

FY 2013 PBGC PROJECTIONS REPORT

SUMMARY

The Pension Benefit Guaranty Corporation (PBGC) guarantees both single-employer and multiemployer pension plans in separate insurance programs. For many years, single-employer plans were the focus of attention because their total underfunding was much greater, PBGC's single-employer program net deficit was greater, and some very large plans had been terminated, whereas only a few multiemployer plans had failed. As this report highlights, that situation is now reversing. While the single-employer program is still likely to remain in net deficit over the 10-year projection period, some improvement is likely due to improved economic conditions and other factors. In contrast, some multiemployer plans are deteriorating and PBGC's multiemployer program is more likely than not to run out of money within the next eight years.

Multiemployer Plans: In the past year, economic conditions improved significantly and most plans are projected to remain solvent. However, research over the past year has also made clear that, for some plans, even the improving economy will not be sufficient to maintain their solvency. Based on recent reports it is now clear that, despite the improving economy, they will not be able to raise contributions or reduce benefits sufficiently to avoid insolvency¹. Plan insolvencies -- possibly affecting more than a million of the ten million people in multiemployer plans -- are now both more likely and more imminent than in our last report.

When plans fail, many participants experience significant benefit reductions because PBGC's statutory multiemployer benefit guarantees are quite low. Furthermore, even that level of benefits is at risk because PBGC's multiemployer program itself is highly likely to be insolvent within a decade, sooner than previously projected.² If and when the program becomes insolvent, the only funds available to support benefits would be the premiums that continue to be paid by remaining plans; this would result in benefits being cut much more deeply, to a small fraction of current guarantees.

The changed outlook in this year's report reflects more current information about the actual experience of multiemployer plans and what steps they will actually take to avoid insolvency. Although current law allows plans to increase

¹ "Insolvent" in this report means cash flow insolvent, i.e., having no funds to pay obligations as they come due.

² Based on current PBGC premium levels and the revised outlook for plan failures, it is more likely than not that PBGC's multiemployer program will deplete its assets by 2022; that likelihood increases to 90 percent by 2025.

contributions and to reduce both future accruals and some already earned benefits, even some retiree benefits, many plans have already exhausted those remedial actions they find feasible. Incorporating this information and the economic improvement into our model and projecting it forward results in both more and earlier plan failures and in a much greater projected deficit of \$49.6 billion.³ Had we had the information about the limits of plan remedies and been able to incorporate them last year, the projected deficit in 2022 would have been \$79.6 billion. The multiemployer simulations are summarized below and detailed beginning on page 9; the changes in our model are detailed beginning on page 14.

Single-Employer Plans: The single-employer simulations, detailed beginning on page 28, show that **improvements in the program’s net position⁴ are likely throughout this decade**, with a mean present value of the projected 2023 deficit of \$7.6 billion. There is significant variation around this mean outcome.

About This Report

This report contains estimates and projections for both PBGC’s single-employer and multiemployer programs over the next decade and beyond, based on current economic conditions, and current law.⁵ To make the projections, PBGC uses two stochastic modeling systems: the Multiemployer Pension Insurance Modeling System (ME-PIMS) and the Single-Employer Pension Insurance Modeling System (SE-PIMS). Each relies on running many simulations to derive a range of possible future outcomes. Averages and ranges are used to summarize the simulations, but there is no single projection that represents the expected results under either program.

³ The mean present value of the 10-year (2023) projections. “Deficit” in this report means total liabilities in excess of total assets as of a certain date. The multiemployer net deficit at any point in time generally reflects the net present value of financial assistance for plans estimated to be or become insolvent within 10 years following that date.

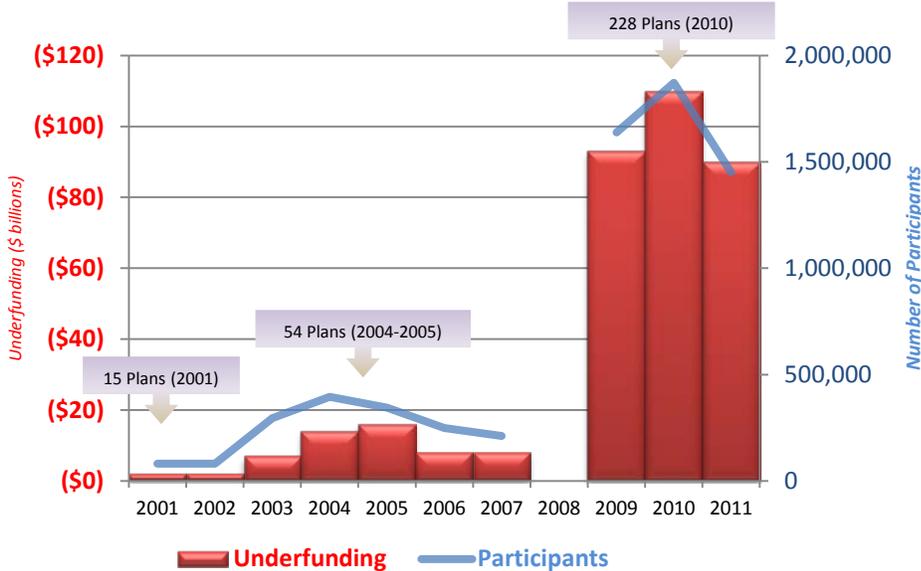
⁴ In this report “financial position,” “net position,” and “net financial position” have the same meaning.

⁵ Under §4008 of ERISA, PBGC is required annually to provide an actuarial evaluation of its future expected operations and financial status. Due to the need to devote resources to preparing reports for FY2012 and 2013, PBGC decided not to reissue a corrected FY2010 report and not to produce a FY2011 report. The 2013 report has been retitled: prior years’ reports were referred to as the “Exposure Report”. This year’s report is generally as of September 30, 2013 (the end of FY2013), but includes legislated changes to premiums enacted through December 2013.

Multiemployer Plan Summary

The current multiemployer system, covering over 10 million participants, is under severe stress, and, absent changes in current law, many plans are likely to fail. Multiple sources of information confirm the increasing pressures on multiemployer plans. Figure 1 shows a dramatic increase in severely underfunded plans over the past decade. The most recent complete data filings show almost 1.5 million people at risk in plans that are severely underfunded.⁶ If and when those plans fail, many participants will experience significant benefit reductions.

Figure 1 – Multiemployer plans covering almost 1.5 million people are *severely underfunded* (i.e., <40% funded)



Most of these participants are in plans in “critical status” as defined under the Pension Protection Act of 2006 (PPA06). For many years, most of these plans were adequately funded; however, in the decade after 2000 repeated market losses and other factors led

⁶ “Severely underfunded” plans are determined as plans less than 40 percent funded using estimated market rates. Data shown is from Table M-13 of PBGC’s 2003-2012 Pension Insurance [Databooks and Data Tables](#). Data prior to 2008 based on Form 5500, Schedule B filings; data after 2008 based on Form 5500 Schedule MB filings; 2008 data excluded due to limited automated processing of files during Schedule changeover.

to very substantial underfunding. PPA06 both tightened funding requirements on these plans and expanded the range of authorities available to correct underfunding.

PBGC has undertaken research into the available data about how plans have used these new authorities. Several years of data are now available on how critical status plans are making changes in order to preserve benefits under the new law. Based on our in-depth investigation into plan filings and reports, we better understand the steps that plans are actually taking to correct underfunding under PPA06. Plans have responded by increasing contributions from current employers, by reducing the future benefits to current employees arising from those contributions, and in some cases by making other allowable benefit adjustments. But in many cases plans stop short of all legally allowed actions, taking only those measures they find feasible⁷. Looking forward, it is clear that, for many plans, the current law measures that are feasible will be insufficient to avoid insolvency.

We have therefore updated our model and underlying assumptions on the actions that we project plans will take to avoid insolvency going forward. This has led to significant increases in our projections: of the number of failing plans and imminence of their failure, of the number of participants who will undergo significant benefit reductions, and of the magnitude of the funds that will be needed to pay benefits. Reflecting improvements in the economy, including improved future asset returns, is not sufficient to bring these failing plans back to health.⁸

Under current law, PBGC multiemployer benefit guarantees are generally much lower than the guarantee levels under our single-employer program. Most people whose plans fail and whose benefits become PBGC's responsibility will experience significant benefit reductions.

If, as currently projected, PBGC's multiemployer program funds are exhausted, the benefit reductions thereafter will be even more severe. At current premium levels, PBGC's multiemployer program is itself on course to become insolvent with a significant risk of running out of money in as little as five years. The risk of insolvency rises rapidly, exceeding 50 percent in 2022 and reaching 90 percent by 2025. If we were to determine a single date of projected insolvency, based on the average yearly projected financial assistance across all our simulations, we would project PBGC's multiemployer program to be insolvent in 2021, consistent with the budget estimate of the Congressional Budget Office.⁹

The mean present value of the deficit in PBGC's multiemployer program would also increase very significantly from prior projections (assuming that PBGC's current level of

⁷ Under current law, critical status plans are permitted to limit their remedial actions to "reasonable measures". For an extended discussion see also footnote 17.

⁸ Across our simulations, PIMS projects future asset returns which have an arithmetic average of 6.6 percent, corresponding to a geometric average rate of return of 6.1 percent. The geometric rate of return reflects that negative asset returns set plans back more than positive returns help them, by reducing the base of assets. This is particularly important for plans whose benefit payments exceed contributions. For details see Table 3 on page 54.

⁹ [Congressional Budget Office April 2014 Baseline](#). We discuss CBO's projection on page 13.

guarantees continues to apply). Driven by the changes we made in our model to reflect plan behaviors, our estimates of the projected deficit have grown from last year's projected 2022 mean present value deficit of \$26.2 billion to this year's \$49.6 billion in 2023. Our model runs 500 simulations of the economy and how plans react to changes. While these results are highly variable, none of our simulations shows PBGC's program in surplus. Instead, our models show PBGC's multiemployer program will have a significant net deficit in 100 percent of our 10-year projection scenarios and that PBGC's multiemployer assets will already have been entirely depleted by the end of the 10-year projection period in 73 percent of our scenarios.

While changes to our model and assumptions increase the projected PBGC deficit, improvements in the economy over the past year significantly reduced the potential impact. Applying the new model and assumptions to the prior year, the deficit projected for 2022 would have been \$79.6 billion rather than \$26.2 billion. The reported mean deficit of \$49.6 billion for 2023 reflects strong returns in asset markets during 2013 and other improvements in the economy.

The report reflects a considerable revamping of the structure of PBGC's multiemployer projection model, of the process used to produce reports under PIMS, and in the determination of new behavioral relationships to reflect plan actions. In determining these new relationships, our process incorporated an initial solicitation of expert opinion, validation and comparison of that opinion against plan administrative data and review of findings with practitioners in the field. We expect to continue to refine both single-employer and multiemployer PIMS models.

Single-Employer Plan Summary

PBGC's simulations show a trend toward significant improvement in PBGC's projected single-employer program net position over the 10-year time horizon as well as a noticeable improvement over the results that were reported last year. Last year PBGC reported a mean present value of the projected 2022 deficit of \$32.5 billion. The 2013 Projections Report shows a comparable deficit of \$7.6 billion for 2023. The program is not in surplus, and the range of variability in the potential outcomes is large. However, none of our simulations project that the program will run out of money within the next ten years. The major causes of the improvement are improving economic conditions, both for the financial markets and the employers themselves, as well as higher projected market rates of return¹⁰ and an increase in PBGC premiums.

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Understanding & Using this Report

This report is an actuarial evaluation and contains estimates and projections. The standard for such evaluations is that the estimates be reasonable and be based on the use of reasonable methods and assumptions; in our professional opinions, this report meets those standards.

The values shown are estimates, not predictions. They reflect a range of values that might result based on the assumptions and behavioral relationships that underlie our projection models. The values are highly dependent on the stochastic projection of many, highly variable factors, such as future interest rates, future equity returns, and future decisions by plan sponsors. **The actual results that ultimately occur in future years can and likely will vary materially from the projections in this report.**

PIMS is not used in developing PBGC’s financial statements. The financial statements are developed using a different methodology that complies with the requirements of Generally Accepted Accounting Principles. The financial statements are a baseline input to PIMS. This and other differences are discussed in the appendices.

Recognizing the Wide Range of Possible Outcomes

Since these projections cover many years and there is considerable uncertainty about even the near future, we show a wide range of possible outcomes. This report includes mean (average) values and “high”, median and “low” values projected for key outcomes for fiscal years 2014 to 2023. To demonstrate potential variation, we set the “high” value at the eighty-fifth percentile (i.e., 85 percent of the outcomes are lower), the median value is at the fiftieth percentile and we display a “low” value at the fifteenth percentile. While the “high” to “low” range represents the bulk of projected outcomes,¹¹ almost a third of projected results lie above or below the “high” to “low” range. These “tail” results may also be important, so we also present discussions of the full distributions of projected financial positions for both programs.

Recognizing Modeling Limitations

The PIMS models are the best available tools for this analysis; but like most models, they are subject to limitations. PIMS models are continually revised in light of changing law and plan sponsor behavior and our understanding of that behavior. The most recent model changes include the recognition of evolving multiemployer plan experience since implementation of the Pension Protection Act of 2006 (PPA06).

Our 2012 report indicated that we were evaluating how to change our model. Analysis of this new experience has enabled PBGC to revisit and enhance certain assumptions and behavioral relationships underlying ME-PIMS. PBGC has largely implemented the recommendations discussed in the 2012 Exposure Report; they are identified and their effects quantified beginning on page 14.

In addition, a peer review of PIMS conducted by outside experts under the supervision of the Social Security Administration suggested additional areas for improvement, some of which have been incorporated in this report.¹² Changes to the models are discussed throughout this report and the appendices.¹³ As always, we plan to continue to improve our models and their documentation.

While both ME-PIMS and SE-PIMS can simulate demographic and economic factors up to 20 years into the future, they do not model all longer-term sources of uncertainty affecting the structure of the pension system such as factors affecting employers’ decisions on

¹¹ Some outcomes are year-by-year results, such as investment income in each year; they show a fairly constant amount of yearly variation. For other categories, such as the net position of the single-employer program, each year affects the next. This produces a cumulative effect, yielding more uncertain results with each passing year. (This cumulative effect is muted in the multiemployer program’s position, where the program’s few assets are a fraction of the value of net new claims.)

¹² Prior to joining PBGC, Christopher Bone, one of the signatories of this report, was also the author of one of the expert review papers.

¹³ We have also set up a new page on our website to provide further access to documentation on PIMS – this page contains links to all the public review papers as well as other information about the models. [PIMS Web Page](#)

whether to continue to sponsor defined benefit pensions or to transfer risk for some or all participants to an insurance company or to the participants (by offering lump sum payouts).

Estimated multiemployer program deficits and financial assistance shown in this report assume that PBGC will provide benefits in accordance with the current level of guarantees rather than reducing guarantee levels to those affordable by premiums.¹⁴ We also have assumed that the sunset provisions of PPA06 will be extended indefinitely. Otherwise, this evaluation assumes continuation of the current law.

Frequently Used Abbreviations

FY	Fiscal Year
ERISA	The Employee Retirement Income Security Act of 1974 as amended
ERM	Critical status plans that have determined they have Exhausted all Reasonable Measures
MAP-21	Moving Ahead for Progress in the 21 st Century Act
ME	Multiemployer
PPA06	The Pension Protection Act of 2006 as amended
PBGC	Pension Benefit Guaranty Corporation
PIMS	Pension Insurance Modeling System
PV	Present Value
SE	Single-employer

¹⁴ This enables the measurement of the size of the promised benefits from the PBGC program and the resources PBGC has to meet those payments. Under current law [ERISA §4022A(f)(2)(C)], if premiums and PBGC fund assets are insufficient to pay guaranteed benefits, and Congress does not act on a formal PBGC submission of alternative actions, guarantees are reduced to the level affordable by premiums.

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There are more than 10 million individuals covered by more than 1,400 insured multiemployer plans. Multiemployer plans are collectively bargained plans that are maintained by one or more unions and multiple companies, generally in the same industry or as members of an association.

By law, PBGC’s insurance program for multiemployer plans operates very differently than the single-employer program. Unlike single-employer plans, PBGC cannot act to prevent plan insolvency. Even after a plan becomes insolvent (i.e., has exhausted its funds), PBGC cannot take over the assets and administration of a terminated multiemployer plan, but rather is limited to providing financial assistance to cover the plan’s guaranteed benefits and its expenses.¹⁵ Multiemployer plans pay lower premiums to PBGC. Especially significant, PBGC-insured benefit guarantees are generally much lower for people in multiemployer plans than for those in single-employer plans.

How Many Participants Are at Risk?

In recent years, PBGC, the Government Accountability Office and a variety of third parties have documented the rise of persistent underfunding and a growing risk of insolvency among a substantial number of multiemployer plans covering a significant fraction of the 10 million multiemployer participants.¹⁶

¹⁵ Formally this financial help is in the form of loans. However, with a very few exceptions over PBGC’s history, the loans have never been repaid.

¹⁶ See e.g., PBGC Jan. 2013 Multiemployer Plan Report to Congress at www.pbgc.gov/documents/pbgc-report-multiemployer-pension-plans.pdf; GAO March 2013 PRIVATE PENSIONS Timely Action Needed to Address Impending Multiemployer Plan Insolvencies at www.gao.gov/assets/660/653383.pdf; 2012 Retirement Security Review Commission Solutions Not Bailouts at www.solutionsnotbailouts.com; 2011 Pension Research Council Working Paper 2011-15 Mazo and Greenblum Multiemployer Pension Plans Respond to the Financial Crisis [The Segal Company] <http://www.pensionresearchcouncil.org/publications/document.php?file=987>

Pension plan administrative data similarly demonstrate a significant increase in the number of severely underfunded pension plans (see Figure 1 above). In 2001, only 15 plans covering about 80,000 participants were under 40 percent funded. By 2011, this had grown to almost 200 plans covering almost 1.5 million participants.

There is significant overlap between these severely underfunded plans and critical status plans¹⁷ as defined under PPA06. In 2011, most (63 percent) plans that were severely underfunded were in critical status, covering 84 percent of the participants in severely underfunded plans.

PPA06 authorized critical status plans to adjust certain benefits and undertake other preservation measures. Many plans have used these authorities. Some have promulgated rehabilitation plans forecasting a return to fully-funded status. However, in a recent report the Government Accountability Office found:

*“... a number of plans, including some very large plans, are facing very severe financial difficulties. Many of these plans reported that no realistic combination of contribution increases or allowable benefit reductions—options available under current law to address their financial condition—will enable them to emerge from critical status.”*¹⁸

Over the past several years, PBGC has researched the steps available to and actually taken by plans in critical status, including meeting with plans individually and with subject-matter experts, and reviewing steps taken in a sample of critical status plans since PPA06.

A significant number of plans reported that they were unable, with the authorities provided by PPA06, to return to adequate funding. These plans instead undertook only the measures they consider reasonable under the circumstances. Other plans reported they had filed rehabilitation plans that included contribution increases to which the bargaining parties would not agree.

Based on these reports, we have made significant changes to the way ME-PIMS models future plan behavior (see discussion beginning on page 14). After incorporating these changes we find that a significant segment of the multiemployer plan universe is at risk of insolvency over the next 5 to 20 years, exposing more than one million participants to the risk that their benefits will be cut significantly, to PBGC guaranteed levels if PBGC's multiemployer fund itself remains solvent, and virtually entirely if that fund itself runs out of assets.

¹⁷ Critical status plans are defined in ERISA § 305 under a variety of alternative criteria that target plans with severe funding or liquidity issues. In 2011, critical status plans covered approximately 3.5 million participants. Critical status plans must establish a rehabilitation plan detailing how they intend to emerge from critical status (generally within 10-13 years), but if they are not projected to emerge during the rehabilitation period after exhausting all reasonable measures, they must develop an alternative scenario that allows them to emerge at a later time or to otherwise forestall possible insolvency. These critical status plans are referred to as “exhausted all reasonable measures” (ERM) plans.

¹⁸ *Op. cit.* GAO March 2013, p. 52

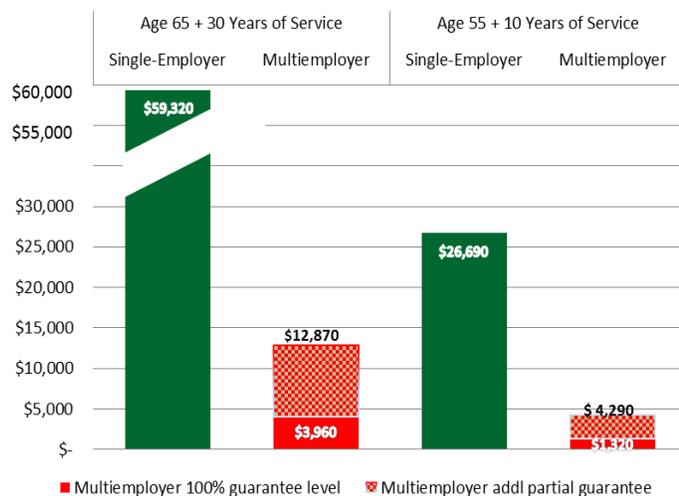
What Benefit Cuts Will People in Failed Plans Experience?

Many discussions about the consequences of multiemployer plan failures or of partition¹⁹ omit the significant benefit reductions they involve. At 30 years of service, benefits of more than \$3,960 per year are only 75% covered, up to a “maximum” guarantee level of \$12,870 per year. That “maximum” applies only to participants with 30 years of service, and is prorated for participants with shorter service. Even participants who are paid the maximum guarantee experience a benefit cut of at least 18 percent.

There are differences between PBGC’s better known single-employer guarantees and the multiemployer guarantees. Benefit guarantees under the multiemployer program provide significantly less coverage than under the single-employer program. PBGC’s single-employer guarantee program covers most benefits owed in failed single-employer plans. Our most recent study showed that over 80 percent of single-employer plan participants received their full vested benefit.²⁰ In contrast, statutory benefit guarantees under the multiemployer program provide significantly less coverage.

- First, PBGC’s full guarantee coverage for participants in multiemployer plans is very low — for an individual with 10 years of service PBGC guarantees 100 percent of the pension benefit only up to \$1,320 per year; for an individual with 30 years of service the full guarantee amount is less than \$4,000 per year.²¹ PBGC guarantees 75 percent of benefits in excess of that level, but the overall guarantee is limited to \$12,870 per year for an individual with 30 years of service. (By comparison, under the single-employer program, the

Figure 2 – PBGC Benefit Guarantees are Much Lower for Multiemployer Plans



¹⁹ Partition is a statutory mechanism (ERISA § 4233), that permits healthy employers to maintain a plan by carving out the plan liabilities attributable to employees of employers who have filed for Chapter 11 bankruptcy. Once partitioned, PBGC assumes liability for paying benefits to the participants of this newly carved-out but terminated plan. Like all multiemployer plans, the new partitioned plan is subject to ERISA’s multiemployer guaranteed benefit limits.

²⁰ [PBGC’s Guarantee Limits – an Update](#), pages 14-25 from PBGC’s 2006 Pension Insurance Data Book.

²¹ PBGC guarantees a full benefit of \$11 per month per year of service, which equates to \$3,960 per year for an individual with 30 years of service. PBGC partially guarantees (75 percent) of the next \$33 per month per year of service, so that the maximum amount PBGC will pay to a participant with 30 years of service is \$12,870. The structure of the guarantee requires that individuals receiving the maximum payout will have a reduction of at least 18 percent in the benefit promise and potentially much more for plans with benefit accrual rates in excess of \$44 per month per year of service.

guaranteed annual benefit for a retiree at age 65 is \$59,320. While neither program ever guarantees more than the benefit accrued under a plan at termination, this demonstrates a significant difference in the cap on the amount of guarantee.)

- Second, PBGC's multiemployer guarantees are prorated based on years of service within a plan. This is in sharp distinction to the single-employer maximum guarantee limit which doesn't change whether a participant has 10 or 40 years of service. This program difference can be particularly harmful to individuals guaranteed under the multiemployer system who retire on disability pensions after only a few years of service.
- Third, the multiemployer guarantee is not adjusted for the age at which it is applied, whereas the single-employer program maximum guarantee limit is actuarially increased for ages above 65 and actuarially reduced for ages below 65 (the age reduction generally does not apply to disability pensioners also eligible for Social Security disability).²² In contrast, the multiemployer limit provides much less protection to the aged currently beyond age 65.

These and other program differences²³ combine to put vulnerable populations, such as retirees who became disabled early in their career and the aged, at relatively greater risk if their plans fail and their benefits are reduced to PBGC multiemployer guarantee levels. We are concerned that participants who try to rely on PBGC guarantees will discover that the guarantees are low, much lower than the guarantees in single-employer plans.

Two examples may help illustrate the severe cuts which could affect multiemployer plan participants.

Example 1: New retiree with 30 years of service and a benefit of \$2,000 per month.

PBGC guarantee: PBGC would guarantee a monthly benefit of \$1,072.50, a **46 percent reduction** in benefit.

Example 2: Retiree totally disabled after three years of service and a benefit of \$250 per month.

PBGC guarantee: PBGC would guarantee a monthly benefit of \$107.25, a **57 percent reduction** in benefit.

²² In theory, the fact that the multiemployer guarantee amount is not reduced for early retirement, while the single-employer guarantee is reduced, could favor multiemployer program participants. But in practice, due to the magnitude of difference in the amount of the guarantee at age 65, even after reduction for early retirement, the single-employer guarantee will generally be larger.

²³ Additional program differences include that the single-employer guarantee is indexed and grows each year, that the single-employer program steps in at an earlier point when there are still assets to be allocated to participants, and that the single-employer program partially guarantees benefit improvements during the past 5 years.

Will PBGC Have Funds to Pay Multiemployer Guarantees?

Participants in insolvent plans also face the risk that PBGC's guarantee fund itself will run out of money to provide financial assistance, so that it will be unable to pay even the current level of guarantees. This and following sections examine that risk.

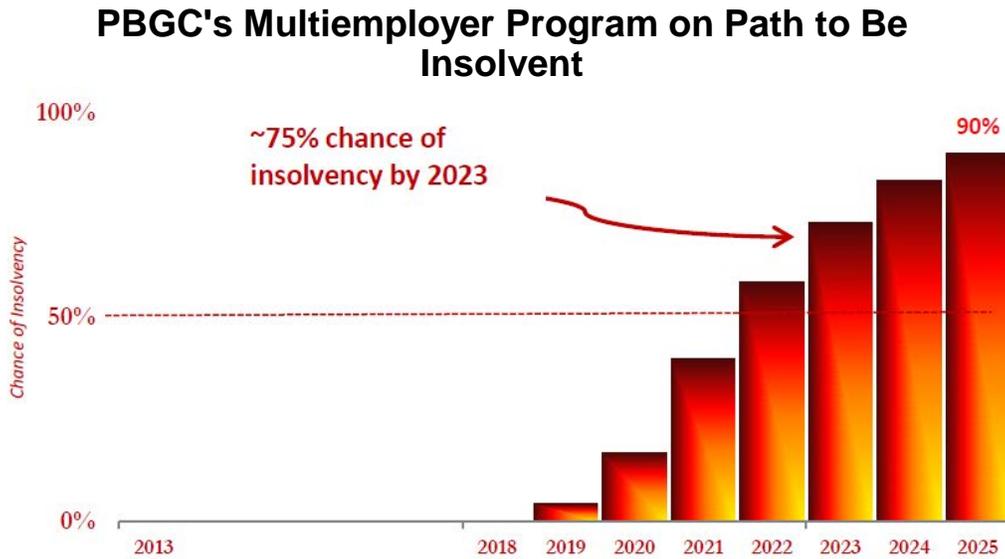
It is more likely than not that PBGC's multiemployer program will run out of money within eight years,²⁴ highly likely within eleven and 99% probable by the end of the 20-year projection period. The projected likelihood of insolvency for the multiemployer program depends heavily on the timing of projected cash flows, which in turn depend on the timing of insolvencies and mass withdrawal terminations in the ME-PIMS scenarios. All of the probabilities of program insolvency are worse than they were in last year's projections.

The Congressional Budget Office has issued a projection of PBGC's multiemployer fund that suggests the fund will be exhausted in 2021. CBO's projection is informed by the analysis underlying this report, and not inconsistent with a projection of PBGC's fund exhaustion date using an assumption that the average level of financial assistance payments will be made from the fund. Since the average financial assistance amounts reflect some chances of large benefit payments in the early years, this generates a fund exhaustion date a year prior to the year we show as more likely than not for the fund to run out.

The chart below shows the likelihood that, by a particular calendar year, PBGC's multiemployer program will exhaust its assets. The distribution of that timing is sensitive to a plan's initial position and to changes in behavioral responses to a plan's financial status. Recognizing these limitations, we present these probabilities as a general measure of the very real risk to PBGC's multiemployer program and the protections that the program provides.

²⁴ Measured from the release of this report in 2014.

Figure 3 – Multiemployer Program on Path to Be Insolvent



Under this year's projections, it is more likely than not that the program will deplete its assets by the end of calendar year 2022. At the end of the 10-year projection period ending in 2023, its assets are depleted in approximately 75 percent of the scenarios (73.2 percent). Program risk continues to rise over time, reaching 90 percent by 2025 and 99 percent by 2033.

The risk of running out of money has increased. All of the probabilities of program insolvency are worse (higher) now than in last year's projections. Last year's (2012-based) report showed the multiemployer program becoming insolvent in 36 percent of the simulations by 2022 (a 10-year projection period). This year, the projected risk of insolvency by 2022 has risen to 59 percent.

The increases in the projected likelihood of exhausting PBGC's assets are largely the result of changed behavioral relationships in the model as the result of better understanding of employer and plan experience and behavior (see below). Other factors that affect the change in the projected likelihood of program insolvency are the passage of an additional year (increasing the likelihood) and the improvement of financial expectations (reducing the likelihood).

How We Changed the ME-PIMS Model to Reflect Recent Trends

As discussed above, PBGC has monitored the evolving experience under PPA06 and taken steps to change the way we model expected trends in such experience and behavior. This section details how we went about evaluating changes to the model and the effect of those changes. Changes are illustrated with respect to the effect on the mean present value of the projected net deficit.

PBGC initially commissioned an external review of ME-PIMS to evaluate the model and its assumptions against the plan experience that had evolved since PPA06. The review was

performed by Buck Consultants, an outside consulting firm with substantial multiemployer pension plan expertise; we received their report recommendations in September 2012.²⁵

The primary recommendations were:

(1) The population of active plan participants should be assumed to decline in the future;

(2) Per capita active participant contributions and total plan contributions should be assumed to increase at lower rates than previously assumed;

(3) Some plan outcomes should be modified to reflect that many plan trustees have decided not to adopt the full range of contribution increases and benefit adjustments available to them under current law, a decision that is permitted under the “exhaustion of all reasonable measures” provision of PPA06; and

(4) Employer withdrawal and mass withdrawal termination²⁶ assumptions based on pre-PPA06 experience should be modified to reflect how plans responded to changes under the PPA06 rules.

As documented in this report and its appendices, we have implemented these recommendations with the partial exception of (4) above, which we expect to include in future revisions to the model. Our process for implementing the recommendations in our model began by soliciting expert opinion from one of our peer reviewers at Buck Consultants, and comparing that opinion with data on a sample of critical status plans, testing and reviewing the sensitivity of the assumptions we developed and further discussion of assumption refinements with practitioners in the field.

In addition, when management reviewed the process of preparing the fiscal 2010 Exposure Report, we identified two other issues that affected projections for the multiemployer system and required modification. First, we determined that ME-PIMS did not include a sufficient number of “probable” plans in the sample (these are plans sufficiently close to running out of money that PBGC has booked a liability on its balance sheet, but which have not yet begun to receive financial assistance). This resulted in an underestimation of near-term cash flows (payment of financial assistance). Second, we identified two algorithms that needed to be modified to better reflect future cash flows. These algorithms affect projected multiemployer plan cash flows because of assumptions about retirement ages and about the timing of withdrawal liability payments.

Further, as part of our review of the structure of ME-PIMS we have continued to evaluate the cash flows it models, and have made additional changes to better calibrate the cash flows from the PIMS sample plans to data reported by the plans. Further improvements in ME-PIMS modeling of cash flows are anticipated to be incorporated into future models.

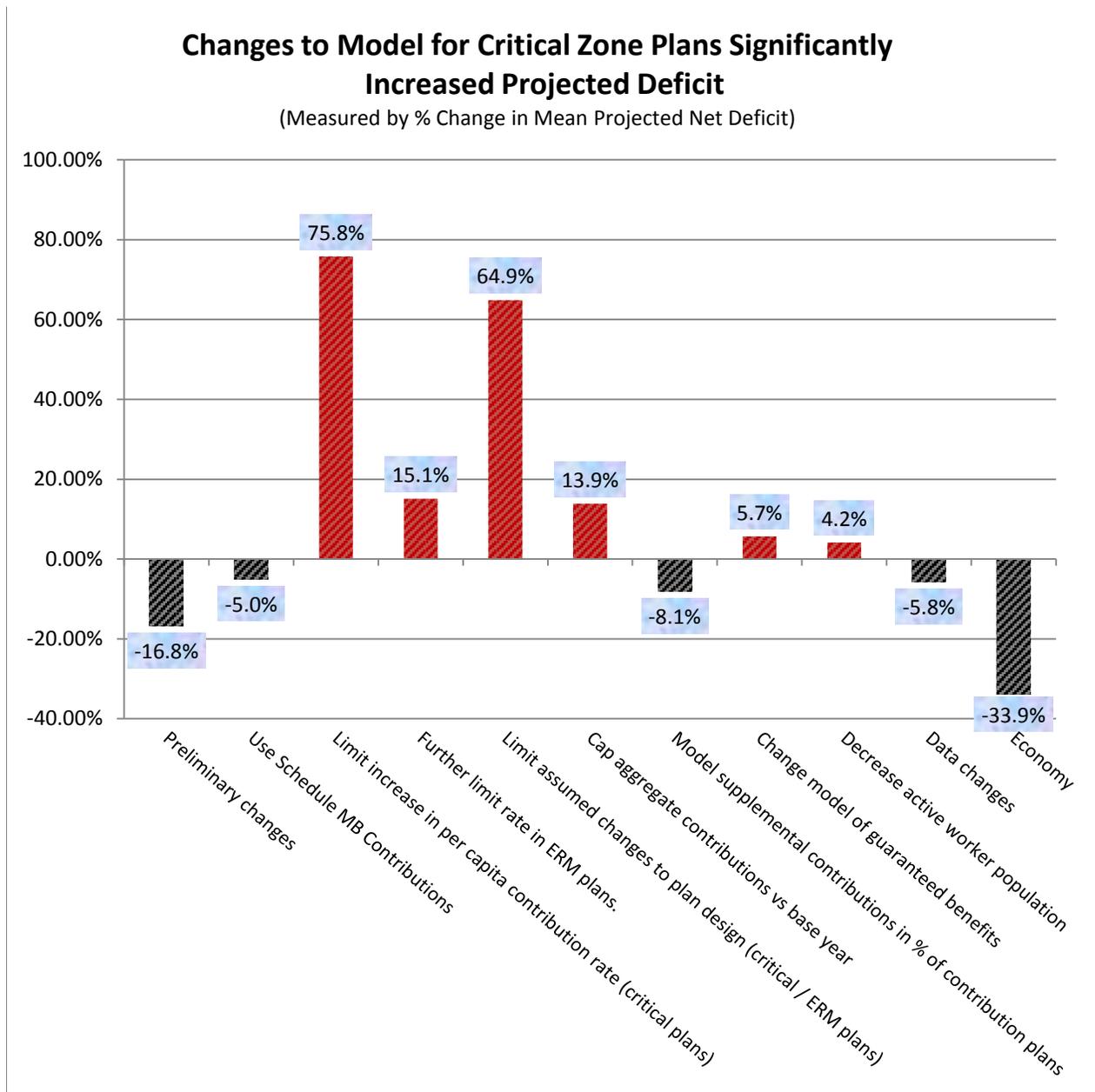
²⁵ [2012 Review](#)

²⁶ A mass withdrawal termination occurs when every contributing employer withdraws from a multiemployer plan.

In addition to the reviews we had already undertaken, internally and with outside experts, the Moving Ahead for Progress in the 21st Century Act (MAP-21) now requires an annual peer review of PIMS, both the single-employer and multiemployer versions. To meet this requirement, both PIMS models were reviewed by experts under the supervision of the Social Security Administration (referred to as the Peer Review in this document). The peer reviewers noted the strengths of the PIMS models; they also suggested many areas for improvement. The expert reviews tended to focus primarily or exclusively on SE-PIMS, but we did receive a number of suggestions on ME-PIMS. We have begun to carefully assess these suggestions and to incorporate many of them into this Projections Report, for example, those relating to greater emphasis on cash flow and disclosure of sensitivity of results. In the coming years we will conduct additional research to assess these suggestions.

The effect of making these changes, as well as changes that reflect an additional year's worth of data and changes in the economy, is shown in the graph below in terms of how each change affects the mean present value of the projected deficit.

Figure 4 – Changes to Model for Critical Zone Plans Significantly Increased Projected Deficit



Reconciling ME-PIMS Results from 2012 to 2013

The table below displays a more detailed reconciliation (in dollars, as well as percentages) of the above changes. Following the table we discuss each item in a separate paragraph. Decreases in the projected deficit amounts are shown in parentheses.

Unlike the percentage changes shown in Figure 4, it is important to note that the magnitude of the dollar amounts shown in the next table change very significantly based on the order in

which they are calculated; if the impacts of the changes were measured in a different order, the values for each of the changes would be different, although the final deficit number would remain the same. For instance, had we reflected the change in the economy first, the net deficit would have decreased by about a third from the initial position, as would subsequent values. But the numbers would still have added up to the final value of \$49.6 billion. We chose this ordering primarily to be able to display the effect that the programming changes would have had, had they been implemented for the prior report (i.e., the 2012 Exposure Report would have noted a deficit of \$79.6 billion instead of \$26.2 billion).²⁷ If PBGC had not adopted the ME-PIMS modeling changes described above, the current projected deficit would have been \$20 billion.

Figure 5 – Reconciliation of Changes in ME-PIMS Results

Reconciliation of Changes in ME-PIMS Results, 2012 to 2013 Results			
Description of Change	Value of Change (\$ billions)	Net Deficit (\$ billions)	% Change
Initial Position for Mean PV of 10-Year Projected Net Deficit from 2012 Exposure Report		\$26.2	
1. Changes to ME-PIMS Model			
a) Preliminary changes.	(\$4.4)	21.8	-16.8%
b) Use Schedule MB contributions.	(1.1)	20.7	-5.0%
c) Limit increase in per capita contribution rate (critical plans).	15.7	36.4	+75.8%
d) Further limit rate in ERM plans.	5.5	41.9	+15.1%
e) Limit assumed changes to plan design (critical/ ERM plans).	27.2	69.1	+64.9%
f) Cap aggregate contributions vs base year.	9.6	78.7	+13.9%
g) Model supplemental contributions in % of contribution plans.	(6.4)	72.3	-8.1%
h) Change model of guaranteed benefits.	4.1	76.4	+5.7%
i) Decrease active worker population.	3.2	79.6	+4.2%
Net Due to Changes in ME-PIMS Model: (Sum of a) through i) above)	53.4		
2. Data changes from fiscal year 2012 to fiscal year 2013	(4.6)	75.0	-5.8%
3. Changes in the economy from fiscal year 2012 to fiscal year 2013	(25.4)	49.6	-33.9%
Year 2023 Mean PV of Projected Net Deficit based on 2013 ME-PIMS Model		\$49.6	

Preliminary changes: The Exposure Report for fiscal year 2012 showed a projected 2022 net deficit of \$26.2 billion (discounted to 2012 present value). Since that time we have made a number of preliminary changes to the model. The largest of these modifications affected

²⁷ See Figures 8 and 9 on page 26.

the way we project longevity increases, especially for retirees, in calibrating our starting benefit amounts. Other changes included the two revisions described in the ME-PIMS assumptions section of the appendices (average retirement age and treatment of withdrawal liability payments as cash flow rather than as a capitalized asset). They also included staff suggestions to increase the number of probable plans included in our sample. Additionally, we chose to use the 10-year results that come from using the first 10 years of the 20-year runs, rather than perform separate shorter runs as we had in the past. In aggregate, these changes decrease the present value of the net deficit by \$4.4 billion.

Use Schedule MB contributions: As recommended by Buck Consultants, we used contribution data from the most recent Form 5500 Schedules MB rather than projecting older data. This change decreases the present value of the net deficit by \$1.1 billion.

The next five changes reflect modifications to the way ME-PIMS models the behavior of plans when their status becomes endangered or critical. ME-PIMS was initially specified shortly after the enactment of PPA06. The behavioral relationships of the model developed at that time were based on expert opinion as to the options plan trustees would adopt in their funding improvement/rehabilitation plans. The updates to these behavioral relationships reflect recommendations from the external review of ME-PIMS and PBGC's staff review of a sample of actual plan operations.

- **Limit increase in per capita contribution rate (critical plans):** In the prior runs of ME-PIMS, we assumed that plans in critical status would increase per-capita contributions to generate the sums needed to emerge from critical status by the end of each plan's rehabilitation period. Based on the external review and our review of sample plans we have revised our model to limit the annual rates of increase in the per-capita contribution in critical status plans. Specifically, we assume that the annual rate of increase in per capita contributions will not exceed 12 percent per year (7 percent for those critical plans determining "exhaustion of all reasonable measures;" see paragraph immediately below.) The new constraints on the annual rate of increase in per-capita contributions (excluding the reduced increase for ERM plans) cause the present value of the deficit to increase by \$15.7 billion. This is the most significant of the changes we introduced into the model, measured in terms of a percentage increase in the liabilities.
- **Further limit rate in ERM plans:** PPA06 generally requires trustees of critical status plans to adopt a "rehabilitation plan" designed to enable the plan to emerge from critical status by the end of the rehabilitation period. However, if the trustees determine that the plan is not expected to emerge from critical status by the end of the rehabilitation period based on reasonable actuarial assumptions and upon exhaustion of all reasonable measures, then the trustees can adopt a rehabilitation plan that consists of reasonable measures to emerge from critical status at a later time or to forestall possible insolvency. Under this standard, trustees may determine that it would not be reasonable to adopt the full range of options available under PPA06 (e.g., that a per-capita contribution rate increase would not increase aggregate contributions because employers would withdraw). PBGC staff research shows that about a third of the critical status plans sampled had concluded that they had "Exhausted all Reasonable Measures" (referred to in this report as "ERM" plans). We have revised the model to incorporate assumptions regarding the factors that drive future ERM status and assumed that ERM plans will limit their contribution increases even more than other critical status plans. This change increases the present value of the deficit by \$5.5 billion. We use the term critical status plans to include plans in critical status, whether or not they are ERM plans.

- Limit assumed changes to plan design (critical/ERM plans):** In fiscal 2012, ME-PIMS assumed that all critical status plans would make all plan design changes available to them under the law if they reached the corresponding point in our sequence of options. In fact, certain of those actions are rarely undertaken based on our staff review of sample plans. In this year's model we no longer assume ERM plans are:
 - eliminating permitted early retirement subsidies and future temporary supplements
 - completely eliminating future benefit accruals
 - rolling back benefit improvements that were made over the prior 60 months

We assume that non-ERM critical status plans will continue to eliminate the permitted early retirement subsidies and temporary supplements for active participants (item (1) above), but will behave like ERM plans in relation to items (2) and (3). Altering these plan behaviors increases the present value of the deficit by \$27.2 billion. This is another very significant change in the projected net position.

- Cap aggregate contributions vs base year:** In addition to limiting the percentage increase in a plan's contribution, we imposed a new limit into the model that caps a plan's aggregate contribution amount (indexed for wage inflation) when compared with the contribution in the pre-PPA06 base projection year. The cap assumes that aggregate contributions in non-ERM plans will not more than double in the first six years, not more than triple in the next six years or exceed 3.5 times the base year amount thereafter. The limit is 1.5 times the pre-PPA06 base year contribution in ERM plans. There is also a floor to this aggregate cap such that the aggregate dollar limit never falls below the prior year's contribution. These further restrictions increase the 10-year projection of the present value of the deficit by \$9.6 billion.
- Model supplemental contributions in % of contribution plans:** Finally, many of the plans under stress, to better relate benefit increases to employer contributions, adopted formulas that provide a benefit equal to a percentage of the employer's contribution on the employee's behalf (termed "percentage of contribution" plans). However, when the employer contributes an additional amount specifically to reduce the plan's deficit, plans have often determined that this "supplemental contribution" will not be a basis for increases in the individual employee's benefit. We have altered our model for critical and endangered plans to treat these increases in contributions as supplemental contributions, which will not generate additional benefits. This change has an offsetting effect on the prior changes, reducing the projected present value of the deficit by \$6.4 billion.

Change model of guaranteed benefits: We made two modifications to the coding to reflect the proper time for reduction of benefits to their guaranteed levels in plans that undergo mass withdrawal and also the proper calculation of service used to estimate the guarantee amount in frozen plans. These changes increase the present value of the deficit by \$4.1 billion.

Decrease active worker population: Our 2012 external review recommended that we reexamine our assumptions concerning the aggregate number of active participants in multiemployer plans. Based on our review of relevant statistics, we changed our assumption from a steady-state active population to a mean rate of decline (across stochastic simulations) of 1.3 percent per year in the total active multiemployer population, exclusive of the effect of mass withdrawals. This change increases the present value of the projected deficit by \$3.2 billion.

Data changes: Changes in the starting data between fiscal 2012 and fiscal 2013 improve the present value of the net position by \$4.6 billion. In particular, more favorable underlying data from the more recent individual plan Forms 5500 outweighed the negative effect of the PBGC initial financial statement position (which worsened from a net deficit of \$5.2 billion as of September 30, 2012 to a net deficit of \$8.3 billion as of September 30, 2013). Changes we made in the model assume that plans will not raise their rate of contribution as quickly as we previously anticipated. Similar changes were also noted in this year's data – showing a decrease in the trend rate for contributions for several plans in our sample. Thus, had we used this year's data in the prior year's model, a portion of the increase in PBGC's net position assigned to changes in the model for this year would instead have been assigned to data changes from last year to this year.

Economy: Finally, between fiscal years 2012 and 2013, there were significant changes in the underlying economy, upon which all the ME-PIMS projections are based. These included, among other things, higher than assumed earnings on the plans' assets in 2013, as well as higher projected market rates of return in the coming years.²⁸ Reflecting these changes reduces the present value of the projected deficit by \$25.4 billion.

In total, the present value of the multiemployer program mean projected net deficit increases from \$26.2 billion to \$49.6 billion.

Summary Projections

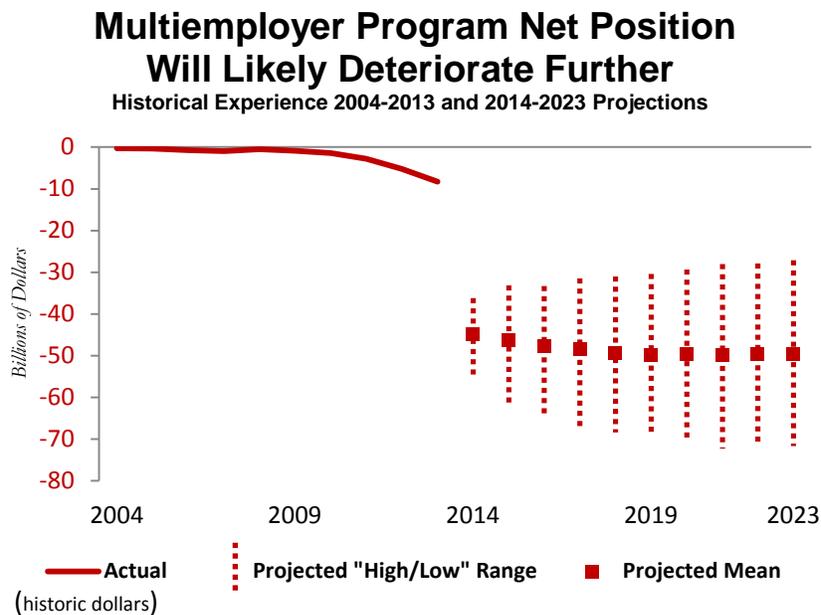
Projected Net Position

The 10-year projections of the multiemployer program's net position nearly all result in declines. ME-PIMS projects that PBGC's multiemployer obligations, in the form of new claims by fiscal 2023, will grow considerably. This growth in liabilities, combined with little growth in multiemployer premiums and assets, results in a mean deficit (after discounting to present value) that is about six times the current deficit.

The chart below shows the fiscal 2014 through 2023 present values of the projected multiemployer net positions (the colored bars and squares) in contrast to the actual historical net positions (the solid line ending in fiscal year 2013). For each future year, the chart shows the mean outcome for each year as a colored square, as well as the range between the fifteenth percentile (15 percent of the outcomes are worse in that year) and the eighty-fifth percentile (15 percent of the outcomes are better). These are the present values of what PBGC would owe, assuming that we had been able to borrow the amounts needed in previous years to meet our financial assistance obligations at current guarantee levels and that the borrowing plus interest increases the deficit.

²⁸ Across our simulations, PIMS projects a mean arithmetic rate of return on plan assets of 6.6 percent, corresponding to a mean geometric rate of return of 6.1 percent.

Figure 6 - Multiemployer Net Position Likely to Deteriorate Further



The average position among the fiscal year 2014 to 2023 outcomes is a very notable decline compared to the multiemployer program’s current net position. These outcomes result largely from anticipating significant financial deterioration in some plans, including several large plans, as well as from an increase in PBGC’s financial statement deficit (\$2.8 billion in fiscal 2011; \$5.2 billion in fiscal 2012, and \$8.3 billion in fiscal 2013), which is the starting point. The significant deterioration in the first year of the projection is largely due to the projection in the model that a small number of very large plans will become “probable” claims, at which point the plans are recorded for financial statement purposes, or “booked.” Deterioration in other plans is also likely.²⁹

Sources of Uncertainty: Multiemployer Program

Most of the uncertainty in the multiemployer system is concentrated in the probability of new claims. These new claims will arise primarily, but not solely, from plans that are currently in poor financial condition. While it is clear that a significant number of plans with a substantial number of participants remain at risk, there is great uncertainty as to the probability and timing of potential mass withdrawals and the insolvencies that eventually

²⁹ In bridging the gap from the liabilities recorded in the 2013 financial statements to the projection in 2014, it is helpful to note that the footnotes to the 2013 financial statements (see Section VI and Note 9 of the statements) contain estimates that other ongoing multiemployer plans, termed reasonably possible to require future financial assistance, show a present value of future financial assistance of \$36.7 billion. These plans are defined as ongoing plans with a projected insolvency date between 10 and 20 years from the valuation date.

follow. A secondary source of variability is the variability in financial assistance payments. Both sources of uncertainty are discussed in detail below.

Projected Net New Claims

The table below shows the mean present values that ME-PIMS projected for new claims³⁰ and the present value of the financial position of PBGC’s multiemployer program in 2023 (discounted to 2013 present values). Alongside those values, the table displays the “low” and “high” values at the fifteenth and eighty-fifth percentiles. Because higher new claims mean greater financial losses to PBGC, the order of the columns has been reversed for the second row of projections to better show the relationship between high new claims and a deterioration of our financial position.

2013 Present Value (PV) <i>(Dollars in billions at year end)</i>	“Low” (15th percentile)	Mean	“High” (85th percentile)
PV PBGC ME Net New Claims FY 2014 -2023	\$37	\$54	\$71
	“High” (85th percentile)		“Low” (15th percentile)
PV FY 2023 PBGC ME Financial Position <i>Surplus/ (Deficit)</i>	\$(27) Insolvent	\$(50)³¹ Insolvent	\$(72) Insolvent

The median of the present value of the level of claims totaled over the next 10 years is about \$52 billion; that is, half of the simulations show a 10-year total of claims above \$52 billion and half below. The mean of the present value of the level of claims (that is, the average level of claims) is higher, about \$54 billion over the next 10 years. The mean is higher than the median because claims reach very high levels under some simulations. For example, 10 percent of the modeled outcomes generate claims with a present value in excess of \$79 billion over the 10-year period.

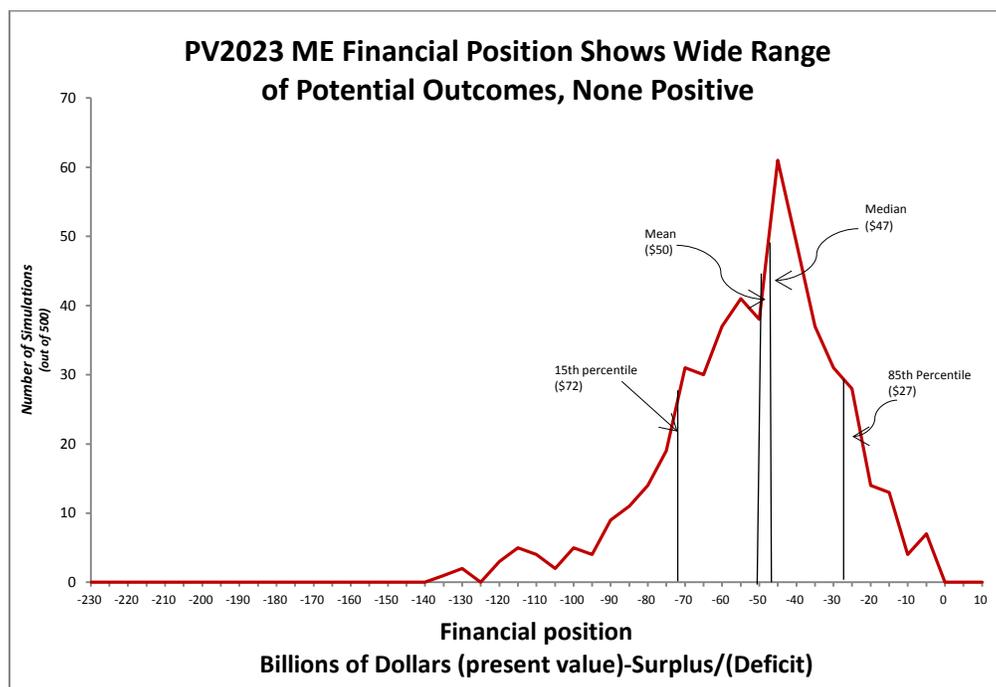
³⁰ The New Claims presented in this table are the present value of net PBGC obligations for plans projected to be booked during the next 10 years. New Claims measures the accumulation, offset by the reversal of spot liabilities over the 10-year projection period, where those liabilities are measured at various times. The PV FY2023 Financial Position measures future obligations as of 2023, including final adjustments for benefit payments, asset earnings, and projected 2023 assumptions and then discounts to a 2013 present value. The number shown includes as part of the deficit any shortage of funds due to providing financial assistance at the currently guaranteed level even after the multiemployer fund runs out of money.

³¹ The mean present value discounted to 2013 is a \$50 billion deficit. The mean discounted present value is the average across all simulation paths; discount rates vary among different simulation paths. The mean projected 2023 value is a \$72 billion deficit.

The middle 70 percent of the outcomes, shown in the table above, for the present value of the multiemployer program’s projected financial position is a range of \$45 billion. None of this middle range includes a projected improvement over the current deficit of \$8.3 billion; among the full range of outcomes, only two percent show any improvement to the program’s current deficit (i.e., the deficit increases in 98 percent of our simulations).

The following graph illustrates the wide range of financial position outcomes that are projected for PBGC’s multiemployer program in the next 10 years. For each value of PBGC’s projected net position along the horizontal axis, the height of the line shows the frequency of that net position.

Figure 7 - ME Financial Position Shows Wide Range of Potential Outcomes, None Positive



Vertical lines on the graph show the present value of PBGC’s projected 2023 net position at the fifteenth and eighty-fifth percentiles and the mean and median values of projected net positions. The median result is a deficit with a present value of \$47 billion in fiscal 2023. None of the 500 projections shows a surplus. The most optimistic of the 500 shows a deficit of \$2 billion in present value (in nominal amount \$3.5 billion, about half the actual reported deficit at the end of FY2013); many show very severe deficits, with the largest projected at a present value of \$131 billion.

PV Financial Assistance Payments

In addition to claims, ME-PIMS simulates financial assistance payments from PBGC to insolvent multiemployer plans to pay retiree benefits and maintain the plans. PBGC does not provide financial assistance until *after* a plan becomes insolvent; therefore much of what PBGC will eventually pay for new claims does not show up as financial assistance payments

from 2014 to 2023, but is reflected in the multiemployer program’s projected financial position (a \$50 billion deficit in present value terms) at the end of the period. In other words, financial assistance payments are much smaller than the anticipated new claims for the coming decade.

Even over the period from 2014 to 2023, financial assistance is projected to exceed PBGC’s resources. Assets in the multiemployer program in 2013 are about \$1.7 billion while the present value of projected premiums is about \$1.2 billion, summing to less than \$3 billion. This is far less than the mean present value of financial assistance of \$6.1 billion below, which shows the mean, and high and low values for the present value of projected new financial assistance payments. Even within the high/low range, financial assistance payments vary by a factor of more than four.

2013 Present Value <i>(Dollars in billions at year end)</i>	“Low” (15th percentile)	Mean	“High” (85th percentile)
PV PBGC ME Financial Assistance Payments FY 2014-2023	\$2.5	\$6.1	\$10.1

Since the projection of financial position reflects money still owed even after providing financial assistance for the next 10 years, it emphasizes the increased demands on PBGC’s resources beyond the projected “financial assistance” flows shown above.

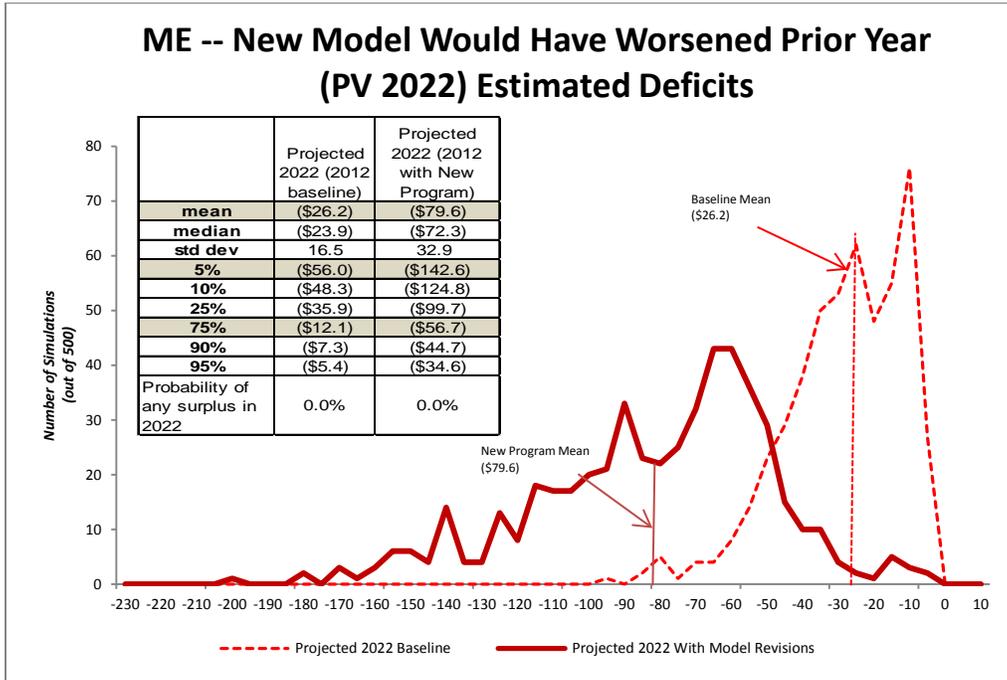
Multiemployer Program Outlook

Virtually all of our projections show a significant worsening of PBGC’s financial position over the next 10 years. As of September 30, 2013, the multiemployer program had a deficit of \$8.3 billion. The mean projected result for 2023 (discounted to a 2013 present value) is a \$50 billion deficit, and the median outcome in fiscal 2023 (discounted to a 2013 present value) is a \$47 billion deficit.

Last year’s report also reflected a worsening net position over the periods measured. However, this year’s entire range of outcomes is significantly poorer than last year’s. This deterioration is mainly due to incorporating into our model of future behavior recent experience in terms of what steps trustees take (or do not take) to improve the solvency of their plans, partially offset by improvements in the economy, as discussed earlier under “How We Changed the ME-PIMS Model to Reflect Recent Trends.”

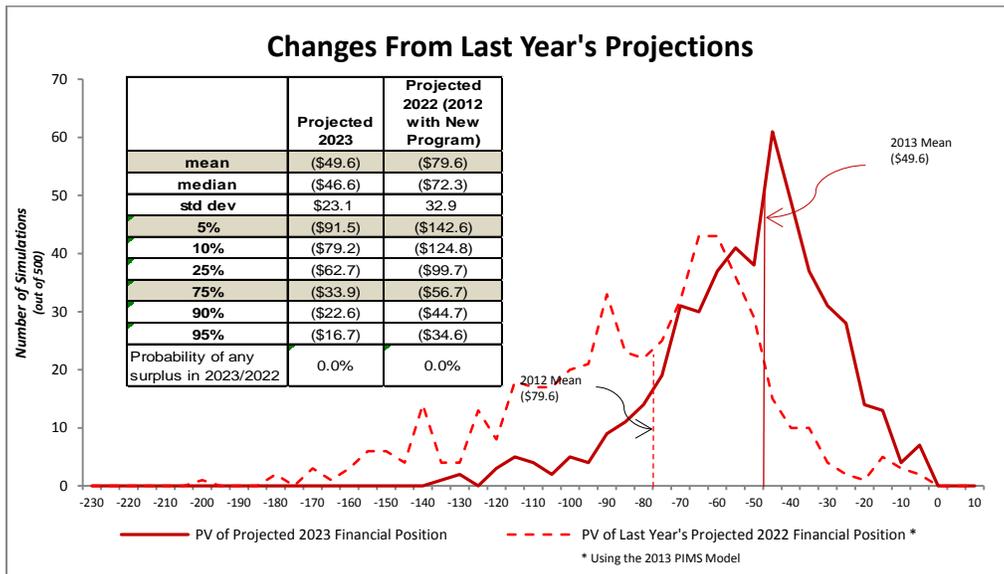
The graphs below illustrate the shift in the distribution of outcomes for the program compared to the prior report. The first graph displays how the changes in our model would have changed the prior results.

Figure 8 – ME New Model Would Have Worsened Prior Year (PV 2022) Estimated Deficits



The second graph compares the results for last year and this year, based on the comparable model.

Figure 9 – ME Changes from Last Year's Data and Economy



The passage of MAP-21 increased the multiemployer program's premium rate by 33 percent, from \$9 to \$12, effective in 2013. Even after the increased premiums, the present value of projected multiemployer premiums during the fiscal years 2014 to 2023 years ranges only between \$1.1 billion and \$1.3 billion. Last year's 10-year projected premiums were higher (ranging from \$1.2 billion to \$1.4 billion); the decrease in this year's projected premiums is largely the result of a change to ME-PIMS — to incorporate the modeling of a generally downward trend in the number of active employees in multiemployer pension plans, leading to a smaller premium-generating population over time. Since the multiemployer program's premiums are relatively low and the program has few assets, the primary driver of the expected deterioration of the net position is new claims (reflecting failed pension plans), with their associated financial assistance payments.

Sensitivity of Changes to the Model and Discount Rate

One of the suggestions made by the experts in the Peer Review was that we enhance our disclosure of the sensitivity of our results to changes in assumptions and other aspects of the model. We have begun to do this, focusing on two of the modifications discussed in the previous section and the modeled discount rate. Over time, we plan to expand this analysis to other significant areas of PIMS.

- As noted above, we replaced an assumption of a steady-state active participant population with a stochastic model of active participation growth and decline. The mean rate of decline is 1.3 percent per year. To examine the sensitivity of this assumption, we considered a decline of twice that level (i.e., a mean rate of decline of 2.6 percent per year). The mean net position, holding all other changes to the model constant, would be a deficit of \$55.9 billion instead of the deficit of \$49.6 billion shown.
- As shown in the chart, the caps we imposed on the aggregate contributions over their base year levels resulted in a \$9.6 billion worsening of the present value of the deficit. To examine sensitivity of this cap, we considered the results of limiting the increases in non-ERM plans to half these levels, that is to 1.0 times, 1.5 times and 1.75 times the base year amounts in the time frames specified above. The mean net position, holding all the other changes to the model constant, would be a deficit of \$59.0 billion instead of the deficit of \$49.6 billion shown.
- Finally we have added a test of the sensitivity of the PIMS discount rate, which assumes annuity purchase rates will revert to a factor based on the combination of our projected mortality and a blend of 30 percent of the composite corporate bond rate and 70 percent of the 30-year Treasury rate. Using solely the 30-year Treasury rate plus our current (projected) mortality tables would reduce the net interest rate by 33 basis points and increase the mean present value of the deficit by \$2.5 billion.

SINGLE-EMPLOYER PROGRAM

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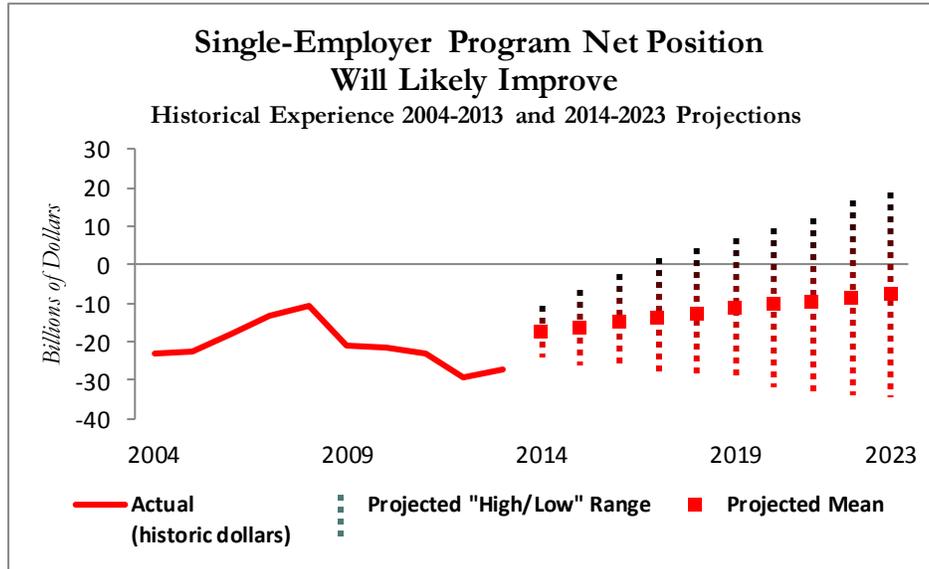
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Summary Projections

Net Position

The chart below shows PBGC’s actual net financial position from fiscal years 2004 to 2013, and the present value of the range of projections for the next 10 years. The fiscal 2013 single-employer program financial statement assets of \$83.2 billion and liabilities of \$110.6 billion result in a net deficit of \$27.4 billion. The mean projection for each future year appears as a large square. The dotted vertical bars for each future year show the range of results between the fifteenth and eighty-fifth percentiles for that future year. Since each year’s position affects the following year’s position, the uncertainty of our financial position grows every year through fiscal 2023, as reflected in the progressively longer vertical bars:

Figure 10 - Single-Employer Program Net Position Will Likely Improve



Because PBGC’s obligations are paid out over the remaining lifetimes of people receiving pensions, a deficit means we will have less money than we will need, over a period of decades. Without changes, at some point there is a risk that a program in a deficit position will run out of money (i.e., it will have paid out all its assets and still owe benefits). That point still appears to be many years in the future for PBGC’s single-employer program. Out of 5,000 simulations, none project that PBGC’s single-employer program will run out of money within the next 10 years. A majority of simulations project decreases in PBGC’s deficit. The primary factors responsible for the improvements in the projected position are:

- (1) Changes in financial market conditions since the fiscal 2012 projections, including strong stock market returns and increases in interest rates during 2013 and
- (2) Increases to single-employer premium rates enacted as part of the Bipartisan Budget Act of 2013 (Pub. L. 113-67) (Budget Act).

Note the decrease from 2013 to 2014 in the mean projected deficit shown in the chart above, a \$10 billion improvement from the actual 2013 deficit of \$27.4 billion. This improvement is partly due to model assumptions that project higher future PBGC discount rates based on changes in projected annuity pricing. PIMS assumes that long term annuity pricing will reflect a return to the pattern of annuity pricing before the financial crisis; the sensitivity of this assumption is discussed below. The higher projected discount rates also result in lower valuations for the liabilities of plans that had previously terminated. In addition, higher than anticipated asset returns in 2013 contributed to the decrease in the deficit.

Additionally, in December 2013, the Budget Act increased both PBGC’s flat-rate and variable-rate single-employer premiums. The flat-rate premium will increase from \$49 per participant in 2014 to \$57 in 2015 and \$64 in 2016 (indexed thereafter). The variable-rate

premium will increase \$10 per \$1,000 of unfunded vested liability in 2015 from the 2014 rate of \$14 per \$1,000 of unfunded vested liability with an additional \$5 per \$1,000 increase in 2016 (also indexed). By the end of the 10-year projection horizon, these increases contribute a present value of \$4.7 billion to PBGC's improving single-employer financial position.

Sources of Uncertainty: Single-Employer Program

The uncertainty in the future of our single-employer program arises from not knowing which plans will fail, how much we will owe participants as a result of these failures, how much we will still owe people by fiscal 2023 (in outstanding benefits that remain beyond the 10-year projection period), what returns PBGC will realize on its assets, and how much we will receive in premiums.

Which Plans Will Fail?

The primary drivers of our projections are the financial health of those companies that sponsor pension plans and the underfunding of those plans. If many companies with large, underfunded pension plans enter bankruptcy and are permitted to terminate their underfunded plans, new claims are created against PBGC, increasing future PBGC obligations. These new claims will also be reflected in our projected net position.

How Much Will We Owe Participants?

Benefit payments and new claims. "Benefit Payments" for a given year means the amount we are projected to pay during that year to retirees (discounted to a 2013 present value), regardless of when their plans failed. "New Claims," on the other hand, represents the total present value of the projected costs over time to PBGC of plans that fail during the projection period. A "New Claim" is the difference between the present value of all the money PBGC will have to pay for a given plan that is projected to fail and the plan's assets (including any recovery from plan sponsors). Note that in our valuation we reflect the benefits payable beyond the 10-year projection period for all failed plans; payments continue until all the people covered by the plan no longer receive benefits.

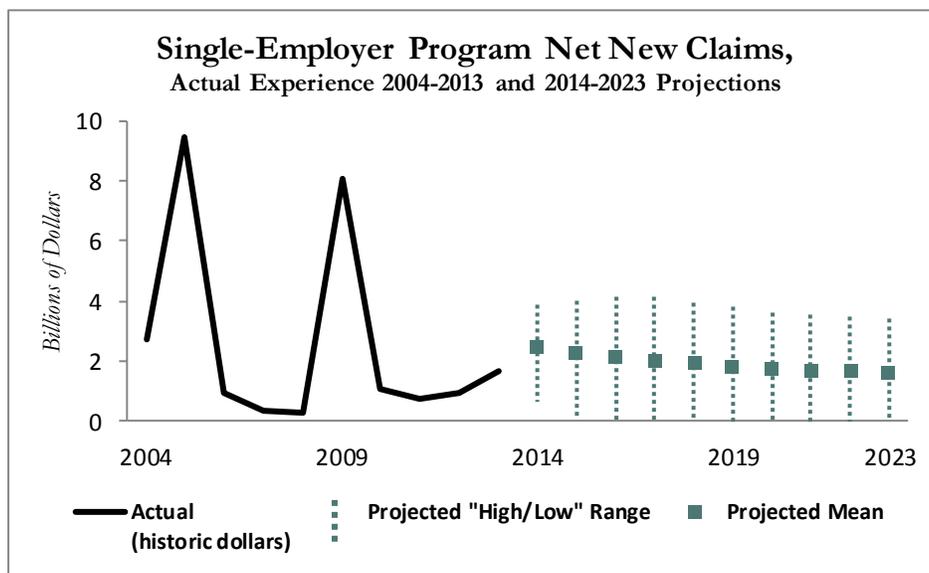
The present value of projected net new claims³² illustrated in the chart below represents the amount of money we owe for people's benefits because their plans fail during the 10-year projection period, less the assets we recover from failed plans and the companies that sponsor them. In this chart, as in similar charts above, the solid line represents historical values, while the dotted lines represent the range of outcomes in future years. The outcomes are between the fifteenth and eighty-fifth percentiles. Since PBGC trustees the assets of failed plans, new claims result in both new assets and new liabilities in our financial position. But since PBGC would not take them over in the first place if they could pay all benefits

³² In the single-employer discussion, "claims" and "net claims" are used interchangeably to indicate additional new liabilities offset by assets and recoveries over a given period.

due, each plan adds liabilities to PBGC that are larger than the assets that PBGC inherits from them.

Like our investment income projections, the projections displayed for net new claims are for each year's results, so there is no cumulative effect in the amount of variability.

Figure 11 - Single-Employer Program Net New Claims



The table below shows a range of projections for present value of the new claims³³ and benefit payments for the next 10 years. The table shows the mean and the “high” and “low” values covering 70 percent of outcomes.³⁴ The projection of benefit payments amounts are present values of the benefit payments projected to occur over the next ten years, while the projected new claims amounts are the present values of all new claims that are booked in the next 10 years.

³³ Similar considerations apply to those for multiemployer new claims. See Footnote 30.

³⁴ In the tables, “high” and “low” projections for different measurements — such as “Benefit Payments” or “New Claims” — simply order all results through that lens. So, amounts within a single column cannot be combined. Where there are relationships among the values presented, we note them in the text that accompanies the tables.

2013 Present Value (PV) <i>(Dollars in billions at year end)</i>	“Low” (15th percentile)	Mean	“High” (85th percentile)
PV PBGC SE Benefit Payments FY 2014-23	\$59	\$70	\$82
PV PBGC SE Net New Claims FY 2014-23	\$4	\$19	\$35

The uncertainty around new claims is greater than that around payments. Since benefit payments include continuing payments to people whose plans already have failed, many of the payments that will be due are already known, decreasing the uncertainty in the amount we will have to pay over the next 10 years. Furthermore, while projected benefit payments in this table are only for the 10-year projection period, projected new claims include obligations for benefit payments far into the future. Under the model, the median of the present value of new claims over the next 10 years is about \$14.5 billion. The mean present value of claims is higher, about \$19.1 billion over the next 10 years. The mean is higher than the median because there is a chance under some simulations that claims could reach very high levels.

How Much Will We Still Owe in Fiscal 2023?

Interest rates affect the present values associated with PBGC’s benefit obligations. The single-employer program’s expenses are mainly benefit payments to the retirees who depend on us.³⁵ At any given point in time, we use an interest rate to determine how much money we need to have now, to support payment of people’s benefits in the future. Changes in this interest rate have a big effect on these calculations. Variation in the rate accounts for a great deal of the variation in the value associated with the benefits we owe people. Within the 70 percent of outcomes presented, the single-employer program’s present value of projected liabilities in fiscal 2023 varies by \$85 billion discounted to a 2013 present value.

2013 Present Value <i>(Dollars in billions at year end)</i>	“High” (85th percentile)	Mean	“Low” (15th percentile)
PV PBGC SE Liabilities in FY 2023	\$136	\$93³⁶	\$51

³⁵ The PV PBGC SE Liabilities in the chart has been changed as of this Projections Report to also include the present value of future administrative expenses (about \$1.5 billion in 2013); comparable values in the prior report exclude this value.

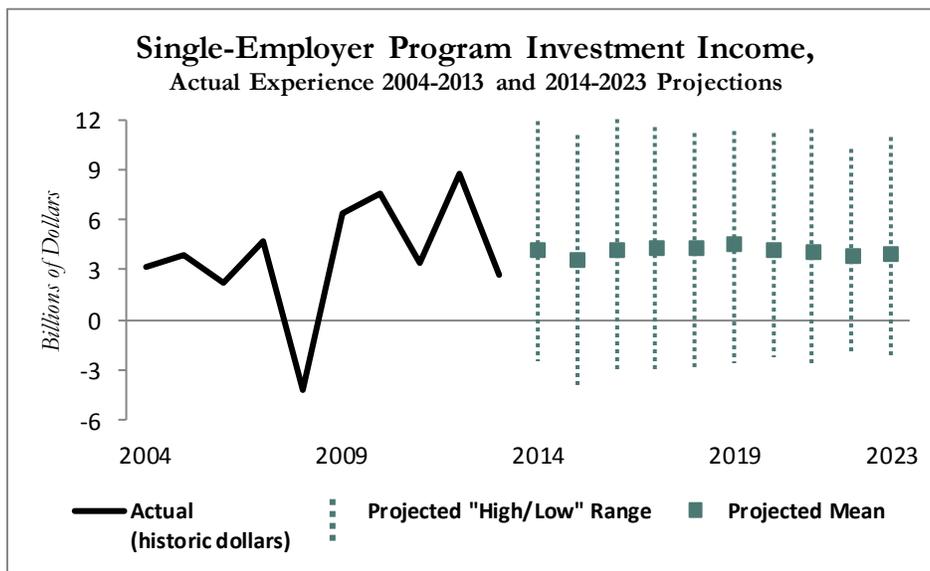
³⁶ The mean present value discounted to 2013 is \$93 billion. The mean projected 2023 value is \$134 billion.

What Investment Returns Will PBGC Realize?

In contrast to the multiemployer program, because PBGC is the statutory trustee of the assets of single-employer terminated plans, the single-employer program currently has a significant pool of assets. The rate of return on these assets is an important source of uncertainty for the single-employer program.

As shown in the chart below, investment income varies a great deal every year, but the amount of variation does not grow cumulatively, because each year's projection is only for that year's investment income (not the accumulated total of all our investment gains and losses). The dotted vertical bars represent the range of outcomes in each year that lie between the fifteenth and the eighty-fifth percentiles. The vertical bars in the chart remain similar in size. For fiscal 2014 (the first year of the projection) that pool of projected results ranges from a \$12.0 billion gain to a \$2.5 billion loss (expressed as present values discounted to 2013).

Figure 12 - Single-Employer Program Investment Income



For these projections, PIMS assumed we would invest 70 percent of assets in fixed income investments (such as treasuries and corporate bonds) and 30 percent of assets in equities (such as stocks) consistent with PBGC's investment policy.

The table below summarizes projections for our total base of assets in the single-employer program by 2023, as well as for what we will earn in investment income up through fiscal 2023. The level of assets is projected to be lower in 2023 than the projections last year for 2022 because PBGC is projecting a lower level of future trusteeships with their accompanying assets.

2013 Present Value <i>(Dollars in billions at year end)</i>	“Low” (15th percentile)	Mean	“High” (85th percentile)
PV PBGC SE Assets in FY 2023	\$58	\$85³⁷	\$114
PV PBGC SE Investment Income FY 2014-23	\$19	\$42	\$67

Within the results shown in the table (fifteenth percentile to eighty-fifth percentile), there is a \$48 billion range projected in the investment return that we will realize and a \$56 billion range in the total amount of PBGC’s projected assets.

New claims also produce increased assets because when plans fail, we inherit their assets as well as their future responsibilities. Thus precisely the same plan termination events add to the money PBGC has on hand, and add even more to the amount we owe. In many scenarios with rising assets, the new claims discussed previously also increase.

How Much Premium Income Will PBGC Receive?

One other factor that helps reduce PBGC’s deficit is premiums. The projected amount of premiums that we will receive under current law (including premium increases under the Budget Act) is shown in the table below:

2013 Present Value <i>(Dollars in billions at year end)</i>	“Low” (15th percentile)	Mean	“High” (85th percentile)
PV PBGC SE Premiums FY 2014-2023	\$20	\$25	\$31

The present value of premiums figures are lower than the corresponding numbers from last year, despite increases in the premium rates. This is mainly due to two considerations. The first is that improvements in the economy (e.g., increased asset returns) lower sponsors’ unfunded vested liabilities, and hence their variable premiums. The second is that an increase in the discount rate both produces lower unfunded vested liabilities and a higher discount on the future premium collections (since they are present values as of 2013).

Variability in Projected Financial Position, Single-Employer Program

SE-PIMS projects PBGC’s potential financial position by combining simulated claims (including what we recover from failed plans and their sponsors to help fund their pension promises) with simulated premiums, investment returns, and other factors, including how

³⁷ The mean present value discounted to 2013 is \$85 billion. The mean projected 2023 value is \$123 billion.

much we already have on hand at the beginning of the simulation (that is, our fiscal 2013 financial position).

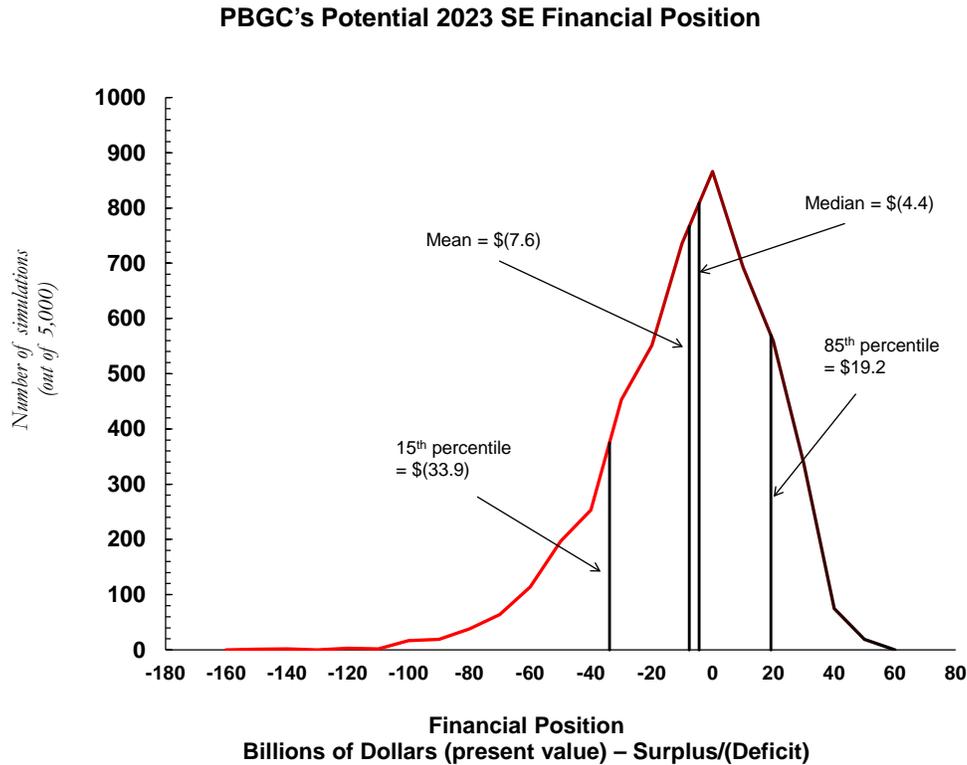
The financial position of the single-employer program as of September 30, 2013, was a deficit of \$27.4 billion. In a majority of simulations, the fiscal 2013 projections show an improvement; the median of the present value of the projected position in 2023 is a \$4.4 billion deficit. But the mean of the present value of the projected position in 2023 is a \$7.6 billion deficit, because in some simulations the deficit reaches very high levels. The table below shows the mean position, along with the values at the fifteenth and eighty-fifth percentiles.

2013 Present Value <i>(Dollars in billions at year end)</i>	“Low” (15 th percentile)	Mean	“High” (85 th percentile)
PV FY 2023 PBGC SE Financial Position	\$(34)	\$(8)³⁸	\$19

Full distribution of results by financial position. The following graph shows the full range of outcomes that SE-PIMS projects for our single-employer financial position over the next 10 years. For each value of PBGC’s projected net position along the horizontal axis, the height of the line shows how many scenarios (out of 5,000) had that net position as a result. The higher the curve, the more simulations fall at that point in the distribution. The further to the right any point on the curve is, the better the financial position associated with that point. The further to the right the graph’s “hump”, the more scenarios have positive outcomes, and the less spread-out the graph is side-to-side, the more the simulations agree on outcomes.

³⁸ The mean present value discounted to 2013 is an \$8 billion deficit. The mean projected 2023 value is an \$11 billion deficit.

Figure 13 - PBGC's Potential 2023 SE Financial Position

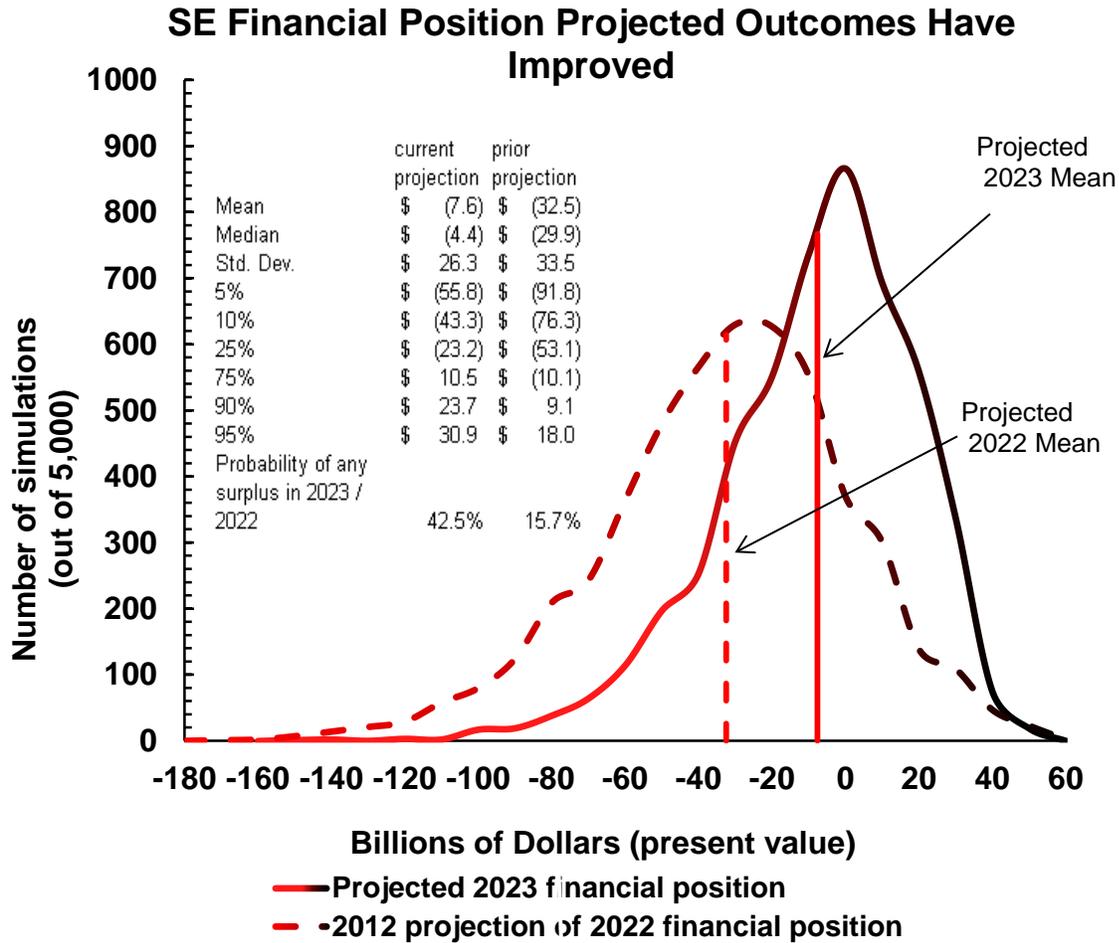


Vertical lines on the graph show the present value of PBGC's projected 2023 net position at the fifteenth and eighty-fifth percentiles, and the mean and median values of projected net positions. The median (as mentioned above) is a \$4.4 billion deficit in fiscal 2023.

Reconciling SE-PIMS Results from 2012 to 2013

Comparison of financial position with last year's results. The graph below compares the 2012 projections of PBGC's 2022 financial position with this year's projections of the 2023 financial position. The hump has moved to the right and has become steeper. This means that the results are more positive and less varied. The mean projected position has improved by about \$25 billion from a deficit of \$32.5 billion to a deficit of \$7.6 billion. The median projected position has also improved.

Figure 14 - SE Financial Position Projected Outcomes Have Improved



Potential for exhaustion of PBGC funds. In our financial statements, we report our financial position by comparing future benefit obligations (which span many decades into the future) and other liabilities with the assets presently held. Those statements do not consider future premiums. In addition, except for a few probable claims for plans that we consider extremely likely to terminate in the near future, future claims are not included in the financial statement liabilities..

The scenarios simulated in SE-PIMS, by contrast, incorporate PBGC’s existing assets and obligations and also:

- Future premium income assuming the premium rates enacted in the December 2013 Budget Act
- Future PBGC claims, which increase PBGC’s benefit obligations but also include assets recovered from the terminated plans and from their sponsors
- Future investment income and/or losses on PBGC assets, based on PBGC’s investment policy and allocations.

In the 5,000 scenarios simulated in SE-PIMS, there are none in which PBGC assets are completely exhausted within the 10-year projection period.

In the table below, we explore the effects of each of the changes on the projected 2023 net deficit. It is important to note that the order of the changes affects the values. If the impacts of the changes were measured in a different order, it is likely that the values for each of the changes would be different, although the final deficit number would remain the same. Decreases in the projected deficit amounts are shown in parentheses.

Figure 15 - Reconciliation of Changes in SE-PIMS Results

Reconciliation of Changes in SE-PIMS Results, 2012 to 2013 Results			
Description of Change	Value of Change (\$ billions)	Net Deficit (\$ billions)	% Change
Initial Position for Mean PV of 10-Year Projected Net Deficit from 2012 Exposure Report		\$32.5	
1. Changes to SE-PIMS Model (changes to model's code)	\$(1.9)	30.6	-5.8%
2. Increase in SE premiums due to Budget Act	(4.7)	25.9	-15.3%
3. Changes in the economy from fiscal year 2012 to fiscal year 2013	(12.7)	13.2	-49.0%
4. Data changes from fiscal year 2012 to fiscal year 2013	(5.6)	7.6	-42.4%
Year 2023 Mean PV of Projected Net Deficit based on 2013 SE-PIMS Model		\$7.6	

Changes to model: The Exposure Report for fiscal 2012 showed a projected 2022 net deficit of \$32.5 billion (discounted to a 2012 present value). Since that time we made a number of changes to the SE-PIMS model, each of which individually had a relatively modest effect. Some of the effects offset one another. Modifications include changes to the way the model "trues-up" premiums from the PIMS sample to the universe of single-employer plans, plus small changes in the way the model projects mortality improvement, recognizes supplements in target liability and target normal cost, computes the variable-rate premium, and determines the expected retirement age for some terminated vested participants. In the aggregate, these changes decrease the present value of the net deficit by \$1.9 billion.

Increase in SE Premiums due to Budget Act: The information in this report is generally determined as of fiscal 2013 except that the report also reflects the premium increases provided in the Budget Act. As shown in item 2 above, the present value of these premium changes decreased the mean present value of the projected deficit by \$4.7 billion.

Economy: Between fiscal 2012 and fiscal 2013, there were significant changes in the underlying economy, upon which all the SE-PIMS projections are based. These included,

among other things, higher than assumed earnings on the plans' assets in 2013, as well as higher projected market rates of return in the coming years.³⁹ Reflecting these changes reduced the present value of the projected deficit by \$12.7 billion.

Data changes: Finally, changes in the starting data between fiscal years 2012 and 2013 improve the present value of the net position by \$5.6 billion. This includes an improvement of \$1.7 billion in PBGC's initial financial statement position as of September 30, 2013, as well as the more favorable fiscal 2013 underlying data.

In total, the present value of the single-employer program mean projected net deficit decreases from \$32.5 billion to \$7.6 billion.

Recent Single-Employer Plan Trends

Our projections do not assume that plans are terminated voluntarily by healthy companies, only by companies in distress. However, some healthy companies do close their pension plans by purchasing annuities and undertaking a standard termination. In these cases, PBGC's current obligations are not affected, but those companies cease paying premiums altogether. We are analyzing the effect of these actions and will attempt to incorporate them in future reports.

Similarly, PIMS does not model the potential that plans will discharge any significant part of their obligations by purchasing annuities through insurance companies and/or paying lump sums. The use of annuity buyouts and lump sums by companies seeking to transfer risk for significant portions of their liabilities has recently become quite visible; PIMS does not model this as continuing or expanding in the future. In addition to affecting premium receipts, these transactions might affect future exposure to claims in some circumstances. We intend to investigate this trend in the future as well.

Finally, the scope of pension plan designs that PIMS models is limited and does not currently incorporate hybrid plan designs. We plan to add features and necessary data elements to enable us to model cash balance pension plans in future iterations of PIMS.

Sensitivity of Changes to the Model's Discount Rate

One of the suggestions made by the experts in the Peer Review was that we enhance our disclosure of the sensitivity of our results to changes in assumptions and other aspects of the model. We have begun to do this, focusing first on the modeled discount rate. Over time, we plan to expand this analysis to other significant areas of PIMS.

³⁹ Across our simulations, PIMS projects a mean arithmetic rate of return on plan assets of 6.6 percent, corresponding to a mean geometric rate of return of 6.1 percent.

As discussed above, we have added a test of the sensitivity of the PIMS discount rate for valuing PBGC obligations, which assumes annuity purchase rates will revert over time to a factor based on the combination of our projected mortality and a blend of 30 percent of the composite corporate bond rate and 70 percent of the 30-year Treasury rate. Using solely the 30-year Treasury rate plus our current (projected) mortality tables would reduce the net interest rate by 33 basis points, increase the mean present value of the deficit by \$4.2 billion, and reduce the likelihood of a surplus in 2023 from 42.5 percent in our base projection to 36.8 percent.

STATEMENT OF ACTUARIAL OPINION

We, the undersigned, certify that this actuarial evaluation has been prepared in accordance with generally accepted actuarial principles and practices and, subject to the disclaimers herein, to the best of our knowledge, fairly reflects the possible distribution of projected outcomes relative to the operations and status of the Corporation's single-employer and multiemployer plan insurance programs as of September 30, 2013, after reflecting estimated effects of the December 2013 Budget Act on single-employer plans.

In preparing this evaluation, we have relied upon information provided to us regarding plan and participant data, plan sponsor financial information, historic asset yield and bankruptcy information and other matters. We have checked this information for reasonableness as appropriate based on the purpose of the evaluation; the responsibility for the source information obtained from Forms 5500 and elsewhere rests with the preparers of these data.

Subject to the disclaimers herein, in our opinion,

- (1) The techniques and methodology used are generally acceptable within the actuarial profession
- (2) The assumptions used are appropriate for the purposes of this report
- (3) The resulting evaluation represents a reasonable estimate of the possible distribution of projected outcomes relative to the operations and status of these programs.

The undersigned are available to discuss the material in this report.

I, Neela K. Ranade, am the Chief Negotiating Actuary of PBGC. I am a Member of the American Academy of Actuaries, a Fellow of the Society of Actuaries and an Enrolled Actuary. I meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained in this report.

I, Christopher M. Bone, am the Director of PBGC's Policy, Research, and Analysis Department (PRAD). I am a Member of the American Academy of Actuaries, a Fellow of the Society of Actuaries and an Enrolled Actuary. I meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained in this report.

I, C. David Gustafson, am the Chief Policy Actuary of PBGC. I am a Member of the American Academy of Actuaries, a Fellow of the Conference of Consulting Actuaries and an Enrolled Actuary. I meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained in this report.

 6/30/14

Neela K. Ranade Date
Chief Negotiating Actuary, PBGC
Member, American Academy of Actuaries

 6/30/14

Christopher M. Bone Date
Director, Policy, Research and Analysis Department, PBGC
Member, American Academy of Actuaries

 6/30/14

C. David Gustafson Date
Chief Policy Actuary, PBGC
Member, American Academy of Actuaries

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Overview of PIMS

The analysis contained in this report was done using ME-PIMS and SE-PIMS. ME-PIMS and SE-PIMS both project long-term exposure by running many simulations, each modeling year-by-year changes over 20 years into the future. Each simulation starts with known facts about the economy, the universe of PBGC-insured plans, and PBGC’s financial position. Then the program introduces random year-by-year changes (within certain bounds) to model economic fluctuations, producing new outcomes a year at a time. Within a scenario, one year’s outcomes form the next year’s starting-point, and so on. The models recognize that all single-employer plan sponsors have some chance of bankruptcy, that all multiemployer plans have some chance of insolvency, and that these probabilities change over time.

Neither SE-PIMS nor ME-PIMS is a predictive model. Although ME-PIMS mathematically models the likelihood of mass withdrawal from a given plan or plan insolvency prior to mass withdrawal, it does not anticipate withdrawal by individual employers. This year we have, however, introduced anticipated employer behaviors in limiting contributions to multiemployer plans. SE-PIMS does not attempt to anticipate companies’ more general behavioral responses to changed circumstances, for example, whether or not to continue to sponsor defined benefit plans.

Throughout this report, we express all future outcomes in present value terms (i.e., discounted back to the end of 2013). Each scenario’s outcomes are discounted based on the 30-year Treasury bond yields projected for that scenario, regardless of whether the underlying simulated cash flows are generated from holdings of equities, corporate bonds, or U.S. Treasury bonds.

In our projections of net position, one important factor is the determination of the amount of money we owe to provide benefits or assistance in today’s present values. Changes in interest rates have a big effect on this calculation — the higher the interest rate by which we calculate what we owe, the lower the present value of the obligations (liabilities) reported on our balance sheet. ME-PIMS and SE-PIMS model uncertainty in future changes to these interest rates.

How Projections Compare to Financial Statement Liabilities

Our long-term exposure projections, presented here, are different from the exposure we report in our financial statements. There, we classify some plans as “probable for financial assistance” (multiemployer) or “probable to terminate” (single-employer) and record them as losses on our financial statements. We describe others as “reasonably possible” and disclose our estimated exposure due to these plans in Section VI of the

PBGC Financial Statements, “Single-Employer and Multiemployer Program Exposure” but do not book them as losses. These estimates are based on plans that PBGC insures and considers likely to require financial assistance or to terminate, compared with all the plans that PBGC insures (the universe modeled in ME-PIMS and SE-PIMS).

PIMS treats the Financial Statement liabilities as initial inputs to the model, estimating how they may vary in the future and adding in the effects of projected new claims, benefit payments and asset returns.

ME-PIMS

ME-PIMS – Overview

Each year, PBGC analyzes insured multiemployer plans to identify those plans that might become claims against the insurance program in the course of preparing its financial statements. In determining whether a plan should be classified as a probable risk of requiring financial assistance in the future and recorded in our financial statements as a balance sheet liability, PBGC evaluates whether the plan can be expected to become insolvent within the following 10 years, often taking into account detailed available plan, industry, and employer data. Each plan is determined to either be “booked” as a liability for the financial statements for a given year or not to be included in the statements at all. A primary driver for large losses to the multiemployer program is mass withdrawal of all sponsors from a given plan, which is the most common basis for “termination” in multiemployer plans.

To project future claims against the multiemployer program that are not booked in the current financial statements, ME-PIMS models a similar (but more mechanical) process for each plan in each future year of each scenario. In each projection year and for the particular economic scenario being simulated, ME-PIMS measures a plan’s funded status, cash flow, asset base, and growth or decline in the contribution base, to determine whether that plan is projected to become insolvent within a specified time horizon. In each projection year, the plans that are projected as future insolvencies within that time horizon become ME-PIMS liabilities that year for the particular scenario. Thus a plan may be “booked” in ME-PIMS in some years and some scenarios and not in others.

There is often a long time lag between PBGC’s booking of a multiemployer plan and the start of PBGC’s financial assistance payments. Those payments begin only after the plan has depleted its assets. In ME-PIMS’ simulation of the multiemployer program, a plan can be booked as a probable claim in one year of a projection and then, if economic conditions are projected to improve sufficiently, it can become un-booked (in the model) in a later year. Because PBGC’s accounting procedures for financial statements reflect considerations not included in the ME-PIMS modeling analysis, and because the financial condition of plans can vary from year to year, the ME-PIMS projections of PBGC’s net position may deviate from PBGC’s financial statements in the upcoming years.

No single underfunding number or range of numbers is sufficient to evaluate PBGC’s exposure and expected claims over the next 10 years. Claims are sensitive to changes in interest rates and investment returns, overall economic conditions, contributions, changes in benefits, the performance of some particular industries, and bankruptcies. In the multiemployer program, a large number of claims from the actual and projected insolvencies of medium-sized plans, and a small number of similar claims from large plans, have characterized the Corporation’s historical claims experience and are likely to affect PBGC’s potential future claims experience as well.

ME-PIMS portrays future underfunding, under current law funding rules, as a function of a variety of economic parameters. The model anticipates that individual plans have various probabilities of positive and negative experience, and that these probabilities can change significantly over time. The model also recognizes the uncertainty in key economic parameters (particularly interest rates and market returns). The

model simulates the flows of claims that could develop under hundreds of combinations of economic parameters and extrapolations of plans' respective 10-year historical patterns.

A multiemployer plan can go through a “mass withdrawal,” which happens when all employers stop participating in a plan at the same time. For each plan in each of the projection years, ME-PIMS calculates a probability of mass withdrawal based on the factors listed in the Assumptions section. For each year, as in the SE-PIMS bankruptcy model, a random number is drawn and compared with the plan's probability of mass withdrawal — the result determines whether or not a mass withdrawal is included in that year of the simulation.⁴⁰

ME-PIMS — Data

ME-PIMS has a detailed database of actual plans (including previously booked plans), which represent more than half of PBGC's insurance exposure in the multiemployer defined benefit system measured from the latest Form 5500 filings available as of the preceding spring (generally 2011 plan year information). The database includes:

- summary statistics on plan demographics
- plan benefit structure
- asset values
- liabilities
- actuarial assumptions
- historical contribution levels and demographic trends (over the 10 prior years) to assist in modeling plan trends

As recommended by the September 2012 external review, the fiscal 2013 version of ME-PIMS incorporates the most recently available contribution data (generally from Schedules MB of the Form 5500), rather than extrapolating from two-years-earlier contribution data. The ME-PIMS database also contains other pension plan information obtained from Schedules MB. For booked plans and two large troubled plans we collected, subject to confidential treatment requests under 29 CFR 4901.24, additional data beyond the general information available on the Form 5500 and used it in the model.

ME-PIMS — Methodology

In ME-PIMS, a sample of actual ongoing plans (both booked and non-booked) represents the universe of multiemployer plans. ME-PIMS simulates contributions and underfunding for the sample plans chosen for the ME-PIMS analysis. It extrapolates or scales the results generated by this sample of plans to the universe of all multiemployer plans. ME-PIMS starts with PBGC's multiemployer net position from the financial statements (an \$8.3 billion deficit in the case of fiscal year 2013) for currently insolvent and probable plans. The starting net position is modeled using a sample of 24 insolvent plans, 32 terminated probable plans, and 43 ongoing probable plans. This is an increase from 6, 12, and 9 plans, respectively, used in fiscal 2012. (This modification accelerates the PBGC insolvency dates modestly; the prior-year sample over-weighted plans with later insolvency dates). In addition, ME-PIMS starts with data on the funded status of 166 non-booked plans that are weighted to represent the universe of PBGC-covered plans that are not current or probable claims for PBGC. The model produces results under 500 different simulations.

⁴⁰ For example, assume the mass withdrawal probability for a plan is 5 percent and that the random numbers are drawn from an urn of balls numbered from 1 to 100. If the ball drawn is numbered 5 or less then the plan experiences a mass withdrawal. If the random number is greater than 5, the plan does not experience a mass withdrawal.

The ongoing non-booked PIMS sample is divided into five tiers, grouped by plan size (based on vested liabilities). In each tier of the sample plans, the individual plans are weighted by the factor for that tier, where the factor is the total vested liability for *all* multiemployer plans in that tier divided by the total vested liability for the *sample* plans in that tier. If a plan is projected to present a claim in ME-PIMS, the claim to the multiemployer program is the claim for that plan multiplied by the factor for that plan's tier. In the tier for the largest multiemployer plans, 10 out of the 11 largest plans are in the ME-PIMS sample. In lower tiers, a progressively smaller proportion of multiemployer plans are in the sample. The factors for the tiers range from 1.06 for the tier of largest plans, to 15.51 for the plans in the tier representing the smallest plans.

ME-PIMS projects PBGC's potential financial position by combining simulated claims with simulated paths for premiums, expenses, PBGC's investment returns, and changes in PBGC liability; that is, the present value of benefits and expenses payable pursuant to claims recognized by the PBGC. The probability of any particular outcome is estimated by dividing the number of simulations with that outcome by 500.

Because multiemployer liabilities are booked by PBGC several years before a plan becomes insolvent, a plan's financial condition can improve after it is first booked, reducing PBGC's liability for that plan (i.e., the value of its claim) by delaying its projected date of insolvency and/or reducing the flow of assistance anticipated after insolvency. In some cases, insolvency is delayed beyond the 10-year threshold required for recognition, causing the plan to become "un-booked" and reducing its claim value to zero. Conversely, a plan's condition can deteriorate further following the initial recognition.

ME-PIMS reflects any un-bookings as negative claims, which are taken into account in the mean and median claim amounts (i.e., the above amounts represent the value of booked minus un-booked future claims). However, financial improvements during the projection period that are insufficient to cause claims to be un-booked are not reflected in the un-booked ME-PIMS claims values. As a result, the change in net position over the projection period may fall short of the amount that would actually be determined when reflecting the present values of simulated premiums, financial assistance, expenses, and investment returns over that period.

ME-PIMS' projections model primarily the plan's financial status rather than that of the plan's contributing employers.

In the multiemployer program, there is little distinction between claims due to insolvency and probable liabilities, unlike the single-employer program. In the single-employer program, a probable liability is generated on the PBGC books when the condition of the sponsoring employer justifies such a claim. In the multiemployer program, a probable liability is generated when certain plan metrics are sufficiently problematic, a mass withdrawal is triggered or cash-flow insolvency is projected within 10 years.

Changes to funding rules following PPA06 (e.g., the Pension Relief Act of 2010) are reflected in the modeling. For two large plans, PIMS incorporates special coding to model plan funding and/or guarantees. Premiums reflect legislative changes through MAP-21.

The version of ME-PIMS used to develop this fiscal 2013 Projections Report differs significantly from the previous year's version. In addition to changes mentioned elsewhere in these Appendices, 2013 ME-PIMS reflects significant changes in the modeling of the behavior of plans in critical and endangered status. Prior to the changes, ME-PIMS incorporated a hierarchy of remedial steps all critical and endangered status plans were assumed to take in response to the requirements of PPA06. The September 2012 external review suggested modification of the remedial steps in the model. Our research corroborated this observation, showing that many trustees of critical status plans have not taken all the "aggressive measures" our 2012 model had assumed. Based on our research, about one-third of critical status plans have determined that they have "exhausted all reasonable measures (ERM)" and will not adopt the full range of benefit adjustment options and contribution increases available under PPA06. We identified these ERM plans through two relationships that measure the amount of extra contributions that would be required in order for the plan to become healthy. A plan that is likely to be an ERM plan:

(1) has a higher ratio of inactive to active participants than a plan that is not likely to be an ERM plan; and

(2) has a higher ratio of {normal cost plus interest on unfunded liabilities} to contributions than a plan that is not likely to be an ERM plan.

ME-PIMS now separately models those critical status plans assumed to be or become ERM plans. We have also altered the hierarchy of remedial steps for these plans to more closely reflect their observed behavior. Further, the hierarchy for non-ERM critical status plans and for endangered status plans has been modified somewhat to reflect the emerging pattern of plans' typical behavior. A number of other conforming changes to benefit and contribution limits were also necessary to implement the revised remedial steps. For example, the model places a number of limits on the contribution increases in order to more closely replicate the actual behavior of plans. Among them, the annual rate of per capita contribution increase in non-ERM critical status plans will not exceed 12 percent. In ERM critical status plans, the annual increase is limited to 7 percent. Further, aggregate contributions in non-ERM plans will not more than double in the first six years, more than triple in the next six years or exceed 3.5 times the base year amount thereafter, when compared to base year contributions. The limit is 1.5 times in ERM plans.

The numerical effects of these changes on our mean results are detailed in the section of this report headed "How We Changed the ME-PIMS Model to Reflect Recent Trends."

ME-PIMS — Assumptions

All of the following variables are stochastically projected:

- **Interest rates, stock returns, and related variables** (e.g., inflation, wage growth, and multiplier increases in flat-dollar plans). These variables are determined by the underlying means, standard deviations, and correlation matrix established for the ME-PIMS projection.
 - Stock returns are modeled as independent from one period to the next. To determine a simulated sequence of stock returns, the model randomly draws returns from a distribution that reflects historical experience going back to 1926.
 - Interest rates are modeled as correlated over time. With the model, the Treasury yield for a given period is expected to be equal to the yield for the prior period, plus or minus some random amount.
 - The random draws affecting the bond yields and stock returns are correlated according to an estimate derived from the period 1973 to 2007. Stock returns are more likely to be high when the Treasury yield is falling and vice versa. Credit spreads on investment-grade corporate bonds are modeled to regress toward their historic mean values.
- **Asset returns.** Plan asset returns are based on a study of historic asset returns among large plans. Using the financial rates directly modeled in PIMS (stock market returns, long-term Treasury bond returns and yields) the study estimated mixtures of those rates to best fit the historic returns of plans in the study. PIMS projects annual plan returns using the following weighting based on the average of the estimated rate mixtures: 48 percent stock market returns, 23 percent long-term Treasury bond returns, 30 percent long-term Treasury bond yield (with a -2.5 basis points additive return adjustment). Future plans for PIMS may include modeling of additional asset class returns allowing PIMS to use the investment allocation information trustees now report as part of the annual Form 5500 filings.
- **Plan demographics.** Starting with the plan's active employee population data from the Form 5500 (grouped by age and service bands), the distribution of active participants for each plan in the future varies according to that plan's actuarial assumptions regarding retirement, disability, and termination

of employment. Age and service also vary over time due to hiring assumptions that are determined separately in each scenario of the projection. Hiring patterns vary with stochastic projections; the general assumption is that a plan's historical hiring distribution continues and hiring occurs (or not) to bring the size of the active population up to the size indicated by the continued trend as needed after plan decrements (retirement, termination of employment, disability) take place. ME-PIMS does not currently assume industry-specific employment trends. The numbers, ages, and benefits of retired and terminated vested participants are imputed based on the active population and vary depending on mortality, separation, and retirement assumptions. Based on the September 2012 external review, the assumption for the historical trend in active participation in multiemployer plans was changed in fiscal 2013. In prior years, ME-PIMS assumed sufficient new hires to keep the mean active multiemployer population at a constant level. Beginning in fiscal 2013, ME-PIMS models net annual changes in employment levels reflecting the path of economic variables in a particular scenario over time, resulting in a mean net decrease in the active multiemployer population of 1.3 percent across all scenarios. The effects of this change are discussed in the Multiemployer Plans & Program section of this report.

- **Benefit-level and employer-contribution increases.** These vary annually during the projection period with some correlation to modeled economic conditions in each future year.
- **Probability of mass withdrawal.** This probability is generated using each plan's:
 - plan size
 - ratio of active to inactive population
 - ratio of assets to benefit payments and expenses
 - ratio of the accumulated credit balance in the funding standard account to employer contributions
 - ratio of market value of assets to vested actuarial liabilities
 - ratio of current year to previous year contribution amount.

The following assumptions are also used in ME-PIMS projections:

- **Mortality.** For purposes of determining plans' mortality experience during each year of the projection period: the RP2000 Combined Healthy male mortality table, projected with Scale AA to the specified projection year. For purposes of determining the present value of PBGC assistance, the RP2000 Combined Healthy male mortality table projected with scale AA to the year of valuation plus 10 years and set back one year.⁴¹
- **Contribution Level/Credit Balances.** The credit balance is increased each year by the valuation interest rate and decreased by the amount by which modeled contributions are below the minimum required. ME-PIMS modeling of employer contributions reflects that most employers make contributions at a level above the minimum required.
- **Benefit Improvements.** For flat-dollar plans that are not in critical or endangered status, benefit multipliers are assumed to increase annually by the rate of increase in average wages. The majority of multiemployer plans have flat-dollar formulas, though there is a trend towards formulas that are

⁴¹ Setting a mortality table back one year means that each individual's life chances are determined as if they were one year younger. For example, the probability of survival that is used for a 65-year-old is what the published table assigns to a 64-year-old. "Projecting" a mortality table means reducing mortality rates each year to reflect expected improvements in longevity.

based on a percentage of total contributions attributable to each participant, especially for plans in critical or endangered status. ME-PIMS models both flat-dollar and percent-of-contributions benefit formulas. In plans where the benefit formula is not a flat-dollar or percent-of-contributions schedule, a translation to such a formula is made and the plan is modeled as a flat-dollar plan.

- **Benefit Improvement Restriction.** ME-PIMS assumes that critical status plans and most endangered status plans will not adopt future benefit improvements (2013 change.)
- **PBGC Premiums.** ME-PIMS models premiums based on the rate under current law with projected rates increasing under the indexing provisions in current law. There is no allowance in premium projections for write-offs of uncollectable premiums.
- **PBGC's Assets.** All assets in the multiemployer program are, by law, placed in revolving funds. PBGC's policy is to invest revolving fund assets in US Treasury securities. Asset returns in ME-PIMS are bound by the modeling of US Treasury returns in future years.
- **Discounting Future Claims.** When ME-PIMS discounts future amounts, the discount factor is a single interest factor which models the "select" and "ultimate" factors described in the 2013 financial statements with an assumed reversion to the relationship of market interest rate and annuity pricing factors observed prior to the 2008 financial crisis. Those factors are based on a survey of private-sector annuity market prices.
- **Determining Discounted Future Present Values Shown in Report Tables.** For calculations involving discounting future amounts, the discount rate used is the 30-year Treasury rate assumed to be in effect for the particular year and economic scenario.
- **Sunsetting Provisions.** We have assumed that the sunset provisions of PPA06 will be extended indefinitely. Otherwise, this evaluation assumes continuation of current law.

Two assumption changes were adopted for 2013 in order to more accurately recognize the date of plan insolvency. These assumptions will have very little, if any, effect on PBGC's net position, although they generally lead to an earlier date of predicted plan insolvency.

- In fiscal 2013 ME-PIMS uses the plan actuary's average retirement age for terminated vested participants instead of age 65 for plans that are already insolvent or terminated, generally resulting in the projection of earlier retirements and earlier plan insolvencies.
- In previous years we modeled the present value of the future withdrawal liability payments as an asset of the plan at the start of the modeling projections. The revised model reflects withdrawal liability payments on a year to year basis as they are assumed to be received, generally resulting in an earlier insolvency date but lower financial assistance.

Possible Future Refinements to the ME-PIMS Model

We expect to continue to modify and improve ME-PIMS in the future. Areas under study include incorporating additional modeling of plans' actual responses to PPA06, especially in the areas of projected mass withdrawals and employer benefit and funding decisions.

A plan becomes insolvent when it does not have enough assets to pay benefits as they become due. A single-employer plan has one sponsor for which financial information is often available and whose financial condition can be assessed and modeled. By contrast, among multiemployer plans, even the identity of some individual employers that participate in particular multiemployer plans has only recently become available. Others remain unknown. At present, ME-PIMS does not model the financial conditions of individual employers (or industries) in multiemployer plans. As we analyze the newly available information on individual employers that provide more than five percent of a plan's contributions, we will consider whether to incorporate this information into the model.

We are also considering structural changes to the ME-PIMS model to better reflect the relative drivers of insolvency as we model them. Of particular interest is the degree to which improvements in demographic data and benefit cash flow projection for inactive participants can be implemented.

SE-PIMS

SE-PIMS — Overview

No single underfunding number or range of numbers is sufficient to evaluate PBGC's exposure and expected claims over the next 10 years. Claims are sensitive to changes in interest rates and investment returns, overall economic conditions, contributions, changes in benefits, the performance of some particular industries, and bankruptcies. Large claims from a small number of terminations characterize the Corporation's claims experience throughout its history and are likely to affect PBGC's potential future claims experience as well.

SE-PIMS starts with data on PBGC's single-employer position and data on the funded status of more than 400 plans that are weighted to represent the universe of PBGC-covered plans. The model produces results under 5,000 different simulations. The probability of any particular outcome is estimated by dividing the number of simulations with that outcome by 5,000. The model uses funding rules, as prescribed by current law.

PBGC's expected claims under the single-employer program depend on two factors: the amount of underfunding in the pension plans that PBGC insures (i.e., exposure) and the likelihood that corporate sponsors of these underfunded plans will encounter financial distress that results in bankruptcy and plan termination (i.e., the probability of claims).

SE-PIMS — Data

SE-PIMS has a detailed database of more than 400 actual plans, sponsored by more than 300 firms, which represent about half of PBGC's insurance exposure in the single-employer defined benefit system measured from the 2011 Form 5500 filings (the most recent year of complete Form 5500 filing data). The database includes:

- summary statistics on plan demographics
- plan benefit structure
- asset values
- liabilities
- actuarial assumptions
- key financial information about the employer sponsoring the plan

The SE-PIMS database contains pension plan information from Schedules SB of the Form 5500 generally from the 2011 plan year. We also reflect any available contributions from later years' filings that are available when we generate the initial results.

SE-PIMS — Methodology

The SE-PIMS sample of over 300 large plan sponsors is weighted to represent the universe of PBGC-insured, single-employer plans. The weighted representation reflects the values of total liabilities and underfunding, and the distribution of funding levels among plans in the insured universe that were available publicly as of the preceding spring (generally 2011 plan year information).

SE-PIMS weights are implemented to scale our sample of plans to be representative of the entire universe of single-employer plans (generally trying to capture the distribution of plans by size). This is done by creating

scaled copies (referred to as “partners”) of the sponsors in the SE-PIMS sample. Each partner is projected to sponsor scaled copies of the same plans sponsored by its source sponsor. Partners begin each scenario with the financial conditions copied from their source sponsors but are scaled in the sizes of their balance sheet entries and employment and receive individual projections of their financial conditions and bankruptcy experiences. Since the SE-PIMS sample is drawn from larger than average plans and corporations, each partner is scaled (in plan size and sponsor size) to one-fifth the size of its source.

Partners are allocated to sponsors in SE-PIMS to create a weighted sample that approximates the distribution of plan liabilities by funding status in the insured universe. For example, the weighted sample’s total value of plan liabilities among plans between 50 to 60 percent funded is compared to the same total for the insured universe, and similarly for plans 60 to 70 percent funded, 70 to 80 percent funded, etc. Partners are allocated for a best fit to the entire distribution.

SE-PIMS simulates contributions, premiums, and underfunding for these plans using the minimum funding and premium rules as required by the PPA06 and subsequent legislation, and then extrapolates the results to the universe of single-employer plans. Recent changes to funding rules and PBGC premiums (including December 2013 Budget Act) are reflected in the modeling. SE-PIMS also uses the employer’s financial information as the starting point for assigning probabilities of bankruptcy, from which it projects losses to the insurance program.

Projections of claims against the insurance program are made stochastically. Claims against the pension insurance program are modeled by simulating the occurrence of bankruptcy for plan sponsors. The model reflects the relationship (over the years 1980 – 1998) between the probability of bankruptcy and the firms’ contemporaneous financial health variables (equity-to-debt ratio, cash flow, firm equity, and employment). For each period, the model assigns a random change in each of these variables to each firm correlated with changes in the economy. The simulated financial health variables determine the probability of bankruptcy for that year.

The model assumes, with the exception noted below regarding variable-rate premiums, that all plan sponsors contribute the minimum amount each year. The model runs 500 economic scenarios (varying interest rates and equity returns) with each plan’s sponsor being “cycled” through each economic scenario 10 times (with varying financial health experiences, bankruptcy probabilities, etc.) for a total of 5,000 different simulations. SE-PIMS then extrapolates the results of these simulations to the universe of insured single-employer plans.

SE-PIMS — Assumptions

All of the following variables are stochastically projected:

- **Interest rates, stock returns, and related variables** (e.g., inflation, wage growth, and multiplier increases in flat-dollar plans).⁴² These variables are determined by the underlying means, standard deviations, and correlation matrix established in SE-PIMS.
 - Stock returns are modeled as independent from one period to the next. To determine a simulated sequence of stock returns, the model randomly draws returns from a distribution that reflects historical experience going back to 1926.
 - Interest rates are modeled as correlated over time. With the model, the Treasury yield for a given period is expected to be equal to the yield for the prior period, plus or minus some random amount.

⁴² In a flat-dollar plan, the pension benefit is determined by multiplying a fixed amount by the participant's years of service. In a salary-related plan, the benefit is determined by multiplying a percentage of the participant's salary by the years of service.

- The random draws affecting the bond yields and stock returns are correlated according to an estimate derived from the period 1973-2007. Stock returns are more likely to be high when the Treasury yield is falling and vice versa. Credit spreads on investment-grade corporate bonds are modeled to regress toward their historic mean values.
- **Sponsor financial health variables** (equity-to-debt ratio, cash flow, firm equity, and employment).
- **Asset returns.** Plan asset returns are based on a study of historic asset returns among large plans. Using the financial rates directly modeled in PIMS (stock market returns, long-term Treasury bond returns and yields) the study estimated mixtures of those rates to best fit the historic returns of plans in the study. PIMS projects annual plan returns using the following weighting based on the average of the estimated rate mixtures: 48 percent stock market returns, 23 percent long-term Treasury bond returns, 30 percent long-term Treasury bond yield (with a -2.5 basis points additive return adjustment). Future plans for PIMS may include modeling of additional asset class returns allowing PIMS to use the investment allocation information sponsors now report as part of the annual Form 5500 filings.
- **Plan demographics.** Starting with plans' population data from the Form 5500, the distribution of active participants for a plan varies throughout the forecast, first, according to that plan's actuarial assumptions regarding retirement, disability, and termination of employment. Age and service also vary over time due to hiring patterns that are determined separately in each scenario of the projection. Unless the plan is frozen, PIMS assumes a stationary mean active participation level for the plan. The distribution of ages and benefits for retired and terminated vested participants are imputed from a long term projection of the starting active population and normalized to the actual counts furnished by the Schedules SB. All participants are assumed to be male and are assumed to elect single life annuities.
- **Probability of bankruptcy.** Sponsors are subjected to an annual stochastic chance of bankruptcy. That probability of bankruptcy is determined by formulas estimated from historical bankruptcies and various measures of companies' financial health over the period 1980 to 1998. Bankruptcy probability formulas generally do not vary by industry.⁴³ A plan presents a loss to participants and/or the pension insurance program if its sponsor is simulated to experience bankruptcy and the plan is less than 80 percent funded for termination liability.

The following assumptions are also used in SE-PIMS projections:

- **Mortality.** For purposes of determining plans' mortality experience during each year of the projection period: the RP2000 Combined Healthy male mortality table projected using Scale AA to the specified projection year. For purposes of determining the amount of underfunding at termination: RP2000 Combined Healthy male mortality table projected with scale AA 10 years beyond the applicable valuation year and set back one year. For determining funding target liabilities — the RP2000 Combined Healthy male table projected with scale AA to the year of valuation plus 10 years.
- **Contribution Level/Credit Balances.** The credit balance is increased each year by the plan's rate of return on assets and decreased by the amount assumed to be used to satisfy the minimum funding requirement. For purposes of modeling future claims in SE-PIMS, it is assumed that employers will contribute the minimum required amount each year and that any credit balance remaining will be used to the maximum extent permitted until the balance is completely depleted.

⁴³ We make an exception for the financial and utilities industries, where relatively high degrees of leverage are considered not to signal a risk of bankruptcy.

- **Benefit Improvements/Benefit Improvement Restriction.** For flat-dollar plans, benefit multipliers are assumed to increase annually by the rate of inflation and productivity growth. For salary-related plans, the benefit formula is assumed to remain constant, but annual salary increases are reflected based on the rate of inflation, productivity growth, and a factor measuring merit and/or seniority. Because we do not model benefit increases that exceed the average wage increase of affected employees, benefit restrictions are not applicable in PIMS.
- **Cash Balance Conversions.** About 50 plans in our database amended their plan formulas in recent years from final pay formulas to cash balance formulas. These plans were processed assuming they continued their prior final pay formulas (instead of using their cash balance formulas - as the cash balance coding for the model was not fully tested). Because the model calibrates separately for the starting liability and future normal cost, this assumption that the prior formula continues should not materially distort the evolving liabilities associated with these plans.
- **Plan Accrual Benefit Restrictions.** Plans with funded percentages below 60 percent must cease benefit accruals. SE-PIMS reflects this rule, and assumes that once a plan is frozen, it will remain frozen, even if the percentage increases above 60 percent at some future time.
- **Declassification of Credit Balances.** When determining funding percentages for triggering benefit restrictions, assets are reduced by credit balances. Sponsors have the option of declassifying credit balances at any time to raise the funded percentage to the level needed to avoid a benefit restriction. For modeling purposes, it is assumed that sponsors will choose to declassify credit balances to the extent necessary to avoid the benefit freeze restriction, but ignores declassification of the credit balance when the 80 percent threshold could be attained.
- **PBGC Premiums.** SE-PIMS models premiums based on the rate under current law (including premium increases under the Budget Act [December 2013]) with projected rates increasing under the indexing provisions in current law. There is no allowance in premium projections for write-offs of uncollectable premiums.
- **Variable-Rate Premiums.** PBGC's experience has been that many companies make plan contributions in excess of the minimum, in part to avoid or reduce their variable-rate premium payments. Virtually all of these companies have been at a low risk of bankruptcy and their plans have not accounted for a material portion of PBGC's claims. By contrast, the relatively small number of plans that result in claims are sponsored by companies that have not made contributions above the required minimum for an extended period prior to the claim. Using the general PIMS projection that companies will make the minimum required contributions would overstate the estimate of PBGC's variable rate premium income. Accordingly, for variable-rate premium projections only, the SE-PIMS model reflects an adjustment to plan assets phased in over five years to offset the assumption that plans generally contribute at the minimum. Variable rate premiums are further scaled to match recent experience. Finally we assume employers will fund up to avoid 50 percent of the increase in the variable rate premium rate per \$1,000 of liability in excess of the \$9 level (again, the excess contribution is assumed only for the determination of the variable premium).
- **PBGC's Assets.** Projected returns are based on analysis of historical returns, return volatilities and correlations between the different asset class returns.
- **Discounting Future Claims.** When SE-PIMS discounts future amounts, the discount factor is a single interest factor which models the "select" and "ultimate" factors described in the 2013 financial statements with an assumed reversion to the relationship of market interest rate and annuity pricing factors observed prior to the 2008 financial crisis. Those factors are based on a survey of private-sector annuity market prices.

- **Determining Discounted Future Present Values Shown in Report Tables.** For calculations involving discounting future amounts, the discount rate used is the 30-year Treasury rate assumed to be in effect for the particular year and economic scenario.

(For additional information on SE-PIMS and the assumptions used in running the model, see PBGC's *Pension Insurance Data Book 1998*, pages 10-17, which also can be viewed on PBGC's website at www.pbgc.gov/publications/databook/databk98.pdf.)

Sample Statistics from FY 2013 Runs in ME-PIMS and SE-PIMS

The following tables show some output statistics from runs of the ME-PIMS and SE-PIMS model for the fiscal 2013 Projections Report. These statistics are specific to the model runs for this report.

Table 1

Arithmetic Means, Standard Deviations and Correlations of Key Financial Market Values FY 2013 Single-Employer and Multiemployer Model Runs (across 2014-2023 for 500 economic scenarios)			
	Long-Term Treasury Yield	Return on 30-year Treasury Bonds	Stock Market Return
Mean	4.0%	4.0%	9.4%
Standard Deviation	1.4%	9.5%	20.3%
Correlations:			
• Long-Term Treasury Yield	1.00	-0.26	-0.04
• Return on 30-year Treasury Bonds		1.00	0.22
• Stock Market Return			1.00

Table 2

Arithmetic Means and Standard Deviations of Market Rates Derived From Projected Long-Term Treasury Yields in FY 2013 Single-Employer and Multiemployer Model Runs			
	Long-Term Corporate Rate	Inflation Rate	Wage, Salary and Flat Benefit Growth Rate
Mean	5.1%	2.9%	4.7%
Standard Deviation	1.4%	1.4%	1.4%

Table 3

**Projected Plan Returns⁴⁴
FY 2013 Single-Employer and Multiemployer Model Runs**

Arithmetic Mean	6.6%
Geometric Mean	6.1%
Standard Deviation	10.4%

Table 4

**Projected Annual Bankruptcy Probabilities⁴⁵
FY 2013 Single-Employer Model Runs**

Arithmetic Mean	0.6%
Standard Deviation	1.0%

Table 5

**Annual Probability of Plans' Projected Mass Withdrawal
FY 2013 Multiemployer Model Runs**

Arithmetic Mean	3.1%
Standard Deviation	8.2%

Table 6

**Annual Rate of Plans' Projected Insolvency
FY 2013 Multiemployer Model Runs**

Arithmetic Mean	1.30%
Standard Deviation	0.53%

⁴⁴ The geometric rate of return reflects that negative asset returns set plans back more than positive returns help them, by reducing the base of assets. This is particularly important for plans whose benefit payments exceed contributions.

⁴⁵ The bankruptcy probability modeling methods and results are more fully described in Boyce, S. and Ippolito, R. A. (2002), The Cost of Pension Insurance. Journal of Risk and Insurance, 69: 121–170. doi: 10.1111/1539-6975.00012.