

## The Multiemployer Pension System: Simulations of the Status Quo

### 1. Overview

This paper presents simulations of the multiemployer pension system under various sets of assumptions, so as to assess the range of possible outcomes should the basic features of the multiemployer system remain unchanged. Metrics presented include the number of plans projected to become insolvent, the number of participants in these plans, and the projected year of insolvency of the PBGC's multiemployer guarantee fund.

The simulations were performed using the Multiemployer Pension Simulation Model (MEPSIM<sup>1</sup>), developed by the Pension Analytics Group. MEPSIM simulates almost all of the 1300 plans in the multiemployer universe, excluding only those plans that lack sufficiently complete 5500 data. This comprehensive approach eliminates the issue of sample-bias, which can affect models that focus on small subsets of the plan universe.

### 2. A Brief Description of MEPSIM

MEPSIM uses publicly-available 5500 data from 2015 as a starting point for its simulations. The data provides key values for each plan, such as liabilities, assets, contributions, current benefit payments and participant counts. At the outset of each plan simulation, MEPSIM uses an algorithm to create a realistic stream of benefit cash flows with a present value equal to the plan's accrued liability. The accrued benefit stream is tailored to the plan's level of demographic maturity, and to match plan data for current benefits (total payments to plan retirees in 2015). An additional benefit stream is created with a present value equal to the plan's "normal cost". This stream represents the annual rate at which the plan's working age population accrues new benefits.

To move forward in time, MEPSIM performs the following actions in each projection year:

1. Payments coming due are subtracted from plan assets, and simultaneously released from the accrued benefit stream such that they are no longer part of the plan's liability.
2. Assets are modified to reflect returns (at the user-specified rate), and contributions received.
3. The stream of accrued benefits is increased to reflect the plan's normal cost.

Using this modeling approach, a plan's financial position changes in a realistic manner across time. Some plans will move along a downward trajectory, eventually becoming insolvent, while others will climb upwards. Users can experiment with assumptions such as the return-on-assets, the rate-of-increase of contributions, and the rate-of-increase of the plan's unit benefit, and observe how these changes affect outcomes. For simplicity, the assumptions are applied uniformly across all plans. That is, it is not possible to specify one set of assumptions for plan "A", a different set for plan "B", etc. For the next version of MEPSIM, we are considering adding the ability to vary assumption sets by major industry category.

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<sup>1</sup> MEPSIM is available online at [www.PensionAnalytics.org](http://www.PensionAnalytics.org).

### 3. Baseline Assumptions

Total contributions to multiemployer plans have roughly doubled since 2001, while total normal cost – a proxy for the annual rate at which workers accrue additional benefits – has been roughly flat. These statistics suggest that plans are depending primarily on contribution increases, not benefit cuts, when addressing deficits. Our historical analysis of individual plans supports this conjecture. Therefore, our “status quo” simulations assume this pattern continues through 2025, with plans raising contributions while holding unit benefits constant.

After 2025, however, we assume it will no longer be possible to raise contributions-per-worker while holding benefit levels unchanged. If this approach were to continue indefinitely, the internal-rate-of-return (IRR) that equalizes the present value of benefit accruals with contributions would drop to an unrealistically low level. Already, for many plans, this IRR has fallen below the risk-free rate-of-return. This issue will be discussed further in a subsequent paper.

Our baseline assumptions are as follows:

**Table 1. Baseline Assumptions**

	<b>Through 2025</b>	<b>After 2025</b>
Return on plan assets	6.0%	6.0%
Rate of increase of the number of active workers	-1.5%	0.0%
Rate of increase of contributions-per-worker	1.5%	0.0%
Rate of increase of each plan’s unit benefit	0.0%	0.0%
Rate of increase of the PBGC’s guaranteed benefit	0.0%	0.0%

- To set our baseline assumption for asset returns, we reviewed the latest medium and long-term capital market forecasts by Vanguard, the McKinsey Global Institute, and JP Morgan. Together, these reports suggest that, for a portfolio allocated 60% to equity and 40% to bonds, a realistic expected return over the next 25 years is 6%. Therefore, we adopted 6% as our baseline assumption for rate-of-return.
- Between 2001 and 2015, the total number of active workers declined at an average rate of 1.5%. We have assumed this trend will continue through 2025, after which the number of workers is assumed to be stable. We adopted the stabilization assumption with caution, bearing in mind that if, in fact, the decline in active workers ends up continuing, we will be understating the likely insolvencies and attendant costs to the PBGC.
- We assume contributions-per-worker increase annually by 1.5% through 2025, then remain level.
- Each plan’s unit benefit is assumed constant across time.
- The level of the PBGC’s benefit guarantee is assumed to remain unchanged.
- We use a rate of 2.55% for discounting the projected stream of PBGC assistance payments. This rate value was determined as a level-equivalent of the full Treasury yield curve from July 3, 2017 for discounting projected assistance payments. We used the projected assistance stream from a baseline run for this purpose, but also found the equivalence-value quite insensitive to assumption changes.

#### 4. Simulation Results under Baseline Assumptions

Under our baseline assumptions, MEPSIM produces the following results:

**Table 2. Simulation Results under Baseline Assumptions**

Group	Projected Year of Insolvency	Number of Insolvent Plans	Total Number of Plan Participants (1000s)	Median Ratio of Workers to Total Participants	Median Ratio of Assets to Liabilities <sup>2</sup>	Present Value of Projected Assistance Payments (Billions)
<b>A</b>	2017 to 2026	39	634	16.2%	35.2%	\$32.0
<b>B</b>	2027 to 2036	92	1,525	21.9%	52.2%	46.3
<b>C</b>	2037 to 2046	120	1,493	34.4%	61.4%	44.1
<b>D</b>	2047 to 2056	102	1,602	38.7%	68.5%	46.8
<b>E</b>	2057+	100	779	40.4%	75.6%	15.5
<b>Total</b>		453	6,032	33.3%	62.7%	184.7
<b>A + B</b>		131	2,158	19.4%	48.8%	78.3
Projected Year of Exhaustion of the PBGC's Multiemployer Guarantee Fund = 2027						

A total of 453 plans are projected to become insolvent, at a present value cost of \$185 billion to the PBGC. This heavy burden is projected to exhaust the PBGC's multiemployer guarantee fund in 2027.

However, some plans could avoid insolvency with modest adjustments to contribution and/or benefit levels. The table above categorizes plans into five groups (A through E) by their projected year-of-insolvency. Within category "A" -- the worst-situated group, with plans headed toward insolvency before 2027 -- the median values for two key ratios, (i) workers to total participants, and (ii) assets to liabilities, are just 16.2% and 35.6%, respectively. For these deeply troubled plans, insolvency appears inevitable.

Moving through groups B to E, plans are increasingly well-situated and, as a consequence, the severity of contribution increases or benefit cuts needed to avoid insolvency declines. Our next paper will include a discussion of this correlation between current financial health and level of required remedial action.

Plans in groups A and B are at an extremely high risk of insolvency. These plans, covering 2.2 million participants, are projected to run out of funds within the next 20 years, at a present value cost of about \$80 billion to the PBGC.

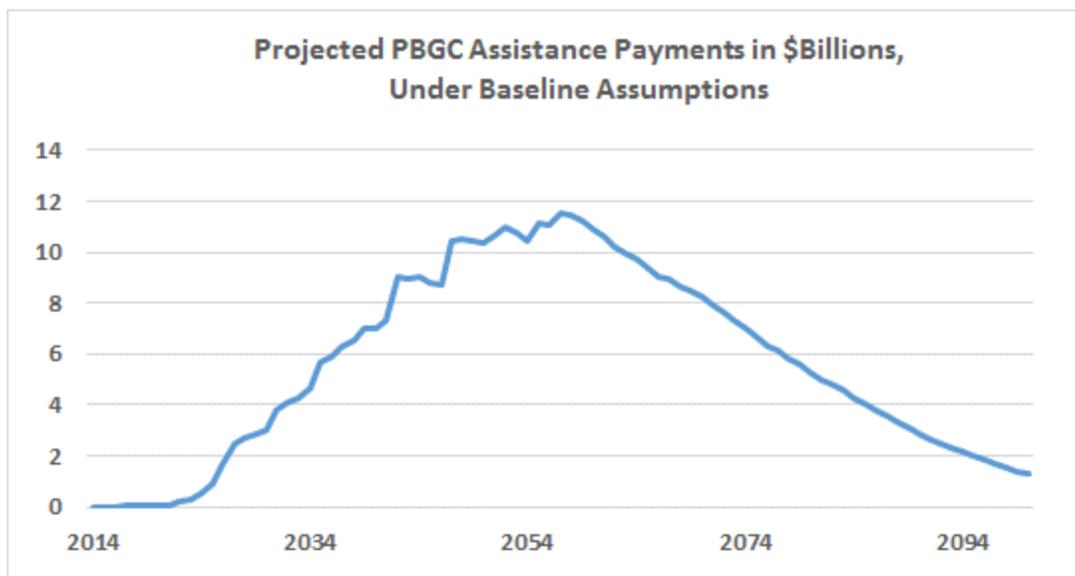
A widely-held view is that a few large plans will present the lion's share of claims on the PBGC. In our baseline run, however, the 10 largest projected claims account for less than half (42%) of total present value of assistance:

<b>Table 3. PV of Assistance of the Largest Claims as a Share of the Total Present Value of Assistance</b>	
Largest claim	10.9%
Sum of 10 largest claims	41.6%
Sum of 20 largest claims	57.6%

<sup>2</sup> We computed this funding ratio by dividing the market value of assets by the plan's unit credit liability, adjusted to a 6% discount rate.

Eliminating the 10 largest claims entirely, in our simulations, “buys” only five years for the PBGC multiemployer guarantee fund, postponing its 2027 exhaustion (based on including all projected claims) only until 2032.

Finally, it is worth noting that the projected stream of PBGC payments has a long tail. Projected assistance payments reach a peak of \$11.2 billion in 2055, and then decline slowly. Our baseline assumes the PBGC benefit guarantee is not indexed. As a consequence, the real value of the guarantee erodes significantly across time. Assuming an average inflation rate of 2%, by 2050 the purchasing power of the guaranteed benefit will have been cut in half relative to current levels, meaning that the PBGC deficits we are forecasting reflect only what is needed to preserve an insurance that lacks long-term protection against price inflation. Indexing guarantees would add significantly to the model’s projected deficits for the PBGC, as demonstrated in section six of this paper.



## 5. Relationship between Zone Status and Risk of Insolvency

On an annual basis, multiemployer plans are required by law to obtain a zone certification from a qualified actuary. Based on a variety of demographic and financial criteria, plans are classified into one of the following zones: (1) not endangered or critical, (2) endangered, (3) seriously endangered, (4) critical or (5) critical and declining. A plan’s zone categorization is intended to roughly represent its risk of insolvency: a plan in the “not endangered or critical” (or “green”) zone is considered to have a low (or no) risk of insolvency, while a “critical and declining” plan’s insolvency risk is considered to be very high.

Our baseline simulation results reveal a strong correlation between a plan’s zone status and its estimated year of insolvency (as projected by MEPSIM):

**Table 4. Total Number of Plans and Projected Number of Insolvencies, Categorized by Zone Status**

Zone	# of Plans in Category	# of Projected Insolvencies	# Insolvencies / # of Plans	Median Year of Insolvency	PV of Assistance (Billions)
1. Not Endangered or Critical	740	219	29.6%	2051	\$77.1
2. Endangered	140	34	24.3%	2048	13.2
3. Seriously Endangered	4	1	25.0%	2044	0.6
4. Critical	207	138	66.7%	2038	48.3
5. Critical and Declining	65	61	93.8%	2029	45.4
Total	1156	453	39.2%		184.7

As one would expect, the projected year-of-insolvency falls (i.e. moves closer to the present) as the severity of the zone status increases. In addition, the percentage of plans projected to become insolvent is sharply higher for plans in the critical and critical-and-declining zones than for those in the other zones.

Our modeling does suggest that about 30% of “green zone” plans are in fact edging toward insolvency. This, of course, is under our baseline assumptions, which likely differ from the assumptions used in the zone certification process. For most plans in this category, the horizon for intervention is ample, with modest benefit cuts and/or contribution increases sufficient -- at least currently -- to avoid insolvency.

## 6. Sensitivity Analysis

To test sensitivity, we varied each individual assumption while holding all others at baseline levels:

**Table 5. Sensitivity of Simulation Results to Changes in Assumptions**

	Assumption Relative to Baseline Level	Year of PBGC Fund Exhaustion	Insolvencies Before 2037		All Insolvencies	
			# Insolvent Plans	PV of Claims (Billions)	# Insolvent Plans	PV of Claims (Billions)
0. Baseline		2027	131	\$78.3	453	\$184.7
1. Return on plan assets, optimistic	+2%	2029	77	44.9	150	69.0
2. Return on plan assets, pessimistic	-2%	2026	239	138.4	852	324.6
3. Rate of increase # of workers, optimistic	+1%	2028	115	70.2	354	167.3
4. Rate of increase # of workers, pessimistic	-1%	2027	148	84.8	554	207.2
5. Rate increase of contributions-per-worker	+1%	2028	115	68.9	297	137.3
6. Rate increase of each plan's unit benefit	+1%	2027	147	90.9	684	268.8
7. Increase of the PBGC's guaranteed benefit	+1%	2027	131	82.3	453	210.8

For example, row one of the table shows the effect of increasing the rate-on-return (ROA) on plan assets by 2% (from 6% to 8%), while holding all other assumptions unchanged at their baseline levels. Roughly speaking, each 1% increase of the ROA reduces the present value of PBGC assistance by about \$60 billion.

While each assumption change has a significant impact on the present value of PBGC assistance, the projected year of exhaustion of the PBGC's guarantee fund is hardly affected because the fund's current asset level is quite small relative to expected claims. As a consequence, the fund is wiped out by the first wave of significant new claims.

## **7. Our Next Paper: Stabilization Options and Costs**

Simulations of the status quo indicate that a large number of plans will exhaust their assets in near future, and that the PBGC's multiemployer guarantee fund -- the backstop against such insolvencies -- will itself be rapidly exhausted even under optimistic assumptions.

We are currently using MEPSIM to evaluate a range of options for addressing this challenging situation. We are targeting the end of August for publication of the results.