FY 2020 Projections Report

PBGC Pension Benefit Guaranty Corporation

September 2021

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FREQUENTLY USED ABBREVIATIONS

ARP	American Rescue Plan Act of 2021
ERISA	Employee Retirement Income Security Act of 1974, as amended
FY	Fiscal Year
ME	Multiemployer
MP-2019	Mortality Projection − 2019 Mortality Improvement Scale
MPRA	Multiemployer Pension Reform Act of 2014
PBGC	Pension Benefit Guaranty Corporation
PIMS	Pension Insurance Modeling System
RP-2014	Retirement Plans − 2014 Mortality Table
SE	Single-Employer
SFA	Special Financial Assistance
VBL	Vested Benefit Liability

EXECUTIVE SUMMARY

The Pension Benefit Guaranty Corporation (PBGC or Corporation) insures against the loss of pension benefits by participants in private-sector pension plans. PBGC operates two separate insurance programs — one for single-employer defined benefit pension plans and one for multiemployer defined benefit pension plans — that are legally separate and operationally and financially independent. The two programs also offer different benefit guarantees and feature different funding mechanisms. This report primarily includes 10-year projections, ending with FY 2030 (September 30, 2030), of the financial status of both programs under a range of future financial scenarios, plus additional projections beyond 10 years for the Multiemployer Program.

While last year's report projected PBGC's Multiemployer Program would become insolvent during FY 2026, this year's projections of the Multiemployer Program show a significant improvement. The new projections show a continued high likelihood of insolvency but delayed until at least the mid-2030s and likely to a point more than 30 years out. Half of projected scenarios result in insolvency by the end of FY 2055 and half result in either insolvency after FY 2055 or indefinite solvency. This change is due primarily to the enactment of the American Rescue Plan (ARP) Act of 2021, which provides Special Financial Assistance (SFA) to eligible multiemployer plans and increases the multiemployer premium rate to $52 per participant for plan years beginning after December 31, 2030.[1]

As a result of ARP, the Multiemployer Program shows significant improvement under all scenarios and, under favorable scenarios, a slightly positive projected net position in FY 2030. The analysis of the impact of ARP in this report is based on the interim final rule made public on July 9, 2021 and published in the Federal Register on July 12, 2021. PBGC received over 100 comments on the interim final rule. Those comments are currently being reviewed. To the extent that PBGC makes any changes to the SFA program in the final rule, these projections may also change.

Results for this year's projections continue to show that PBGC's Single-Employer Program is likely to remain out of deficit over the next decade.

Figure 1 summarizes the main results of this report:

Figure 1 – PBGC Projected Net Financial Position for End of FY 2030
Present Value as of September 30, 2020 ($ in billions)

	Multiemployer Program	Single-Employer Program
Mean	($6.7)*	$49.9**
15th to 85th Percentile	($17.0) - $2.6	$33.3 - $65.9

* ($6.7) billion net position consists of $4.3 billion in assets and $11.0 billion in liabilities.
** $49.9 billion net position consists of $111.9 billion in assets and $61.9 billion in liabilities.

[1] The legislation, enacted on March 11, 2021, is the American Rescue Plan Act of 2021 (P.L. 117-2).

MULTIEMPLOYER PROGRAM

American Rescue Plan (ARP)

ARP enables eligible multiemployer plans to apply to PBGC for SFA. Eligibility is limited to the most financially troubled plans based on specific criteria set by statute. The SFA is calculated to be the amount required for the plan to pay all benefits due through the end of the last plan year ending in 2051, generally based on statutorily mandated assumptions. The SFA, which is funded by uncapped appropriations of general revenues, is paid by PBGC to each eligible plan in a one-time lump sum and is not subject to repayment. PBGC estimates that, on average, a total of $97.2 billion in SFA will be distributed to 268 plans. Several factors could impact the number of plans that become eligible for SFA and the amount of SFA determined in plan applications. As a result, PBGC's stochastic estimates range from 158 plans receiving a total of $66.1 billion in SFA to 482 plans receiving a total of $147.4 billion.

ARP establishes an eighth fund at PBGC for the purposes of providing SFA to plans and to pay for the operating expenses required to administer the program. By law, all initial applications for SFA must be submitted to PBGC by December 31, 2025, and the eighth fund will make no further SFA distributions after FY 2030. Although the actual amount and timing of SFA distributions may differ from PBGC estimates, the program is funded by periodic transfers from the general fund of the Treasury in amounts necessary to make all approved SFA payments and fund PBGC's SFA operating expenses through FY 2030.

The SFA to be provided to eligible plans will effectively address the near-term crisis faced by the Multiemployer Program, but ARP was not designed to address the underlying structural issues in the multiemployer system that contributed to the crisis.[2]

Projected Net Financial Position (Assets vs. Liabilities)

The Multiemployer Program projections, displayed as present values as of September 30, 2020, show a mean improvement in net financial position (i.e., the average of all the scenarios modeled) of $57.0 billion – from negative $63.7 billion (the actual reported net position on September 30, 2020) to a projected negative $6.7 billion at September 30, 2030 (on a present value basis as of September 30, 2020).

The projected improvement in the net position is due primarily to the enactment of ARP, which is expected to result in the "unbooking" of liabilities for ongoing plans that had previously been booked as probable losses, and the deferment or avoidance of other potential insolvencies beyond FY 2030.[3] There were also changes in recent economic data and assumptions, such as discount rates and asset returns, that contributed to the projected improvement. If the FY 2030 mean net financial position of negative $6.7 billion is instead expressed in terms of the expected future value as of September 30, 2030, it would be negative $8.5 billion. For the purposes of this report, this is referred to as the nominal value.

[2] SFA includes repayments of section 4261 regular financial assistance loans to PBGC.

[3] PBGC records projected financial assistance for ongoing plans as probable losses under ASC 450 if the plan is projected to go insolvent within ten years. The SFA provided under ARP extends the solvency of eligible plans that were previously recorded as probable losses by more than 10 years. These plans are expected to be reclassified from probable losses in FY 2021, and such accounting classification will be reviewed along with all other plans in subsequent years.

Projected Insolvency (Available Funds)

While last year's report estimated that PBGC's Multiemployer Program would likely run out of money (i.e., become "insolvent") in FY 2026, the Program is no longer projected to become insolvent in the 10-year projection period. Under most projection scenarios, the SFA provided to eligible plans under ARP delays the insolvency of PBGC's Multiemployer Program to a point likely more than 30 years out. The most pessimistic scenario of the 500 scenarios projects the fund to go insolvent in FY 2036, while optimistic scenarios project the fund to remain solvent indefinitely. The median projected insolvency year, post-ARP, is FY 2055. In addition, 56 percent of projected scenarios result in insolvency by the end of FY 2060. This uncertainty about whether and when the Multiemployer Program will run out of money is driven by several variables, such as plans' future asset performance and plans' contribution income.

Methods and Assumptions

The Multiemployer Program projections model is substantially the same as that used last year, with the major differences being changes to reflect the enactment of ARP, new plan data, updated plan behavioral assumptions, and updated economic assumptions. These changes are quantified and detailed in **Figure 9**, with additional details about changes in the Appendix.

SINGLE-EMPLOYER PROGRAM

Projected Net Financial Position (Assets vs. Liabilities)

The projection shows the mean net financial position in the Single-Employer Program growing from $15.5 billion, the actual reported net position as of September 30, 2020, to an estimated $49.9 billion on September 30, 2030 (on a present value basis as of September 30, 2020). In FY 2020, actual premium income and asset/liability gains exceeded mean projections in the FY 2019 Projections Report, while actual claims and expenses were slightly less than mean projections in the FY 2019 Projections Report. Thus, the net position starting point of the projection period is higher for this report than what was projected to be in the FY 2019 report.

As the net position of the Single-Employer Program continues to improve, the potential for a return to negative net position is reduced, even with very high claims. Still, existing underfunding is more acute in plans sponsored by companies with the highest risk of financial distress, and any downturn in the economy increases both underfunding and the probability of claims to PBGC. Plans sponsored by employers with below-investment-grade credit ratings had an aggregate underfunding of $176 billion as of December 31, 2019, per PBGC's FY 2020 Annual Report, up from $155 billion as of December 31, 2018, reported in PBGC's FY 2019 Annual Report. This is a significant portion of the estimated $560 billion of total underfunding in PBGC-insured single-employer plans based on 2018 Form 5500 filings.[4]

Methods and Assumptions

The single-employer model is substantially the same as that used last year, with the major differences being the modeling of plans terminating through a standard termination, and updated plan data and economic

[4] Total plan underfunding from Table S-44 of PBGC's 2019 Data Tables.

assumptions. These changes are described in the discussion in **Figure 15**, with additional details about changes in the Appendix.

ABOUT THIS REPORT

PBGC's annual Projections Report is required by section 4008 of the Employee Retirement Income Security Act, as amended (ERISA) to be an "actuarial evaluation of the expected operations and status of [PBGC's] funds." The purpose of the report is to provide an actuarial evaluation of the future financial status of PBGC's Multiemployer and Single-Employer Programs. It does so by projecting solvency (adequacy of assets and income to meet cash needs) and balance sheet net financial position (assets minus liabilities) for the two programs under a variety of simulated future conditions. Net financial position is determined on a present value basis – in this report, a negative net position does not imply a projected insolvency.

The report generally uses data and assumptions as of September 30, 2020, the end of FY 2020, though economic data was updated through December 31, 2020.[5] The projections start with PBGC's FY 2020 Annual Report and forecast results under a range of future economic scenarios, without presuming any changes in current law.[6] Assumptions are established as of September 30, 2020. The effects of ARP, however, are reflected in this report, even though it was enacted after September 30, 2020. This is consistent with the approach used in past Projections Reports to reflect significant legislated changes that would impact the projections of the solvency and future financial condition of the Multiemployer and Single-Employer Programs.

ARP establishes a new PBGC multiemployer "eighth fund" to provide SFA to eligible plans and to pay for program expenses.[7] SFA will be funded by appropriations of general revenues through periodic transfers from the Treasury Department. This report provides estimates for the aggregate amount of SFA to be distributed by the new eighth fund but does not project SFA outlays on an annual basis. The timing of PBGC payments of SFA to eligible plans is subject to the timing of SFA applications and approvals and is therefore uncertain. Furthermore, most of the report's analysis of the Multiemployer Program excludes eighth fund assets and obligations because (1) SFA payments will be fully funded by the appropriations and not from other PBGC insurance funds, and (2) by law, the eighth fund will make no further SFA distributions after FY 2030 and will thus be effectively closed out. The cash flow activity of the eighth fund is certain to be short-term in nature and will have no bearing on the Multiemployer Program's long-term financial position other than the SFA's impact in extending the solvency of many eligible plans and thereby forestalling claims on PBGC's insurance fund.

Financial markets and employment levels have experienced significant volatility since the start of the COVID-19 pandemic in March 2020. The federal government enacted significant policy changes and stimulus

[5] The use of economic data as of December 31st, in this report and in future reports, improves the model's projection of single employer variable rate premium revenue in the following year because most plans' variable rate premium requirements are based on funding levels as of January 1st.

[6] The financial statements in the FY 2020 Annual Report were prepared in conformity with accounting principles generally accepted in the United States of America (U.S. GAAP) and utilize data and assumptions available as of September 30, 2020 (the end of FY 2020).

[7] By law, PBGC maintains several separate funds that finance other activities in the Multiemployer and Single-Employer Insurance Programs.

packages to combat the economic downturn seen at the beginning of the pandemic. However, due to uncertainty around the long-term impact of COVID-19 and government relief efforts, this report makes no special assumptions regarding the impact of COVID-19 on future asset returns, unemployment, mortality, or legislation.

While no specific assumptions were made regarding COVID-19's impact on future economic conditions, economic data, including asset returns and interest rates, were updated through December 31, 2020. At that time, equities had bounced back from losses in March and April of 2020 and exceeded historic highs, and interest rates were at historic lows. These economic conditions are reflected in the starting point of the projections for this report.

PBGC uses two stochastic modeling systems to develop the projections: the Multiemployer Pension Insurance Modeling System (ME-PIMS) and the Single-Employer Pension Insurance Modeling System (SE-PIMS). Both systems use distributions of investment returns, interest rates, and other variables to estimate a range of possible future outcomes. The report uses averages and ranges to summarize the results of the simulations.

The projections shown are estimates, not predictions. They reflect a reasonable range of values that result from assumptions about many factors including:

- Inflation and wage growth.
- Interest rates.
- Equity returns.
- Plan sponsor decisions about contributions.
- Multiemployer plan applications for SFA provided by ARP.

In addition, many aspects of the individual plans and the complex rules that govern the private employer pension system in the United States are simplified or ignored to create a working model. **The actual results that ultimately occur in future years will vary, potentially significantly, from the mean projections in this report.**

Wide Range of Possible Outcomes

To illustrate the uncertainty in future outcomes, this report shows a range of results associated with a given set of assumptions. These include the mean (i.e., average) and median (i.e., middle) values, as well as percentile results along the distribution of outcomes. To demonstrate potential variation, the 85th percentile (15 percent of the outcomes are higher [more favorable]), the median value (50th percentile), and the 15th percentile (15 percent of outcomes are lower [less favorable]) are shown. During a 10-year or longer period, it is likely that results will at times fall outside this 15th – 85th percentile range. The 1st and 99th percentile results are also shown in figures to provide a sense of the broad range of potential outcomes.

Financial Obligations

The report presents two types of financial measures:

- Liabilities, which represent the present value of the retirement benefits that will be provided by PBGC for the lifetime of participants and their beneficiaries. PBGC's liabilities are compared to assets to determine a net financial position.
- Cash flows, which represent the benefit payments expected to be disbursed by PBGC during each year of the projection period. Cash flows provide the basis for examining PBGC solvency.

Claims are newly recorded liabilities reduced by any associated plan assets and cash recoveries from plan sponsors for a plan that PBGC takes over.[8] Claims are recorded when the payment of guaranteed amounts is "probable." Claims happen only when a plan does not have enough assets to pay promised benefits, up to the level guaranteed by PBGC. PBGC's liabilities include amounts for claims where PBGC is already providing assistance and estimated amounts for probable claims yet to mature.

The insurable event giving rise to a claim and the coverage provided is different for the Single-Employer Program and the Multiemployer Program.

- Single-Employer Program – The insurable event is termination of an underfunded plan, generally whose sponsor is in financial distress (e.g., bankruptcy of a company that sponsors a plan without enough assets to cover all future benefits up to the level guaranteed by PBGC).[9]
- Multiemployer Program – The insurable event is plan insolvency, typically the drawdown of all assets in the plan such that there is not enough money to pay benefits for the next year. For accounting purposes, multiemployer claims are booked as probable losses when a plan is within 10 years of insolvency.

Discussions of PBGC's net financial position reflect a comparison of liabilities to assets as of a certain date. The PIMS models estimate liabilities and assets on PBGC's books in the future in different economic scenarios. They do not model possible future losses that are disclosed in footnotes to PBGC's financial statements but not booked as liabilities, such as amounts that represent "reasonably possible" contingencies.[10]

"Benefit payments" in the Single-Employer Program and "financial assistance" in the Multiemployer Program mean the amount PBGC is projected to pay to retirees or a multiemployer plan during that year, respectively, regardless of when a plan failed. The solvency projection of each PBGC program is based on the sufficiency of assets, investment returns, and premiums to meet PBGC's benefit payment/financial assistance obligations and expenses for a particular year. This report uses the term "insolvent" to mean lacking the funds to pay benefits/assistance and expenses for a year. PBGC can have a negative net financial position but still not be insolvent for the purposes of this definition.

[8] Asset recoveries are only made in single-employer claims events and are not applicable for the Multiemployer Program.
[9] Terminations that result in claims on the Single-Employer Program can be a "distress" termination initiated by the plan administrator when the plan sponsor and its controlled group meet certain conditions of financial distress or, alternatively, an "involuntary" termination initiated by PBGC.
[10] Reasonably possible contingencies are discussed in Note 9 of PBGC's FY 2020 Annual Report. Measured as of December 31, 2019, they were $176 billion for the Single-Employer Program and $9.3 billion for the Multiemployer Program.

About the PIMS Models

The PIMS models are unique and complex. They are designed specifically for estimating the information in this report and other related analyses. The models are regularly revised to reflect changing laws, plan sponsor behavior, and other actuarial assumptions.

The FY 2020 SE-PIMS model was updated to reflect the minimum funding relief provisions of ARP that affected single-employer plans and the impact of expected future standard plan terminations, but otherwise remains predominantly the same as the FY 2019 model. For FY 2020, the ME-PIMS model was updated to reflect the SFA provisions of ARP based on PBGC's corresponding interim final rule.[11] Both models were updated with new plan data from plans' Forms 5500 and assumptions regarding the underlying economy.

While both ME-PIMS and SE-PIMS can simulate some demographic and economic factors at least 20 years into the future, they do not model all longer-term sources of uncertainty affecting the pension system.[12]

Estimated Multiemployer Program deficits and financial assistance shown in this report assume that PBGC will provide financial assistance in accordance with the current level of guarantees. This evaluation assumes no changes to the current law after September 30, 2020, for both multiemployer plans and single-employer plans (except for ARP).

[11] This report is based on provisions effective in the interim final rule made public on July 9, 2021 and published in the Federal Register on July 12, 2021, which is subject to future changes based on consideration of public comments. The interim final rule can be found here: https://www.govinfo.gov/content/pkg/FR-2021-07-12/pdf/2021-14696.pdf.

[12] For more information on PIMS, including links to user publications and peer review papers, see the PIMS web page https://www.pbgc.gov/about/projections-report/pension-insurance-modeling-system.

MULTIEMPLOYER PROGRAM

MULTIEMPLOYER PROGRAM OVERVIEW

Multiemployer pension plans are collectively bargained plans maintained by one or more labor unions and multiple unrelated companies that are generally in the same industry or members of a trade association. PBGC's Multiemployer Program covers approximately 10.9 million participants in about 1,400 plans.

The Multiemployer Program is legally distinct from, and operates differently than, PBGC's Single-Employer Program. When a multiemployer plan becomes insolvent, which occurs when a plan has insufficient funds to pay benefits, PBGC does not take over the administration of the plan. Rather, PBGC provides financial assistance directly to the plan to cover participants' guaranteed benefits and plan administrative expenses. This financial help is provided as loans to plans.

By statute, the features and obligations of the Multiemployer Program and the Single-Employer Program are separate and distinct. For instance, multiemployer plans' premium rates are lower than those for single-employer plans and are based solely on participant count. The amount and structure of the benefit guarantees provided under each program also differ significantly, and the guaranteed amount is generally lower for multiemployer plans. Further, assets of the Multiemployer Program are separate from those of the Single-Employer Program, and assets from one program cannot be used to fund obligations of the other program.

Over the past decade, due to the severe underfunding and near-term insolvency of a sizeable segment of multiemployer plans, the Multiemployer Program has reported substantial potential liabilities and increasing risk of insolvency. Based on 2018 Form 5500 filings, there was an estimated $757 billion of total underfunding in PBGC-insured multiemployer plans.[13]

If PBGC's Multiemployer Program were to run out of money, PBGC would be able to provide financial assistance only from premium income, which is insufficient to enable plans to pay guaranteed benefits. Participants in plans receiving financial assistance would have their benefits significantly reduced and receive only a fraction of the benefits guaranteed by PBGC.

The enactment of the American Rescue Plan (ARP) Act on March 11, 2021, provides significant monetary relief to the most financially distressed multiemployer plans, thereby extending the projected solvency of these plans. The financial status of the Multiemployer Program will reflect this relief because many deeply troubled plans are no longer expected to require financial assistance within the next few years and beyond. **Figure 2** summarizes the improvement in the projected FY 2030 financial condition of the Multiemployer Program from FY 2019 to FY 2020, primarily due to the enactment of ARP.

[13] Total plan underfunding from Table M-9 of PBGC's 2019 Data Tables.

Figure 2 – Projected Improvement in FY 2030 Multiemployer Program Net Position		
	FY 2019 Model (Pre-ARP)	**FY 2020 Model (Post-ARP)**
Expected FY 2030 Mean Net Financial Position – present value as of September 30, 2020 ($ billions)	($87.9)*	($6.7)
Median Projected Year of PBGC Insolvency	FY 2026	FY 2055

* The Pre-ARP expected FY 2030 mean net financial position is based on the ME-PIMS model used in the FY 2019 Projections Report, with the expected FY 2029 mean net financial position adjusted to reflect the passage of time. This is shown in **Figure 9** of this report.

AMERICAN RESCUE PLAN (ARP) ACT

ARP established section 4262 of ERISA under which Special Financial Assistance (SFA) is provided to eligible multiemployer plans.[14] Eligibility for SFA is restricted to:

(1) plans that are in critical and declining status in any plan year beginning in 2020 through 2022;

(2) plans with an approved benefit suspension under MPRA as of the enactment of ARP;

(3) plans that are certified to be in critical status, have a modified funding percentage of less than 40 percent, and an active to inactive participant ratio of less than 2 to 3 in any plan year beginning in 2020 through 2022 (doesn't have to be same year for each requirement); and

(4) plans that became insolvent after December 16, 2014, and did not terminate prior to enactment of ARP.

Eligible plans can apply to PBGC for SFA in the amount required for the plan to pay all benefits due through the end of the last plan year ending in 2051, based on a deterministic projection subject to certain prescribed assumptions and methods. For plans that adopted a benefit suspension either under MPRA (ERISA section 305(e)(9)), or eligible insolvent plans (under ERISA section 4245(a)), the SFA includes make-up payments of suspended benefits for participants and beneficiaries who are in pay status at the time SFA is paid, and prospective reinstatement of suspended benefits for all participants and beneficiaries. For eligible insolvent plans, the SFA also includes the amount needed to repay the loan from PBGC for the regular financial assistance paid during the period of the plan's insolvency.

The receipt of SFA does not impact a plan's ability to apply for regular financial assistance payments under section 4261 of ERISA if the plan becomes insolvent in the future. Plans that receive SFA continue to be covered under the PBGC Multiemployer Program with the same premium and guaranteed benefit levels as all other multiemployer plans. However, by receiving SFA, these plans agree to abide by certain conditions stipulated by statute and under PBGC's interim final rule. This includes a prohibition on applying for a suspension of benefits under MPRA in the future.

ARP amends ERISA section 4005 to establish an eighth fund at PBGC for the exclusive purposes of providing SFA to plans and paying for PBGC's operating expenses required to administer the SFA program.

[14] ARP includes additional provisions described in sections 9701 through 9703 that provide multiemployer plans with temporary funding relief. These provisions are expected to have minimal impact on PBGC's projection results and were not modeled in ME-PIMS for purposes of this report.

The eighth fund will be funded by periodic transfers from the Treasury Department under the appropriations provided in ARP. There is no ceiling on the aggregate amount that the Treasury Department will transfer to PBGC's eighth fund to provide for SFA under the terms of the SFA program. Transfers from the Treasury to the new eighth fund cannot occur after September 30, 2030. Additionally, ARP increases the multiemployer premium rate to $52 per participant for plan years beginning after December 31, 2030 and indexed for inflation thereafter.

ME-PIMS models plan eligibility and estimates SFA amounts under 500 stochastic scenarios. Although certain plans are already known to be eligible for SFA based on existing plan certifications for the 2020 plan year, more plans could become eligible by the 2022 plan year. The level of plan asset returns or changes to plan demographics may make additional plans eligible. Changes in these same factors may significantly impact the amount of SFA that is ultimately paid to eligible plans. The wide range of possible outcomes shown in **Figure 3** reflects the sensitivity in estimates to changes in plan asset returns and plan demographic changes.

Figure 3 – Stochastic Range of Projected SFA Distributions

	Estimated Number of Plans	Estimated Total SFA ($ billions)
99th Percentile	482	$147.4
85th Percentile	315	$115.9
Mean	268	$97.2*
50th Percentile (Median)	268	$95.7
15th Percentile	197	$77.5
1st Percentile	158	$66.1

* The mean SFA amount of $97.2 billion differs from the estimated $94 billion total shown in the Regulatory Impact Analysis in PBGC's interim final rule. The estimates in this report use an updated version of ME-PIMS that reflects more up-to-date data, assumptions, and modeling improvements (as described in the Appendix). The updated SFA estimate includes more current Form 5500 plan data. The SFA amounts include approximately $200 million in financial assistance loan repayments and approximately $700 million in make-up payments for previously suspended benefits.

Under ARP, plans have until December 31, 2025 to first apply to PBGC for SFA, and have until December 31, 2026 to submit a revised application if the initial application is not approved. Under PBGC's SFA interim final rule, several subsets of eligible plans will have priority status to apply for SFA within the first two years following enactment of ARP. All other eligible plans generally may apply after March 11, 2023. In addition to uncertainty regarding the number of plans that may become eligible for SFA, it is uncertain when each eligible plan will apply for SFA. For purposes of conducting projections of PBGC's newly established eighth fund, ME-PIMS applies a simplified assumption under which all eligible plans are assumed to apply for and receive SFA by 2024.

ARP substantially improves the financial outlook for PBGC's Multiemployer Program. By forestalling the near-term insolvency of the most troubled multiemployer plans and providing a modest premium increase

effective beginning with premiums for the 2031 plan year, the Multiemployer Program is no longer expected to go insolvent in FY 2026 and can accumulate a greater level of reserve assets in its insurance fund in the near-term.

PBGC's multiemployer net position will be significantly improved as most ongoing plans previously classified as probable losses are "unbooked." For purposes of this report, all "unbookings" of liability for regular financial assistance are assumed to be recognized in PBGC's financial statements as of September 30, 2021. Except in the most adverse projection scenarios, these plans are generally expected to remain "unbooked" through FY 2030.

Apart from the significant effects described above on future claims for regular financial assistance, given the program duration and "pass-through" nature of SFA cash flows, the SFA funding and payment activity by itself is not expected to have a material effect on the projected financial position of PBGC in FY 2030.

In addition to forestalling the insolvency of PBGC's Multiemployer Program, ARP improves benefit security for over three million participants of eligible multiemployer plans. Even if the Multiemployer Program were securely funded, had these financially troubled plans failed without SFA, many participants would have been subject to benefit reductions. For many plans, the multiemployer guaranteed benefit level is significantly lower than the plan benefit level. The SFA provided under ARP enables plans to pay participants the unreduced level of their benefit promises for many years to come.

MULTIEMPLOYER PROGRAM SOLVENCY

ARP will delay and may potentially avert the insolvency of PBGC's Multiemployer Program. Under most projection scenarios, the SFA provided under ARP delays the insolvency of the Multiemployer Program by at least 20 years. Under favorable projection scenarios, some plans that receive SFA remain solvent indefinitely, which could enable the Multiemployer Program to likewise remain solvent indefinitely. If future experience is unfavorable relative to the assumptions plans use to calculate the amount of SFA, plans may become insolvent earlier than expected and, in turn, accelerate the insolvency of the Multiemployer Program. While the focus of this report is a 10-year projection, a 40-year PBGC solvency analysis is included to show the range of potential longer-term solvency scenarios.

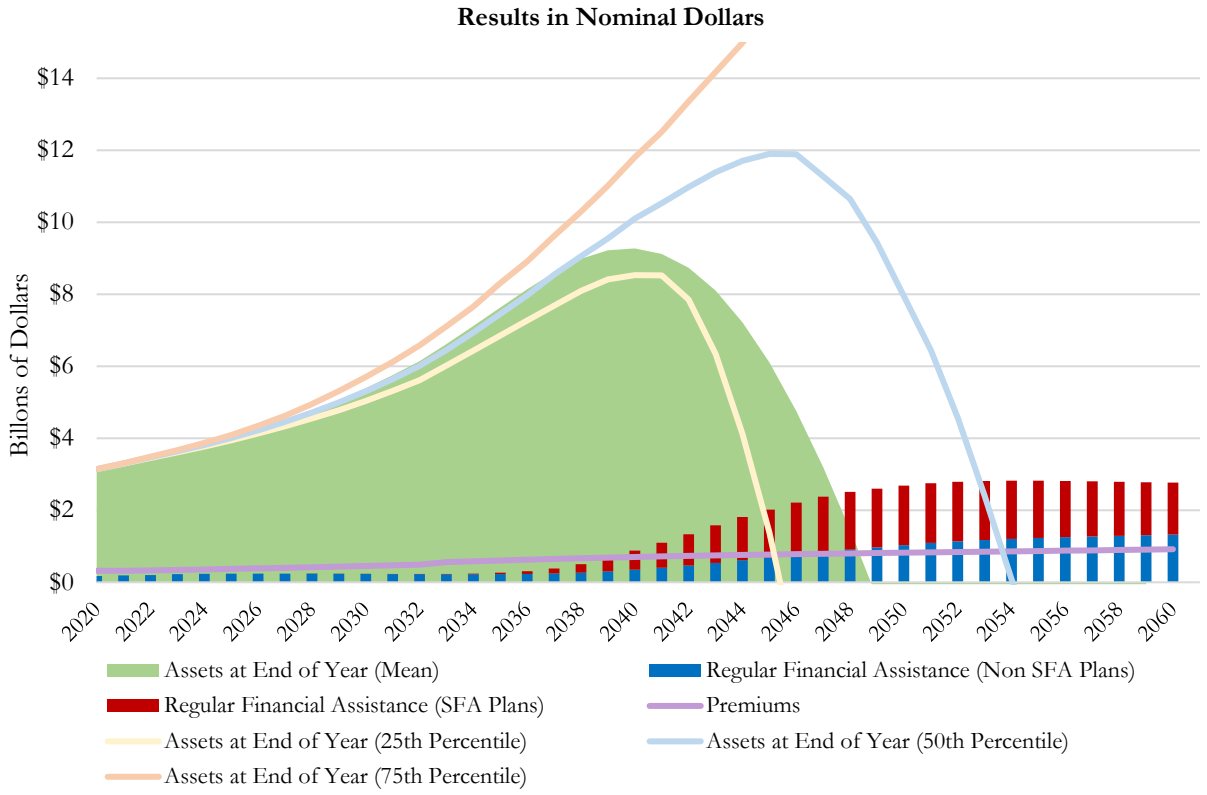
An illustration of PBGC's multiemployer fund balance provides insight into the factors that influence the Multiemployer Program solvency projection. **Figure 4** compares PBGC's Multiemployer Program assets as of the beginning of each fiscal year to the projected premium income and projected average financial assistance payments for each fiscal year.[15] In the mean of all 500 scenarios, projected annual premium income exceeds projected annual financial assistance payments each year until FY 2040, after which the value of PBGC's multiemployer fund balance begins to decrease sharply as plans begin to go insolvent and start drawing regular financial assistance from PBGC's Multiemployer Program. Between one-half to two-thirds of this annual projected financial assistance is expected to be provided to plans that previously received SFA. The asset balance shown in green and the bars illustrating annual financial assistance amounts represent the

[15] Assets are shown as of a point in time – the beginning of the fiscal year – and compared with the cash flow generated due to premiums and financial assistance for that following year. Items of lesser significance, including investment income and administrative expenses, are not shown. Treasury funding for SFA is not included in **Figure 4** asset amounts because, by law, it is distributed by PBGC's newly created eighth fund.

mean of all 500 economic scenarios, including favorable scenarios under which plans remain solvent and adverse scenarios under which plans begin receiving financial assistance earlier than expected.

As illustrated in **Figure 4**, there is a wide range in the projected estimates of the solvency of the Multiemployer Program. The mean asset value drops to zero in FY 2049, whereas the median asset value drops to zero in FY 2055. The higher financial assistance payments in the adverse projection scenarios have a larger influence on the mean result because they are large enough to deplete the modest level of PBGC reserve assets, even when averaged with the smaller financial assistance payments from the favorable projection scenarios. Under the median projection, the acceleration of PBGC financial assistance payments generally begins at a later point than under the mean results.

Figure 4 – PBGC Multiemployer Fund Assets, Regular Financial Assistance Payments, and Premiums by Fiscal Year



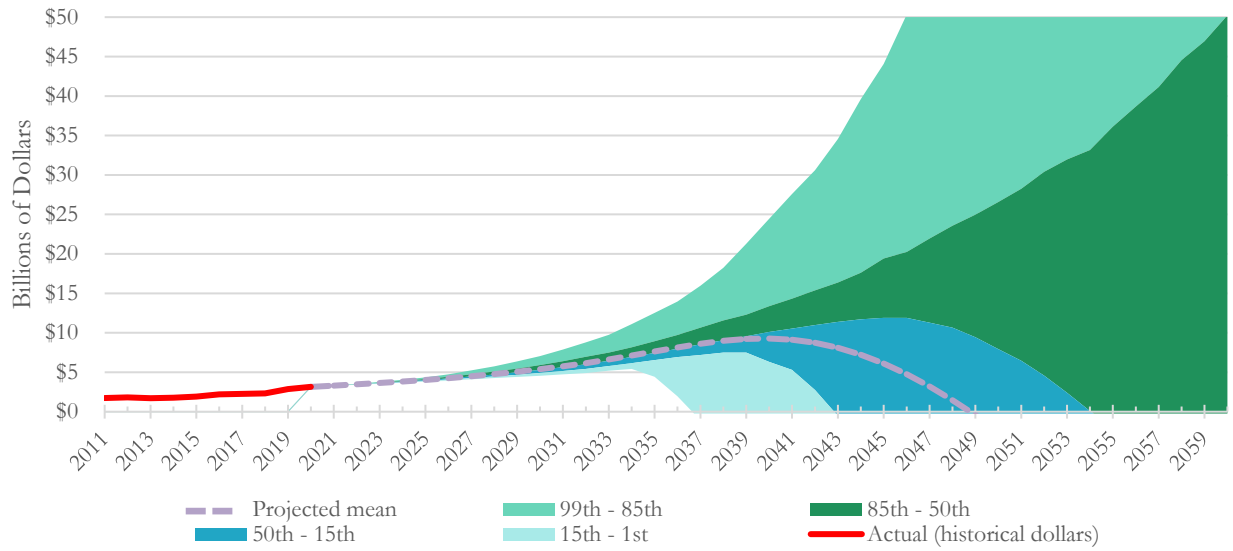
Note: Under the 75th percentile projection, the PBGC ME program does not go insolvent.

Figure 4 shows PBGC's multiemployer fund balance at three levels of certainty. The difference in the projected PBGC solvency period between the 25th percentile scenario and the 50th percentile (median) scenario is nearly 10 years. Under the 75th percentile scenario, PBGC's multiemployer fund balance is projected to remain solvent indefinitely.

The projected solvency of the Multiemployer Program over this extended period is highly uncertain and subject to variable outcomes. The median solvency projection period for Multiemployer Program

assets (to FY 2055) is over 30 years and is subject to a wide range of adverse or favorable experience over that long period of time. **Figure 5** illustrates the wide distribution and variability of these outcomes.[16]

Figure 5 – Projected Assets of PBGC Multiemployer Program
(Mean and percentile scenarios)



At the 1st percentile, Multiemployer Program assets are depleted during FY 2037.[17] Under these scenarios, financial markets incur significant losses in the years closely following the payments of SFA to eligible plans. Because in these adverse scenarios, asset returns underperform compared to the deterministic projection included in the simulated SFA applications, plans are projected to go insolvent much earlier than 2051. Furthermore, asset performance is correlated not just among the plans that receive SFA but among all plans in the multiemployer universe. The collective impact of numerous multiemployer plans going insolvent within a short period causes PBGC to run out of money sooner.

In the most favorable stochastic scenarios, the Multiemployer Program remains solvent indefinitely. Under these scenarios, financial markets generally experience favorable returns in the years closely following the payments of SFA to eligible plans, allowing these plans to remain solvent well past 2051. These scenarios generally include periods of higher premium revenues, which are indexed to wage growth, and low claims.

Although investment returns play a significant role in driving the wide range of the stochastic outcomes, additional factors contribute to the overall uncertainty. One such key factor is the level of future employer contributions to ongoing plans, which is driven by both future increases to contribution rates and changes in the units of work that form the basis of contributions, e.g., hours or shifts of work performed. Additionally, changes to plan demographics, future accruals, and liability gains and losses also play an important role.

[16] PBGC assets shown in **Figure 5** exclude the newly created eighth fund, given its pass-through structure.
[17] Under the most adverse scenario out of 500 scenarios, PBGC is projected to run out of money during FY 2036.

MULTIEMPLOYER PROJECTIONS OF NET FINANCIAL POSITION

The new projections show a significant improvement to the Multiemployer Program's net financial position during FY 2021 due to the enactment of ARP. For purposes of the projections in this report, all plans that are expected to be eligible for SFA that were included in the FY 2020 financial statements as probable or actual insolvencies are assumed to be "unbooked" in FY 2021.

Figure 6 shows the actual net financial position for the program for FY 2011 through FY 2020, and selected ranges of projected net financial positions for the following 10 years. The reported FY 2020 net financial position for the Multiemployer Program was negative $63.7 billion. The deficit is expected to be eliminated entirely during FY 2021 due to the enactment of ARP. However, the mean financial position then gradually declines over the subsequent 10 years to a projected negative $6.7 billion by the end of FY 2030 (expressed as a present value as of September 30, 2020).

Although the mean projected financial position as of FY 2030 is a net deficit, most projection scenarios show a modest positive net position. The mean net financial position is nearly $8 billion lower than the median. This occurs because the range of projected outcomes is unevenly distributed, with the magnitude of potential deficits in the most adverse scenarios significantly greater than the magnitude of potential positive net positions in the most favorable scenarios. Under highly adverse scenarios, severe market losses are experienced broadly by multiemployer plans which accelerate potential insolvencies for plans that receive SFA as well as for plans that do not receive SFA. Such market losses suffered by all plans lead to a high level of new PBGC claims that combine to produce a substantial net deficit. The potential for financial upside is more muted. In highly favorable scenarios, PBGC is generally not expected to incur any new claims by the end of FY 2030. However, improvements in net position are constrained by the low level of premiums paid by multiemployer plans, even taking into account the modest ARP premium increases that take effect in FY 2031.

As in the past, these projections assume that PBGC maintains its financial assistance at current guarantee levels, even though there is no source of additional resources under current law the fund becomes insolvent. The deficit is the present value of future financial assistance, less projected assets, plus any unfunded amounts for prior years carried forward with interest. The adjustment for unfunded liabilities reflects the current schedule of guarantees and financial assistance in years prior to the projection date.

Figure 6 – Multiemployer Program Projected Net Financial Position (Mean and percentile scenarios)

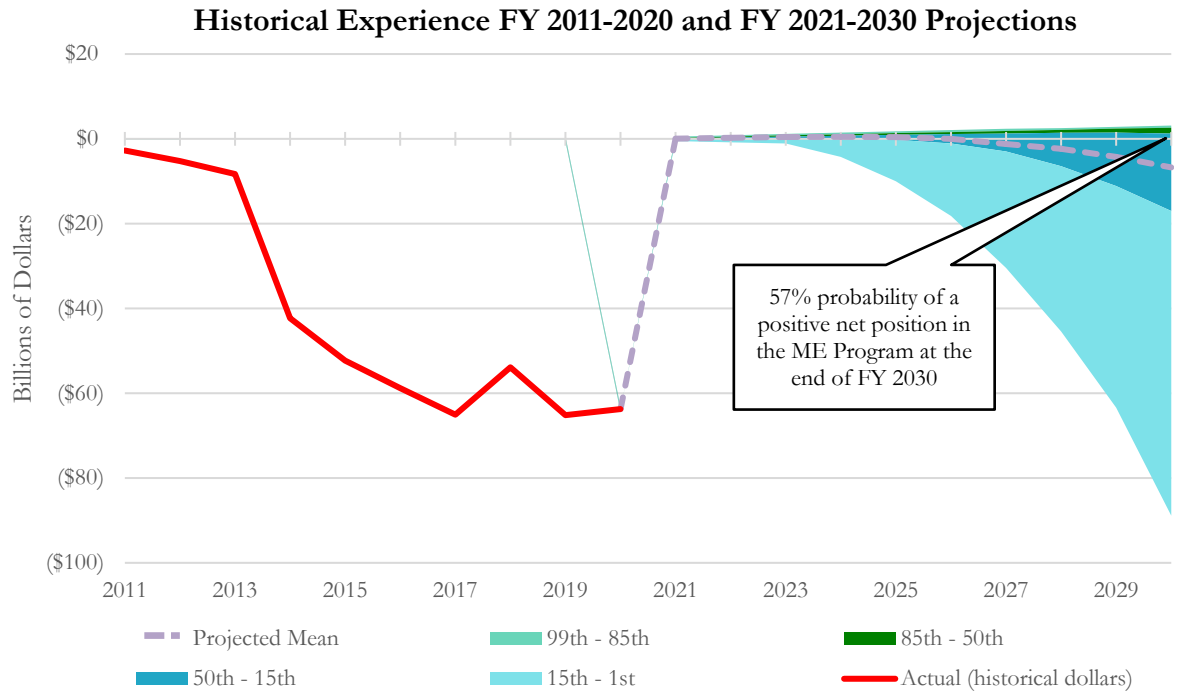
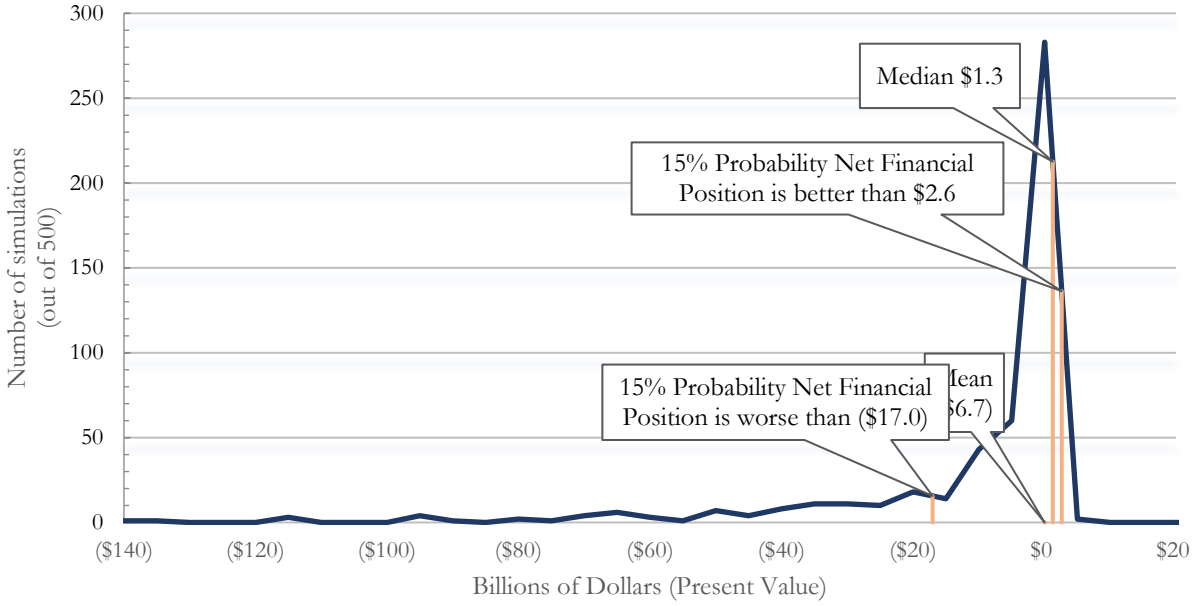


Figure 7 below shows the full range of projected outcomes for the net financial position of the Multiemployer Program in FY 2030. This includes the scenarios that fall below the 1st percentile and above the 99th percentile. For each value of PBGC's projected net financial position along the horizontal axis, the height of the line shows the frequency of that net financial position.

A significant majority of scenarios reflect only a modest positive or negative net position by the end of FY 2030. However, the long, negative tail of the distribution illustrates the wide range of possible deficit outcomes that is consistent with the wide cone shown in **Figure 6** under the 1st to 15th percentile results. These adverse outcomes in the left tail have a low probability before FY 2030, but the downside scenarios become more likely if the projection were extended beyond FY 2030.[18]

[18] The funding goal described under section 9704(b) of ARP for purposes of calculating SFA is the payment of plan benefits through the end of the last plan year ending in 2051. As a result, the incidence of new PBGC claims is expected to increase over time as the 10-year measurement period for purposes of classifying probable losses approaches 2051.

Figure 7 – Potential FY 2030 Multiemployer Program Net Financial Position



The Multiemployer Program remains exposed to significant risk going forward. Many plans and industries continue to face ongoing challenges such as aging plan populations and declining contributions. Although the SFA will substantially bolster the financial position of eligible plans, future developments in many of the industries that sponsor these plans may limit the sustainability of troubled plans, leaving workers and retirees in poorly funded plans exposed to continued risks to the security of their benefits, and risks of loss for the multiemployer system.

VARIABILITY IN MULTIEMPLOYER PROGRAM FINANCIAL POSITION

As described above, there is economic and demographic uncertainty in the projections of the Multiemployer Program. Post-ARP, there are four major sources of uncertainty in the multiemployer system:

- Number of plans that become eligible for and receive SFA.
- SFA amounts determined for eligible plans.
- Changes in the financial position and demographics of plans that receive SFA.
- Changes in the financial position and demographics of plans that do not receive SFA.

Each of these four factors has a direct impact on the expected new claims to be incurred by PBGC in the next 10 years. The number of plans and the amounts of SFA will be impacted by how plans approach the application process and therefore present a challenge to model. Although net new claims (i.e., new claims less the "unbooking" of existing claims) are expected to be negative during the upcoming decade due to the "unbooking" of liabilities for plans that are now expected to receive SFA, the extent to which adverse experience may subsequently cause plans to again become probable losses by the end of FY 2030 is uncertain.

There is minimal variability in the expected amount of financial assistance payments made by PBGC in the next 10 years. **Figure 8** summarizes the range of the Multiemployer Program's net financial position.

Figure 8 – Variability in FY 2030 Multiemployer Net Financial Position
Present Value at the end of FY 2020 ($ in billions)

	Mean	15th – 85th percentile range	1st – 99th percentile range
PBGC net financial position			
1. FY 2020 actual	($63.7)	($63.7)	($63.7)
2. FY 2030 projected	($6.7)*	($17.0) - $2.6	($88.9) - $3.1
Present value of financial activity expected during FY 2021-2030			
3. "Unbooking" of existing claims due to ARP**	$62.7	$62.7	$62.7
4. New claims***	($11.6)	($21.8) – ($2.5)	($93.6) – ($2.1)
5. Regular (non-SFA) Financial assistance payments	$2.2	$2.1 - $2.3	$2.0 - $2.4
6. Premiums received****	$3.7	$3.7 - $3.8	$3.7 - $3.8

* If expressed in nominal terms, the mean projected net financial position for FY 2030 is negative $8.5 billion.
** Ongoing plans included in the September 30, 2020 financial statements as probable losses are expected to be "unbooked" in FY 2021.
*** New claims are the present value of future financial assistance at the time plan insolvency becomes probable by 2030.
**** Premiums plus $3.1 billion in assets as of September 30, 2020, are available to make periodic, regular financial assistance payments to insolvent plans during the projection period.

Number of Plans that Become Eligible for and Receive SFA

In addition to certain ongoing plans that are currently insolvent or were granted an approval for a MPRA benefit suspension, the SFA program allows plans to become eligible for SFA based on their zone status, funded ratio, and demographics over the plan years 2020 - 2022. Based on the most recently available Form 5500 filing information and zone status certifications, there are approximately 200 plans that appear that they would have satisfied the SFA eligibility criteria if eligibility was determined in plan years beginning during or before 2020. Although some of these plans may experience improvements to their funded position and no longer meet the eligibility criteria during the 2020 to 2022 plan year window, most of these 200 plans are expected to remain eligible for SFA. There are nearly 300 additional plans that do not currently meet the eligibility criteria based on recently reported data but could become eligible under at least one ME-PIMS scenario by the 2022 plan year. The number of plans that ultimately become eligible depends on plan experience from 2018 to 2022, particularly related to plan investment returns, liability gains and losses, changes in valuation assumptions, and demographic changes.

As shown in **Figure 3**, the difference in the SFA plan count between the 15th and 85th percentiles is 118 plans, and expands to a difference of 324 plans between the 1st and 99th percentile results. Other than plans eligible for relatively small amounts of assistance, the number of eligible plans will have a significant impact on PBGC's future financial results. The number of plans that receive SFA will impact the incidence of new

PBGC claims on its insurance fund. The SFA will improve plans' funded position and generally extend projected solvency, and the applicable conditions under ERISA section 4262(m) will likely enhance this impact.[19]

SFA Amounts Determined for Eligible Plans

The amount of SFA for each eligible plan is also uncertain and depends on many of the same factors that will influence the number of eligible plans. The estimated amount of SFA differs for every plan and under every stochastic scenario, based on the projected asset, liability, and cash flow information estimated as of the SFA application date assumed by the model. There is significant variability in the aggregate amount of SFA projected by ME-PIMS, including a difference of approximately $38 billion between the 15th and 85th percentiles and $80 billion between the 1st and 99th percentile results (see **Figure 3**). Also, the amount of SFA that a plan actually receives could differ substantially from the amount estimated by ME-PIMS, for the following reasons:

- ME-PIMS generally relies on publicly available plan-level information that is typically 2-3 years old and does not include sufficiently detailed information about demographic data, expected plan benefit payments, and expected contribution income for direct use in the model.
- Plan sponsors and actuaries can change assumptions for purposes of determining SFA if the previous assumptions are no longer reasonable.
- Plan experience through the SFA application date, particularly asset return experience, will impact the amount of SFA that is requested.
- The timing of each eligible plan's application is unknown.

The variance between SFA amounts estimated by ME-PIMS and the actual amounts that will be paid through FY 2027 impact both the financial projections of PBGC's new eighth fund as well as the projected net position of the multiemployer guarantee fund. If ME-PIMS underestimates or overestimates the SFA payment amounts, PBGC's net financial position as of September 30, 2030, could be better or worse than the forecast in this report.

Changes in the Financial Position of Plans that Receive SFA

The amount of SFA paid to eligible plans is based on deterministic projections of all plan obligations and resources. The amount of SFA is the amount required by the plan to pay all benefits due through the end of the last plan year ending in 2051, using assumptions constrained by statute. Due to the long-term nature of these projections, actual experience may differ significantly from the assumptions used to calculate the SFA. SFA amounts are paid in a single lump sum and are not "trued-up" in the future to account for ongoing plan experience. Consequently, it is possible for plans to receive SFA and still go insolvent before the 2051 target year or, alternatively, remain solvent for much longer.

[19] Plans that receive SFA are subject to certain conditions imposed under ERISA section 4262(m). The conditions include restrictions on benefit improvements, contribution reductions, asset allocation, and withdrawal liability. These restrictions are not explicitly modeled in ME-PIMS, but are expected to help extend the solvency of plans that receive SFA.

Asset returns are critical to a plan's future solvency, particularly during the early years when non-SFA asset balances are high and not being spent down. Under ARP, SFA assets must be invested in high-quality fixed income securities or other permissible investments, so plans are expected to spend SFA assets first to minimize the portion of plan assets that are subject to investment restrictions with the goal of growing non-SFA assets at a higher rate of return. If the return on plan assets is unfavorable during these initial years, it would accelerate plan insolvencies. Plans would struggle to recoup these losses when the annual cash outflows are a large percentage of the remaining assets. Asset performance is likely to be correlated between plans, so low returns could have a significant detrimental impact to PBGC's net position.

Future contribution income also impacts a plan's solvency, and it is driven by the size of the workforce as measured by Contribution Base Units (CBUs). CBU experience is impacted by several factors, such as local and national labor market conditions, industry outlook, non-union competition, local business conditions, job automation, and employer withdrawals. These factors are difficult to predict with precision over long time horizons. The level of CBUs could deviate significantly from the plan's projections in its SFA application (and decrease more than predicted by ME-PIMS), and a decline in contribution income could accelerate a plan's insolvency and generate a new PBGC claim.

Changes in the Financial Position of Plans that do not Receive SFA

Eligibility for SFA is limited to the most financially distressed multiemployer plans as provided in ARP. There are other plans in critical status and endangered status that could become insolvent under certain projection scenarios. As of September 30, 2020, these plans are generally not projected to become insolvent within 10 to 20 years. However, under adverse projection scenarios, some plans are projected to be within 10 years of insolvency by September 30, 2030, and would therefore be booked as a liability in PBGC's financial statements at that time.

The bars in **Figure 4** above show that, on average, between one-third to one-half of annual projected financial assistance is expected to be provided to plans that do not receive any SFA. Generally, the key risk factors for these plans (e.g., investment risk and potential loss of future contribution income) are similar to those of plans that receive SFA. Consequently, any correlated adverse experience (such as a financial market downturn) can lead to a significant deterioration of the Multiemployer Program's financial position.

MULTIEMPLOYER RECONCILIATION FROM FY 2019 TO FY 2020

Figure 9 provides a detailed reconciliation of the changes in estimates from FY 2019 to FY 2020. ME-PIMS projections of PBGC's multiemployer obligations are significantly lower than last year's projections resulting in a mean present value of negative $6.7 billion for FY 2030. This is an improvement in net position of $75.6 billion from the previous projection of negative $82.3 billion for FY 2029.

The 10-year projections show the Multiemployer Program's net financial position improved substantially from last year's projections. This is primarily due to the enactment of ARP, which will result in the "unbooking" of a significant portion of the probable losses recorded as of September 30, 2020. Most of the ongoing plans previously booked as probable losses are eligible to receive SFA, which is projected in most

scenarios to extend plan solvency past 2040.[20] The net deficit also decreased due to assumption changes, primarily the change to reflect a central tendency for interest rates to rise above the level of assumed inflation. This resulted in higher discount rates for determining the present value of future financial assistance. However, the impact of the assumption change relative to the FY 2019 projections was mitigated by the large decline in interest rates during FY 2020.

Figure 9 – Reconciliation of Changes in Multiemployer Results Present Value at the end of FY 2020 ($ in billions)	
1. FY 2029 Mean Net Financial Position from FY 2019 Projections Report	($82.3)
2. Passage of Time	(5.6)
3. Expected Year 2030 Mean Net Financial Position [(1) + (2)]	($87.9)
4. Changes	
a) New Plan Data	3.8
b) New Economic Data	(24.3)
c) Economic Assumption Changes	46.7
d) Model Improvements	1.3
e) Other Assumption Changes	1.4
f) Total Changes [(4a)+(4b)+(4c)+(4d)+(4e)]	$28.9
5. FY 2030 Mean Net Financial Position Prior to Reflection of ARP [(3) + (4f)]	($59.0)
6. Impact due to the Enactment of ARP	52.3
7. FY 2030 Mean Net Financial Position [(5) + (6)]	**($6.7)**
8. Adjustment from Present Value to Nominal Value	(1.8)
9. Nominal Value of FY 2030 Mean Net Financial Position [(7) + (8)]	($8.5)

Note: The order of changes impacts the magnitude of each change. The magnitude of changes shown in 4(a) through 4(f) would be significantly smaller if the impact due to the enactment of ARP was measured first.

The $52.3 billion impact of ARP shown in **Figure 9** differs from the $62.7 billion impact shown in **Figure 8**. This is primarily because **Figure 8** illustrates the immediate "unbooking" of SFA-eligible plans in FY 2021 (based on FY 2020 measurement of the net position) whereas **Figure 9** illustrates the ARP impact as one of many incremental changes to the FY 2030 estimated measurement of the net position. Both the $52.3 billion and $62.7 billion impacts shown in **Figure 8** and **Figure 9** are significantly smaller than the $97.2 billion mean estimate of SFA shown in **Figure 3**. The SFA amount is larger because it provides for full plan level benefits (not limited to PBGC guarantees) and because it will be provided to a larger group of plans than those expected to be classified as PBGC probable losses in FY 2030.

[20] For an ongoing plan to be booked as a probable loss in FY 2030, it must be projected to go insolvent by 2040 as of a 2030 measurement date.

Passage of Time. The FY 2019 report projected PBGC's net financial position in FY 2029 and presented the results valued in 2019 dollars. To compare this with the FY 2020 report, which projects to FY 2030 with values reported in 2020 dollars, the FY 2019 projections are rolled forward to project one additional year with one less year of discounting. In addition, the FY 2020 projection includes one additional year of projected new insolvencies compared to the FY 2019 projection (i.e., those in the FY 2020 projection are projected to become insolvent through FY 2040, whereas the FY 2019 projection only includes projected insolvencies through FY 2039). The effect of the roll forward is a reduction of $5.6 billion in the projected net financial position.

New Plan Data. Changes in the starting data between FY 2019 and FY 2020 reflect new plan data provided on plans' Forms 5500. This includes higher-than-expected returns on assets during FY 2019 and changes in participant data and contributions. Use of the updated data improves the projected net financial position by $3.8 billion.

New Economic Data. The different economic climate in FY 2020 compared to FY 2019 results in changes to the economic assumptions upon which all the ME-PIMS projections are based. Because interest rates declined by approximately 50 basis points since last year, expected returns on assets are reduced, which increases projected future financial assistance. Because future financial assistance is paid well into the future, the present value is highly sensitive to interest rates, and the present value of the financial assistance increased significantly due to the lower interest rates. Reflecting these changes reduces the projected net financial position by $24.3 billion.

Economic Assumption Changes. This year's report incorporates changes to economic modeling related to projecting long-term interest rates, determining discount rates used to value PBGC liabilities, and the timing of historic financial market data that is used by the simulations.

In prior reports, long-term interest rates have been based on a random walk model with no drift. In a random walk model, each change in rates is pure chance. With random walks there are no trends, so while in any particular scenario rates can move significantly up or down from the starting point, the median projection has no change from the starting point because upward and downward movements are equally likely. To better represent the relationship of long-term interest rates to inflation, this year's report assumes an underlying trend of increases in long-term interest rates until the median projection is approximately 60 basis points higher than inflation. These higher interest rates result in lower present values of future financial assistance and higher expected investment returns. Both effects result in deferring plan insolvencies, resulting in a positive impact on the projected net position of $19.7 billion.

The discount rate used to value PBGC financial statement liabilities is based on insurance companies' group annuity prices. During FY 2021, PBGC updated its modeling of those prices, which resulted in higher discount rates. Reflecting this change lowers the estimated cost of both PBGC's liabilities and projected future claims, increasing the projected net position by $5.0 billion.

Prior reports set the starting point for economic conditions on September 30 of the year of the report. This year's report and future reports will set that starting point on December 31, three months later. This change starts the economic projections more in-line with current economic conditions. The three additional months

included in this report had above-average stock market returns which defers insolvencies and increases the projected net position by $22.0 billion.

The combined effect of all these economic assumption changes is a $46.7 billion increase in the projected net position.

Model Improvements. Various minor enhancements were made to the ME-PIMS model in conjunction with this report. These modifications include (1) a more precise projection of PBGC's multiemployer guarantee fund assets based on a refinement of cash flow timing, (2) an enhancement to the calculation of estimated projected plan benefit payments based on demographic information, and (3) minor adjustments to the cash flow projections used for plans that are currently receiving PBGC financial assistance or have terminated by mass withdrawal. The combined effect of these enhancements improved the projected net financial position by $1.3 billion.

Other Assumption Changes. Following the release of the FY 2019 report, PBGC analyzed the assumptions for contributions and withdrawal liability payments. The studies resulted in updates to several assumptions used in ME-PIMS. One significant update is to reflect the fact that a portion of the plan contribution amount reported in the Form 5500 may include existing withdrawal liability payments and to assume that a portion of future active population declines reflects future employer withdrawals. Another update was to reflect more recent data on the assumption for future contribution rate increases. These updates result in a decline in projected plan income, which reduces the projected net financial position by $7.4 billion. Another significant update is to assume that 40 percent of plans that become insolvent do not terminate under a mass withdrawal event, and, further, to significantly revise the assumptions about mass withdrawal liability payment collections for the 60 percent of plans assumed to go into mass withdrawal upon insolvency. This update increases the assumed amounts of plan income following a plan's projected insolvency, which improves the projected net financial position by $8.8 billion. The combined impact of these updates improves the projected net financial position by $1.4 billion.

SENSITIVITY OF CHANGES TO THE MULTIEMPLOYER MODEL

Discount Rate

The sensitivity information provided below relates to the discount rate for PBGC obligations. Only the discount rate for calculating PBGC liability values is changed; no other related variables, such as inflation or asset returns, are changed in the sensitivity calculations. The information is presented as present values in FY 2020, but the rate used to discount the projected FY 2030 net position back to FY 2020 is not changed for this sensitivity analysis.

Figure 10 – Sensitivity of Net Position to Discount Rate Changes
Present Value at the end of FY 2020 ($ in billions)

	+50 Basis Points	Baseline	-50 Basis Points
FY 2030 Multiemployer Net Financial Position	($5.4)	($6.7)	($8.4)

If market prices for annuities were based on discount rates 50 basis points higher than in the base projections, the mean present value of the FY 2030 Multiemployer Program net financial position would improve by $1.3 billion. Discount rates 50 basis points lower would increase the deficit by $1.7 billion in FY 2030.

Future Wage Index

PBGC's primary assumption on future wage growth is developed from the intermediate assumption of the Social Security Administration's projection assumptions. Using an assumption developed from Social Security Trustees' high-cost assumption, which uses lower wage growth, the mean present value of the FY 2030 multiemployer deficit increases by $0.1 billion.[21]

PBGC also publishes other sensitivity tests of the model on the PIMS page on PBGC's website.[22]

[21] In PBGC's baseline model, the median annual rate of projected wage growth is 3.8 percent. In PBGC's high-cost sensitivity, the median annual rate of projected wage growth is 2.6 percent.

[22] The PIMS page is available at https://www.pbgc.gov/about/projections-report/pension-insurance-modeling-system. Links to sensitivity test memos are included under the column labeled "Information About PIMS."

SINGLE-EMPLOYER PROGRAM

SINGLE-EMPLOYER PROGRAM OVERVIEW

PBGC's Single-Employer Program covers defined benefit pension plans that generally are sponsored by a single private-sector employer. The Program covers about 23.5 million participants in about 23,000 pension plans. The Program's financial status has evolved from recent deficits to a positive net financial position projected to grow over the next 10 years. None of the projected scenarios result in PBGC's Single-Employer Program running out of money within the next 10 years. The projected growth in the net financial position over the upcoming ten-year period is due primarily to projected low claims activity with premium revenue exceeding the cost of claims. Higher premium revenue has resulted from higher premium rates, and relatively higher premiums paid by underfunded plans, which are subject to the variable rate premium.

The information in this report starts with PBGC's existing assets and liabilities as of September 30, 2020. However, because the variable rate premium for the majority of single-employer plans is based on interest rates and assets as of January 1, PBGC now projects future results from the actual December 31 net position. In prior reports, projections started with the financial position as of September 30 of the evaluation year. SE-PIMS is used to project:

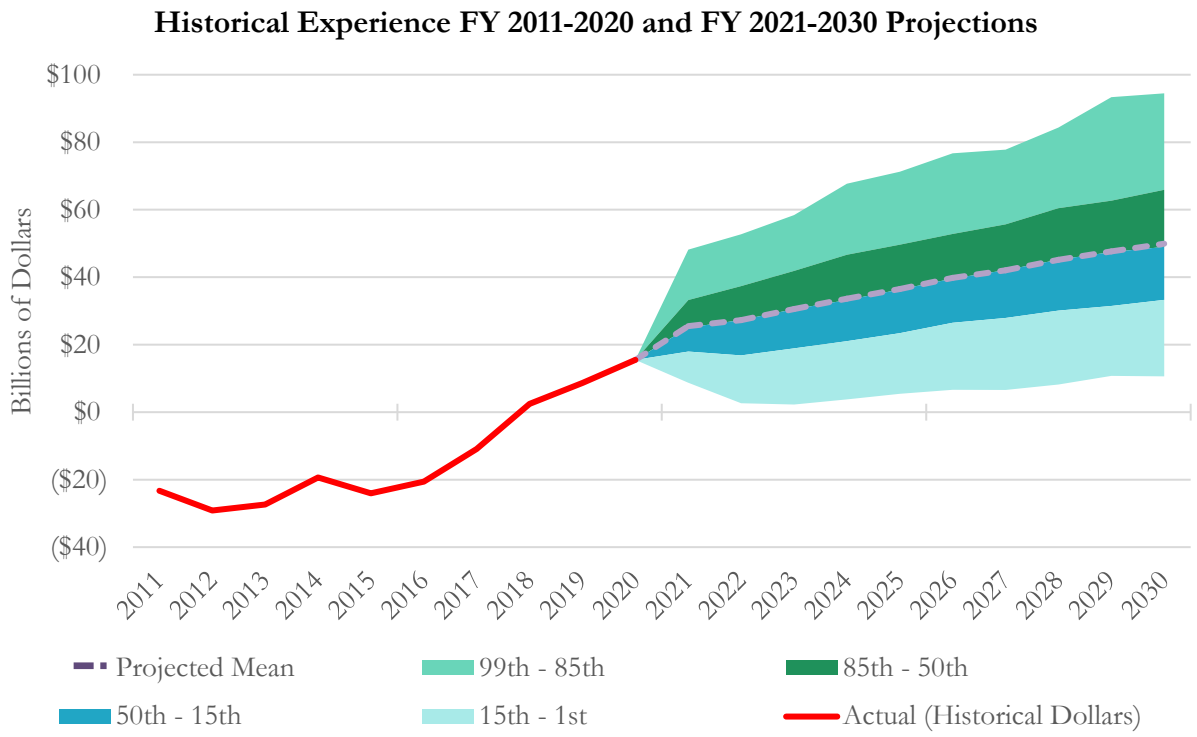
- Future premium income.
- Assets and liabilities for single-employer plans that may become future PBGC claims and increase PBGC's benefit obligations (assets include plan assets and additional assets that may be recovered from the sponsors of terminating plans).
- Future investment income on PBGC assets, based on PBGC's investment policy and asset allocations.

SINGLE-EMPLOYER PROJECTIONS OF NET FINANCIAL POSITION

The projections show that the Single-Employer Program net financial position is likely to continue to improve. This is similar to the pattern reported last year.

Figure 11 shows PBGC's actual net financial position for FY 2011 to FY 2020 and selected ranges of projected net financial positions for the next 10 years. As shown in the FY 2020 Single-Employer Program financial statements, assets of $143.5 billion and liabilities of $128.0 billion result in a positive net financial position of $15.5 billion at the beginning of the projection period. The uncertainty of PBGC's financial position, as shown by the widening cone of results, grows in the future. This year's mean projected present value net financial position is $49.9 billion in FY 2030, an increase of $3.6 billion from the comparable numbers in the FY 2019 report. Expressed in nominal terms, the mean projected net financial position in FY 2030 is $65.8 billion.

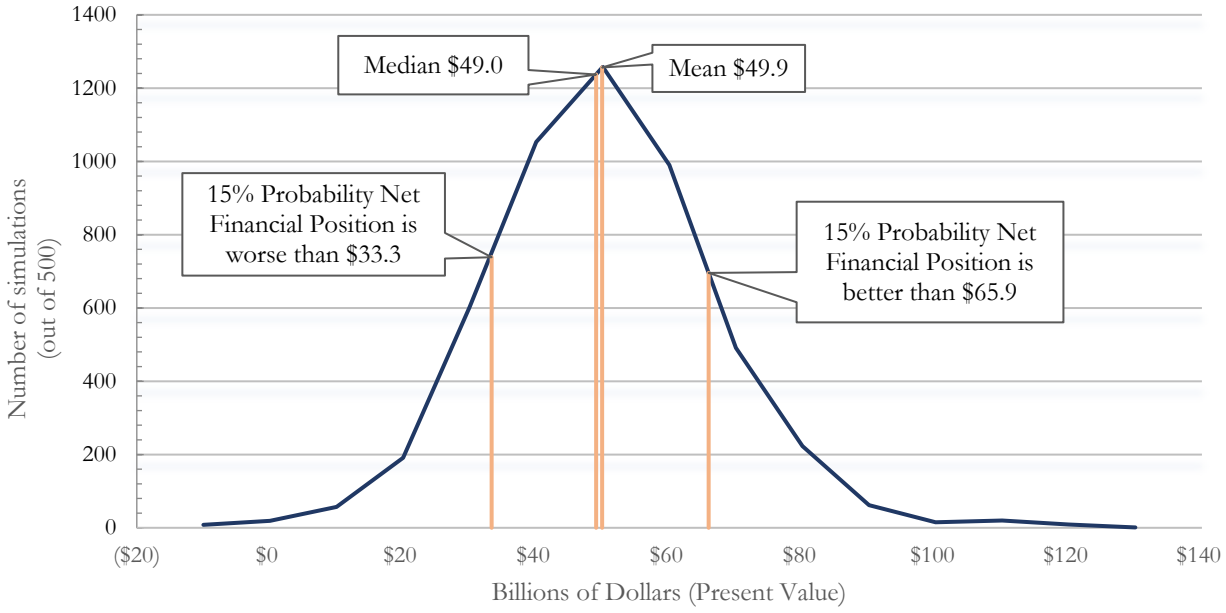
Figure 11 – Single-Employer Program Projected Net Financial Position (Mean and percentile scenarios)



The projected improvements to PBGC's net financial position over the 10-year period are due to a general trend of improving plan funding in single-employer plans and projected PBGC premiums exceeding projected claims.

Figure 12 shows the full range of the 5,000 outcomes projected by the model for PBGC's Single-Employer Program's financial position in FY 2030. This includes the scenarios that fall below the 1st percentile and above the 99th percentile. For the Single-Employer Program projection, there only are a few scenarios that result in a negative net financial position. For each value of PBGC's projected net financial position along the horizontal axis, the height of the curve shows how many paths have that net financial position as a result. The higher the curve, the more simulations have results at that point in the distribution. The further any point is to the right of the curve, the better the financial position associated with that point.

Figure 12 – Potential FY 2030 Single-Employer Program Net Financial Position



Vertical lines on the graph show the present value of PBGC's projected FY 2030 net financial position at the 15th and 85th percentiles and the mean and median values of projected net financial positions. The median is a $49.0 billion positive net financial position in FY 2030, while the mean is a $49.9 billion positive net financial position. The potential range of results on the FY 2030 net financial position goes from negative $12.2 billion to $125.7 billion. Although nearly all outcomes result in a positive net financial position, the few negative outcomes show the tail risks in the Single-Employer Program.

VARIABILITY IN SINGLE-EMPLOYER FINANCIAL POSITION

As described above, there is uncertainty in PBGC's Single-Employer Program projections. **Figure 13** shows the mean net financial position and liabilities, along with the results for the 15th to 85th and 1st to 99th percentiles and the range of outcomes for factors that have a significant impact on the FY 2030 net financial position. The considerations related to each factor are explored in the rest of this section.

Figure 13 – Variability in 2030 Single-Employer Net Financial Position Present Value at the end of FY 2020 ($ in billions)			
	Mean	**15th – 85th percentile range**	**1st – 99th percentile range**
PBGC net financial position			
1. FY 2020 actual	$15.5	$15.5	$15.5
2. FY 2030 projected	$49.9*	$33.3 - $65.9	$10.6 - $94.5
Present Value of financial activity expected during FY 2021 – FY 2030			
3. New claims incurred	($8.3)	($1.4) - ($15.9)	($0.1) - ($40.5)
4. Asset/Liability gain	$3.7	($13.9) - $20.3	($30.0) - $53.6
5. Premiums received**	$39.1	$28.4 - $52.0	$23.9 - $67.5

* If expressed in nominal terms, the mean projected net financial position for FY 2030 is $65.8 billion.

** $39.1 billion mean premium income is the sum of $17.6 billion in flat-rate premium income and $21.4 billion in variable-rate premium income. The variability in premium income is largely attributable to variable-rate premiums.

Financial Position

Figure 13 shows the present value of estimates of PBGC's net financial position at the end of the 10-year projection in this report. The variability in results comes from the uncertainty around future claims, premium income, which fluctuates with changes in plans' underfunding, and investment returns on the portion of PBGC assets not matched to PBGC's benefit liabilities. Within the 15th to 85th percentile range of outcomes, the Single-Employer Program's present value of projected financial position in FY 2030 varies by $32.6 billion (discounted to September 30, 2020).

Bankruptcy and New Claims

When companies in bankruptcy or financial distress terminate their underfunded plans, the underfunding is the basis for a new PBGC claim. A claim is the excess of the present value of the plan benefits that PBGC is expected to pay over the value of the plan's assets and any recovery from the sponsoring firm. A "new claim" is the claim for a plan that was not included in the most recent financial statements.[23] **Figure 13** shows the mean and the range of outcomes for new claims.

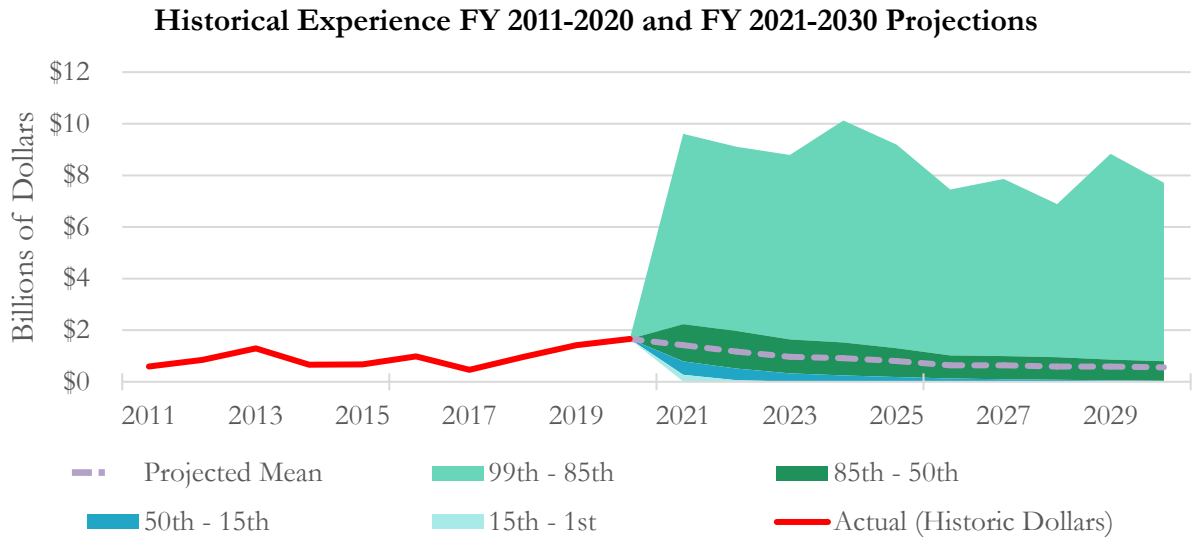
In **Figure 14**, the inner cone around the projected mean represents the range of outcomes between the 15th to 85th percentiles while the full cone represents the 1st to 99th percentile level of claims.[24] The projections displayed for net new claims are for each year's results, so patterns in the amount of variability reflect long-term trends rather than cumulative effects. The projections show a downward trend in mean claims over the

[23] No specific determination of future "probable" claims is included in the projections for single-employer plans because the model does not attempt to predict future short-term PBGC accounting classifications of troubled plans that are close to terminating but have not yet terminated.

[24] The figure does not include claims for plans currently booked by PBGC but not yet terminated ("Probable" plans). Since these plans had not terminated as of September 30, 2020, their claims are not included in the historic claims and they are excluded from the projections of future claims (since they are reflected in the balance sheet values that are projected forward in PIMS).

10-year period, largely due to a projected improvement in plan funding. The very high level of claims at the 99th percentile is related to economic crisis scenarios where both the volume of bankruptcies and the amount of pension underfunding increase significantly at around the same time. Scenarios with low levels of claims are the result of favorable economic projections, which reduce both plan underfunding and the likelihood of plan sponsor bankruptcies.

Figure 14 – Single-Employer Program Net New Claims
(Mean and percentile scenarios)



Investment Outcomes

When PBGC trustees a single-employer plan, the plan's assets are transferred to PBGC's Trust Fund, as are any additional assets recovered from the sponsor during bankruptcy proceedings. Premium income received is invested in PBGC's Revolving Fund, which is primarily invested in Treasury securities. The total pool of Single-Employer Program assets is invested according to PBGC's investment policy, which employs a liability-driven strategy where most of the change in liability due to interest rate changes will be mirrored by changes in the asset value.

A small portion of assets is invested in a portfolio of fixed income and equity investments with the objective of achieving higher returns. PBGC's investment policy operates to reduce the return-seeking portion of assets as PBGC's net financial position improves (i.e., a "glidepath" approach). PBGC's assets are invested mostly in fixed income investments to mitigate much of the interest rate risk in PBGC's liabilities. Thus, although the investment returns for PBGC's assets are somewhat volatile, high investment returns tend to offset increases in the value of PBGC's liabilities, and low investment returns tend to be offset by decreases in the value of PBGC's liabilities.

Figure 13 shows the asset/liability gain, which is the difference between projected investment income and the change in PBGC's liability due to interest rates. The numbers represent the range of cumulative outcomes that lie between the 15th and 85th percentiles and the 1st and 99th percentiles. For the 10-year projection

period, the outcome ranges from a loss of $13.9 billion to a gain of $20.3 billion in the 15th to 85th percentiles, expressed as present values discounted to 2020.

Premium Income

PBGC's premium structure and levels are set by Congress, but variable rate premium income changes with the underfunding in single-employer plans and fixed rate premium income changes with the number of plan participants. For example, fixed rate premiums decrease when plans pay lump sums or transfer plan liabilities for some participants by purchasing group annuity contracts from an insurance company. Variable rate premiums increase when plan underfunding increases due to certain events such as declines in interest rates or investment losses.

Even though additional premium revenue improves PBGC's net financial position, higher variable rate premiums are associated with downside scenarios where asset returns are low and interest rates decrease, both of which increase plan underfunding. In other words, when the size of potential claims increases, premiums also increase, and vice versa, which reduces the ultimate impact of interest rates and investment returns on PBGC's future net financial position. The combined effect of the investment strategy and premium structure helps dampen volatility and mitigate risks in the Single-Employer Program.

SINGLE-EMPLOYER RECONCILIATION FROM FY 2019 TO FY 2020

Figure 15 provides a detailed reconciliation of the projection results due to changes in the model and data from FY 2019 to FY 2020. The mean projected position at the end of the projection period has increased by about $3.6 billion, to a present value of projected net financial position of $49.9 billion. The modest increase in net position is due to the passage of time, updated data, model improvements, and legislative changes, offset by changes in economic assumptions.

Figure 15 – Reconciliation of Changes in Single-Employer Results Present value at the end of FY 2020 ($ in billions)	
1. FY 2029 Mean Net Financial Position from FY 2019 Projections Report	$46.3
2. Passage of Time	4.0
3. Expected FY 2030 Mean Net Financial Position [(1) + (2)]	$50.3
4. Changes	
a) New Plan, Sponsor, and PBGC Data	$3.9
b) New Economic Data	$4.7
c) Economic Assumptions	($12.0)
d) Model Improvements	$1.6
e) Legislative Changes	$1.4
f) Total	($0.4)
5. FY 2030 Mean Net Financial Position [(3) + (4f)]	**$49.9**
6. Adjustment from Present Value to Nominal Value	$15.9
7. Nominal Value of FY 2030 Mean Net Financial Position [(5) + (6)]	$65.8

Note: The order of changes impacts the magnitude of each change.

Passage of Time. The FY 2019 report projected PBGC's net financial position in FY 2029 and presented the results valued in 2019 dollars. To compare with the FY 2020 report, which projects to FY 2030 with values reported in 2020 dollars, the FY 2019 projections are rolled forward to project one additional year with one less year of discounting. The effect of the roll forward is an increase of $4.0 billion in the projected net financial position.

Plan, Sponsor, and PBGC Data. Between the FY 2019 and FY 2020 Annual Reports, PBGC's net financial position improved from $8.7 billion to $15.5 billion. This is a larger one-year improvement in PBGC's net financial position than was projected with FY 2019 SE-PIMS, primarily due to lower claims, higher premiums, and favorable investment returns. Additionally, updated single-employer plan data results in both claims and premiums being projected at higher levels than would be projected using last year's data. The combination of these updates improves the projected net financial position by $3.9 billion.

New Economic Data. The different economic climate in FY 2020 compared to FY 2019 results in changes to the economic assumptions upon which all the SE-PIMS projections are based. Long-term interest rates fell by approximately 50 basis points from the starting point of last year's projections to September 30, 2020, while equities had above-average returns over the same period. These changes lead to lower future expected asset returns, which decreases plan funding, increases future claims, and increases future variable rate premium revenue. The net effect of these changes was an increase in the projected net position of $4.7 billion.

Economic Assumptions. This year's report incorporates changes to economic modeling assumptions related to projecting long-term interest rates, determining discount rates used to value PBGC liabilities and the timing of historic financial market data that is used by the simulations.

Prior reports started the economic projections on September 30 of the year of the report. This year's report starts the economic projections from December 31, three months later. This improves the model's projection of variable rate premium revenue in the following year because most plans' 2021 variable rate premium requirements are based on funding levels as of January 1, 2021. The three additional months included in this report had above-average stock market returns resulting in improved plan funding, lower projected claims, and lower projected variable rate premium revenue. This decreased the projected net position by $4.3 billion.

In prior reports, long-term interest rates have been based on a random walk model with no drift, i.e., the level of interest rates in median scenarios did not change. To better represent the relationship of long-term interest rates to inflation, this year's report assumes an underlying trend of increases in long-term interest rates, until they are approximately 60 bps higher than inflation. These higher interest rates result in lower estimates of pension plan liabilities and higher expected investment returns. Both effects result in higher plan funding levels which decreases projected claims. However, projected variable rate premium revenue also decreases and more than offsets the lower claims cost, resulting in a net negative impact on the projected net position of $10.5 billion.

The discount rate used to value PBGC financial statement liabilities is based on insurance companies' group annuity prices. During FY 2021, PBGC updated its modeling of those prices, which resulted in higher discount rates. Reflecting this change in this report lowers the estimated cost of both PBGC's liabilities and of projected future claims, increasing the projected net position by $2.8 billion.

The net effect of all these economic assumption changes is a $12.0 billion decrease in the projected net position.

Model Improvements. Several improvements have been made to the modeling for this year's report. These include improved modeling of the timing of premium payments to PBGC and the timing of benefit payments by pension plans, incorporation of modeling of voluntary standard terminations of pension plans, and improved modeling of various actuarial calculations used in projecting plan liabilities, contribution requirements, and premium assessments. More detail for each of these changes is provided in the Appendix. The combined effect of these changes is a $1.6 increase in the projected net position.

Legislative Changes. ARP allows single-employer defined benefit pension plans to extend the amortization periods of funding shortfalls and increase the interest rates used to value pension plan liabilities for minimum required funding purposes. Both provisions result in lowering plan contribution requirements, potentially resulting in lower levels of projected plan funding, higher levels of projected PBGC claims and higher levels of projected variable rate premium revenue. The net effect of modeling these provisions is a $1.4 billion increase in the projected net position.

SENSITIVITY OF CHANGES TO SINGLE-EMPLOYER MODEL'S DISCOUNT RATE

The sensitivity information provided below relates to the discount rate for PBGC obligations. Only the discount rate for calculating PBGC liability values is changed; no other related variables, such as inflation or asset returns, are changed in the sensitivity calculations. The information is presented as present values in 2020, but the rate used to discount the projected FY 2030 net position back to 2020 is not changed for this sensitivity analysis.

Figure 16 – Sensitivity to Discount Rate Changes in Single-Employer Results
Present Value at the end of FY 2020 ($ in billions)

	+50 Basis Points	Baseline	-50 Basis Points
FY 2030 Single-Employer Net Financial Position	$52.0	$49.9	$46.7

If market prices for annuities were based on discount rates 50 basis points higher than in the base projections, the mean present value of the FY 2030 Single-Employer Program net financial position would improve by $2.1 billion. Discount rates 50 basis points lower would decrease the mean present value of the net financial position by $3.2 billion.

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 Program and Multiemployer Program as of September 30, 2020.

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 opinions,

(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, Theodore A. Goldman, 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, R. Evan Inglis, am an actuary in 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.

Theodore A. Goldman, FSA, EA, MAAA
Director, Policy, Research and Analysis Department, PBGC

R. Evan Inglis, FSA, EA, CFA, MAAA
Actuary, Policy, Research and Analysis Department, PBGC

APPENDIX

OVERVIEW OF PIMS

The analysis in this report uses ME-PIMS and SE-PIMS. The PIMS models are primarily models of pension plans, rather than of plan participants. They use data reported by multiemployer plans and a sample of single-employer pension plans to model the future funding status of the universe of private sector pension plans. Both models project long-term financial outcomes 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. The models then introduce random year-by-year changes (within certain bounds) to simulate economic fluctuations, producing 500 simulations for alternate economic paths through time. Within a simulation, each plan's outcomes from one year form the following year's starting point for that plan, 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 depending on a variety of factors.

Neither PIMS model attempts to model all plan sponsor behavior. However, each model does anticipate certain responses in some key areas. ME-PIMS reflects anticipated employer and plan sponsor behavior through contribution rate assumptions related to zone status, MPRA applications, and SFA-related assumptions. SE-PIMS reflects anticipated plan sponsor behavior related to contributions and standard terminations.

Future Outcomes Are Expressed in Present Value Terms

This report expresses future outcomes in present value terms (i.e., discounted back to the end of FY 2020), but shows nominal values in certain figures (present values at the end of FY 2030 or any intervening year are described as "nominal values" in this report). Results are explicitly noted as expressed in nominal or present value terms. Present values are higher when interest rates are low and vice versa.

The uncertainty in future interest rates is modeled in both versions of PIMS. Therefore, the rates change in each year in each simulation. Each simulation's outcomes are discounted based on the 30-year Treasury bond yields projected for that simulation, regardless of whether the underlying simulated cash flows are generated from holdings of equities, corporate bonds, or U.S. Treasury bonds.

How Projections Compare to PBGC's Financial Statement Liabilities

PIMS treats the most recent PBGC financial statement liabilities as the starting point and estimates how they may vary in the future, adding the effects of projected new claims, benefit payments, and asset returns. The projections of future financial statement information in this report explicitly determine liabilities for plans that are projected to be "probable for financial assistance" (multiemployer), but not for plans that are "probable to terminate" (single-employer).

Capital Market Assumptions

The following economic variables are stochastically projected in both versions of PIMS:

Interest Rates, Stock Returns, and Related Variables. These variables are determined by the underlying means, standard deviations, and correlation matrix established for the PIMS projections. Related variables include inflation, wage growth, and increases in benefits for flat-dollar plans.

- 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 and with an underlying trend based on the difference, at the start of the simulation, between the 30-year Treasury yield and the expected rate of future inflation. For the three-year period ending December 31, 2020, monthly values of the 30-year Treasury yield averaged 59 basis points higher than the annual rate of inflation. The trend incorporated in the model adjusts the distribution of projected Treasury yields such that the median projected yield approaches this 59 basis point spread over the median projected inflation rate. The inflation assumption for this year' s report implies a median rate of inflation of 2.4 percent, resulting in the median projected yield trending toward 2.99 percent. The trend rate is estimated using data from the period 1993-2020. The Treasury yield for a given period is expected to be equal to the yield for the prior period, plus the underlying trend adjustment, and plus or minus a randomly generated amount. The underlying trend for this year's report results in a projection of generally rising interest rates, but at any point on a given projected path, interest rates can either rise or fall depending on the randomly generated component of interest rate changes.

- The random draws affecting the bond yields and stock returns are correlated according to an estimate derived from the period 1973 to 2007.[25] 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 Allocation. A single representative asset allocation is assumed for all single-employer and multiemployer plans, based on an internal 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 uses the following weighting: 48 percent stock market returns, 22 percent long-term Treasury bond returns, and 30 percent long-term Treasury bond yields. Returns are adjusted down by 2.5 basis points (percentages are rounded).

Under PBGC's multiemployer program SFA interim final rule, plans are generally required to invest SFA assets in high quality, fixed-income securities. For purposes of this report, the ME-PIMS model utilizes simplified methods and assumptions to project plan asset returns. The simplified methods and assumptions do not separately model the performance of SFA assets from other plan assets. This is a modeling enhancement that is expected to be made for the FY 2021 Projections Report, in addition to a review of the single representative asset allocation used by PIMS.

[25] This assumption has been subsequently reviewed by PBGC; it was determined that the estimate derived in that time frame is still representative of current correlation rates.

ME-PIMS

ME-PIMS — Overview

Each fiscal year-end, in preparing its financial statements in accordance with accounting principles accepted in United States of America (U.S. GAAP), PBGC analyzes insured large (over 35,000 participants) and medium (between 2,500 and 35,000 participants) multiemployer plans to identify those ongoing plans that might become claims against the Multiemployer Program. In determining whether a plan should be classified as a probable risk of requiring future financial assistance and recorded in PBGC's year-end financial statements as a balance sheet liability and income statement expense, PBGC evaluates whether the plan is likely to become insolvent within the next 10 years, taking into account the most recent available detailed plan and industry data, where available. Each plan is determined to either be recognized ("booked") as a liability for the financial statements or not to be included in the accrued liabilities at all. In addition, PBGC discloses the aggregate dollar amount of those multiemployer plans categorized as reasonably possible (plans projected to become insolvent within the next 11 to 20 years).

In the Multiemployer Program, a probable liability is estimated (and booked on PBGC's financial statements) when cash-flow insolvency is projected to occur within 10 years. To estimate future claims against the Multiemployer Program that are not already booked in the current financial statements, ME-PIMS projects, separately for each simulation, a plan's funding status, cash flow, asset base, and change in the contribution base, to determine whether that plan would be booked as a liability according to the criteria described above.

ARP has been reflected in the FY 2020 ME-PIMS valuation by assuming that all plans that become eligible for SFA under section 4262(b) of ERISA by the 2022 plan year will apply for and receive SFA payments. Current estimates of projected SFA payments are not shown in this report as obligations of PBGC nor are the payments included in the cash flow exhibits (unless specifically noted). However, projected PBGC liabilities and projected regular financial assistance payments reflect the estimated favorable impact on plan underfunding of SFA payments that are expected to be paid to eligible and approved plans. For purposes of this report, all liability "unbookings" related to regular financial assistance for such plans are assumed to be recognized in PBGC's September 30, 2021, financial statements. PBGC will receive recurring funding to cover all approved SFA payments and SFA administrative costs from the Treasury general fund via uncapped appropriations provided in ARP. Given the duration of the SFA program and the "pass-through" nature of SFA cash flows, those SFA funding and payment entries are not expected to materially affect the projected likely financial position of PBGC in 2030, which is the central focus of this report.

ME-PIMS — Data

The model uses Form 5500 data for each plan in the universe of multiemployer plans, including terminated and insolvent plans. Selected numeric entries from Schedules MB, R, and H/I are downloaded from the Form 5500 datasets to the PIMS database.

A sample of plans for which PBGC has complete data, information on plan provisions, demographics of active workers, and plan assumptions as to future demographic changes is used to impute data to other plans of similar size, demographics, or industry, as appropriate. A brief description of the methodology follows:

- Plans in the prior year's ME-PIMS database are categorized into major industries.
- Within each industry, the 25th percentile, the 75th percentile, and the median active-to-inactive ratio is determined.
- For each plan not in the sample, the downloaded data is extended by imputing plan provisions, census information, and assumptions from the closest match to the 25th percentile, the 75th percentile, or median active-to-inactive ratio.
- The set of sample plans was extended, and the closest matches were updated from the prior year.

Contributing employers' information is not generally available and thus not used in this model; all contribution information used in this report is on a plan level.

Data is reviewed for outliers and missing fields. Data on critical and declining zone status plans is supplemented with filed participant notices and other information available to PBGC.

Data on withdrawal liability payments and regular ongoing employer contributions. For plans with greater than 5,000 participants, withdrawal liability payment data was obtained from the 2018 Schedule MB attachments. For critical and declining plans with a greater than 20 percent change in contribution, market value of asset, actuarial value of asset, total liabilities, current liability normal cost, benefit payment, or total headcounts compared to last year, data was obtained from the 2018 Schedule MB attachments or audit statements. For plans with less than 5,000 participants or plans otherwise not reviewed, an average of the larger plans noted above was used to estimate the withdrawal liability payments. This average was calculated separately for construction industry plans vs "other" plans -- with "other" plans further categorized between green/endangered status plans and critical (including declining) status plans. For all plans, a per capita contribution rate based on the total contributions less withdrawal liability payments (whether actual or modeled) is calculated based on average active participant counts during the base year.

For plans that have already been booked in PBGC's financial statements, PBGC collects additional data, which is subject to confidential treatment requests under 29 CFR 4901.24. This information is used to supplement/override the data treatment described above.

ME-PIMS — General Methodology

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 PBGC. The probability of any particular outcome is estimated by dividing the number of simulations with that outcome by 500, the number of economic simulations for multiemployer plans.

In each simulation, the model generates 50-year projections for each plan under each of the 500 economic scenarios. The model first generates future benefit payment streams and future normal cost streams from a simulated census. These cash flow streams are then projected forward year by year, assuming experience matches the events modeled along each simulated path and that the demographics of future hires are the same as the current active distribution. Projected benefit accruals are adjusted to reflect assumed changes in

benefit formula (e.g., to a one percent of contribution formula or the removal of early retirement subsidies upon a plan entering critical status) and active population changes.

There is typically a long lag between PBGC's booking of a multiemployer plan and the start of PBGC's financial assistance payments. Payments from PBGC 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 the plan's condition improves sufficiently in the simulation, it can become "un-booked" (in the model) in a later year. Conversely, a plan's condition can deteriorate further following the booking.

ME-PIMS — Plan Sponsor Behavior With Respect to MPRA

Multiemployer funding rules create situations where plans may make decisions or alter their behavior based on funded status, projected insolvency, or other factors. These behavioral adaptations are modeled to a limited extent in ME-PIMS.

The model assumes that plans in critical status will increase contribution rates and make other plan changes. These assumptions are different for critical status plans that are projected to receive SFA or to "exhaust all reasonable measures" in the future. All critical and declining status plans are assumed to have exhausted all reasonable measures.

The model also reflects suspensions of benefits and partitions for plans projected to be critical and declining after 2022 based on the simulated financial status of the plan in each simulation. Plans that are critical and declining, and do not receive SFA prior to 2030 are assumed to make a one-time decision in 2030 whether to apply for benefit suspensions and/or partitions based on the model's assumptions regarding partition and benefit suspension probabilities. Plans projected to receive a partition remain in partition status throughout the projections.

See the Assumptions section regarding Benefit Suspensions and Partition for further details.

ME-PIMS models SFA but does not separately model other forms of PBGC financial assistance, such as facilitated merger assistance.

ME-PIMS — Cash Flow Development

ME-PIMS uses information reported on the Form 5500 to develop benefit payment projections by current participant status, which are calibrated to each plan's reported current liability and benefit payments, as well as its normal cost.

Active participant scatters and decrement assumptions were collected for approximately 600 plans for the FY 2020 report. The model utilizes this data to simulate active census data for the remaining multiemployer plans based on industry and the plan's active-to-inactive ratio. Cash flows for actives are generated based on the decrement for each of the active age and service cell combinations.

For inactive participants, a different process is used since inactive participant age/service data is not available for all plans. A simplified calibration process extrapolates inactive participants from a census distribution of a

large multiemployer plan using each plan's estimated accrual rates and inactive participant count. Across-the-board shifts in the largest multiemployer plan's inactive census distribution by age and service are then applied to match the current liability reported on Schedule MB of the Form 5500. This is done separately for terminated vested participants and for in-pay retirees and beneficiaries.

ME-PIMS — Assumptions

In addition to the economic variables described above, several plan demographic variables are stochastically projected:

Plan Demographics. Starting with the plan's active participant 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 projections. Hiring patterns vary with stochastic projections; the general assumption is that a plan's historical hiring distribution continues and hiring occurs so that the size of the active population continues at the same trend after plan decrements (retirement, termination of employment, disability) take place.

ME-PIMS does not currently assume industry-specific employment trends. The model incorporates annual variability, resulting in a mean net decrease in the active multiemployer population of 1.3 percent per year across all simulated paths.

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

Mortality. The model uses the RP-2014 Combined Healthy Mortality Table, projected to 2035 with the MP-2019 Improvement Scale.

Credit Balances. Each plan's credit balance is increased each year by the plan's valuation interest rate and increased/decreased by the amount by which modeled contributions are greater/less than the minimum otherwise required.

Per Capita Contribution Rate Increases. The annual estimated per capita contribution growth rate is projected as follows:

- Green Zone (Neither Endangered nor Critical) plans – Assumes a rate of increase based on a target rate, with the increases capped at a 6.0 percent per year increase for 12 years, except that, for the first five years after the valuation date, the increase rate will not be less than the recent five-year historical average increase rate as of the valuation date. The target rate noted above is a rate, which when multiplied by the active participant count, equals the normal cost plus a 12-year amortization of unfunded liabilities (ignoring credit balances) in three years from each projected valuation anniversary date. The current contribution rate is assumed to increase levelly over three years to achieve the target rate, subject to the maximum increase rates noted. Per capita contribution growth is lowered to national average wage increases (NAWI) after 12 years (or the cumulative cap is hit).
- Endangered plans – Assumes that plans implement a funding improvement plan that includes contribution rate increases estimated to avoid a funding deficiency and achieve a 33 percent better funded ratio in 10 years, with a maximum 8 percent per year increase in per capita contribution

growth for up to 12 years. Per capita contribution growth is lowered to inflation after 12 years, or when the cumulative cap is hit.

- Critical plans (except for those projected to receive SFA) – Assumes that plans implement a rehabilitation plan that includes contribution rate increases estimated to eliminate the funding deficiency and bring the plan to 80 percent funded in 10 years, with a maximum of 8 percent per year increase in per capita contribution growth for up to 12 years. Per capita growth is lowered to inflation after 12 years, or when the cumulative cap is hit.
- Critical and Declining plans (except for those projected to receive SFA) – Assumes a flat 2.5 percent per year increase.
- Plans projected to receive SFA – Future contribution rates are assumed to remain level for 15 years, and then increase by NAWI thereafter.

Per capita contributions for all plans will be further limited to a multiple of 2.5 times the 2009 baseline per capita (based on contributions divided by active participant count from the 2009 Schedule MB), after which inflation/wage growth becomes the underlying increase rate.

The above contribution rate increases apply until the plan is projected to become insolvent within 10 years; no future increases are applied thereafter.

Plan administrative expenses: Expenses are calculated as the greater of (1) the administrative expense (excluding investment expenses) as a percentage of expected benefit payments from the most recent Form 5500 filing multiplied by the total benefit payments in each projection year and (2) the administrative expense from the prior year rolled forward at a 2 percent increase per year. This amount is then capped by 5 percent of total benefit payments. The increase in the flat rate premium to $52 in 2031 (approximately a $7 increase) is added to the above-calculated expense starting in 2031.

Benefit Improvements. For green zone plans with a flat dollar benefit formula, benefit increases are assumed to track changes in wages over time. Only future service benefits are increased – no past service benefit improvements are assumed.

Benefit Improvement Restriction. It is assumed that critical and endangered status plans do not adopt future benefit improvements.

Withdrawal Liability Payments. For currently terminated and insolvent plans and certain previously-booked plans, a schedule of payments is received from the plan administrators – such payment schedules are then discounted for the possibility of non-payment (predominately due to the potential bankruptcy of a withdrawn employer). The scheduled payments are assumed to "decay" by 2 percent per year. For all other plans, the prior year actual or modeled withdrawal liability payments are assumed to decline by 30 percent in the first year (recognizing the one-time nature of lump sum settlements of withdrawal liability that are or may be included in the total withdrawal liability payments) and phase-out over 15 years. Future withdrawals are modeled, and such payments are assumed to phase-out over 20 years.

Mass Withdrawal. In the model, no plans are assumed to go through mass withdrawal prior to insolvency. Upon insolvency, 60 percent of plans are assumed to go through mass withdrawal; the remaining 40 percent

of plans are assumed to remain ongoing. In the case of mass withdrawal, initial year payment assessments by the plan from withdrawn employers are estimated at 120 percent of the most recent projected year regular contributions, with 70 percent of employers assumed to commence withdrawal liability payments in the first year. After the first year, withdrawal liability payments are assumed to decay over 20 years from the first year. In the case of an ongoing insolvent plan, contributions are assumed to decline by 10 percent (from the prior year) in the first year of insolvency, and then decrease by 5 percent per year thereafter.

PBGC Premiums. Premiums are paid in accordance with current law (including the increase in the flat rate premium to $52 in 2031 under ARP) out of plan assets. There is no allowance for write-offs of uncollectable premiums or for the fact that a portion of the premium collected is not credited with interest under MPRA.

Discounting Future Claims. Future claims are discounted with a single interest factor (under each scenario) that models the curve of interest factors described in PBGC's financial statements (using the simulated 30-year Treasury rate generated for the particular year and economic path plus 42 basis points). Those factors are based on a survey of private-sector annuity market prices.

Discounting Future Present Values (i.e., the "nominal" values) Shown in Report Tables. Future nominal values (but not the present value of claims at such dates – see above) are discounted to September 30, 2020, using the simulated 30-year Treasury rate generated for the particular year and economic path.

Assumptions about Benefit Suspensions and Partitions. For plans receiving SFA, no future suspensions or partitions are assumed. For non-SFA plans, it is assumed that there is a 12 percent likelihood that a critical and declining status plan (if it is projected to meet the long-term insolvency test without a partition) will apply for suspension alone; and a 3 percent likelihood that it will apply for both a benefit suspension and a partition (if it is also projected to pass the long term loss test, it is assumed that it can also pass the "non-impairment test"). The test is done only in 2030. The determination of benefit suspension and partition amounts is based on the following process and assumptions:

- In a partition, the guaranteed portion of benefits for some participants is spun off to a separate, insolvent plan, for which PBGC will provide financial assistance. PIMS uses the inputted cash flows to calculate the maximum suspension level (110 percent of PBGC's guarantee, with special protections for certain retirees).
- The assumed average return on plan assets used in MPRA solvency tests is five percent.
- Plans that have gone through a suspension will be re-tested every five years. Deterioration in financial conditions will allow plans to further suspend benefits up to a limit of 110 percent of PBGC's guarantee. To be conservative, a lower asset return of 4.5 percent is used to test for suspension percentage changes.

Assumptions specific to SFA determination: The FY 2020 ME-PIMS valuation assumes that all plans that become eligible for SFA by the 2022 plan year will apply for it. Plans that are very close to meeting the eligibility criteria under ERISA section 4262(b) may take action(s) to become eligible for SFA (e.g., modify their actuarial assumptions). To account for this plan behavior, ME-PIMS uses modified eligibility criteria:

- For purposes of determining a plan's zone status for SFA eligibility:
    - Projected contributions are reduced by 5 percent per year for the first two years

    - The solvency threshold for determining critical and declining status is changed to 25 years instead of 20 years
- The threshold for modified funding percentage is changed to 45 percent instead of 40 percent

Due to the high degree of uncertainty related to application timing, ME-PIMS uses a simplified assumption: plans in the first four priority application groups under PBGC's interim final rule are assumed to be paid SFA in 2022, plans in the remaining priority application groups are assumed to be paid SFA in 2023, and all other plans are assumed to be paid SFA in 2024. All SFA applications are assumed to be approved in the first filing.

ME-PIMS is programmed to replicate a plan's SFA application in each model scenario under which the plan is projected to be eligible for SFA. The initial data used as the basis for the application's SFA calculation is based on the ME-PIMS stochastic projection to the application date. The SFA is then calculated using a deterministic projection based on assumptions as follows:

- Interest rate: the lesser of 5.5 percent or the interest rate shown on the most recent Schedule MB. The 5.5 percent rate is an estimate of the third segment rate plus 200 basis points (per ERISA section 4262(e)(3)).
- CBU decline after the measurement date: 2 percent per year for the first 10 years, 1 percent per year thereafter.
- Contribution rate increases after measurement date: none.
- Mortality: the same mortality assumption used for other ME-PIMS valuation purposes.
- Administrative expenses: prior year administrative expenses, excluding investment expenses, increased by 2 percent per year, and capped at a percentage of each year's projected benefits (the cap ranges from 6 percent to 15 percent, depending on plan size).
- Withdrawal liability payments – same as regular ME-PIMS assumptions. This is consistent with the conditions placed on withdrawal liability calculations under PBGC's interim final rule, which limits the impact of SFA on future withdrawals. It is consistent with the assumed CBU decline noted above (i.e., moderate CBU decline rates are consistent with a low level of employer withdrawals).
- Other assumptions: no changes from the assumptions used for other ME-PIMS valuation purposes.

Plan Demographics to Facilitate Cash Flow Modeling. To determine cash flows, ME-PIMS utilizes these assumptions:

- Proportion of active population assumed to be male: 70 percent.
- Proportion of retirees (in ongoing plans) assumed to be male: 80 percent.
- Proportion of terminated vested participants (in ongoing plans) assumed to be male: 94 percent.
- Age difference: females three years younger than their male spouses.
- Proportion of active population assumed to elect a joint and survivor payment form: 60 percent.

- Proportion of current retirees assumed to be receiving a joint and survivor payment form: 30 percent.
- Proportion of terminated vested participants assumed to elect a joint and survivor payment form: 35 percent.
- Joint and survivor payment form: joint and 50 percent survivor benefit.
- Proportion of participants assumed married for pre-retirement death benefit: 80 percent.
- Conversion factors based on PBGC rates for the joint and 50 percent survivor benefit: 0.8730 for male participants; 0.9135 for female participants.

Bipartisan American Miners Act. This legislation authorized federal funding over time for the United Mine Workers Plan and amended current law provisions related to federal funding for United Mine Workers retiree health benefits. Since federal funding is the principal source of solvency for this plan going forward, solvency projections for this plan are sensitive to variations in the expected amounts of future federal transfers to the plan. However, the amounts of future federal funding available for the United Mine Workers Pension Plan are not known with certainty because the amounts available for the pension plan depend on the amounts needed each year by certain United Mine Worker retiree health plans, among other things.

Estimated expected transfers have been provided to OMB by The Office of Surface Mining Reclamation and Enforcement (OSMRE), U.S. Department of the Interior. In the ME-PIMS model, these estimated annual amounts are treated as additional contributions in the projections of plan assets. There are no estimates of transfers to the pension plan beyond FY 2031, so for purposes of the projections in this report, the estimated transfer amount is assumed to stay level after FY 2031 until the United Mine Workers Plan is fully funded.

The annual federal transfer amounts provided by OMB for FY 2020 through FY 2030, and then updated for FY 2021 through 2031, used for the projections in this report (until the plan is fully funded) are as follows:

Estimated Federal Transfers to United Mine Workers Plan (provided by OSMRE)		
	Transfer Amount (in millions)	
Fiscal Year	FY 2020 Projection	FY 2021 Projection
FY 2020	$1,576	N/A
FY 2021	$321	$322
FY 2022	$332	$276
FY 2023	$387	$274
FY 2024	$389	$287
FY 2025	$395	$303
FY 2026	$401	$314
FY 2027	$405	$332
FY 2028	$406	$328
FY 2029	$405	$338
FY 2030	$406	$349
FY 2031 and later	$406	$358

SE-PIMS

SE-PIMS — Overview

PBGC's expected claims under the Single-Employer Program depend on two factors: (1) the amount of underfunding in the pension plans that PBGC insures (i.e., exposure) and (2) 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). Claims are sensitive to interest rates and investment returns, contributions, benefit changes, industry changes, and economic conditions which impact bankruptcies.

SE-PIMS starts with PBGC's current net financial position and data on the funding status of more than 450 very large plans, with results for this group scaled up to represent the full single-employer universe. The model produces 5,000 simulations (500 economic paths for each of the 10 bankruptcy 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.

SE-PIMS — Data

SE-PIMS uses the data for more than 450 actual plans, sponsored by more than 300 companies. These plans represent over half of PBGC's insurance exposure in the single-employer defined benefit system measured from the 2018 Form 5500 filings. SE-PIMS also reflects contribution data from later years' Form 5500 filings to the extent available when the initial results are generated.

The database includes:

- Summary statistics on plan demographics,
- Plan benefit structure,
- Asset values,
- Liabilities,
- Actuarial assumptions, and
- Key financial information about the employer sponsoring the plan.

Plan data for the past six years are downloaded from Schedules SB, R, H, and I of the Form 5500 database into the PIMS database. In addition, information on plan provisions, demographics of active workers, and plan assumptions for future demographic changes are manually entered and reviewed against signed forms and attachments. If demographic information is missing for a particular plan, data from other plans of similar size, demographics, or industry is used for that plan.

The plans included are primarily those with the largest plan liabilities where (1) sufficient data is available on the sponsor for the SE-PIMS bankruptcy probability model and (2) plan details can be sufficiently captured in the SE-PIMS model.

Fundamental financial and market data on firms is obtained from Compustat which is provided by S&P Global Market Intelligence and linked to plan sponsors. Where there is missing data for a plan sponsor, data is imputed using industry averages, averages for plan sponsors of comparable size, or other measures.

Historical economic data is gathered from the Federal Reserve Economic Database tables, Interest Rate Tables provided by the Internal Revenue Service, and SBBI® Yearbooks. Data on PBGC's historical financial position is based on PBGC sources, which also supply the information published in PBGC's Data Tables.

PBGC reviews the data inputs – including the economic inputs (annual returns of stock and bond market indices, other historical data, generated stochastic paths), regulatory inputs (various IRS pension plan limits and information regarding CPI and national average wage growth), firm data (plan affiliation, firm economic data, weight as part of sample universe), and plan data (Form 5500 data and adjustments for missing or inconsistent data).

SE-PIMS — General Methodology

The SE-PIMS sample is weighted (scaled up) to represent the full universe of PBGC-insured, single-employer plans. The weighted sample represents total liabilities and underfunding, and the distribution of funding levels among plans in the PBGC-insured universe based on data available as of the preceding spring.

The weighting process uses scaled copies of the plan sponsors' business (called "partners") and their pension plans. Each partner begins each simulation with the financial conditions copied from their source sponsors but are scaled in relation to the size of each sponsor's balance sheet entries and employment. The financial conditions and bankruptcy experience for each partner is projected separately. Because the SE-PIMS sample is drawn from larger than average plans and corporations, each partner (sponsor and plan size) is scaled 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 that are 50 to 60 percent funded is compared to the same total for the insured universe, and similarly for plans that are 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 minimum funding and premium rules, and then extrapolates the results to the universe of single-employer plans.

SE-PIMS also uses each employer's financial information as the starting point for assigning probabilities of bankruptcy.

Projections of claims against the Single-Employer Program are made stochastically. Claims are modeled by simulating the occurrence of bankruptcy for plan sponsors. The model reflects the relationship from 1980 to 1998 between the probability of bankruptcy and variables representing financial health, such as equity-to-debt ratio, cash flow, firm equity, and employment.[26] For each period, the model assigns random changes in each

[26] The FY 2017 independent PIMS peer review, required by the Moving Ahead for Progress in the 21st Century Act (P.L. 112-141), titled "Bankruptcy and Mass Withdrawal Modeling in PIMS", dated October 1, 2019, collected updated bankruptcy data through 2017 which verified the appropriateness of the model assumptions.

of these variables for each firm, which are correlated with changes in the economy. The simulated financial health variables determine the probability of bankruptcy for that year.

SE-PIMS models contributions from plan sponsors based on meeting minimum funding requirements, avoiding variable rate premiums, maintaining or regaining prior funding levels (based on liability measurements used in corporate financial accounting), and incentives to attain a funding threshold that eliminates restrictions on the accelerated benefit payments. When sponsors are simulated to experience bankruptcy, the model retroactively overrides modeled contributions for the three years prior to bankruptcy to assume zero contributions for those years. The model runs 500 economic paths (varying interest rates and equity returns) with each plan's sponsor being "cycled" through each economic path 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[27]

The following variables are stochastically projected:

Sponsor Financial Health Variables. Equity-to-debt ratio, cash flow, firm equity, and employment.

Plan Demographics. Starting with plans' population data from Form 5500, the distribution of active participants for a plan varies throughout the forecast 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 simulated path of the projections. 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 long-term projections 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 straight life annuities.

Probability of Bankruptcy. Sponsors are subjected to an annual stochastic chance of bankruptcy. That probability of bankruptcy is based on the relationship between bankruptcies and various measures of companies' financial health. The bankruptcy risks generated for PIMS are compared to market indices, and the largest outliers have their modeled risk recalibrated to equal the mean of the market estimate of bankruptcy risk for their class of bonds. Bankruptcy probability formulas generally do not vary by industry.[28] In bankruptcy, plans with modest levels of underfunding are less likely than severely underfunded plans to result in claims on PBGC. Thus, for modeling purposes, 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. If the sponsor of a plan is simulated to experience bankruptcy and the plan is more than 80 percent funded for termination liability, the plan is assumed to be terminated through the standard termination process.

[27] For additional information on SE-PIMS and the assumptions used in running the model, see https://www.pbgc.gov/sites/default/files/legacy/docs/PIMS-Overview-2011.pdf.

[28] SE-PIMS makes an exception for the financial and utilities industries, where relatively high degrees of leverage are considered not to signal a risk of bankruptcy. SE-PIMS also increases the bankruptcy probabilities of a few large companies whose model probabilities greatly underestimate the risk of bankruptcy as measured by their bond ratings.

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

Mortality.[29] For the sample plans' year-by-year experience mortality during the projection period: the blended RP-2014 male annuitant and non-annuitant mortality tables times 1.09, projected with the MP-2018 two-dimensional rates to 2019, but using just the ultimate MP-2018 improvement rates for all years after 2019 to the specified projection year (static basis). This is the same mortality experience assumed in the FY 2019 report and parallels the experience mortality of PBGC's trusteed census.

For the present value of PBGC benefit payments: the blended RP-2014 Healthy male mortality table times 1.09, with generational projections using the MP-2019 scale. This is based on a study of PBGC-insured participants and is the same table used in PBGC's September 30, 2020, financial statements.

For purposes of determining minimum funding requirements after 2018: RP-2006 (with separate annuitant and non-annuitant tables) generationally projected from 2006 using MP-2019. For calibrating to the 2018 Schedule SB target liability, the statically projected annuitant and non-annuitant tables were used (static projection as specified in IRC §1.430(h)(3)-1(c)(3)(ii)). For 2017(when a 2018 Schedule SB was not available at time of data preparation), the RP-2000-based blended IRS table was used.

It is assumed that collectively bargained plans have received approval from IRS to use a substitute mortality table with mortality rates 9 percent higher than the standard table.

Contributions and Credit Balances. Contributions are assumed to be driven by incentives such as complying with minimum funding requirements, reducing the variable rate premium (VRP), and maintaining funded status at certain levels that are potentially based on accounting, termination, or other liability measures. The primary funded ratio measure driving contribution behavior is assumed to be based on the vested benefit liability (VBL) used to determine the VRP. The statutory minimum required contribution (reflecting maximum allowable credit balance usage) is assumed to be a floor. For plan sponsors that experience bankruptcy in the projections, contributions for the three years prior to bankruptcy are reduced to zero.

Plans that are not required to pay a VRP as a result of funding to or beyond 100 percent of the VBL are assumed to be motivated by different factors than plans that have not funded to that level. The VBL funded level changes throughout the projection period, thus the factors motivating contribution behavior and the parameters used to determine projected contribution amounts also change.

Plans funded above 100 percent of the VBL within the last three years are assumed to make the largest of the following contributions.

- A multiple of the normal cost determined under statutory assumptions – a multiple of 1.5 for plans funded below 105 percent of VBL grading down to a multiple of 1.0 for plans funded above 130 percent of VBL;
- The amount needed to eliminate a portion of the VBL deficit relative to the highest VBL funded ratio in the last three years – 30 percent of the deficit for plans funded below 110 percent of VBL, 20 percent for plans funded above 115 percent of VBL, otherwise 25 percent; or

[29] PBGC uses a mortality table based on the actual experience of trusteed plan populations with generational projections to determine the pension benefit liability in the Annual Report.

- For plans in which the VBL funded percentage falls below 100 percent, the amount needed to fully fund the VBL over 1-4 years for plans funded above 80 percent of VBL, or over 7-10 years for plans funded below 80 percent of VBL.

Sponsors of plans that have not been funded above 100 percent of the VBL in any of the past three years are assumed to make contributions that reflect a combination of possible contribution behaviors based on the plan's Adjusted Funding Target Attainment Percentage (AFTAP) or VBL funded ratio, as shown in the tables below. The combination of contribution behaviors represents that plan sponsors in the same circumstances may use different contribution approaches.

- Sponsors of plans that have an AFTAP below 80 percent make contributions based on the following combinations of possible contribution behaviors:

AFTAP	Contribution Behavior Percent of Plan Sponsors Assumed to Use Behavior	
	Increase AFTAP to 80%	Minimum Required Contribution (MRC) only, using 90% of available credit balance
0% - 70%	0%	100%
70% - 75%	50%	50%
75% - 80%	100%	0%

- All other sponsors of plans make contributions based on the following combinations of possible contribution behaviors:

Contribution Amount	Contribution Behavior
Sum of the two contribution behaviors times the VRP factor	Fully fund VBL over 1-4 years for plans above 80% VBL funded, over 7-10 years for plans below 80% VBL funded
	Eliminate 30% of the deficit relative to highest VBL funded ratio in last 3 years
Plus: the following behavior times (100% minus the VRP factor)	MRC, using 90% of available credit balance

The VRP factor is based on the "effective" VRP rate, i.e., the VRP rate adjusted for the impact of the VRP cap. The VRP factor is equal to 50 percent if the effective VRP rate is $30 per $1,000 unfunded VBL, and is adjusted upwards for higher VRP rates, with all plans assumed to immediately fully fund the VBL if the VRP rate ever reaches $100. The VRP factor is adjusted downwards for VRP rates lower than $30 with no plans funding toward the VBL at a VRP rate of $0.

Actual 2018 and 2019 contributions and the associated minimum required contributions are used to update the information from the 2018 Form 5500 filings where available as of the data compilation date.

Form of Payment. Except for certain cash balance plans, SE-PIMS assumes all benefits will be paid as annuities. It is assumed that cash balance plans will pay participants the full accrued benefit (i.e., the account balance) as a lump sum upon termination or retirement unless benefit restrictions apply (see below).

Benefit Improvements. 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 representing merit and seniority.

Benefit Restrictions. The statute provides that certain benefit restrictions apply if a plan's Adjusted Funding Target Attainment Percentage (AFTAP) is less than a specified percentage and unadjusted assets are less than Target Liability. Liabilities underlying the AFTAP calculation are determined using stabilized discount rates. Assets are generally the actuarial value of assets, reduced by credit balances when the actuarial value of assets does not exceed liabilities. The benefit restriction provisions of section 436 of the Internal Revenue Code are reflected as follows:

- Benefit Improvement Restriction. Because the benefit improvement restriction does not apply to benefit increases unless they exceed the average wage increase and PIMS projects benefit increases proportionally with wage increases, the benefit improvement restriction is not applicable for SE-PIMS.
- Lump Sum Payment Restriction. The lump sum benefit payment restriction is reflected to the extent a cash balance plan is projected to have an AFTAP below 80 percent.
- Benefit Accrual Restriction. Plans with funding percentages below 60 percent are assumed to freeze benefits and to remain frozen even if the percentage increases above 60 percent in the future.

Credit Balance Waivers. Because assets underlying the AFTAP calculation are reduced by credit balances unless assets exceed liabilities (see above), sponsors are permitted, or in some cases required, to reduce ("waive") credit balances to the extent needed to avoid benefit restrictions. SE-PIMS assumes that sponsors will choose to waive credit balances to the extent necessary to avoid freezing benefits when funding drops below the 60 percent threshold. In addition, because cash balance plans are assumed to pay the full accrued benefit as a lump sum, such plans are assumed to waive credit balances to the extent necessary to achieve 80 percent funding, if possible.

PBGC Premiums. SE-PIMS models premiums based on current law, including the provisions regarding future indexing and provisions in the SECURE Act of 2019 for lower premium rates for CSEC plans. There is no allowance in premium projections for write-offs of uncollectable premiums. Premiums are assumed paid by the employer rather than from the plan assets.

PBGC Guarantee Limits. SE-PIMS models the level of benefits PBGC will pay in projected claims as the lesser of participants' vested benefit levels and PBGC's maximum guarantee level. Circumstances where benefits might be further limited, or where PBGC might be required to pay in excess of the maximum benefit guarantee level are not modeled.

PBGC's Assets. PBGC's asset allocation as of September 30, 2020, is reflected as the starting point and portfolio risk is assumed to be gradually reduced as PBGC's funding status improves, in accordance with the investment policy.[30]

Discounting Future Claims. When SE-PIMS discounts future amounts, the discount factor is a single-interest factor that approximates the yield curve that would be used for PBGC's financial statements at the time of the projected calculation. Those interest factors are based on surveys of private-sector group annuity market prices. There was an assumed reversion to the relationship of market interest rates and group annuity pricing factors observed prior to the 2008 financial crisis.

Determining Discounted Future Present Values Shown in Report Tables. For results presented as present values in this report, the discount rate used to adjust nominal values is the simulated 30-year Treasury rate generated for the particular year and economic path.

[30] https://www.pbgc.gov/sites/default/files/april-2019-ips-pbgc.pdf.

SAMPLE STATISTICS FROM FY 2020 RUNS IN ME-PIMS AND SE-PIMS

The following tables show selected output statistics from runs of ME-PIMS and SE-PIMS for this report.

Figure A-1

Arithmetic Means, Standard Deviations, and Correlations of Key Financial Market Values FY 2020 Single-Employer Model Runs* (Across 2021-2030 for 500 economic paths)

	Long-Term Treasury Yield	Return on 30-year Treasury Bonds	Stock Market Return
Mean	2.9%**	-0.1%	7.4%
Standard Deviation	1.1%	8.6%	20.0%
Correlations:			
Long-Term Treasury Yield	1.00	-0.14	0.00
Return on 30-year Treasury		1.00	0.20
Stock Market Return			1.00

* ME-PIMS yields economic returns within 0.1 percent and correlations within 0.02 of the single-employer results. ME-PIMS forecasts over 50 years as opposed to 20 years for SE-PIMS and, consequently, is prone to more extreme stochastic paths over the longer span of the projection.

** The discount rate used to value PBGC liabilities and claims is this rate plus 42 basis points for both insurance programs.

Figure A-2

Arithmetic Means and Standard Deviations of Market Rates Derived from Projected Long-Term Treasury Yields in FY 2020 Single-Employer and Multiemployer Model Runs

	Long-Term Corporate Rate	Inflation Rate	Wage, Salary and Flat Benefit Growth Rate
Mean	4.0%	2.6%	4.0%
Standard Deviation	1.1%	1.1%	1.1%

Figure A-3 Projected Plan Returns FY 2020 Single-Employer and Multiemployer Model Runs	
Arithmetic Mean	4.3%
Geometric Mean	3.8%
Standard Deviation	10.1%

Figure A-4 Projected Annual Bankruptcy Probabilities[31] FY 2020 Single-Employer Model Runs	
Arithmetic Mean	0.7%
Standard Deviation	2.1%

Figure A-5 Annual Rate of Plans' Projected Insolvency FY 2020 Multiemployer Model Runs	
Arithmetic Mean	0.1%
Standard Deviation	0.02%

[31] The bankruptcy probability modeling methods and results are 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.

CHANGES FROM THE PRIOR YEAR

FY 2020 ME-PIMS includes the following changes from the FY 2019 Projections Report:

Model Improvements. Several improvements were made to the ME-PIMS model for FY 2020. See the Model Improvements section for a summary of the changes and their impact on the projections.

American Rescue Plan Act (ARP). ARP required several changes in methods and assumptions for the FY 2020 report. Plans that will receive SFA will be subject to somewhat different rules and constraints than under the status quo, and, as such, the assumptions made for future contribution rate increases were significantly modified. Also, to reflect ARP and to better reflect emerging experience, the assumptions regarding future partitions and benefit suspensions were substantially revised.

Contribution Increase. Based on several internal PBGC studies and analysis, the FY 2020 ME-PIMS model modified the approach to modeling plan contribution increases. The revised assumptions: (1) reflect more up-to-date data on observed contribution rate increases, (2) factor into the contribution rate increases the minimum funding rules for "green" zone plans, and (3) harmonize the contribution rates increase parameters so that large swings in contribution rate increases do not occur when plans move from one zone status to another (and many times, back again). Also, the contribution rate increases now more closely integrate prior increases that occurred while the plan was in another status. For the plans expected to receive SFA, future contribution rates are kept level for 15 years, then increased by the National Wage Base Index each year for the next 15 years. After 30 years, plans that received SFA are treated the same as other plans and use the same modeling plan contribution increase by zone status.

Withdrawal Liability and Mass Withdrawal. Based on several internal PBGC studies and analysis, the FY 2020 ME-PIMS model was changed in several interrelated ways. The methodology was changed to separate the withdrawal liability payments from the regular ongoing employer contributions, either based on actual data from the Schedule MB attachments or estimated based on data that was available. The withdrawal liability portion of the total reported contributions is now projected separately and differently than ongoing employer contributions. In addition, the FY 2019 ME-PIMS model assumed that all plans would go into mass withdrawal upon insolvency. The FY 2020 ME-PIMS model assumes that 60 percent of plans go into mass withdrawal upon insolvency and 40 percent remain ongoing indefinitely. For plans assumed to go into mass withdrawal, new methods and assumptions were adopted to better estimate the mass withdrawal payments.

MPRA Suspensions and Partitions. Changes were made to the percentage of future eligible plans to apply for benefit suspensions and partitions (reflecting the take-up rates based on the period since MPRA was passed) and updated the following to be consistent with ARP provisions:

- Plans that already implemented MPRA are required to undo MPRA upon receiving SFA.
- As a model simplification, plans that do not receive an SFA are still eligible for a one-time implementation of MPRA as of January 1, 2030.
- After January 1, 2030, the suspension percentage is retested every five years to determine if the suspension percentage should be changed due to favorable or unfavorable experience.

FY 2020 SE-PIMS includes the following changes from the FY 2019 Projections Report:

Model Improvements. Several improvements were made to the SE-PIMS model for FY 2020. See the Model Improvements section above for a summary of the changes and their impact on the projections.

Mortality Table Used to Determine the Amount of Underfunding at Termination. The scaling factor was updated from MP-2018 to MP-2019 and applied on a generational basis (rather than statically projecting all payments to the approximate duration of the liability).

Mortality Table Used to Determine Minimum Funding Requirements. This was changed in FY 2020 to be based on separate annuitant and non-annuitant tables projected generationally for all advancing ages using the two-dimensional MP-2019 scale. In FY 2019, PBGC produced a "statically projected" valuation table for 2020 (per IRC §1.430(h)(3) – 1(c)(3)(ii)) using MP-2018. This statically projected table also blended the annuitant and non-annuitant mortality rates. In FY 2019, for years beyond 2020, we projected the statically projected 2020 table using the ultimate MP-2018 scale. For calibrating to the 2018 Schedule SB target liability, the separate statically projected IRS annuitant and non-annuitant tables are used.

ARP. PIMS modelling of statutory minimum required contributions now reflects both of the following ARP changes as being implemented for plans years beginning in 2020:

- Narrowing the corridor around the 25-year average segment rates for plan years beginning before 2030 and establishing a permanent five percent floor on the 25- year average segment rate, and
- Permanently extending the amortization period from seven years to 15 years.

Both PIMS models include updated economic assumptions as noted in the Capital Market Assumptions section above. The major assumptions are summarized below. The rates shown are the arithmetic mean of the first 10 years of the projection.

Figure A-6

Economic Assumption Changes for FY 2020

FY 2020 Single-Employer and Multiemployer Model Runs

	FY 2020	FY 2019
Long-Term Treasury Yield*	2.9%	2.3%
Return on 30-year Treasury Bonds*	-0.1%	2.0%
Stock Market Return (Arithmetic)*	7.4%	7.9%
Long-Term Corporate Rate	4.0%	3.4%
Inflation Rate	2.6%	2.7%
Wage, Salary, and Flat Benefit Growth Rate	4.0%	4.2%
Projected Plan Returns	4.3%	4.9%
Annual Bankruptcy Probability for SE Plans	0.7%	0.6%
Annual Rate of Plans' Projected Insolvency for ME Plans	0.1%	0.9%

* ME-PIMS yields economic returns within 0.1 percent of the Single-Employer Model. ME-PIMS forecasts over 50 years as opposed to 20 years for SE-PIMS and, consequently, is prone to more extreme stochastic paths over the longer span of the projection. The discount rate used to value PBGC liabilities and claims is the Long-Term Treasury Yield plus a spread. For both insurance programs, this spread was changed in FY 2020 from minus 13 basis points to plus 42 basis points.