FY 2012 PBGC EXPOSURE REPORT[1]

The FY 2012 PBGC Exposure Report provides an actuarial evaluation of its future expected operations and financial status. This report contains estimates and projections for both the single-employer and multiemployer programs over the next decade and beyond.

To project long-term exposure, PBGC uses two systems: the Single-Employer Pension Insurance Modeling System (SE-PIMS) and the Multiemployer Pension Insurance Modeling System (ME-PIMS). Each relies on running many simulations to derive a range of possible outcomes.

The multiemployer program simulations, summarized beginning on page 6, deserve particular attention. Due to the deterioration in a few large multiemployer plans, the projections show a 36 percent chance that PBGC's multiemployer program will be insolvent[2] by FY 2022 and a 91 percent chance that it will be insolvent by FY 2032.[3]

The single-employer projections, summarized beginning on page 3, show that continued substantial program net deficits[4] are likely throughout this decade.

These projections are discussed in detail throughout this report.

DISCLAIMER

Readers should be aware that this report is an actuarial evaluation and contains estimates and projections. Unlike the historical financial balance sheet and income statement values, which are subject to accounting and audit standards, the standard for actuarial projections is that they be reasonable. The values shown are estimates, not predictions; they reflect the range of values that might result based on the assumptions that underlie our projection models. The results shown in this report are mean values. The mean values (PBGC's probability of insolvency and net position in 2022) are highly variable and unpredictable stochastic projections of many factors, such as future interest rates and future equity returns. **The results that ultimately occur can and often do vary materially from the reported results.**

The projections in this report are subject to limitations. Although ME-PIMS currently is our best available tool for undertaking the exposure analysis required by ERISA, it was designed before implementation of the Pension Protection Act (PPA) changes for multiemployer plans. Experience with multiemployer plans since implementation of PPA changes has caused PBGC to revisit certain assumptions underlying ME-PIMS which we will discuss further below and on page 24 ("Possible Future Refinements to the ME-PIMS Model").

After commissioning an external review of ME-PIMS by an outside consulting firm with substantial multiemployer expertise, in September 2012 we received recommendations that certain ME-PIMS

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1 This report is provided to satisfy requirements in Section 4008 of ERISA.

2 "Insolvent" in this report means both balance sheet insolvent and cash flow insolvent, a lack of liquidity to pay debts as they fall due.

3 As described in the disclaimer section beginning on this page, there are important limitations to our ME-PIMS model. Both SE-PIMS and ME-PIMS can simulate up to 20 years into the future, but they do not model longer-term sources of uncertainty affecting the structure of the pension system, such as factors affecting employers' decisions on whether to sponsor defined benefit pensions. These factors become increasingly important over longer-term horizons.

4 As of September 30, 2012, PBGC's single-employer insurance program had a negative net position or "deficit" of $29.1 billion. Deficit in this report means total liabilities less total assets as of a certain date.

assumptions and methods should be modified to better reflect current experience. The primary modifications addressed four areas: (1) The population of active plan participants should be assumed to decline in the future; (2) Per capita active participant contributions should be assumed to increase at a lower rate than currently assumed; (3) Some plan outcomes should be modified to reflect that many plan trustees have decided not to follow all of the plan steps under the law, a decision that is permitted under the "reasonable measures" provision of PPA; and (4) Employer withdrawal and mass withdrawal[5] assumptions based on pre-PPA experience should be modified to reflect how plans have responded to changes under the PPA rules. In addition, when management reviewed the process of preparing the FY 2010 Exposure Report, we identified two other issues that affect projections for the multiemployer system and require modification. First, we determined that ME-PIMS under-sampled probable plans. Second, we identified two algorithms that need to be modified to better reflect future cash flows. These algorithms affect projected multiemployer plan cash flows because of assumptions about retirement ages and about the timing of withdrawal liability payments. We expect to continue to modify and improve our models in the future.

We cannot predict with confidence how projections will change when various modeling modifications are implemented.[6]

In addition, last year PBGC's Office of Inspector General (OIG) concluded that the FY 2010 Exposure Report "contained numerous errors and inconsistencies and did not meet information quality controls for Federal agencies or PBGC policy … because PBGC (specifically the Policy, Research and Analysis Department or PRAD) lacked quality control policies and processes to ensure the validity and accuracy of reported [actuarial] projections". OIG concluded that PBGC issued the report with errors and inconsistencies in both the multiemployer and single-employer sections of the PBGC's FY 2010 Exposure Report (issued November 2011).[7] As a result, we removed our report from our website.

Recognizing the Wide Range of Possible Outcomes

Since these projections cover many years and there is obviously considerable uncertainty about even the near future, we show a wide range of possible outcomes. Throughout this report, we present the mean (average) results that SE-PIMS and ME-PIMS projected for some key outcomes for the period FY 2013-2022.

Balance sheet and income statement values are subject to accounting and audit standards. The Exposure Report is an actuarial evaluation. The Exposure Report clearly states that the values shown are estimates and are not predictive but reflect the range of values that might result based upon the assumptions that underlie our projection models. These values have very large standard deviations and depend heavily on highly variable and unpredictable stochastic projections of key factors such as future interest rates and future equity returns. The proper standard for PBGC's actuarial projection models is that the estimates be reasonable. To give a sense of the potential variation and the factors that generate it, we also show a 'high' value (at the eighty-fifth percentile) and a 'low' value (at the fifteenth percentile). This range represents the bulk of our projected outcomes in each case.[8]

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5 A mass withdrawal occurs when every contributing employer withdraws from a multiemployer plan, which results in the plan's termination.

6 In addition, the "Moving Ahead for Progress in the 21st Century Act" (MAP-21) requires an annual peer review of PIMS, which may result in additional recommendations for modifications.

7 Given the delays occasioned by the additional work on the FY 2010 Exposure Report, work on the FY 2012 Exposure Report had to commence immediately thereafter. Accordingly, PBGC has not produced the FY 2011 Exposure Report.

8 Some of the outcomes that we describe are year-by-year results, such as investment income in each year. In these cases there is generally a fairly constant amount of variation every year. For other categories, such as the net position of the single-employer program, each year affects the next, so there is a cumulative effect, yielding more uncertain results with each passing year. (This cumulative effect does not apply to the multiemployer program's position, where the program's few assets are a fraction of the value of impending claims. There is a very wide range of results every year, but the range does not grow larger over time as it does for the single-employer program.)

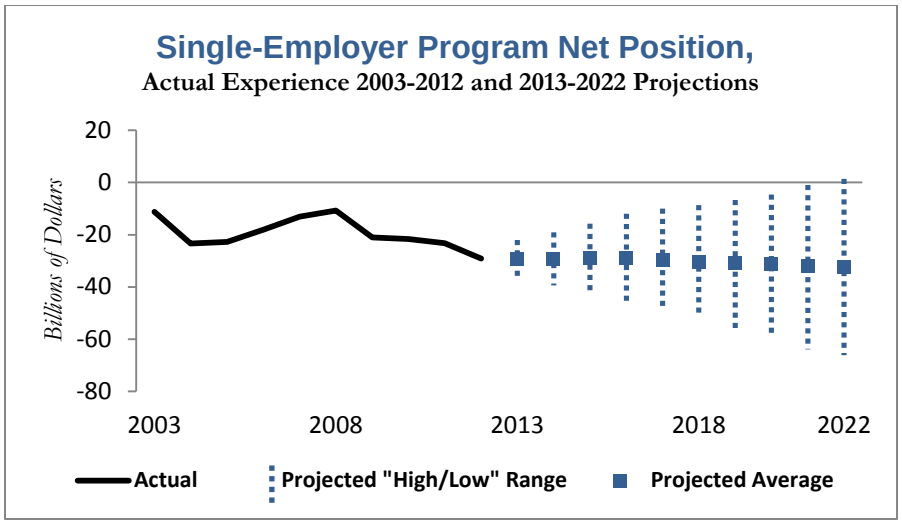
Almost a third of our projected results lie above or below the range displayed. For example, while the set of *all* single-employer results includes financial positions from a $65 billion surplus to a $173 billion deficit, the difference between the 'high' and 'low' values displayed ranges from a $1.4 billion surplus to a $66.1 billion deficit, significantly less than the full range. These "tail" results may also be important, so we present discussions of the full distributions of projected financial positions for both programs later in the report.

Summary of Projections

This financial exposure presentation combines all of PBGC's future claims, premiums, investment returns, etc., into a single net financial position[9]. That net surplus or deficit is the result of each of these components. Projections for PBGC premiums, amounts that PBGC may gain or lose through investments, and that PBGC will pay — and will still owe by FY 2022 — for people with failed pension plans, are important factors in each projected position. Each of them varies considerably, and as a result the net financial position varies as well. In this summary section, we describe the range of projected net financial positions and some of their important component factors. In later sections, we show the ranges for the components in greater depth.

Single Employer Program

The chart below shows our actual net financial position from FY 2003 - 2012, and the FY 2012 present value of the range of projections for the next 10 years. The FY 2012 single-employer program liabilities of $112.1 billion and assets of $83.0 billion result in a net financial position of ($29.1) billion. The average, or mean, projection for each future year appears as a large dot. The dotted vertical bars for each future year show the range of results between the fifteenth (15 percent of the 5,000 simulations resulted in a worse outcome) and eighty-fifth percentiles (15 percent of the simulations resulted in a better outcome) for that future year. Since each year's position affects the next year's, the uncertainty of our financial position grows every year through FY 2022, as reflected in the progressively longer vertical bars:



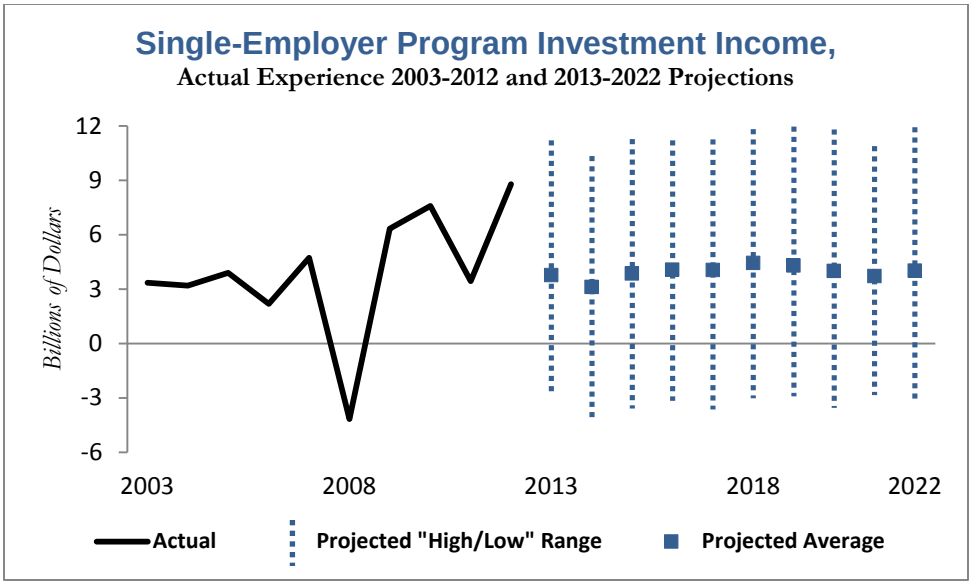
[9] In this report "net financial position", "net position", and "financial position" have the same meaning.

Because PBGC's obligations are paid out over the lives of people receiving pensions, a deficit means we will have less money than we will need, over a period of decades. Without changes, at some point there is a risk that a program in a deficit position will run out of money. It will have paid out all its assets and still owe benefits. That point still appears to be many years in the future for PBGC's single-employer program. Out of 5,000 simulations, none project that PBGC's single-employer program will run out of money within the next 10 years. A majority of simulations project increases in PBGC's deficit, and because some simulations result in very large deficits for the program, the average (mean) outcome is a decline in the program's position.

Of the factors that affect the projected net position, the most significant are new claims from terminated plans and investment income. The premiums that PBGC will collect are a smaller but still significant factor. The amount we pay in benefits each year affects what we owe and what we have on hand equally.

As shown in the chart below, investment income varies a great deal every year, but the amount of variation does not grow cumulatively, because each year's projection is only for that year's investment income (not the accumulated total of all our investment gains and losses). The dotted vertical bars represent the range of outcomes in each year that lie between the fifteenth (15 percent of the outcomes are worse in that year) and the eighty-fifth (15 percent of the outcomes in that year are better) percentiles. So, the vertical bars in the chart remain similar in size. For FY 2013 (the first year of the projection) that pool of projected results ranges from an $11.2 billion gain to a $2.9 billion loss.

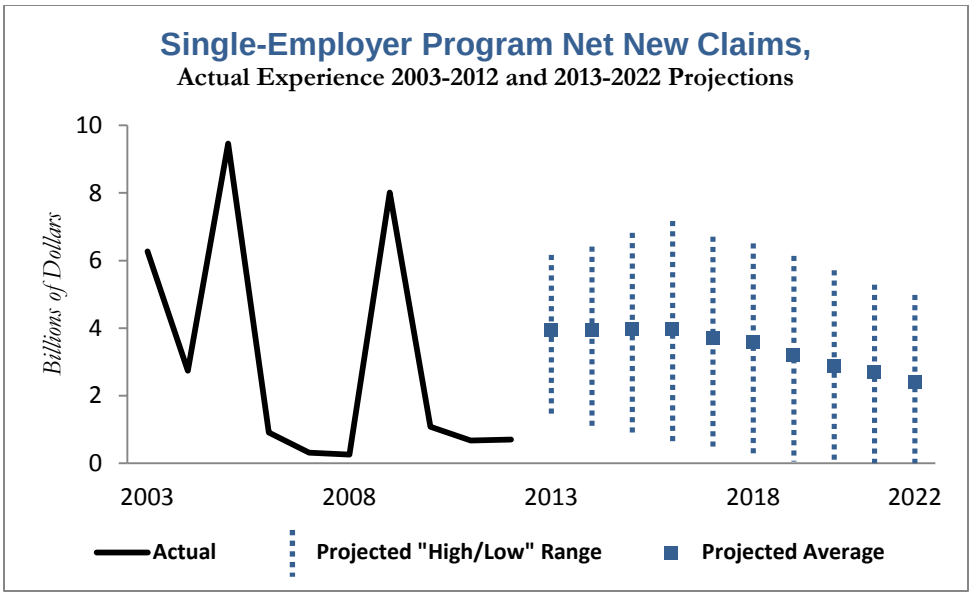
Two important facts should be noted: First, our projections do not assume that plans are terminated voluntarily by healthy companies, only by companies in distress. In fact, some healthy companies do close their pension plans by purchasing annuities and undertaking a standard termination. In these cases, PBGC's obligations are not affected, but those companies cease paying premiums altogether. We are analyzing the effect of these actions and will attempt to incorporate them in future reports. Second, PIMS does not model the potential that plans will discharge any significant part of their obligations by purchasing annuities through insurance companies and/or paying lump sums. The use of annuity buyouts and lump sums by companies seeking to "de-risk" significant portions of their liabilities has recently become quite visible; PIMS does not model this as continuing or expanding in the future. We have not yet investigated the potential that this would decrease PBGC premium income. While PIMS does model routine terminations of employment and retirement among participants in the sample of pension plans, it does not account for the possibility that a plan sponsor will offer a significant portion of its participants (retired or otherwise) a transfer of assets either through annuity purchases or payments of lump sums.



Projected new net claims (below) represent the amount of money we owe for people's benefits because their plans fail during the 10-year projection period, less the assets we recover from failed plans and the companies that sponsor them. In this chart, as in similar charts above, the black line represents historical values, while the colored lines represent the range of outcomes in future years. The range of outcomes are those between the fifteenth (15 percent of the outcomes in that year are worse) and the eighty-fifth (15 percent of the outcomes are better) percentiles. Since PBGC takes over the assets of plans that fail, new claims result in both new assets and new liabilities in our financial position. But since PBGC would not take them over in the first place if they could pay all benefits due, each plan adds liabilities to PBGC that are larger than the assets that PBGC inherits from them.

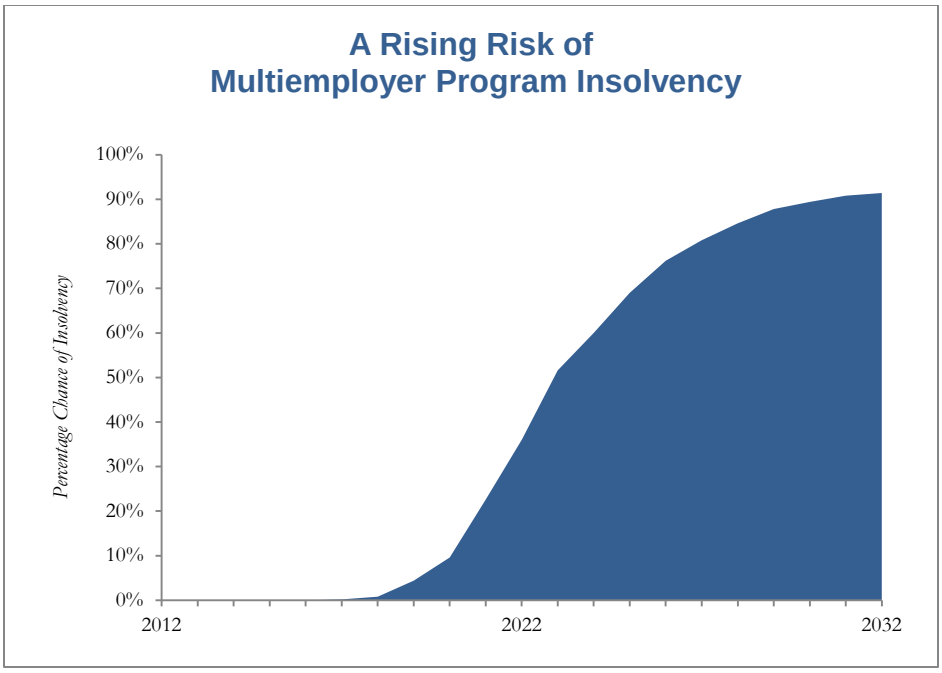
Like our investment income projections, the projections displayed for new net claims are for each year's results, so there is no cumulative effect in the amount the data vary.

To model future new claims, SE-PIMS starts with present economic conditions and information we have on how well-funded plans are. Then every year, the model projects many scenarios with different random annual fluctuations to factors affecting plans' funding and sponsors' financial health, within certain bounds. (See Appendix 1: Methodology.)



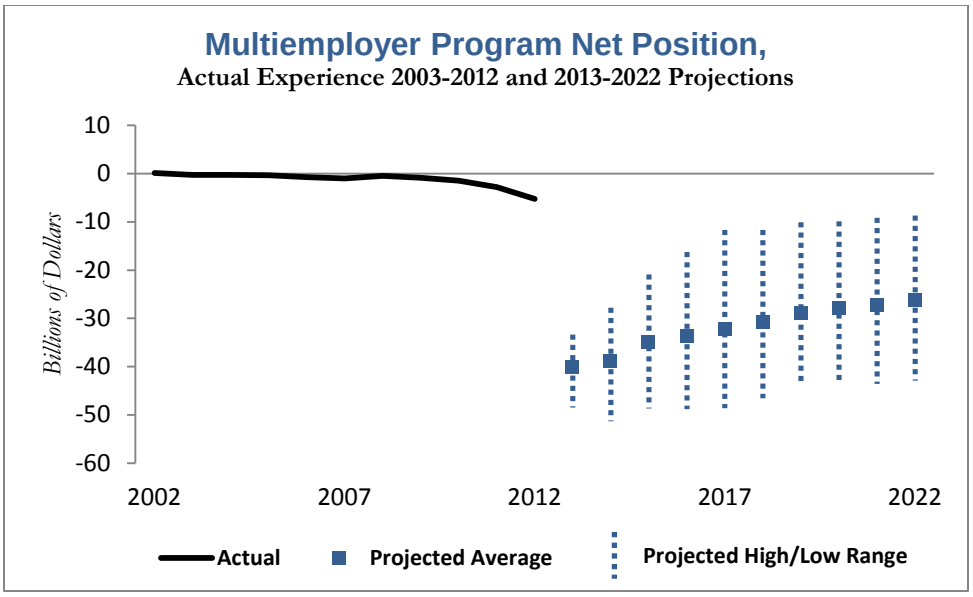
Multiemployer Program

The chart immediately below shows the chance of multiemployer program insolvency over a 20-year projection period. The projected likelihood of insolvency for the multiemployer program depends heavily on the timing of projected cash flows, which in turn depend on the timing of mass withdrawals in the PIMS scenarios. The distribution of that timing is very sensitive to small changes in starting data and assumptions. Recognizing these limitations, we present these probabilities as a general measure of the very real risk to PBGC's multiemployer program and the protections that the program provides. The chart on the next page shows the multiemployer program's actual financial position from FY 2002 - 2012, and the range of projections for the next 10 years.[10] The FY 2012 multiemployer program liabilities of $7.0 billion and assets of $1.8 billion result in a net financial position of ($5.2) billion.



In FY 2009 we presented the first results from the new ME-PIMS, showing a sobering risk picture for the program. This year, we ran simulations for a 20-year horizon. Our multiemployer program ran out of money in 91 percent of simulations. PBGC's multiemployer insurance program became insolvent in 36 percent of simulations within the shorter FY 2013-2022 projection period.

[10] See disclaimer beginning on page 1.



The 10-year projections of the multiemployer program nearly all result in declines. The chart above shows the FY 2012 present value of the range of projected multiemployer net positions (the colored bars and squares) in contrast to the actual historical net positions (the black line ending in year FY 2012). For each future year, the chart shows the mean outcome for each year as a colored square, and the range between the fifteenth (15 percent of the outcomes are worse in that year) and the eighty-fifth (15 percent of the outcomes are better) percentiles. The average position among the FY 2013 - 2022 outcomes is a very notable decline compared to the multiemployer program's current net position. These outcomes result largely from the significant deterioration in a few large plans, as well as from PBGC's increasing deficit (an increase in the deficit from $1.4 billion in FY 2010 to $2.8 billion in FY 2011, to $5.2 billion in FY 2012). Deterioration in other plans is also possible. The deterioration in the first year of the projection is due to the chances under the modeling that a few very large plans will move from a "reasonably possible" claim to a "probable" claim, at which point the plans are projected as being recorded for financial statement purposes, or "booked."

Due to the multiemployer program's design, there is often a long time lag between the booking of a multiemployer plan and the plan's actual insolvency. In modeling the design of the multiemployer program, a plan can be booked in one year of an ME-PIMS projection and improve sufficiently to become unbooked in a later year. Because PBGC's accounting procedures are independent of the ME-PIMS modeling analysis and because the financial condition of plans can vary slightly from year to year, projections of PBGC's net position in the first few years of the 10-year projection period may or may not correspond with PBGC's financial statements in the next couple of years. The precipitous drop in PBGC's projected net position in early years beyond FY 2012 should not be read as a prediction that plans booked in those years would remain booked, or become insolvent, in the longer-term future.

The impact of new claims dwarves other drivers of the deficit. For example, all multiemployer premiums over the next decade are projected to total just less than $1.3 billion. Since multiemployer plans spend all their money before PBGC steps in, there is no other significant funding stream. Multiemployer program assets vary by only $1.5 billion, or about 1/23rd of the amount that projected claims vary in the range displayed. The projected value of new claims by FY 2022 varies by $35 billion among the ME-PIMS projections shown.

Sources of Uncertainty: Single-Employer Program

The uncertainty in the future of our single-employer program arises from uncertainty about which plans will fail, about how much we will have to pay people as a result of these failures, and about how much we will still owe people by FY 2022 (in outstanding benefits that remain beyond the 10-year projection period.)

Which plans will fail?

The primary drivers of our projections are the financial health of those companies that have pension plans and the underfunding of those plans. If many companies with large, underfunded pension plans enter bankruptcy and are permitted to terminate their underfunded plans, creating new claims against PBGC, then the amount we pay in benefits through FY 2022 will also increase, as will future obligations. These new claims will also be reflected in our projected net position.

How much will we have to pay people?

Benefit payments and new claims. "Benefit Payments" for a given year means the amount we are projected to pay during that year to retirees, regardless of when their plans failed. "New Claims," on the other hand, represents the total projected costs over time to PBGC of plans that fail during the projection period. A "New Claim" is the difference between the plans' assets and all the money PBGC will have to pay for a given plan that is projected to fail — not just for the year it fails or for the 10-year projection period, but until all the people covered by the plan stop receiving benefits.

The table below shows a range of projections for new claims and benefit payments for the next 10 years. The table shows the average (mean) and the "high" and "low" values among seventy percent of outcomes.[11] The projection of benefit payments amounts are present values of the benefit payments projected to occur over the next ten years, while the projected new claims amounts are the present values of all new claims that are booked over the next ten years. In some cases, a claim booked during the next ten years will not call for any benefit payments until beyond the ten-year projection period.

September 30, 2012 Present Value *(Dollars in billions)*	"Low" (15th percentile)	**Mean**	"High" (85th percentile)
PBGC SE Benefit Payments FY 2013-22	$71	**$82**	$93
PBGC SE New Claims, Net FY 2013-22	$14	**$34**	$55

The uncertainty around new claims is greater than that around payments. Since benefit payments include continuing payments to people whose plans have already failed, many of the payments that will be due are already known, decreasing the uncertainty in the amount we will have to pay over the next 10 years. Furthermore, while our projected benefit payments are only for the 10-year projection period, our projected new claims include obligations far into the future. Under the model, the median value for new claims over the next 10 years is about $30.2 billion. This is not the same as the average (mean). Half of the simulations show

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

a 10-year total of claims above $30.2 billion and half below. The average (mean) level of claims is higher, about $34.2 billion over the next 10 years. The mean is higher than the median because there is a chance under some simulations that claims could reach very high levels.

How much will we still owe in FY 2022?

Interest rates affect how we calculate obligations. The single-employer program's expenses are mainly benefit payments to the retirees who depend on us. At any given point in time, we use an interest rate to calculate how much money we need to have now, to support payment of people's benefits in the future. Changes in this interest rate have a big effect on these calculations. (See Appendix 1: Methodology.) The rate accounts for a great deal of what we project we will owe people, but we cannot affect the rate used in the PIMS calculations, only attempt to project it.

All told, within the seventy percent of outcomes presented, the SE program's projected liabilities in FY 2022 vary by $89 billion.

September 30, 2012 Present Value *(Dollars in billions)*	"High" (85th percentile)	**Mean**	"Low" (15th percentile)
PBGC SE Liabilities in FY 2022	$175	**$130**	$86

What investment returns will PBGC realize to help make future payments?

PBGC's assets in hand can grow various ways: assets inherited from failed plans, recoveries in bankruptcy from sponsors abandoning their pension promises, premiums, and investment income. Of these, investment returns are a significant determinant of how much we can expect PBGC's assets to grow.

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

The table below shows projections for our total base of assets in the single-employer program by 2022, as well as for what we will earn in investment income up through FY 2022.

September 30, 2012 Present Value *(Dollars in billions)*	"Low" (15th percentile)	**Mean**	"High" (85th percentile)
PBGC SE Assets in FY 2022	$73	**$99**	$126
PBGC SE Investment Returns FY 2013-22	$14	**$39**	$66

Within the results shown in the table, there is a $52 billion range projected in the investment return that we will realize and a $53 billion range in the total amount of PBGC's projected assets, illustrating just how dependent our asset growth is on our investment returns.

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

One other factor that helps offset the amount we owe is estimated premiums. The projected amount of estimated premiums that we will receive under current law (including premium increases under MAP-21) is shown in the table below:

September 30, 2012 Present Value *(Dollars in billions)*	"Low" (15th percentile)	**Mean**	"High" (85th percentile)
PBGC SE Premiums FY 2013-2022	$19	**$27**	$36

Since premiums have been set by Congress, at rates that do not cover PBGC's likely obligations, the premiums we collect are far outstripped by obligations.

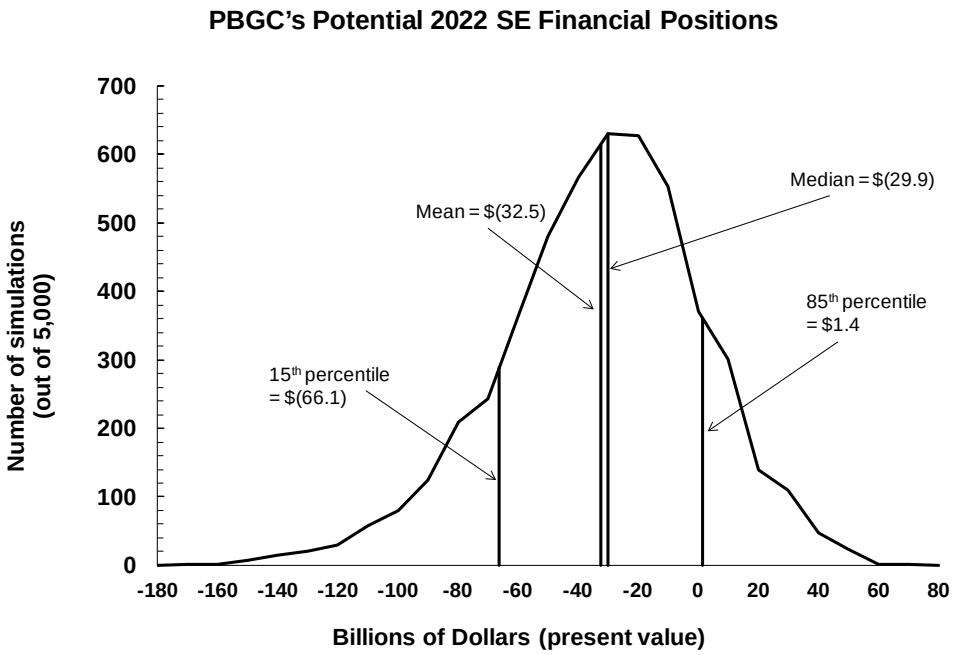
Projected financial position, single-employer program

SE-PIMS projects PBGC's potential financial position by combining simulated claims (including what we recover from failed plans and their sponsors to help fund their pension promises) with simulated premiums, investment returns, and other factors, including how much we already have on hand at the beginning of the simulation (that is, our FY 2012 financial position).

The financial position of the single-employer program as of September 30, 2012, was a deficit of $29.1 billion. In a majority of simulations, the FY 2012 projections show a decline; the median projected position in 2022 is a $29.9 billion deficit. This means that half of the simulations show either a smaller projected deficit than $29.9 billion, or a surplus, and half of the simulations show a larger projected deficit. But the average (mean) outcome in 2022 is a $32.5 billion deficit, because in some simulations the deficit reaches very high levels. The table below shows the average (mean) position, along with the values at the fifteenth and eighty-fifth percentiles.

September 30, 2012 Present Value *(Dollars in billions)*	"Low" (15th percentile)	**Mean**	"High" (85th percentile)
FY 2022 PBGC SE Financial Position	$(66)	**$(32)**	$1

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



Simply put, the further to the right the graph's "hump" is, the more scenarios have positive outcomes, and the less spread-out the graph is side-to-side, the more the simulations agree on outcomes.

Vertical lines on the graph show the present value of PBGC's projected 2022 net position at the fifteenth (15 percent of the outcomes are worse) and eighty-fifth (15 percent of the outcomes are better) percentiles, and the mean (or "average") value of projected net positions. The median (as mentioned above) is a $29.9 billion deficit in FY 2022. (Half the simulations show a higher deficit, and half show a lower one or a surplus.)

Potential for exhaustion of PBGC funds. In our financial statements, we report our financial position by comparing future benefit obligations (which span many decades into the future) and other liabilities with the assets presently held. Those statements do not consider future premiums or future claims. A stakeholder reading those financial statements alone could wonder how to evaluate the possibility of PBGC running out of funds.

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

- Future premium income assuming the premium rates enacted in the Moving Ahead for Progress in the 21st Century Act of 2012 (MAP-21);
- Future PBGC claims, which increase PBGC's benefit obligations but also include assets recovered from the terminated plans and from their sponsors; and
- Future investment income and/or losses on PBGC assets, based on PBGC's investment policy and allocations.

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

Multiemployer Program

A multiemployer plan is a collectively bargained plan that is maintained by two or more unrelated companies. There are more than 10 million individuals covered by about 1,450 insured multiemployer plans.

By law, PBGC insures multiemployer plans very differently from how we insure single-employer plans. Some of the differences are:

- PBGC-insured benefit levels are lower for people in multiemployer plans than for those in single-employer plans.
- Multiemployer plans pay lower premiums to PBGC.
- We do not take over troubled multiemployer plans and do not act at all until a plan becomes completely insolvent. PBGC then funds an insolvent plan's continued operations[12]. We do not take over assets from failed multiemployer plans.

Almost all the uncertainty in the multiemployer system is concentrated in the probability of new claims. Such new claims will arise primarily, but not solely, from plans that are currently in poor financial condition. The financial condition of many plans has been worsened by several factors, chiefly: declines in union employment and the resulting shift in plans from largely working to retired populations, two significant market downturns within the past dozen years, and the recent very significant and broad economic stresses starting in 2007-2008.

How many multiemployer plans will fail? What will we owe when they do?

The table below shows the average (mean) values that ME-PIMS projected for new claims and financial position for PBGC's multiemployer program in FY 2022. Alongside those values, the table displays the "low" and "high" values at the fifteenth and eighty-fifth percentiles. Higher new claims mean greater financial losses to PBGC, so we have reversed the order of the columns for the second row of projections, to better show the relationship between high new claims and a deterioration of our financial position.

September 30, 2012 Present Value *(Dollars in billions)*	"Low" (15th percentile)	**Mean**	"High" (85th percentile)
PBGC ME New Claims, Net FY 2013 -2022	$19.5	**$37.6**	$54.5
	"High" (85th percentile)		"Low" (15th percentile)
FY 2022 PBGC ME Financial Position	$(8.7)	**$(26.2)**	$(42.9)

As stated above, we do not take over assets from failed multiemployer plans, so the only assets in the multiemployer program are from the premiums that we have collected (or will collect) and any interest that we earn on those premiums.

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

Not surprisingly, given the limited sources of asset growth in the multiemployer program, the table shows a range of $34.2 billion for the multiemployer program's projected financial position — with virtually all of that range being deterioration from the program's current deficit of $5.2 billion.

Under ME-PIMS, the median amount of claims totaled over the next 10 years is about $36.2 billion; that is, half of the simulations show a 10-year total of claims above $36.2 billion and half below. The mean level of claims (that is, the average level of claims) is higher, about $37.6 billion over the next ten years. The mean is higher than the median because there is a chance under some simulations that claims could reach very high levels. For example, under the model there is a 10 percent chance that claims could exceed $59.6 billion over the 10-year period.

Actual payments within the next decade are much less than new claims.

In addition to claims, ME-PIMS simulates assistance payments from PBGC to multiemployer plans to pay people's benefits and maintain the plans. The table below shows the average (mean) and high and low values for such payments among simulations between the fifteenth and eighty-fifth percentiles, for the 10-year period ending in FY 2022.

September 30, 2012 Present Value *(Dollars in billions)*	Low (15th percentile)	**Mean**	High (85th percentile)
PBGC ME Financial Assistance Payments FY 2013-2022	$2.2	**$3.4**	$5.1

Financial assistance payments vary within this range by a factor of almost two and a half, with a "high" benefit payment figure of $5.1 billion within the range shown.

However, since PBGC delays helping multiemployer plans until *after* plans spend all their money, most of what we will pay for a new claim does not show up in financial assistance from 2013-2022, but in the multiemployer program's financial position at the end of the period. Since the financial position projection shows money still owed in FY 2022, it captures the deterioration at which the "financial assistance" flow only hints.

Multiemployer program financial position is projected to deteriorate dramatically

Virtually all of our projections show a much worse position over the next ten years. As of September 30, 2012, the multiemployer program had a deficit of $5.2 billion. The average (mean) projected result for 2022 is a $26.2 billion deficit, and the median position outcome in FY 2022 is a $23.9 billion deficit. (Half of the simulations show either a smaller deficit than $23.9 billion or a surplus, and half of the simulations show a larger deficit.)

This is a substantial change from previous years' projections. The most important reason for this deterioration is the reported deterioration in a few large multiemployer plans. A smaller factor is the Pension Relief Act of 2010, which relaxed funding requirements and therefore increases PBGC's exposure.

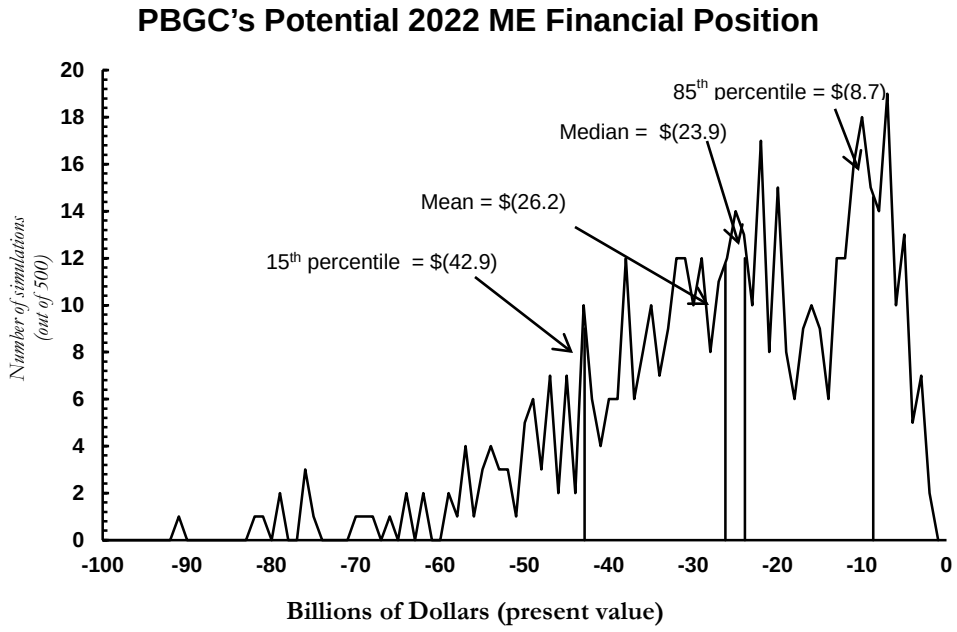
The passage of MAP-21 increased the multiemployer program premium rate by 33%, from $9 to $12, effective in 2013. However, the present value of projected multiemployer premiums during the FY 2013 - 2022 years ranges only between $1.2 and $1.4 billion. Since the multiemployer program's premiums are very low and the program has few assets, the primary driver of the net position is failed pension plans and new claims.

ME-PIMS projects PBGC's potential financial position by combining simulated claims with simulated premiums, expenses, and investment returns.

But unlike the relationships among the flows and positions in SE-PIMS, those in ME-PIMS leave little room for assets to grow, due to the design of the multiemployer program. In the multiemployer program, assets can grow only through the collection of premiums and interest on any money on hand.

In contrast to multiemployer premiums and assets, ME-PIMS projects that PBGC's multiemployer obligations, in the form of new claims by FY 2022, will grow considerably, resulting in a deficit that is, on average, more than five times the current deficit.

The following graph illustrates the wide range of financial position outcomes that are possible for PBGC's multiemployer program over the next 10 years. For each value of PBGC's projected net position along the horizontal axis, the height of the line shows how many scenarios (out of 500) had that net position as a result.



Vertical lines on the graph show the present value of PBGC's projected 2022 net position at the fifteenth (15 percent of the outcomes are worse) and eighty-fifth (15 percent of the outcomes are better) percentiles and the mean (or "average") value of projected net positions. The median result is a $23.9 billion deficit in FY 2022. Since the line shows no outcomes to the right of 0 on the graph, it is clear at a glance that no projections show any surplus. Many show very severe deficits.

Appendix

Overview of PIMS

Our long-term exposure projections, presented here, are different from the exposure we report in our financial statements. There, we classify some plans as "probable terminations," and record them as losses on our financial statements. We describe others as "reasonably possible" to terminate, and disclose our estimated exposure due to these plans in Section VII, "Single-Employer and Multiemployer Program Exposure" — but do not book them as losses. These estimates are based on plans that PBGC insures and considers likely to terminate, compared with all the plans that PBGC insures (the universe modeled in SE-PIMS and ME-PIMS).

The analysis contained in this report was done using the Single-Employer and Multiemployer Pension Insurance Modeling Systems (SE-PIMS and ME-PIMS, respectively). ME-PIMS and SE-PIMS both project long-term exposure by running many simulations, each modeling year-by-year changes over 10 years. Each simulation starts with known facts about the economy, the world of insured plans, and PBGC's financial position. Then the program introduces random year-by-year changes (within certain bounds) to model economic fluctuations, producing new outcomes a year at a time. Within a scenario, one year's outcomes form the next year's starting-point, and so on. The models recognize that all single-employer plan sponsors have some chance of bankruptcy, that all multiemployer plans have some chance of insolvency, and that these probabilities change over time.

Neither the single-employer nor the multiemployer Pension Insurance Modeling Systems are predictive models. SE-PIMS does not attempt to anticipate companies' behavioral responses to changed circumstances. Although ME-PIMS mathematically models the likelihood of mass withdrawal from a given plan or plan insolvency prior to mass withdrawal, it does not anticipate behavioral responses by individual employers.

Throughout this report, we express all future outcomes in present value terms (i.e., discounted back to 2012). Each scenario's outcomes are discounted based on the 30-year Treasury bond yields projected for that scenario, regardless of whether the underlying simulated cash flows are generated from holdings of equities, high-yield bonds, corporate bonds, or U.S. Treasury bonds.

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

SE-PIMS

SE-PIMS — Overview

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

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

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

SE-PIMS — Data

The analysis of PBGC's projected financial position was performed using PBGC's SE-PIMS. SE-PIMS has a detailed database of more than 400 actual plans, sponsored by more than 300 firms, which represent about half of PBGC's insurance exposure in the single-employer defined benefit system measured from the 2010 Form 5500 filings (the most recent year of complete Form 5500 filing data). The database includes:

- the plan demographics,
- plan benefit structure,
- asset values,
- liabilities, and
- actuarial assumptions.

In addition, SE-PIMS also includes key financial information about the employer sponsoring the plan.

The SE-PIMS database contains pension plan information from Schedule SB of the Form 5500 (Annual Return/Report of Employee Benefit Plan) generally from the 2010 plan year. In addition, more recent data available from ERISA Section 4010 filings is used for certain large underfunded plans.

The SE-PIMS sample of over 300 large plan sponsors is weighted to represent the universe of PBGC-insured, single-employer plans. The weighted representation reflects the values of total liabilities and underfunding , and the distribution of funding levels, among plans in the insured universe as of the most recent year for which complete data is available (currently 2010).

SE-PIMS — Methodology

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

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

SE-PIMS simulates contributions, premiums, and underfunding for these plans using the minimum funding and premium rules as required by the PPA and subsequent legislation, and then extrapolates the results to the universe of single-employer plans. Recent changes to funding rules and PBGC premiums (MAP-21) are reflected in the modeling. SE-PIMS also uses the employer's financial information as the starting point for assigning probabilities of bankruptcy, from which it projects losses to the insurance program.

The SE-PIMS model is not predictive. That is, it is not intended to provide a single best estimate of future events. When used in a stochastic (random) mode, SE-PIMS provides a range of possible future outcomes and quantifies the likelihood of these outcomes.

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

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

SE-PIMS — Assumptions

All of the following variables are stochastically projected:

- Interest rates, stock returns, and related variables (e.g., inflation, wage growth, and multiplier increases in flat-dollar plans[13]. These variables are determined by interest rates in SE-PIMS. Tables 1 through 3 in the "Sample Statistics" section of this appendix provide statistics about the projections in the scenarios.
- Sponsor financial health variables (equity-to-debt ratio, cash flow, firm equity, and employment).
- Asset returns. Plan asset returns are based on a study of historic asset returns among large plans. Using the financial rates directly modeled in PIMS (stock market returns, long-term Treasury bond returns and yields) the study estimated mixtures of those rates to best fit the historic returns of each plan in the study. PIMS projects annual plan returns using the following weighting based on the average of the estimated rate mixtures: 48 percent stock market returns, 23 percent long-term Treasury bond returns, 30 percent long-term Treasury bond yield and a -2.5 basis points additive adjustment. Future plans for PIMS include modeling of additional asset class returns allowing PIMS to use the investment allocation information sponsors now report as part of the annual Form 5500 filings.
- Plan demographics. Starting with plans' population data from the Form 5500, the number of active participants for a plan varies first, according to that plan's actuarial assumptions regarding retirement, disability, and termination of employment. Age and service also vary over time due to hiring patterns that are determined separately in each scenario of the projection. Hiring assumptions vary with stochastic projections, the general assumption is that a plan's historical trend continues, and hiring occurs (or not) to bring the active population up to the continued trend as needed after plan decrements (retirement, termination of employment, disability) take place. The numbers, ages, and benefits of retired and terminated vested participants vary depending on mortality, separation, and retirement assumptions.
- Probability of bankruptcy. Sponsors are subjected to an annual stochastic chance of bankruptcy. That probability of bankruptcy is determined by formulas estimated from historical bankruptcies and various measures of companies' financial health over the period 1980 to 1998. Bankruptcy probability formulas

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

generally do not vary by industry [14]. 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. Losses to the insurance program are calculated by averaging the losses in all simulations across all scenarios.

Two of the most important variables in the stochastic simulations are stock returns and interest rates. Stock returns are 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. Unlike stock returns, interest rates are correlated over time. With the model, the Treasury yield for a given period is expected to be equal to the yield for the prior period, plus or minus some random amount. The random draws affecting the bond yields and stock returns are correlated according to an estimate derived from the period 1973-2007. Stock returns are more likely to be high when the Treasury yield is falling and vice versa. Credit spreads on investment-grade corporate bonds are modeled to regress toward their historic mean values.

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

- Mortality. For purposes of determining plans' mortality experience during each year of the projection period: the RP2000 mortality table projected using Scale AA to that year. For determining the amount of underfunding at termination: RP2000 Combined Healthy mortality table set back one year and projected with scale AA to year of valuation plus 10[15]. For determining funding targets liabilities — the RP2000 table projected with scale AA to the year of valuation plus 10.
- Contribution Level/Credit Balances. The credit balance is increased each year by the plan's rate of return on assets and decreased by the amount assumed to be used to satisfy the minimum funding requirement. For purposes of modeling future claims in SE-PIMS, it is assumed that employers will contribute the minimum required amount each year and that any credit balance remaining will be used to the maximum extent permitted until the balance is completely depleted.
- 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 measuring merit and/or seniority.
- Plan Accrual Benefit Restrictions. Single-employer Plans with funded percentages below 60 percent must cease benefit accruals. SE-PIMS reflects this rule, and assumes that once a plan is frozen, it will remain frozen, even if the percentage increases above 60 percent at some future time.

  When determining funding percentages for triggering benefit restrictions, assets are reduced by credit balances. Sponsors have the option of declassifying credit balance assets at any time. By declassifying a credit balance, a sponsor may be able to raise the funded percentage to the level needed to avoid a benefit restriction. For modeling purposes, it is assumed that sponsors will choose to declassify credit balances to the extent necessary to avoid the benefit freeze restriction.
- Plan Benefit Improvement Restriction: As noted earlier, SE-PIMS assumes that salary-related plans will not increase benefits and that hourly plans will increase benefits to reflect the rate of inflation plus productivity growth. But, benefit increases that do not exceed the average wage increase of affected

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[14] The exception to not varying bankruptcy likelihoods by industry is that the model reflects that relatively high degrees of leverage in the financial and utilities industries are considered not to signal a risk of bankruptcy.

[15] Setting a mortality table back one year means that the table's probability of survival for someone who is X - 1 years old is used to represent the probability of survival of someone who is X years old. For example, for this purpose, the probability of survival that is used for a 65-year-old is what the table would assign to a 66-year-old. "Projecting" a mortality table means reducing mortality rates each year to reflect anticipated improvements in longevity.

employees are not subject to the benefit improvement restriction. Therefore, this provision was assumed to have no effect.

- PBGC Premiums. PIMS models premiums based on the rate under current law (including premium increases under MAP-21) with projected rates increasing under the indexing provisions in current law. There is no allowance in premium projections for write-offs of interest penalties and premiums.
- Variable-Rate Premiums. PBGC's experience has been that many companies make plan contributions in excess of the minimum, in part to avoid or reduce their variable-rate premium payments. Virtually all of these companies have been at a low risk of bankruptcy and their plans have not accounted for a material portion of PBGC's claims. By contrast, the relatively small numbers of plans that result in claims are sponsored by companies that historically have not made contributions above the required minimum. Using the general PIMS projection that companies will make the minimum required contributions would overstate the estimate of PBGC's variable rate premium income. Accordingly, for variable-rate premium projections only, PIMS models aggregate contribution levels above the minimum levels, with an adjustment to plan assets that is based on recent historical variable rate premium experience.
- PBGC's Assets. Projected returns are based on analysis of historical returns, return volatilities and correlations between the different asset class returns.
- Discounting Future Contributions/Claims. For calculations involving discounting future amounts, the discount rate used is the 30-year Treasury rate assumed to be in effect for the particular year and economic scenario.

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

ME-PIMS

ME-PIMS –Overview

Each year, PBGC analyzes insured multiemployer plans to identify those plans that might become claims against the insurance program. In general, if a terminated plan's assets are less than the present value of its liabilities, PBGC considers the plan a probable risk of requiring financial assistance in the future, as recorded in our financial statements. The primary driver for large losses to the multiemployer program is mass withdrawal of all sponsors from a given plan (these are captured in projected new claims).

To project future claims against the multiemployer program that are not in the current financial statements, ME-PIMS mimics the same type of analysis for future years. By "booking" probable plans in each year of the projection, ME-PIMS mimics PBGC's analysis of multiemployer plans in which employers continue to make regular contributions for covered work, to determine whether any of these ongoing plans are probable or possible claims against the insurance program.

In each projection year, ME-PIMS combines measures of chronic underfunding, poor cash flow, a falling contribution base, and a lack of money on hand to weather temporary income losses, into one measure of the likelihood that a plan will fail. In the projections, these plans become ME-PIMS liabilities that year.

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

ME-PIMS portrays future underfunding under funding rules, as prescribed by current law, as a function of a variety of economic parameters. The model anticipates that individual plans have various probabilities of positive and negative experience, and that these probabilities can change significantly over time. The model also recognizes the uncertainty in key economic parameters (particularly interest rates and market returns). The model simulates the flows of claims that could develop under hundreds of combinations of economic parameters and extrapolations of plans' respective 10-year historical patterns.

A multiemployer plan can go through a "mass withdrawal", which happens when all employers stop participating in a plan at the same time. For each plan in each of the projection years, ME-PIMS calculates a probability of mass withdrawal. The size of the plans is one factor in the calculation, as are several ratios: assets to cash flow; assets to liabilities; active to inactive participants; current year to previous year contribution amount; and the funding-standard account balance to contributions. For each year, as in the SE-PIMS bankruptcy model, a random number is drawn and compared with the plan's probability of mass withdrawal — the result determines whether or not a mass withdrawal happens[16].

ME-PIMS — Data

ME-PIMS has a detailed database of 188 actual plans (including previously booked plans), which represent more than half of PBGC's insurance exposure in the multiemployer defined benefit system measured from the latest Form 5500 filings available. The database includes:

- plan demographics,
- plan benefit structure,
- asset values,
- liabilities, and
- actuarial assumptions.

In addition, ME-PIMS incorporates historical data of employer contribution levels and demographic trends (over the 10 prior years) to assist in modeling plan trends.

The ME-PIMS database contains pension plan information from Schedule MB of the Form 5500 (Annual Return/Report of Employee Benefit Plan) generally from the 2010 plan year. In addition, more recent data from any available reporting of plan status (endangered, seriously endangered, and critical) plus any multiemployer plans' reports regarding funding improvement plans (for endangered status plans) or rehabilitation plans (for critical status plans) have been incorporated into the modeling system.

ME-PIMS — Methodology

PIMS simulates contributions, premiums, and underfunding for these plans using the minimum funding and premium rules as required by ERISA (including legislative changes in PPA through MAP-21) and then extrapolates the results to the universe of multiemployer plans. Changes to funding rules following PPA (e.g., the Pension Relief Act of 2010) are reflected in the modeling.

ME-PIMS starts with PBGC's multiemployer net position (a $5.2 billion deficit in the case of FY 2012) and data on the funded status of 161 plans that are weighted to represent the universe of PBGC-covered plans that are not current or probable claims for PBGC. The model produces results under 500 different

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

simulations. The probability of any particular outcome is determined by dividing the number of simulations with that outcome by 500.

The nature of the multiemployer program and PBGC's established method for recognizing claims against the program require a long time horizon for examining potential claims. The near-term financial condition of one employer (or even several employers) usually does not determine the risk presented by a given multiemployer plan. Rather, projected claims result from underfunding in a plan that shows several characteristics of future deterioration. In ME-PIMS, those characteristics can worsen or improve in different scenarios under stochastic modeling.

ME-PIMS' projection of exposure to a multiemployer plan depends largely on the plan's financial status rather than that of the sponsoring companies. The amount of underfunding for each plan is based on the best available data, including annual Form 5500 filings and reports that multiemployer plans provide regarding their status under the funding rules (healthy, endangered, seriously endangered, or critical) and the associated filings that detail their respective plans to work out of an adverse status.

In the multiemployer program, PBGC recognizes probable liabilities for plans with the potential to present claims over a limited time horizon. Generally, claims are recognized when their financial condition is likely to deteriorate substantially within 10 years. ME-PIMS models these claims in future years by projecting, for each future year, a potential claim within the 10 years following that future year.

In the multiemployer program, there is little distinction between claims due to insolvency and probable liabilities, unlike under the single-employer program. In the single-employer program, a probable liability is generated when the condition of the sponsoring employer justifies such a claim. In the multiemployer program, a probable liability is generated when certain plan metrics are sufficiently problematic. Given a sufficiently problematic collection of plan metrics, and a cash-flow projection of insolvency, a plan is classified as probable, and is thus recognized as a PBGC liability.

PBGC's classification of claims against the multiemployer program depends both on the funded status of the plan and on several measures of the plan's health. These two factors are then used in modeling cash flow requirements of the plan, to anticipate insolvency. Plan funding data (asset and liability amounts) for estimates were collected from Form 5500 filings for 2009, and 2010 (the most recent available for each plan). The Corporation adjusted this plan data from such sources as additional reporting from individual plans, and from data provided by plans or their service providers.

ME-PIMS projects PBGC's potential financial position by combining simulated claims with simulated paths for premiums, expenses, PBGC's investment returns, and changes in PBGC liability; that is, the present value of benefits and expenses payable pursuant to claims recognized by the PBGC.

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

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

The ME-PIMS model is not predictive. As is the case with all PIMS-based reporting (single-employer or multiemployer) our analysis is not a prediction or a forecast but rather provides a range of possible outcomes generated by 500 random economic scenarios. It is important to analyze any PIMS results beyond the mean

and median values. Careful attention should also be given to so-called tail results (e.g., the fifteenth and eighty-fifth percentile outcomes) as the recent financial turmoil has compelled policy makers to do.

Projections of claims against the insurance program are made stochastically. Claims against the pension insurance program are modeled by simulating the occurrence of insolvency, or mass withdrawal with insolvency anticipated within 10 years, for any given plan. To anticipate insolvency, the model projects future cash flows that would be experienced by a plan under various scenarios. For mass withdrawal, the model reflects the relationship among various factors (the ratio of active to inactive participants, the ratio of assets to benefit payments, and the period of time over which the funding standard account is available to ameliorate contribution requirements). For each period, the model assigns a random change in each of these variables to each plan, correlated with changes in the economy. The simulated financial health variables determine the probability either of insolvency or of mass withdrawal for that year.

In ME-PIMS, a sample of actual plans represents the universe of multiemployer plans. The PIMS sample is divided into five tiers, grouped by plan size (based on vested liabilities). In each tier of the sample plans, the individual plans are weighted by the factor for that tier, where the factor is the total vested liability for *all* multiemployer plans in that tier divided by the total vested liability for the *sample* plans in that tier. If a plan is projected to present a claim in ME-PIMS, the claim to the multiemployer program is the claim for that plan multiplied by the factor for that plans' tier. In the tier for the largest multiemployer plans, ten out of the eleven largest plans are in the ME-PIMS sample. In lower tiers, a progressively smaller proportion of multiemployer plans are in the sample. The factors for the tiers range from 1.06 for the tier of largest plans, to 18.09 for the plans in the tier of smallest plans.

The model assumes that plan contributions follow plan-specific ten-year historical patterns of contribution increases, within parameters established to restrain unlikely patterns of increase or decrease. The model runs 500 economic scenarios (varying interest rates and equity returns). ME-PIMS then extrapolates the results of these simulations to the universe of insured multiemployer plans.

ME-PIMS — Assumptions

All of the following variables are stochastically projected:

- Interest rates, stock returns, and related variables (e.g., inflation, wage growth, and multiplier increases in flat-dollar plans). These variables are determined by interest rates in ME-PIMS. Tables 1 through 3 in the "Sample Statistics" section of this appendix provide statistics about the projections in the scenarios.

- Asset returns. Plan asset returns are based on a study of historic asset returns among large plans. Using the financial rates directly modeled in PIMS (stock market returns, long-term Treasury bond returns and yields) the study estimated mixtures of those rates to best fit the historic returns of each plan in the study. PIMS projects annual plan returns using the following weighting based on the average of the estimated rate mixtures: 48 percent stock market returns, 23 percent long-term Treasury bond returns, 30 percent long-term Treasury bond yield and a -2.5 basis points additive adjustment. Future plans for PIMS include modeling of additional asset class returns allowing PIMS to use the investment allocation information sponsors now report as part of the annual Form 5500 filings.

- Plan demographics. Starting with plans' population data from the Form 5500, the number of active participants for each plan varies according to that plan's actuarial assumptions regarding retirement, disability, and termination of employment. Age and service also vary over time due to hiring assumptions that are determined separately in each scenario of the projection. Hiring patterns vary with stochastic projections, the general assumption is that a plan's historical trend continues, and hiring occurs (or not) to bring the active population up to the continued trend as needed after plan decrements (retirement, termination of employment, disability) take place. ME-PIMS does not currently assume industry-specific or collective-bargaining employment trends. The numbers, ages,

and benefits of retired and terminated vested participants vary depending on mortality, separation, and retirement assumptions.

- Benefit-level and employer-contribution increases. These vary annually during the projection period with some correlation to modeled economic conditions in each future year.
- Probability of mass withdrawal. This probability is generated using each plan's:
  - ratio of active to inactive populations,
  - ratio of assets to benefit payments and expenses,
  - ratio of the funding standard account to the decrease in that funding standard account, and
  - plan size.

Two of the most important variables in the stochastic simulations are stock returns and interest rates. Stock returns are 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. Unlike stock returns, interest rates are correlated over time. With the model, the Treasury yield for a given period is expected to be equal to the yield for the prior period, plus or minus some random amount. The random draws affecting the bond yields and stock returns are correlated according to an estimate derived from the period 1973-2007.

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

- Mortality. For purposes of determining plans' mortality experience during each year of the projection period: the RP2000 mortality table set back one year, projected with Scale AA to that year. For purposes of projecting plan population in valuing projected liabilities: the RP2000 mortality table set back one year, projected with scale AA to the year of valuation plus 10 years.
- Contribution Level/Credit Balances. The credit balance is increased each year by the valuation interest rate and decreased by the amount by which modeled contributions are below the minimum required. ME-PIMS modeling of employer contributions reflects that most employers make contributions at a level above the minimum required, though this is not always true. There is some interaction between the classic minimum required contribution and the contributions required in light of Recovery Schedules.
- Benefit Improvements. For flat-dollar plans, benefit multipliers are assumed to increase annually by the rate at which they have increased over the 10 years previous to the year for which the Form 5500 provides data. Most multiemployer plans have flat-dollar formulas, though there is a trend towards formulas that are based on a percentage of total contributions attributable to each participant. ME-PIMS models both flat-dollar and percent-of-contributions benefit formulas. In plans where the benefit formula is not a flat-dollar or percent-of-contributions schedule, a translation to such a formula is made and the plan is modeled as a flat-dollar plan.
- Benefit improvement restriction. ME-PIMS assumes that due to restrictions on benefit increases (they cannot take place in bargaining agreements unless contributions will immediately fund such an increase under PPA) plans will not increase benefits.
- Benefit accrual restriction. ME-PIMS models benefit reductions that arise in recovery schedules under endangered and critical plan statuses. These restrictions are modeled in ME-PIMS for endangered and critical plans as appropriate under the respective rules for such plans. For plans that include benefit freezes in their recovery schedules, those freezes are modeled as continuing indefinitely.

- PBGC Premiums. ME-PIMS models premiums based on the rate under current law with projected rates increasing under the indexing provisions in current law. There is no allowance in premium projections for write-offs of interest penalties and premiums.
- PBGC's Assets. All assets in the multiemployer program are, by law, placed in revolving funds that are invested in US Treasury securities. Asset returns in ME-PIMS are bound by the modeling of US Treasury returns in future years. This modeling incorporates random fluctuations within certain bounds to simulate variation over time.
- Discounting Future Contributions/Claims. When ME-PIMS discounts future amounts, the discount factor is a single interest factor derived from the "select" and "ultimate" factors described in the 2012 financial statements. Those factors are based on a survey of prices that the private-sector annuity market would charge at present, to pay a given amount in the future.

Possible Future Refinements to the ME-PIMS Model

As noted in the disclaimer at the beginning of the 2012 Exposure Report, we expect to continue to modify and improve ME-PIMS in the future. For example, we plan to incorporate into ME-PIMS information on plans' actual responses to PPA, to replace some of our early assumptions that accompanied the passage of PPA. This will affect the projection of employer contribution and employment levels, the hierarchy of steps taken in funding improvement and rehabilitation plans, and the occurrence of projected mass withdrawals in multiemployer plans. In addition, we plan to make necessary refinements in the modeling of cash flows and the sampling of plans currently "booked" as PBGC liabilities.

Expected claims under the multiemployer program depend on two things. One is the amount of underfunding in the pension plans that PBGC insures (i.e., exposure). The other is the likelihood that a plan will fail, or become insolvent, either in the course of ongoing operations or following a mass withdrawal.

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

Sample Statistics from FY 2012 Runs in ME-PIMS and SE-PIMS

The following tables show some output statistics from runs of the ME-PIMS and SE-PIMS model for the FY 2012 Exposure Report. These statistics are specific to the model runs for this report, but show general examples from running the FY 2012 Exposure Report economic assumptions and plans' data through the stochastic process.

Table 1

Arithmetic Means, Standard Deviations and Correlations of Key Financial Market Values
FY 2012 Single-Employer and Multiemployer Model Runs
(across 2013-2022 for 500 economic scenarios)

	Long-Term Treasury Yield	Return on 30-year Treasury Bonds	Stock Market Return
Mean	3.0%	3.0%	8.2%
Standard Deviation	0.9%	6.8%	20.6%
Correlations:			
• Long-Term Treasury Yield	1.00	-0.29	-0.11
• Return on 30-year Treasury Bonds		1.00	0.23
• Stock Market Return			1.00

Table 2

Arithmetic Means and Standard Deviations of Market Rates Derived From Projected Long-Term Treasury Yields in FY 2012 Single-Employer and Multiemployer Model Runs

	Long-Term Corporate Rate	Inflation Rate	Wage, Salary and Flat Benefit Growth Rate
Mean	4.1%	2.6%	4.4%
Standard Deviation	0.9%	0.9%	0.9%

Table 3

Projected Plan Returns
FY 2012 Single-Employer and Multiemployer Model Runs

Mean	5.4%
Standard Deviation	10.3%

Table 4

Projected Annual Bankruptcy Probabilities[17] FY 2012 Single-Employer Model Runs	
Mean	0.6%
Standard Deviation	1.2%

Table 5

Annual Probability of Plans' Projected Mass Withdrawal FY 2012 Multiemployer Model Runs	
Mean	2.2%
Standard Deviation	7.4%

Table 6

Annual Rate of Plans' Projected Insolvency FY 2012 Multiemployer Model Runs	
Mean	0.1%
Standard Deviation	0.1%

Limitations in Modeling Future Uncertain Events

Readers should interpret the results from this modeling with caution and with an understanding of the models' limitations. Results can be sensitive to model design decisions such as equation specifications, degrees of interdependence among variables, and historical periods used for the estimates. The modeling depends on historic estimates of the behaviors (volatilities, correlations, central tendencies, etc.) of the models' variables and does not reflect uncertainties about the future that might not be evident from historic data. The real range of future outcomes can be more uncertain if different modeling assumptions are applied.

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

Statement of Actuarial Opinion

This actuarial evaluation has been prepared in accordance with generally accepted actuarial principles and practices and, subject to the disclaimer beginning on page one of this report, to the best of my knowledge, fairly reflects the possible distribution of projected outcomes relative to the operations and status of the Corporation's single-employer and multiemployer plan insurance programs as of September 30, 2012.

In preparing this evaluation, I have relied upon information provided to me regarding plan and participant data, plan sponsor financial information, historic asset yield and bankruptcy information and other matters. I have checked this information for reasonableness as appropriate based on the purpose of the evaluation; the responsibility for the information rests with the preparers of the original source data.

Subject to the disclaimer beginning on page one of this report, in my opinion, (1) The techniques and methodology used are generally acceptable within the actuarial profession; (2) The assumptions used are appropriate for the purposes of this report; and (3) The resulting evaluation represents a reasonable estimate of the possible distribution of projected outcomes relative to the operations and status of the these programs.

I, C. David Gustafson, am the Chief Policy Actuary of PBGC. I am a Member of the American Academy of Actuaries, a Fellow of the Conference of 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.

C. David Gustafson

Chief Policy Actuary, PBGC

Member, American Academy of Actuaries