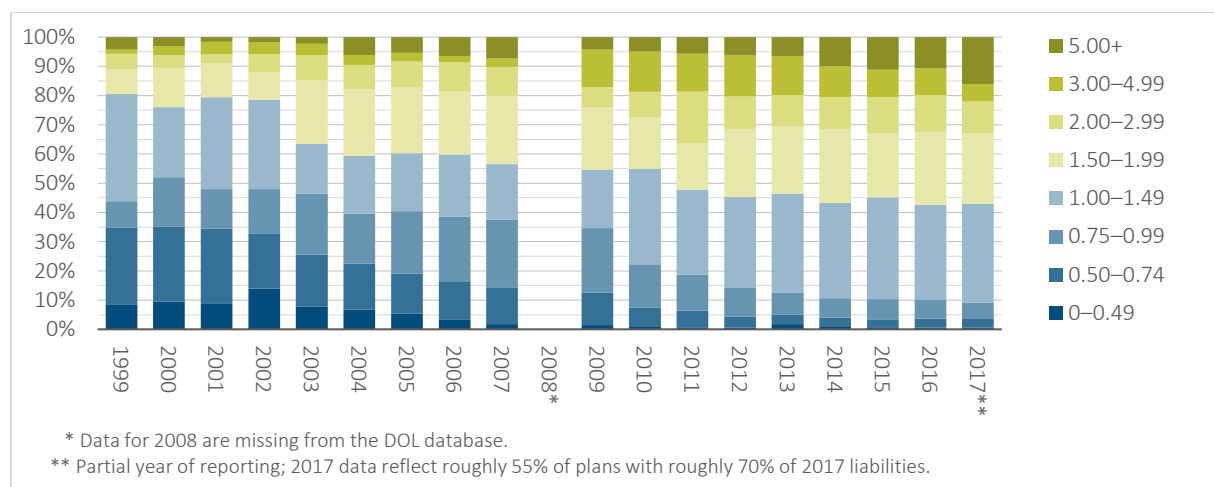
Dependency Ratio

Unfunded liabilities reflect benefits earned by both active and inactive participants. However, MEPP employer contributions typically are a product of the number of active participants working and the predetermined contribution rate. The dependency ratio is the ratio of the number of inactive participants to the number of active

participants. Therefore, all other things being equal, a plan with a higher dependency ratio—more inactive participants relative to active participants—will feel greater pressure on its contribution rates.[10]

Figure 9 shows the percentage of participants who are in plans with dependency ratios in given ranges. It shows that over most of the period studied, most MEPP participants were in plans whose inactive participants outnumbers active participants.

Figure 9
PARTICIPANT-WEIGHTED RANGE-DISTRIBUTION OF DEPENDENCY RATIOS

* Data for 2008 are missing from the DOL database.
** Partial year of reporting; 2017 data reflect roughly 55% of plans with roughly 70% of 2017 liabilities.

Further, the proportion of inactive MEPP participants steadily increased. In 1999, inactive participants outnumbered active participants in 56% of plans, and the proportion of inactive participants has increased steadily since then. In both 2015 and 2016, 90% of participants were in plans that had more inactive participants than active participants.

The frequency of more severe dependency ratios also increased. In 1999, about 1 out of 10 participants was in a plan with a dependency ratio of 2.0 or greater. By 2015 and 2016, 3 out of 10 participants were in plans with a dependency ratio of 2.0 or greater. In 1999, 4% of participants were in plans that had a dependency ratio of 5.0 or more, and by 2015, 11% of participants were in plans with a dependency ratio of 5.0 or more.

Aggregate Liabilities and Funded Status

Although some plans are in good financial condition, the multiemployer pension system carries significant unfunded liabilities, as Figure 10 shows. Using the actuarial methods and discount rates reported for minimum funding purposes, aggregate unfunded liabilities increased 14% from about $133 billion for 2015 to about $151 billion for 2016, the most recent year of complete reporting. The increase was in part because of lower-than-expected asset returns during 2015. Most plans continued to have an unfunded liability on the funding basis. Note that for the funding basis, actuarial methods may include asset smoothing. Factors affecting unfunded liabilities include contributions, plan changes, assumptions changes and/or favorable financial and demographic experience compared with the actuarial assumptions and are beyond the scope of this study.

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[10] Inactive participants include retirees as well as participants no longer accruing benefits but not yet retired.

Figure 10
AGGREGATE LIABILITIES AND FUNDED STATUS

* Partial year of reporting; 2017 data reflect roughly 55% of plans with 70% of MEPP liabilities.
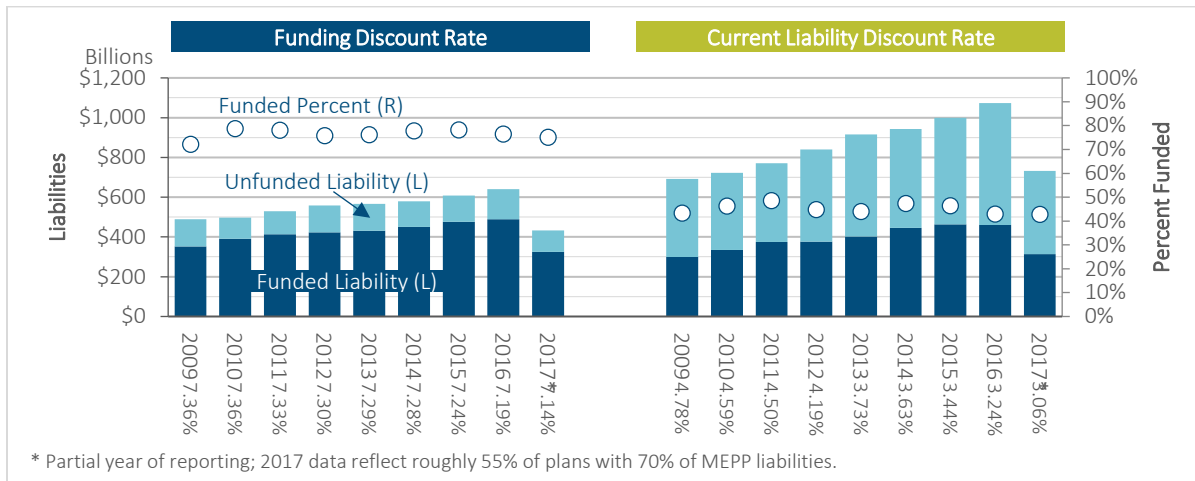
Current Liabilities are computed with much lower discount rates that vary from year to year and are compared with the market value of assets.[11] Unfunded Current Liabilities increased 15% from approximately $535 billion in 2015 to approximately $613 billion in 2016. The increase stemmed from lower discount rates, as well as other factors that were only partially offset by any favorable financial and/or demographic experience. Almost all plans had an unfunded liability on a Current Liability basis.

The number of plans with data in the DOL Form 5500 database prior to 2001 varies significantly from the number of plans with data in subsequent years. Because aggregate values in Figure 10 depend heavily on the plans included in the data, a limited number of years is shown. While Figure 10 shows plan-weighted average discount rates for the corresponding liabilities, Figure 11 shows the plan-weighted average discount rates for the entire period studied.

Figure 11
AVERAGE DISCOUNT RATES

* Data for 2008 are missing from the DOL 5500 database.
** 2017 data reflect roughly 55% of MEPPs.
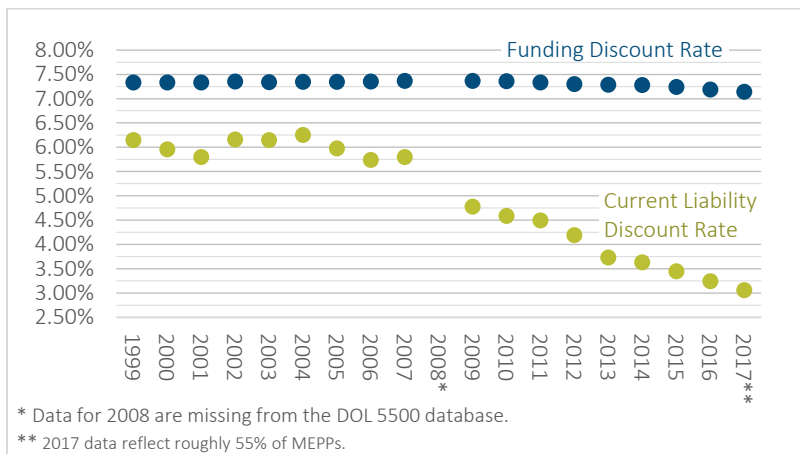
[11] Discount rates used to compute Current Liability are based on an average of Treasury rates, which roughly approximates a risk-free rate. In addition, Current Liability reflects prescribed mortality assumptions that were developed largely from single employer (corporate) plan experience. Internal Revenue Code §431(c)(6)(D) governs the assumptions and methods used to compute Current Liability for MEPPs.

Data and Methods

Tabulations and analyses are based on publicly available data from the Department of Labor Form 5500 as of Dec. 6, 2018, which reflects completed reporting for plan years through 2016 and a partial year of reporting for 2017. Data for 2017 represent reporting by roughly 55% of plans with roughly 70% of MEPP liabilities. Refer to Table 1 on the following page for a summary of the plans included in this study, and note the following items about the data:

- With typical extensions, Form 5500 is generally due 9½ months after the end of the plan year. For example, for a plan year that runs from Jan. 1, 2017 through Dec. 31, 2017, Form 5500 is due Oct. 15, 2018. Most plans file on or immediately before the deadline. Thus 2017 data reflects primarily plans with calendar year plan years plus any plans that filed earlier than required.

- Other than exclusions or 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 and methods for funding these plans or for any other purpose.

- Data for the 2008 Schedule MB is missing from the Department of Labor Form 5500 database, consequently all 2008 data is excluded from this study.

- Data in the DOL database for previous years may have changed, and authors' criteria for errors and missing data may differ slightly from some previous analyses. Consequently, results for previously published years may differ.

- Many participants have earned benefits under more than one multiemployer plan, and many employers contribute to more than one of these plans. This study reflects the sum of reported counts for each plan.

Liabilities for PBC and PBCR using funding discount rates are the unit credit liabilities reported on Schedule MB for years 2008 and later. For years prior to 2008, the authors estimated unit credit liabilities by adjusting Current Liabilities under Internal Revenue Code §431 for different discount rates. In previous iterations of this study, the authors estimated unit credit liabilities for all years. As a result, some of the figures in this study may not match previously published figures for some years, although the general outcome remains the same.

The techniques and assumptions used were developed for the multiemployer sector as a whole and may not be appropriate for any given plan or small set of plans. Modifications to the assumptions and methods used may result in different numerical outcomes, but the overall conclusions are likely to be similar.

Acknowledgments

Table 1

SUMMARY OF DATA INCLUDED

Plan Year	Excluded Number of Plans	Included in Study			
		Number of Plans	Number of Active Participants (Millions)	Total Number of Participants (Millions)	Number of Contributing Employers
1999	52	584	1.94	3.96	N/A
2000	76	1,187	3.42	6.90	N/A
2001	79	1,222	4.03	8.16	N/A
2002	58	1,249	4.13	8.45	N/A
2003	44	1,269	4.03	8.53	N/A
2004	38	1,285	3.86	8.60	N/A
2005	33	1,307	4.09	9.18	N/A
2006	34	1,305	4.03	9.25	N/A
2007	34	1,309	4.03	9.39	N/A
2008	N/A	N/A	N/A	N/A	N/A
2009	134	1,197	3.90	9.37	219,486
2010	147	1,173	3.67	9.33	212,539
2011	100	1,203	3.62	9.57	214,660
2012	95	1,209	3.50	9.57	205,756
2013	100	1,194	3.59	9.68	208,144
2014	61	1,216	3.56	9.76	203,082
2015	42	1,221	3.53	9.74	204,767
2016	37	1,212	3.63	10.07	199,849
2017[12]	20	662	2.53	7.13	117,482

[12] Partial year of reporting; data as of Dec. 6, 2018, reflect roughly 55% of plans with roughly 70% of 2017 liabilities.

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 30,000 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.

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