ACTIVE PARTICIPANTS IN ME-PIMS

March 19, 2021

Advanced Analytical Consulting Group, Inc.

Constantijn W.A. Panis, PhD
213-784-6400
stanpanis@aacg.com

Karthik Padmanabhan, MS, MBA
312-551-9001
karpad@aacg.com

SUMMARY

The Pension Benefit Guaranty Corporation (PBGC) insures participants in private pension plans against loss of benefits in case their plan is unable to pay benefits. The agency uses a stochastic modeling system, the Multiemployer Pension Insurance Modeling System (ME-PIMS), to project future expected liabilities related to multiemployer plans. Future expected liabilities depend, in part, on annual employer contributions to multiemployer pension plans, which in turn depend on the number of active participants in such plans. This report reviews ME-PIMS's current approach to projecting active participation in multiemployer plans.

The current model assumes that the growth rate of active participants is distributed uniformly between -3.3% and 0.7%, with a long-term target of -1.3% per year. It assumes that all plans grow at the same rate. The projected rate can vary over time and scenarios, but it is invariant to industry, plan funding, macroeconomic indicators, or other factors.

We analyze historical rates of change of active participation in multiemployer plans and find that the current model is at odds with different rates of change across plans. We develop a simple alternative model in which historical rates of change are explained by plan maturity, plan risk status, Construction industry, and the rate of return on equity. We recommend that PBGC consider that model, or a similar one, to maintain heterogeneity among multiemployer plans and to recognize factors that can affect plans' financial outlook both directly and through their link with active participation and resulting cash flow.

CONTENTS

1. INTRODUCTION

The Pension Benefit Guaranty Corporation (PBGC) projects the solvency of its program to insure the benefits promised by multiemployer defined benefit (DB) pension plans based on a microsimulation model, the Multiemployer Pension Insurance Modeling System (ME-PIMS). PBGC retained Advanced Analytical Consulting Group, Inc. (AACG) to review ME-PIMS's current modeling of the number of active participants in multiemployer plans. This document is the final report of our review.

Employers that participate in a multiemployer plan make contributions on behalf of their employees who are active participants in the plan. Active participants may therefore be viewed as the contribution base of multiemployer plans. Their number directly correlates with the flow of cash to such plans and is therefore of vital importance to plan funding. By extension, accurate modeling of plans' numbers of active participants is important to the validity of ME-PIMS.

This report starts with a discussion of the current approach to modeling active participation in multiemployer plans, including its strengths and weaknesses (Section 2). Section 3 presents a quantitative analysis of the number of active participants in recent years. Section 4 concludes with recommendations for future modeling of active participation.

2. CURRENT MODELING APPROACH

Overview

Our understanding of the current approach to modeling the number of active participants is based on a 2014 memorandum by Steven Boyce ("Boyce Memo"),[1] which documented a prior version of the model, and private communication of recent changes. The number of active participants is equal to the previous year's number plus a random rate of growth:

$$N_{it} = N_{it-1}(1 + \alpha + \varepsilon_t) \qquad (1)$$

where N_{it} represents the number of active participants in plan *i* at time t, α denotes the average targeted growth rate, and ε_t is a random component. Equivalently, the annual rate of change is:

$$(N_{it} - N_{it-1})/N_{it-1} = \alpha + \varepsilon_t \qquad (2)$$

It is our understanding that α=-0.013, i.e., active participation is assumed to contract by 1.3% per year, on average. The random component is uniformly distributed from -0.02 to 0.02 (-2% to 2%). It varies across projection years and scenarios, but is the same for all

[1] PBGC provided us this memorandum, which was last modified on 7/21/2014. A near-identical version appears at https://www.pbgc.gov/about/projections-report/pension-insurance-modeling-system/projection-of-levels-of-future-active.

plans.[2] Equivalently, the assumption is that the rate of change is assumed to be uniformly distributed from -3.3% to 0.7%.

The targeted average growth rate, -1.3%, was based on historical numbers of active participants as reported on Schedule B/MB of 1991–2011 Form 5500 filings.

Strengths and Potential Weaknesses of the Current Approach

Perhaps the main virtue of the current approach is the fact that it is straightforward to understand. The model relies on only an average growth target (-1.3%) and the range of the uniformly distributed random component.

The model's parsimony is, of course, also the source of a number of potential weaknesses. We identified the following potential issues.

All plans grow at the same rate. The model's random component, ε_t, varies over time and across scenarios, but is assumed to be the same for all plans in a certain year and scenario. In reality, even in a single year, growth rates may vary across plans because of differences in non-union competition, regional variation, unequal challenges facing various industries, and other factors.

No Differences by Industry. The current model does not account for industry. However, long-term changes in the number of active participants may differ across industry sectors. (This is distinct from potential within-year variation across industries discussed in the previous paragraph.)

No Variation by Plan Characteristics. The current model does not account for any plan characteristics. However, the inclination of employers to continue contributing to a plan may depend on its financial outlook or other factors. For example, an underfunded plan with mostly inactive participants will likely need to increase its contribution rates to meet its benefit obligations, and employers may be discouraged by such a prospect.

No Interactions with the Macro Economy. The Boyce Memo demonstrates that active participation in multiemployer plans declined substantially in years with high unemployment and tended to increase in years with low unemployment. However, the current model does not account for any macroeconomic metric.

Long-Term Growth May Miss the Target. The model targets -1.3% growth on average, with annual growth rates that are distributed symmetrically around -1.3%. However, this average breaks down when growth is compounded over time. For example, suppose a plan with 1,000 active participants grows 10% in the first year (to 1,100 participants), and contracts 10% in the next year (to 990 participants). The arithmetic average of 10% and -10% is 0%, but the plan contracted by 1% because 1.10 x 0.90 = 0.99. Similarly, symmetry around a target of -1.3% may, in the long run, cause faster contraction than 1.3% annually.

[2] There is one exception. ME-PIMS assumes that contributions to plans in the Critical and Declining zone remain constant, and this assumption is implemented through a 0% rate of change (FY 2019 PBGC Projections Report, page 32).

Estimation Period. The current target rate of change model was estimated on data from 1991 through 2011. We will evaluate active participant changes using newer data.

The next section explores whether these potential issues are material to active participation and can be incorporated into a formal model.

3. ANALYSIS OF ACTIVE PARTICIPATION

Data Source

The current model was estimated on participant counts reported on Form 5500 filings of multiemployer plans for 1991-2011. Form 5500 filings are available from the DOL website since plan year 1999.[3]

The Form 5500 asks about active participation in multiemployer pension plans in two places. First, the main Form 5500 asks about numbers of plan participants at the end of the reporting period. (In addition, active participation at the beginning of the plan year needs to be reported since 2014.) See Figure 1. Second, Schedule MB asks about the number of participants at the beginning of the plan year; see Figure 2. Schedule MB replaced Schedule B, starting in 2008; the same participant questions were asked on Schedule B.

Figure 1. Participation Questions on the Form 5500

6		Number of participants as of the end of the plan year unless otherwise stated (welfare plans complete only lines 6a(1), 6a(2), 6b, 6c, and 6d).	
	a(1)	Total number of active participants at the beginning of the plan year	
	a(2)	Total number of active participants at the end of the plan year..................	
	b	Retired or separated participants receiving benefits	
	c	Other retired or separated participants entitled to future benefits	
	d	Subtotal. Add lines 6a(2), 6b, and 6c.	
	e	Deceased participants whose beneficiaries are receiving or are entitled to receive benefits.	
	f	Total. Add lines 6d and 6e.	
	g	Number of participants with account balances as of the end of the plan year (only defined contribution plans complete this item)	
	h	Number of participants who terminated employment during the plan year with accrued benefits that were less than 100% vested	

Source: 2014–2019 Form 5500. Line 6a(1) does not apply prior to 2014.

[3] See https://www.dol.gov/agencies/ebsa/about-ebsa/our-activities/public-disclosure/foia/form-5500-datasets. The analysis data were extracted on January 4, 2021.

Figure 2. Participation Questions on Form 5500, Schedule MB

	(1) Number of participants	(2) Current liability
2 Operational information as of beginning of this plan year:		
a […]		
b "RPA '94" current liability/participant count breakdown:		
(1) For retired participants and beneficiaries receiving payment		
(2) For terminated vested participants		
(3) For active participants:		
(a) Non-vested benefits...		
(b) Vested benefits		
(c) Total active		
(4) Total		
c […]		

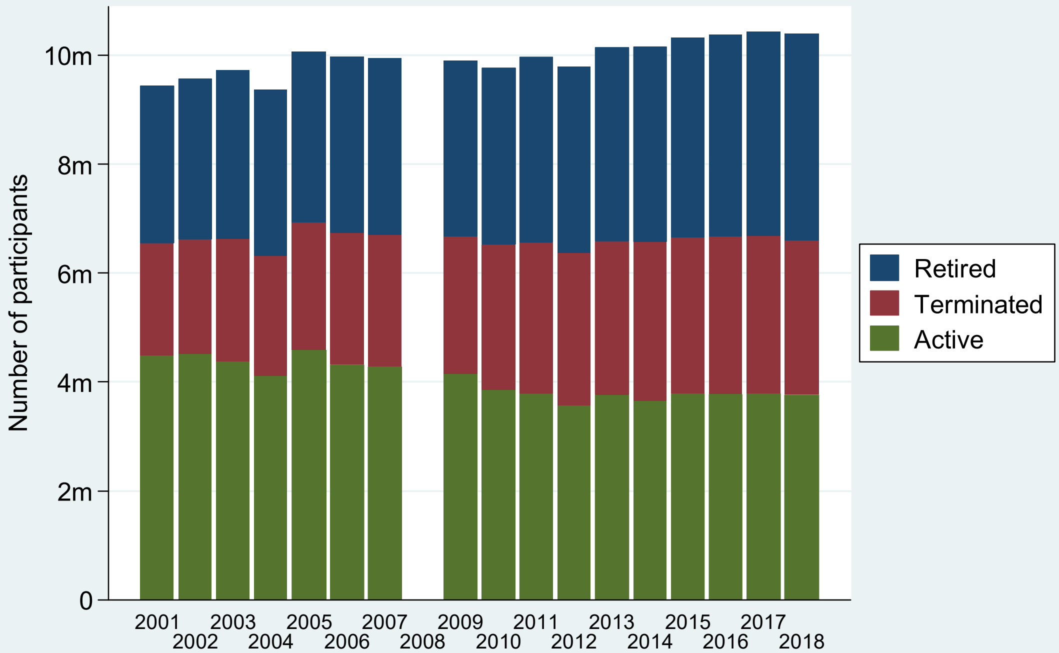
Source: 2008–2019 Form 5500 Schedule MB.

Participant counts on the main Form 5500 and Schedule B/MB are generally consistent. It is our understanding that ME-PIMS uses Schedule B/MB participant counts, and our focus is likewise on Schedule B (through 2007) or Schedule MB (2008 and later). Where Schedule B/MB participant counts were missing, we used the main Form 5500 for imputation purposes. Schedule B/MB asks for the number of participants at the beginning of the reporting period. The calendar year in which a reporting period started is known as the plan year.

Descriptive Statistics

Figure 3 shows the number of active, terminated/vested, and retired participants in multiemployer plans, as reported on Schedule B/MB, for plan years 2001 through 2018. Years 1999-2000 and 2019 are not shown because the data appeared incomplete; no Schedule MB data are available electronically for 2008. While the total number of participants has generally increased, active participation generally decreased until 2012 and remained approximately level after 2012.

Figure 3. Active, Terminated/Vested, and Retired Participants in Multiemployer Plans, By Plan Year



Source: Form 5500, Schedule B/MB.

The number of plans that reported nonzero active participants decreased from 1,530 in 2001 to 1,228 in 2018, indicating that many multiemployer plans merged or terminated. The aggregate number of active participants may therefore not be a good basis for estimating and projecting organic changes in active participation of ongoing plans.

Figure 4 shows the distribution of yearly changes in active participation based on pairs of consecutive filings. The distribution is mostly bell-shaped, except at the extremes: 0.9% experienced a change of -100% (from any active participants to none) and 0.5% reported a change of 100% or more. Figure 5 shows the same, weighted by active participants.[4] The weighted distribution is generally tighter, suggesting that large changes are associated with smaller plans. Again 0.9% of the distribution is at -100%, which means that plans covering 0.9% of active participants reduced to zero active participants in any single year. We manually reviewed the filing histories of the 20 largest plans that reported zero active participants for the first time; in all but one case, the issue appeared to be misreporting because active participation was restored to approximately the same level as before in the next filing, and active participation as reported on the main Form 5500 was uninterrupted. In other words, filings that report a change of -100% often appear erroneous.

[4] All weighted analyses use the number of active participants in the preceding year as weight. For example, if a plan's active participants rose from 1,000 to 1,050, the change was 5% and is weighted by 1,000. Weighting by the preceding year's number ensures that the average change is equal to the change of the aggregate number.

Figure 4. Distribution of Annual Changes in Active Participation (1999–2019)

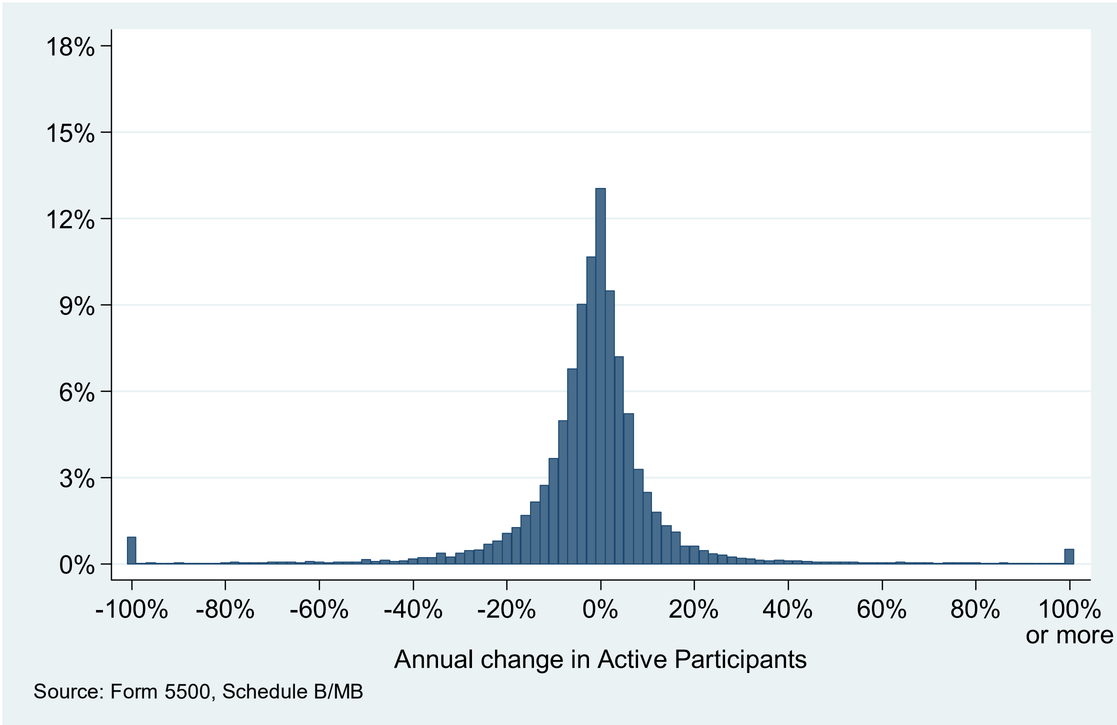
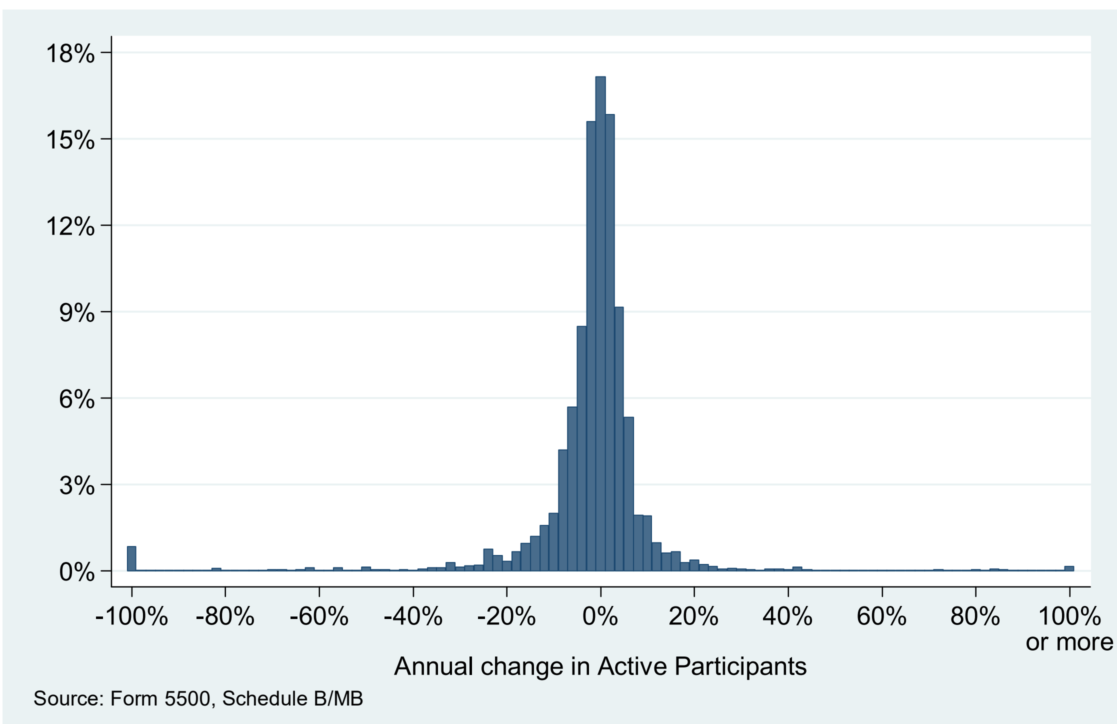


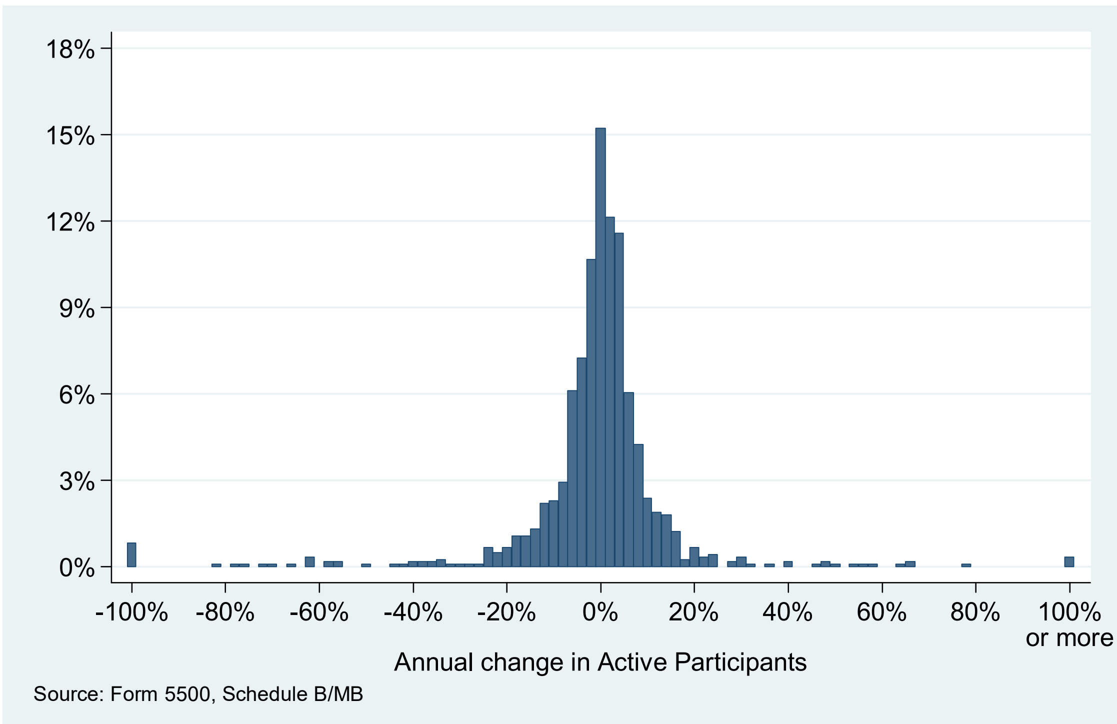
Figure 5. Distribution of Annual Changes in Active Participation, Weighted by Active Participants (1999–2018)



Apart from extreme changes, the distribution of annual change in active participation is bell-shaped. This suggests that the distribution of the model's random component should not be uniform but bell-shaped (e.g., normal). Our finding is consistent with the Boyce Memo, which likewise documented a bell-shaped distribution of rates of change.

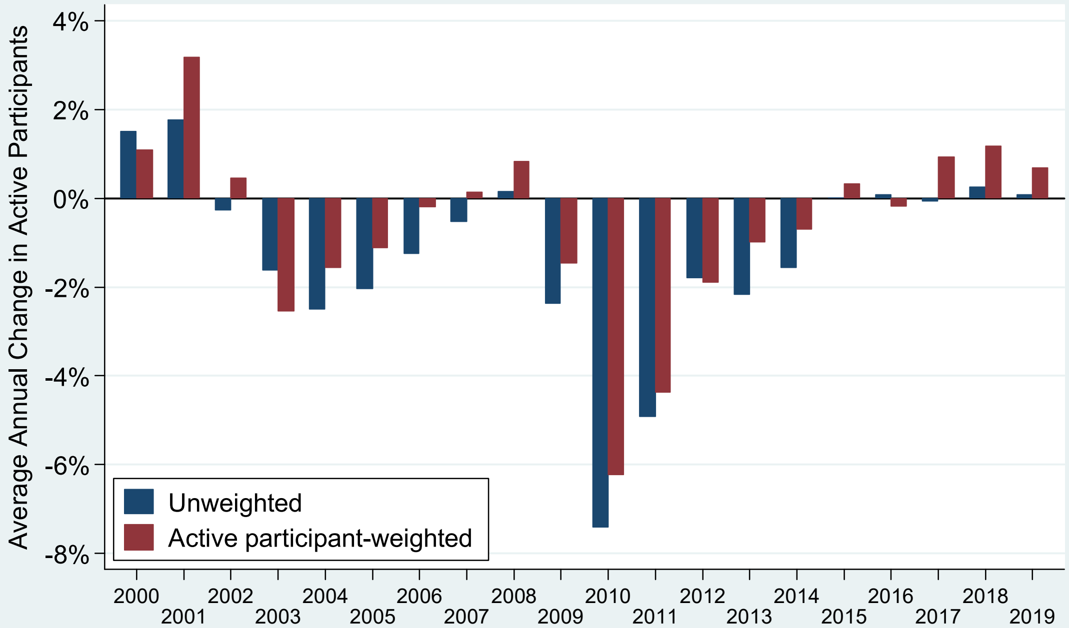
Figure 4 above shows the distribution of annual changes in active participation for pooled data from 1999 to 2019. Figure 6 shows the same for a single plan year, 2018. The distribution is again bell-shaped and there is substantial variation around the mean. This suggests that the current model's assumption that all plans grow at the same rate in a certain year is at odds with reality. The solution is straightforward, namely to draw a random component not just for every year (ε_t), but for every plan in every year (ε_{it}).

Figure 6. Distribution of Annual Changes in Active Participation (2018)



An objective of ME-PIMS, and thus of our analysis, is to project the change in active participants of plans as they grow or contract organically. Following the analysis in the Boyce Memo, we excluded reported changes outside the range from -30% to +30%. This criterion should exclude plan mergers and terminations from the analysis. For the remaining multiemployer plans, Figure 7 shows the average yearly change in active participation over time. The blue bars are unweighted and the red bars are weighted by active participants.

Figure 7. Average Change in Active Participation, by Plan Year



Source: Form 5500, Schedule B/MB.
Note: Excludes plans with changes in excess of 30%.

The participant-weighted average rate of change ranged from -6.2% in 2010 to 3.1% in 2001. Recall that the current model assumes that active participation in all plans grows or contracts at the same rate in a year, and that it draws the change randomly from a uniform distribution between -3.3% and 0.7%. In light of the historical annual averages shown in Figure 7, that range appears too narrow.

Taking the average over multiple years of annual average rates of change, the average participant-weighted change in 2000–2019 was -0.70% per year: -0.25% per year in 2000–2009 and -1.15% per year in 2010–2019. For comparison, the Boyce Memo found an average change of -1.3% between 1992 and 2011.

The annual average rates of change in Figure 7 are based on growth rates defined as $r_{it} = (N_{it} - N_{it-1})/N_{it-1}$, where r_{it} is the growth rate and N_{it} the number of active participants of plan *i* in year *t*. As argued on page 2, projections that use growth rates distributed symmetrically around a target growth rate may miss their target. For example, suppose the target is 0% growth and the projections are 10% in the first year and -10% in the next year. At the end of the second year, the active population is the starting population times 1.10 x 0.90 = 0.99, i.e., a net contraction of 1% rather than 0%. Instead, we prefer measuring the growth rate as $\ln(1 + r_{it})$. We refer to this metric as the "geometric growth rate" or "geometric rate of change." At r_{it}=0%, the growth rate and the geometric growth rate are equal because $\ln(1 + r_{it}) = \ln(1 + 0) = 0$. Suppose again the target is 0% and the projections of the geometric growth rate are 10% in the first year and -10% in the next year. A 10% geometric growth rate means $\ln(1 + r_{it})$=0.1, i.e., r_{it}=exp(0.1)-1= 10.517092% and -10% corresponds to r_{it}=exp(-0.1)-1= -9.516258%. At the end of the second year, the active population is equal to the starting population times 1.10517092 x 0.90483742 = 1, i.e., a compounded change of 0%. Because the geometric growth rate preserves the target in projections, much of the remainder of this report is based on the geometric growth rate.

The average participant-weighted geometric rate of change in 2000–2019 was -0.93% per year: -0.52% per year in 2000–2009 and -1.35% per year in 2010–2019.[5]

Table 1 provides more detail about average participant-weighted geometric rates of change by industry sector.[6] Annual growth rates for 2000–2019 were -0.11% for plans in the Construction sector, -1.96% for Retail plans, -1.91% for Transportation plans, and -1.20% in Other or Unknown industries.

Table 1. Plans, Active Participants, and Average Annual Participant-Weighted Geometric Changes in Active Participants, by Sector

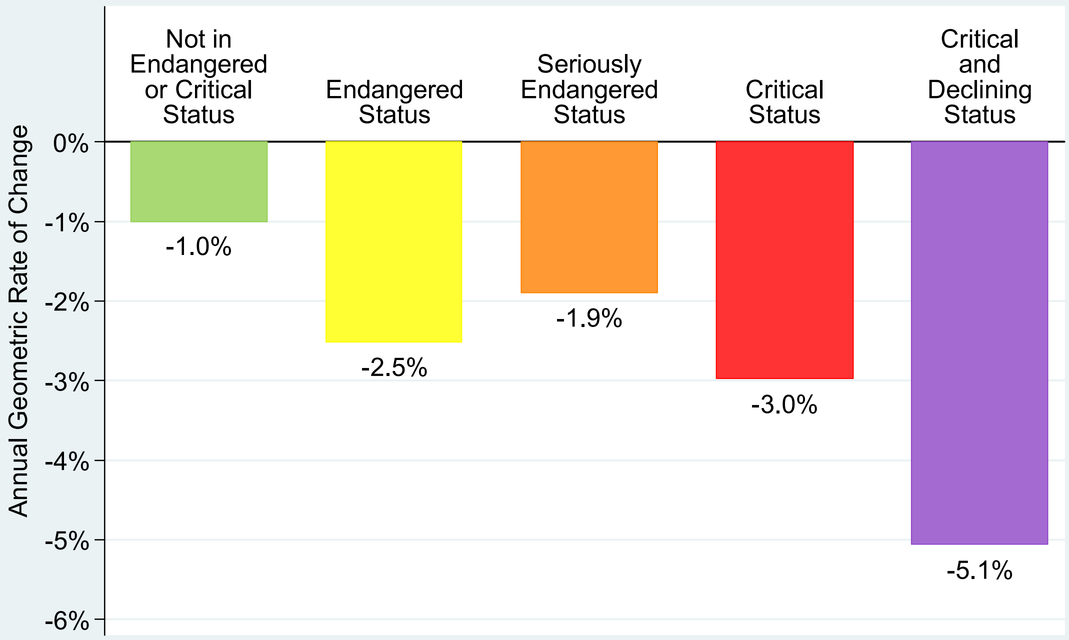
	Plan year 2018:		Average annual geometric rate of change		
	Plans	Active participants	2000-2009	2010-2019	2000-2019
Construction	672	1.58m	0.79%	-1.00%	-0.11%
Retail	59	0.53m	-2.95%	-0.97%	-1.96%
Transportation	120	0.44m	-1.84%	-1.98%	-1.91%
Other/Unknown	320	1.11m	-0.76%	-1.64%	-1.20%
All sectors	1,171	3.66m	-0.52%	-1.35%	-0.93%

Source: Schedule MB of 1999-2019 Form 5500 filings.
Based on plans with annual changes between -30% and +30% only.

Finally, Figure 8 shows annualized participant-weighted geometric rates of change in active participants by plans' risk status. Risk status is taken from Schedule MB, line 4a; it was first asked in 2008 and has been available electronically since 2009. Plans at greater risk generally contract faster than relatively healthy plans, ranging from -1.0% per year among plans that are in neither endangered nor critical status to -5.1% per year for plans in critical and declining status. The average rate of contraction among seriously endangered plans is smaller than among endangered plans, but that rate is based on a small sample: only 1.7% of plan filings reported seriously endangerment.

[5] To preserve comparability, the calculations of these rates excluded changes—not geometric changes—in excess of 30%, abs(r_{it})>0.30. This exclusion also applies to all results discussed below.
[6] Industry sectors are based on Form 5500 business codes, along with corrections and industry groupings as provided by Bill Marx on 2/13/2019.

Figure 8. Average Annual Participant-Weighted Geometric Changes in Active Participation, by Risk Status (2009–2019)



Source: Form 5500, Schedule B/MB.
Note: Excludes plans with changes in excess of 30%.

Regression Model Analysis

Table 2 shows parameter estimates from regression models. The outcome variable is the geometric rate of change of active participation in a plan between two years:

$$\ln(1 + r_{it}) = \beta' x_{it} + \varepsilon_{it}$$

The data consists of filings from 1999 to 2019, i.e., the earliest year contributing to the regression is 2000. Our preferred specification is in the fourth column, labeled "Weighted." The explanatory variables are as follows.

- *Inactive/total participants.* The ratio of inactive to total participants may be interpreted as a measure of plan maturity. It ranges from 0 to almost 1 with a mean of 0.58. A coefficient of -0.14 means that a 10 percentage point difference in maturity translates into reduced annual growth (sharper contraction) by about 1.4 percentage points (0.10 x -0.14 = -0.014 = -1.4%).
- *Plan is at risk* and *Risk status is missing*. The former is an indicator variable for whether the plan reported that it was in endangered or critical status, including seriously endangered and declining; the latter is an indicator for whether risk status is missing. Risk status is available since 2009 only. In earlier years, or when the plan did not report its risk status, the risk status indicator was set equal to its mean over

non-missing values (0.415) and the missing indicator was turned on.[7] Lack of statistical significance suggests that no significant difference exists between plans with missing or non-missing risk status, and that it may be omitted from the specification. When included in the third and fourth specifications, the missing indicator is indeed statistically insignificant (not shown). For that reason, the specifications in the third and fourth columns omit the missing indicator.

- *Construction, Retail, and Transportation*. These are indicator variables for plans in the corresponding industry sectors. They are statistically significant, but their signs and magnitude suggest that plans in those three sectors grow faster (contract less) than plans in other sectors, which is only partially consistent with the raw differences documented in Table 1. In other words, while rates of change differ across industry sectors, those differences appear to be driven by factors such as maturity and risk status. We therefore excluded industry indicators from our preferred specification, except for Construction because employers participating in Construction sector plans are subject to more lenient withdrawal liability provisions than those in other sectors (29 USC §1388).
- *Lagged 5-year equity return*. This variable is the five-year trailing average annualized geometric rate of return (including dividends) on stocks in the S&P 500 index, lagged by one year. For example, the value in plan year 2015 is the annualized geometric rate of total return on the S&P 500 index in 2010–2014. It ranges from -2.3% (in 2005) to 25.1% (in 2000) with a mean of 6.8%. Its estimated effect is positive, meaning that the rate of change in active participation relates positively to lagged 5-year returns on large cap stocks. We found its effect to be highly robust to alternative model specifications.[8]
- *Lagged geometric change*. This variable is the one-year lagged geometric rate of change in active participation, i.e., an autoregressive variable. Its effect is positive and statistically significant, but it is small: all else equal, only about 1.5% of last year's rate of change persists in the next year. Given its lack of economic significance and the complications that autoregression introduces for calibration (discussed below), we omitted it from our preferred model specification.

[7] Attempts to impute risk status based on funded level were abandoned because they did not improve model fit.

[8] Alternative predictors of active participation include the unemployment rate or rate of growth of Gross Domestic Product, but their future values are not projected in ME-PIMS. In contrast, ME-PIMS projects the rate of return on equity.

Table 2. Regression Estimates of the Geometric Rate of Change

	Baseline	AR(1)	Simplified	Weighted
Inactive/total participants	-0.1408 ***	-0.1448 ***	-0.1410 ***	-0.1346 ***
	(0.0035)	(0.0038)	(0.0034)	(0.0033)
Plan is at risk	-0.0063 ***	-0.0054 ***	-0.0059 ***	-0.0081 ***
	(0.0017)	(0.0017)	(0.0017)	(0.0012)
Risk status is missing	0.0017	0.0031 **		
	(0.0012)	(0.0013)		
Construction	0.0133 ***	0.0105 ***	0.0100 ***	0.0052 ***
	(0.0013)	(0.0014)	(0.0012)	(0.0009)
Retail	0.0057 **	0.0058 **		
	(0.0027)	(0.0028)		
Transportation	0.0121 ***	0.0134 ***		
	(0.0021)	(0.0022)		
Lagged 5-year equity return	0.2005 ***	0.2256 ***	0.1997 ***	0.1914 ***
	(0.0077)	(0.0091)	(0.0077)	(0.0059)
Lagged geometric change		0.0146 ***		
		(0.0027)		
Intercept	0.0429 ***	0.0456 ***	0.0471 ***	0.0505 ***
	(0.0027)	(0.0028)	(0.0023)	(0.0019)
Observations	24,072	22,082	24,072	24,072
Weighted?	No	No	No	Yes
R-Squared	0.1023	0.1032	0.1010	0.1134
Root MSE	0.0880	0.0872	0.0880	0.0671

Standard errors in parentheses. Significance: *=10%, **=5%, ***=1%.

We explored model specifications that control for plan size, as measured by active or total participants (not shown). All else equal, larger plans appear to grow faster (contract less) than smaller plans. However, we excluded plan size from the model specification because it may cause ME-PIMS to run "off the rails" in the sense that large plans would be projected to grow ever faster.

The third and fourth columns of Table 2 control for the same variables, but differ in that the fourth column was estimated using weights equal to the (previous year's) number of active participants. The weighted regression reflects our preferred specification because, in the absence of controls for plan size, its estimates are influenced by plans in proportion to their active population.

Projections

The bottom row of Table 2 displays the square root of the mean squared error (MSE) of each regression, which is an estimate of the standard deviation of the residual, ε_{it}. It plays a role in stochastic projections based on regression models.

Recall that the model referenced in Table 2 is $\ln(1 + r_{it}) = \beta' x_{it} + \varepsilon_{it}$. Denote the estimated parameters by $\hat{\beta}$ and the estimated standard deviation of the residual (root MSE) by $\hat{\sigma}$. The projected geometric rate of change of plan *i* in year *t* is:

$$\ln(1 + r_{it}) = \widehat{\beta}' x_{it} + \hat{\sigma} z_{it},$$

where z_{it} is a random draw from the standard normal distribution. The projected rate of change is $r_{it} = \exp(\widehat{\beta}' x_{it} + \hat{\sigma} z_{it}) - 1$.

Table 2 shows that the R-Squared of the preferred specification is 0.1134, which means that about 11% of the variation in the growth rate is explained by variation in the model's independent variables and that almost 89% stems from random variation in the residual. We therefore strongly suggest stochastic projections (projections that include a random draw of the residual) to maintain the distribution of growth rates within a single year (such as illustrated by Figure 6 on page 7). Should a compelling reason exist to exclude residual draws from the projections, then a variance correction needs to be applied.[9]

4. RECOMMENDATION

Model Specification

The current implementation of ME-PIMS assumes that, for a year within a scenario, the numbers of active participants at all multiemployer plans grow or contract at the same rate. The projected rate of change is drawn from a uniform distribution that ranges from -3.3% to 0.7%. The current model is parsimonious but it does not capture the diversity and range of the rates at which multiemployer plans have changed over the past two decades. It also does not take account of plan-level or macroeconomic variation. However, such relationships can be important. For example, we found that at-risk plans tend to lose active participants faster than not-at-risk plans. The contribution base of at-risk plans may therefore shrink faster than ME-PIMS currently projects, and ME-PIMS may underestimate the fraction of plans that will require assistance from PBGC.

Even within a single year, plans have grown or contracted at widely varying rates, which is at odds with the current assumption of equal rates of change among all plans within a year. An important objective of a microsimulation model such as ME-PIMS is to preserve heterogeneity across plans, including heterogeneity in rates of change of active participation. We therefore recommend ME-PIMS draw a random rate of change for every plan in every year and every scenario.

We estimated a simple single-equation model that describes rates of change in active participation with just four determinants: plan maturity (defined as the ratio of inactive to total plan participants), plan at-risk status, Construction sector, and the rate of return on equities. Each of these factors has a statistically significant and economically meaningful effect on the rate of change in active participation. They also matter directly for a plan's financial outlook, and it may be important to capture their additional effect on a plan's cash flow via active participation. We recommend that ME-PIMS adopt a similar model.

---

[9] The variance correction depends on the distribution of ε_{it}. If ε_{it} is distributed normally with mean zero and standard deviation σ, the expected value of $\exp(\varepsilon_{it})$ is $\exp(\sigma^2/2)$, so that the projection of r_{it} is $\exp(\widehat{\beta}' x_{it} + \hat{\sigma}^2/2) - 1$. See, for example, *NIST/SEMATECH e-Handbook of Statistical Methods*, section 1.3.6.6.9, available at https://www.itl.nist.gov/div898/handbook/eda/section3/eda3669.htm.

Likely Effects and Merits of an Alternative Active Participation Model

Adopting an alternative active participation model may be expected to have two primary effects. The first is to improve the distribution of the projected financial position of PBGC's multiemployer program. The projected rate of change in active participation would connect to plan characteristics, macroeconomic developments, and unobserved—but very real—determinants. As a result, the projected paths of individual plans may be expected to be more realistic and to better preserve the diversity of paths that is observed in historical data. Ultimately, the resulting stochastic projection of the financial position of PBGC's multiemployer program will better capture its future distribution. The second effect is to brighten the outlook of PBGC's multiemployer program. Subject to the observations on a sensitivity analysis in the next section, PBGC should consider raising the target average rate of change to around -0.9%, up from the current -1.3%. The effect of such a change is likely an improvement in the financial outlook of PBGC's multiemployer program.

An alternative active participation model that factors in plan characteristics may further enhance the ability of ME-PIMS to carry out hypothetical policy scenarios. For example, the indicator for the Construction industry may be interpreted as capturing withdrawal liability rules that differ from those in other sectors. Its estimate (to slow contraction by 0.52%) can help inform the likely effects of potential proposals to modify liability withdrawal rules in other industries.

Sensitivity Analysis

The average annual participant-weighted rate of change in active participation ranged from -6.2% to 3.1% in 2000–2019, with an overall geometric average over that period of -0.93%. However, historical rates have fluctuated, even over longer periods. At issue is whether the historical average continues to hold in future years, or whether any adjustments to the model are advisable. A relatively straightforward way to achieve a targeted rate is by calibrating the intercept of the model.

We suggest that experts develop plausible bounds for the expected rate of change in active participation and apply those scenarios in ME-PIMS to gauge the sensitivity of PBGC's financial outlook to alternative levels. These scenarios may be viewed as low-cost and high-cost scenarios. Eventually, a baseline scenario can be adopted, and it would be of great interest to understand how sensitive the model is to unexpectedly high or low rates of change. If the sensitivity is high, then a periodic recalibration of active participation rate changes should be employed.

DISCLAIMER

The views, opinions, and/or findings contained in this report should not be construed as an official Government position, policy or decision, unless so designated by other documentation issued by the appropriate governmental authority.

We call your attention to the possibility that other professionals may perform procedures concerning the same information or data and reach different findings than Advanced Analytical Consulting Group, Inc. (AACG) for a variety of reasons, including the possibilities that additional or different information or data might be provided to them that was not provided to AACG, that they might perform different procedures than did AACG, or that professional judgments concerning complex, unusual, or poorly documented matters may differ.

This document contains general information only. AACG is not, by means of this document, rendering business, financial, investment, or other professional advice or services. This document is not a substitute for such professional advice or services, nor should it be used as a basis for any decision or action. Before making any decision or taking any action, a qualified professional adviser should be consulted. AACG, its affiliates, or related entities shall not be responsible for any loss sustained by any person who relies on this publication.

This document is the Final Report on ME Active Participant Projections, Part 3 of Deliverable 3 under Contract 16PBGC20C0015 (PIMS Peer Review — Single Employer Contribution Policy and Risk Transfer Analysis and Multi-Employer Active Population Analysis).