Impact on Contributions, Funded Ratios, and Claims against the Pension Insurance Program
of the
Administration's Pension Reform Proposal

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Introduction

This paper reports the results of a series of simulations of the effects that the Administration's single-employer defined benefit pension funding reform proposal and current law will have on the future values of three key variables in the single employer pension system: required minimum contributions, plan funding levels and claims against the pension insurance program.

The results of simulations for a number of economic scenarios are presented. The scenarios discussed in this paper were chosen to reflect the performance of the proposal over a wide range of generic economic conditions. None of the scenarios should be considered predictions or forecasts of future economic performance. Additionally, the program used to develop these simulations keeps the population of defined benefit pension plans and the active participants in those plans roughly constant over time. For these reasons, the results discussed in the paper are not directly comparable to results that might be generated by analyzing the proposal's effects under any specific forecast of future economic conditions or path of defined benefit pension plan participation.

All simulations cover the 10-year period from 2006 through 2015 for the single-employer system as a whole and do not attempt to measure the effects of either the proposal or current law on individual pension plans or specific industries. The analysis suggests that under the scenarios analyzed plan funding and contributions will be higher and claims will be lower if the proposal is enacted than will be the case if current funding rules remain in place.

The results in this paper reflect only how the proposed funding rule rules affect the pension system under an assumption that plan sponsors continue to behave as they do under current law. For modeling purposes, sponsors are assumed to make minimum required contributions each year. These results do not reflect the effects of some critical components of the proposal including the direct and incentive effects of benefit restrictions and the incentive

effects of the proposed system of PBGC premiums. The proposal provides plan sponsors with both the tools and incentives to smooth contributions by funding above the minimum during good times. Projected minimum contributions do not reflect this behavior – that is, sponsors are not assumed to take advantage of new rules that allow sponsors to build funding cushions in good economic times. The paper does discuss a stylized example of how a representative sponsor might use these rules to make the path of required contributions less volatile over time.

Pension Funding Has Been Inadequate

Many single-employer defined benefit pension plans are seriously underfunded, a situation that threatens the long-term viability of the pension system if not corrected. Total underfunding in the system is currently estimated to exceed $450 billion. A number of large pension plans have terminated in recent years with significant underfunding of promised pensions resulting in a precipitous decline in the net position of the single-employer insurance program. The program, which had a $7.7 billion surplus in 2001, had a $23.3 billion deficit at the end of 2004.

Plan terminations often have serious consequences for plan participants. For example, Bethlehem Steel's plan had only about $3.5 billion in assets to cover almost $8 billion of promised benefits when it terminated. While the insurance system will pay for almost $4 billion in unfunded benefits, Bethlehem retirees will receive half a billion dollars less in benefits than promised because of the legal limits of PBGC's guarantee. Some participants will receive less than half of their promised benefit.

If plan underfunding and large claims against the insurance program are allowed to persist, the burden on remaining plan sponsors, whose premiums are the primary source of revenue to pay unfunded benefits, will continue to increase. If that burden becomes too great, sponsors may ask the Congress to authorize a bailout of the system by U.S. taxpayers.

The Administration's Proposal to Reform Pension Funding

The Administration's pension proposal is designed to protect participant's benefits and improve the position of the insurance program by providing better incentives for sponsors to maintain responsible funding than exist under current law. Pension underfunding is more than $450 billion notwithstanding compliance of plan sponsors with current funding rules – a testament to the need for reform. Current funding rules are simply inadequate to ensure proper funding of pension promises.

The proposal will reduce the chances that future retirees will suffer losses in earned pension benefits and will restore the health of the pension insurance program. These goals will be accomplished by correcting structural flaws in the funding rules. Key features of the proposal include provisions that will:

- Measure plan assets and liabilities accurately.
- Ensure adequate funding by establishing funding targets that equal the full value of accrued benefits.

- Increase limits on deductible contributions in order to allow sufficient advance funding by plans in good economic times, to reduce substantial increases in minimum required contributions in bad economic times.
- Reduce moral hazard by restricting financially troubled companies with underfunded plans from making new benefit promises they cannot keep.
- Reform PBGC premiums so that they better reflect a plan's risk and ensure the pension insurance system's financial solvency.

For a detailed description of the Administration's pension reform proposal, see the Department of Labor's website at http://www.dol.gov/ebsa/pdf/SEPproposal2.pdf.

Methodology

This paper compares the impact of current law and the Administration's funding reform proposal on minimum contribution requirements, funded ratios, and expected claims against the pension insurance program. Comparative results are shown for a "baseline economy" (an economy where interest rates, equity returns, and other variables are set at approximately their historical averages), for the type of economy that prevailed from 1995 through 2004 (which in its latter years included the "perfect storm" of low interest rates and declining equity values), and 500 scenarios chosen at random using a stochastic modeling approach.

The analysis was performed using the PBGC's Pension Insurance Modeling System (PIMS). PIMS has a database with detailed information on about 400 actual pension plans, sponsored by nearly 300 firms. These plans represent about 50 percent of the liabilities and underfunding in the defined benefit system. The model projects various economic scenarios over the 10-year period from 2006 through 2015 and measures the impact of each scenario on the plans in the database for each year of the 10-year period. Some of these economic scenarios are deterministic, with interest rates, equity returns, and other variables set to mimic a particular economic period (such as the 1995 through 2004 period). Some of the scenarios are stochastic, with interest rates, equity returns, and other variables allowed to fluctuate randomly (within certain bounds based on historical experience). In both the deterministic and stochastic scenarios, PIMS extrapolates the results of the simulations to the universe of single-employer plans.

The PIMS model is not predictive. That is, it does not provide a single best estimate of future events. When used in a stochastic mode, PIMS provides a range of possible future outcomes and quantifies the likelihood of these outcomes. As noted above, these results do not reflect the effects of some critical components of the proposal, including the incentives provided by the proposal to encourage better funding. Plan sponsors may choose to make additional contributions to avoid benefit restrictions or to avoid the proposed higher PBGC premiums.

More general behavioral responses to either economic conditions or the proposal are also not incorporated. Thus, for example, the modeling does not incorporate the possibility that companies in a single industry will seek to terminate their plans in response to the termination of their competitors' plans. The analytical methodology and assumptions used in the modeling are described more fully in the appendix to this paper. Additional information about PIMS is in the *Pension Insurance Data Book (1998)*, page 10, available on the PBGC's website at: http://www.pbgc.gov/publications/databook/databk98.pdf.

Summary of Findings

The results of the comparative funding analysis are set forth in the charts below. In sum, the charts show that the Administration proposal will produce stronger pension funding than current law, reduce losses to participants and the pension insurance program, and permit a smoother pattern of contributions:

- *Greater contributions into plans.*
    - o Overall minimum contributions paid to single-employer plans will increase compared to current law because of the higher funding targets and elimination of the "full funding limitation" and credit balances.
    - o Higher deductible contribution limits will enable sponsors to build up a funding "cushion" during good times to minimize contributions during bad times.

- *Improved funded ratios.*
    - o Funded ratios (plan assets divided by plan liabilities, computed on a termination basis) improve compared to current law because of the higher contributions required under the proposal.
    - o In a baseline economy, funded ratios improve steadily under the proposal, reaching approximately 95 percent of termination liability by the end of the 10-year period. Under current law, funded ratios reach only about 80 percent of termination liability.
    - o In a "perfect storm" economy, funded ratios remain higher under the proposal than under current law in both bad years and good years. Importantly, our analysis suggests that the higher deductible contribution limits will enable sponsors to build up a funding "cushion" during good times to minimize contributions during bad times.

- *Reduced termination insurance claims.*
    - o Average claims against the pension insurance system are significantly lower under the proposal. Losses by participants would be correspondingly lower, as well.
    - o In 95 percent of the economic scenarios run by the model in the stochastic mode, losses are lower under the funding proposal than under current law.

Results of the Economic Modeling

Baseline Economy

Charts 1, 2, 5, and 7 below compare the effect of the funding proposal on contributions and funded ratios in a hypothetical "baseline economy." The baseline economy scenario is a deterministic run that uses fixed values for variables such as long-term Treasury rates and equity returns. These values are the medians of their historical values, held constant over the entire 10-year period.

Charts 3, 4, 6, and 8 illustrate the effect of the Administration funding proposal on claims against the pension insurance program under a wide range of economic scenarios. Each of these charts is based on a stochastic modeling of 500 possible economic scenarios over the

same 10-year period, 2006 through 2015. The median economic assumptions under the stochastic model are consistent with the assumptions used in the deterministic baseline economy. (See the Appendix to this paper for more detail.)

Aggregate Effects

Chart 1 shows the aggregate amount of required pension contributions for each year through 2015, assuming the Administration proposal becomes effective in 2006. The "current law" projections assume that the current liability interest rate will revert to the 30-year Treasury rate after the end of 2005, which will occur if no pension legislation passes the Congress this year.
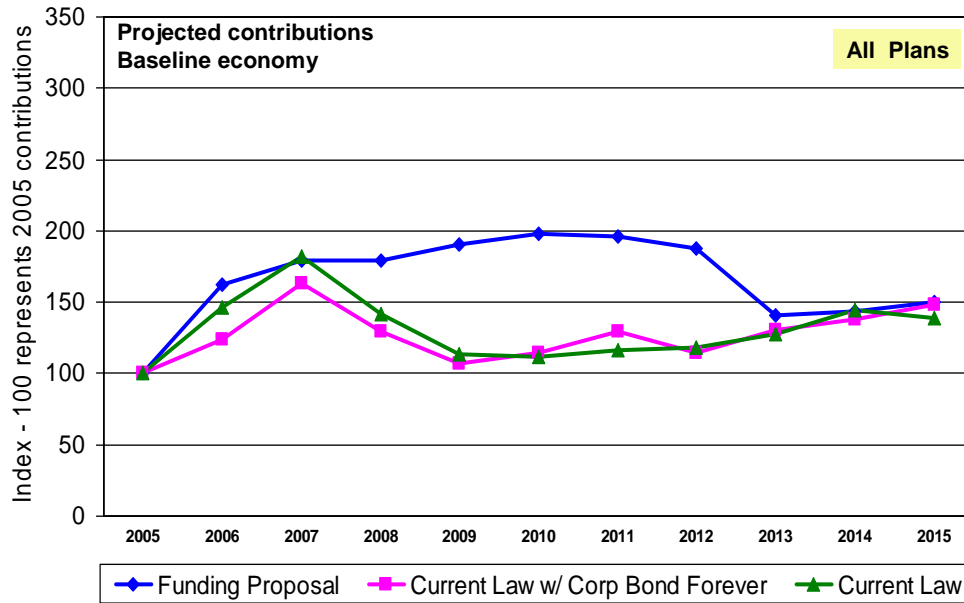
All slides that depict estimated future claims and contributions express those amounts not in dollar terms but as index numbers. The base of the index is the estimated level of contributions or claims in 2005, as appropriate, under current law.

For comparative purposes, projections are also shown assuming the basis for the current liability interest rate remains the long term corporate bond rate, as defined by the Pension Funding Equity Act of 2004.

Contributions are higher under the Administration proposal over the 2006 to 2012 period, after which contributions under current law and the proposal converge.   The higher levels of annual contributions reflect the generally higher funding targets included in the Administration proposal. Another driver of the higher contributions is that, under the proposal, funding deficits relative to the new funding targets that exist on the date of enactment will be amortized over seven years.
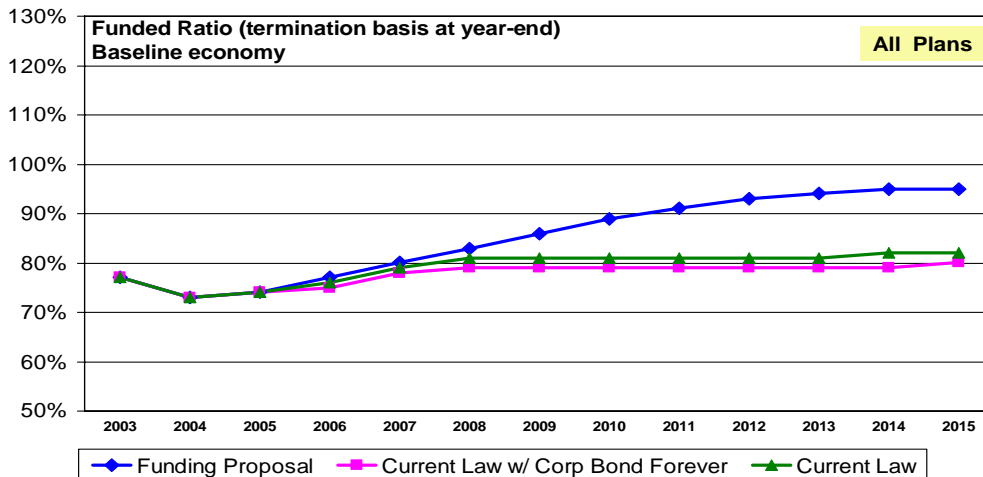
Chart 1

Under the proposal, required contributions continue until accrued benefits are funded.

Projected contributions
Baseline economy

All Plans

(Y-axis: Index - 100 represents 2005 contributions; X-axis: 2005–2015)

Legend: Funding Proposal — Current Law w/ Corp Bond Forever — Current Law

The effect of increased contributions required under the funding proposal is illustrated by Chart 2. This chart shows the aggregate projected funded ratio (total assets divided by total liabilities, measured on a termination basis[1]) through 2015. Under the proposal, the ratio climbs steadily and reaches about 95 percent of termination liability by the end of the 10-year period. Under current law the average funded ratio flattens out after two years and never gets much above 80 percent of termination liability. This illustrates one of the major problems with current law -- required contributions level off well before a plan is adequately funded.

Chart 2

Current rules do not lead to better-funded plans.
The funding proposal improves funded ratios over time.

Funded Ratio (termination basis at year-end)
Baseline economy   **All Plans**

Legend: ◆ Funding Proposal   ■ Current Law w/ Corp Bond Forever   ▲ Current Law

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[1] "Termination basis" means assets at fair market value and liabilities measured using PBGC's methodology for valuing the liabilities of an underfunded, terminated plan taken over by the PBGC. The PBGC's methodology is market-based: the agency conducts surveys of the prices charged by private-sector insurance companies to write group annuity contracts, and sets its assumptions to match those prices. Thus, termination liability equals the cost of paying a private insurer to provide the promised benefits. If plan funding is less than 100 percent of termination liability, participants may lose benefits.

Chart 3 shows − under the proposal and under current law − the mean claims against the pension insurance program from the 500 randomly chosen economic scenarios under the stochastic modeling.[2] Claims represent the amount of underfunding in terminated plans that would be guaranteed by the PBGC. (Of course, as discussed above, participants in underfunded plans also often suffer major losses in their pension benefits upon termination due to statutory limits on PBGC's guarantee.)

Chart 3

Better funded plans reduce losses to participants and burden on premium payers.
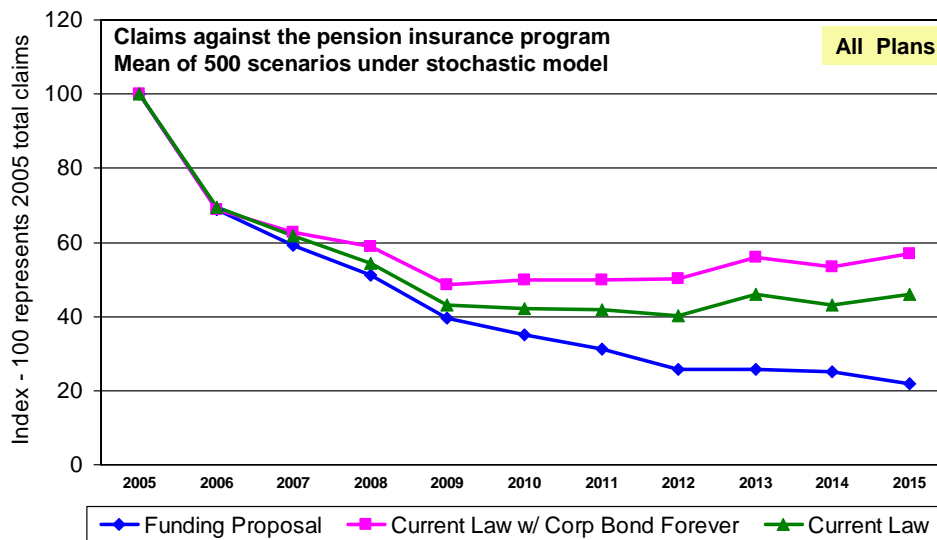
As Chart 3 shows, the average amount of claims is much lower under the funding proposal than under current law, with the gap increasing over the 10-year period. This is not surprising, in view of the earlier charts, which show the proposal producing better plan funding. Better funded plans are less likely to terminate in a distress or involuntary termination and, even if they do, the funding shortfall will be less.

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[2] Stochastic, rather then deterministic, modeling is used to show expected claims because a deterministic simulation of claims has inherent shortcomings and biases that could make the analysis unreliable.

Chart 4 illustrates the same point in a slightly different way. Whereas Chart 3 shows the average amount of claims under the 500 hypothetical scenarios, Chart 4 shows whether, in each scenario, the funding proposal (represented by the blue diamonds) or current law (represented by the pink squares) results in lower claims against the pension insurance program. These points are mapped on a graph showing the average 30-year Treasury bond yield on the vertical axis and the average equity return on the horizontal axis for each scenario.

Chart 4 demonstrates that losses are lower under the funding proposal under a wide range of economic conditions. In the simulation, losses were lower under the proposal for 95 percent of the simulations (477 of 500). The few scenarios in which the proposal results in higher claims (23 of 500) were almost all scenarios characterized by rising interest rates.

Chart 4

The proposal results in lower losses in 95% of the scenarios modeled.
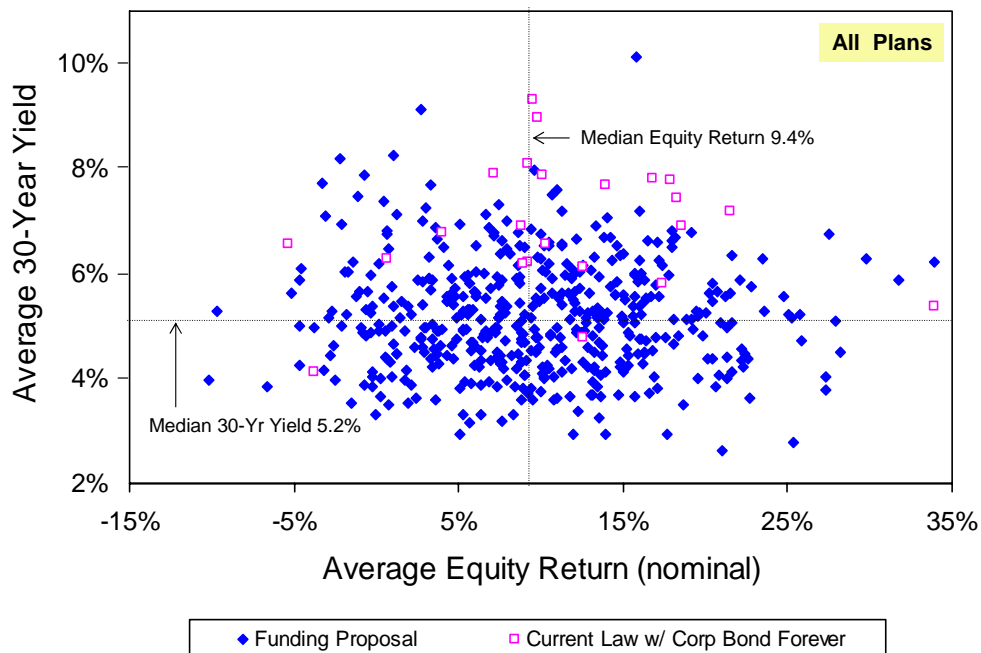
Effects on At-Risk Plans in a Baseline Economy

The Administration proposal sets the funding target for plans of investment grade companies as "ongoing" liability and for plans of non-investment grade companies as "at-risk" liability. "At-risk" liability is generally higher than "ongoing" liability because the at-risk assumptions reflect the higher risk of plan termination for plans sponsored by non-investment grade companies.[3]

The effect of increased contributions required to be made by non-investment grade plan sponsors is illustrated in Chart 5. This chart shows the projected funded ratio (total assets divided by total liabilities, measured on an "at-risk" basis) through 2015. Under the proposal, the funded ratio for at-risk plans climbs steadily and reaches just over 100 percent of at-risk liability by the end of the 10-year period. (In these simulations, because assets are assumed to earn a higher rate of return than the rate used to discount liabilities, funding will slightly exceed 100 percent.)

Chart 5

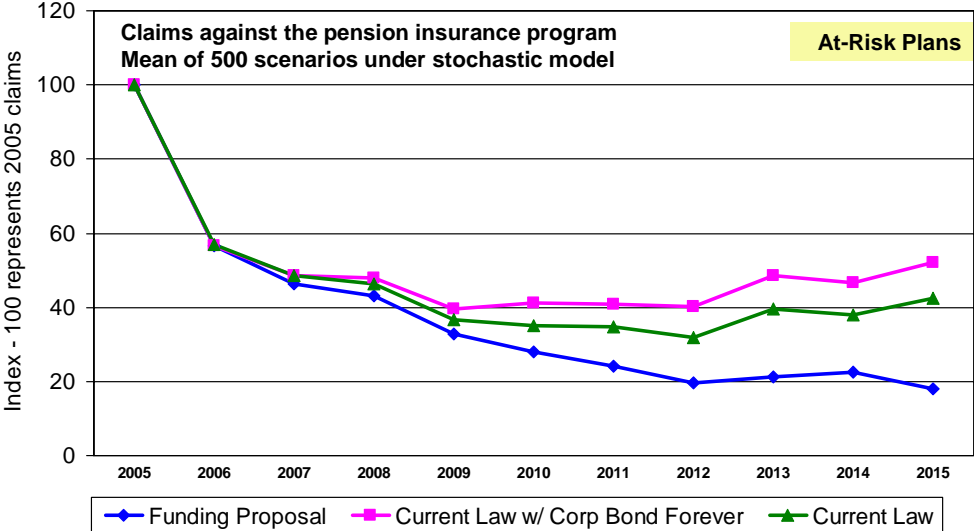# The proposal improves funded ratios for "at-risk" plans.

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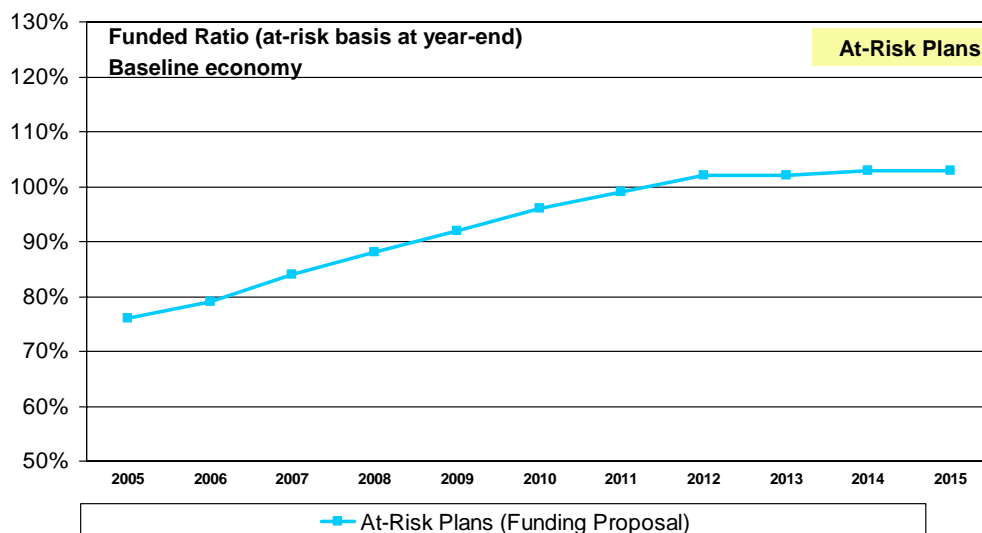
[3] Information about these liability measures and the standards for investment and non-investment grade status is in the Administration's Pension Reform Proposal, which is located on the Department of Labor's website at: http://www.dol.gov/ebsa/pdf/SEPproposal2.pdf.

Like Chart 3, Chart 6 shows the mean claims against the pension insurance program from the 500 randomly chosen economic scenarios under the stochastic modeling, but only for "at-risk" plans. Claims represent the amount of underfunding in terminated at-risk plans that would be guaranteed by the PBGC. The chart shows that the proposal is effective in reducing claims from at-risk plans.

Chart 6

Losses from "at-risk" plans will be reduced significantly under the proposal.

Claims against the pension insurance program
Mean of 500 scenarios under stochastic model

At-Risk Plans

Legend: Funding Proposal — Current Law w/ Corp Bond Forever — Current Law

Effects on Ongoing Plans-Baseline Economy

The effect of increased contributions required by investment grade plan sponsors is illustrated in Chart 7. This chart illustrates the projected funded ratio (total assets divided by total liabilities, measured on an "ongoing" basis) through 2015. Under the proposal, the funded ratio for ongoing plans climbs steadily and reaches about 100 percent of ongoing liability by the end of the 10-year period.
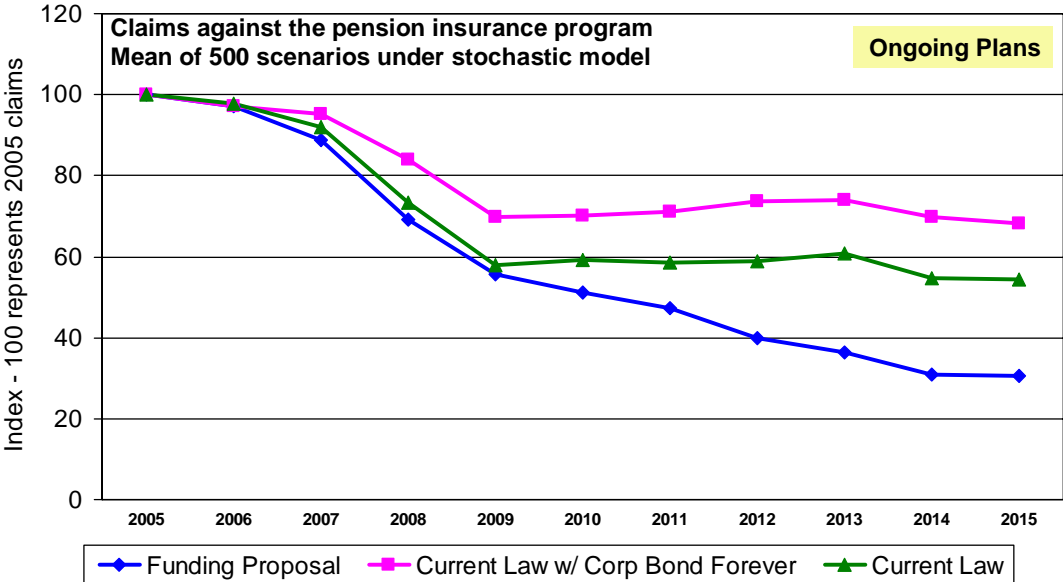
Chart 7

The proposal improves funded ratios for "ongoing" plans.

Funded Ratio (ongoing basis at year-end)
Baseline economy

Ongoing Plans

Ongoing Plans (Funding Proposal)
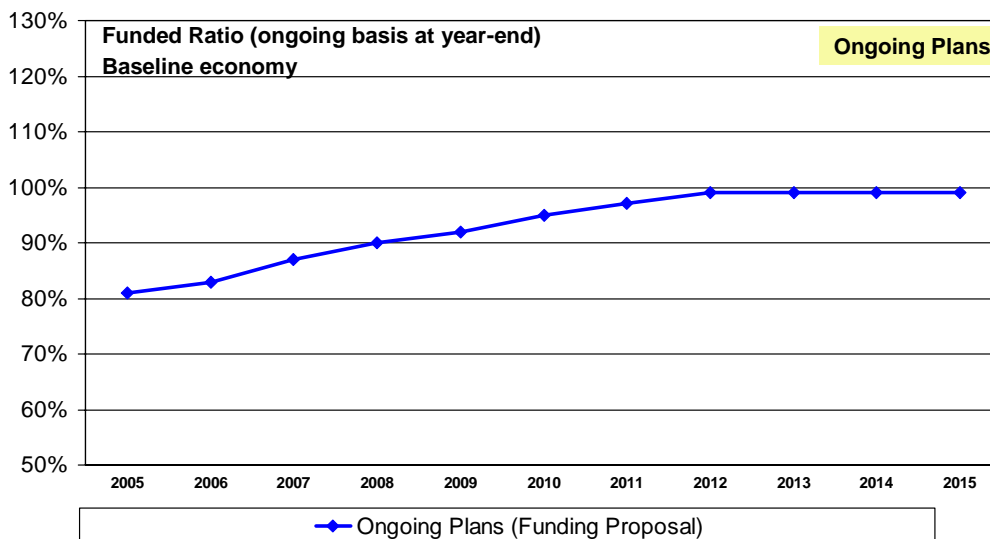
Like Charts 3 and 6, Chart 8 shows the mean claims against the pension insurance program from the 500 randomly chosen economic scenarios under the stochastic modeling, but only for "ongoing" plans. Claims represent the amount of underfunding in terminated ongoing plans that would be guaranteed by the PBGC. The proposal is successful in reducing claims significantly from "ongoing" plans as well as from "at risk" plans.

Chart 8

Losses from "ongoing" plans will be reduced under the proposal.

Claims against the pension insurance program
Mean of 500 scenarios under stochastic model

Ongoing Plans

Index - 100 represents 2005 claims

Legend: Funding Proposal — Current Law w/ Corp Bond Forever — Current Law

Perfect Storm Economy - the 1995 to 2004 period.

Charts 9 and 10 compare the effects of the Administration proposal to current law on minimum contributions and funded ratios based on a hypothetical economy closely resembling the 1995-2004 economy.[4] The latter years of the 1995-2004 economy have often been described as creating a "perfect storm" for pension plans because of the combination of a reduction in plan assets due to the stock market decline and a simultaneous increase in plan liabilities due to declining interest rates.

Chart 9 shows that contributions to plans in this kind of "perfect storm" economy would be higher under the Administration proposal than under current law. This reflects that under current law both plan assets and plan liabilities are "smoothed," which masks and delays needed funding. Under the proposal, a plan's funding target and assets are determined on a market basis, resulting in timely and accurate plan funding.

Chart 9

## In a "perfect storm" economy, current law smoothing leads to weaker funding.

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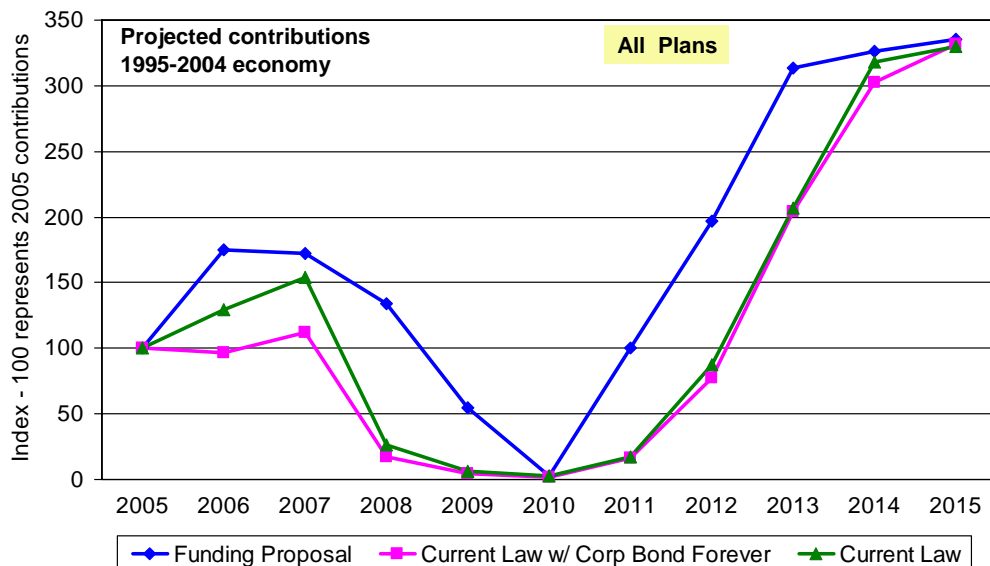
[4] The hypothetical economy is not exactly the same as the 1995-2004 economy because the model takes into account economic realities as of 2006 (such as then-prevailing interest rates) and then recreates the same economic pattern from the 1995-2004 period.

Chart 10 shows the beneficial effects of the proposal on funded ratios in a "perfect storm" economy. Although plan funded ratios decline significantly in this kind of an economy even under the proposal, the decline is much less severe, with funded ratios never falling below about 75 percent of termination liability. And the funded ratios recover to about 95 percent of termination liability within just three years under the proposal, whereas they remain below 80 percent under current law.

Chart 10

# The proposal leads to better-funded plans even in a "perfect storm" economy.
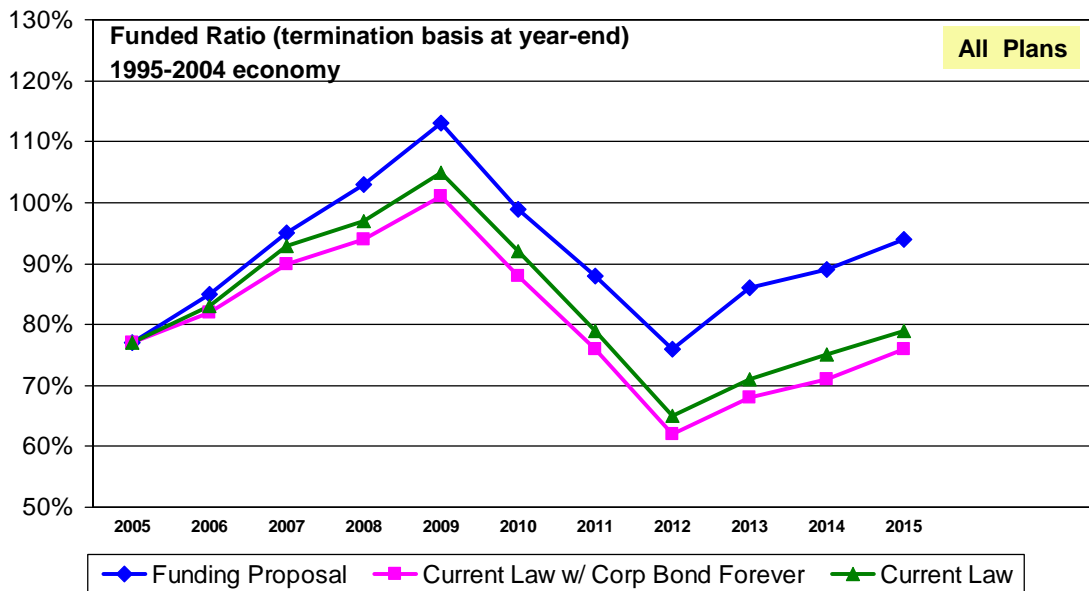
An important element of the Administration proposal is an increase in the amount of tax-deductible contributions that may be made to a plan. The proposal includes two funding "cushions." The first allows funding of plans up to 130 percent of their funding target. The second cushion allows pre-funding for salary and benefit increases. These funding cushions provide plan sponsors with a good deal of flexibility to contribute additional funds in good times so as to minimize the need to contribute in bad times.

As previously noted, PIMS and this analysis have not attempted to capture behavioral effects of the Administration proposal. Rather, the analysis has focused on minimum required contributions. Chart 11 provides a stylized example of how a plan sponsor *might* use the additional flexibility provided in our proposal to maintain smooth contributions. The chart shows how a plan sponsor could take advantage of the flexibility in the proposal to reduce the volatility of contributions in an economy similar to the "perfect storm" economy of 1995-2004.

The chart shows projected contributions over the 10-year period from 2006 through 2015. The plan sponsor is assumed to contribute 25 percent above the required amount in 2006. In each subsequent year, contributions are assumed to be the greater of 98 percent of the prior year's contribution or the minimum required amount. The chart shows that under the proposal sponsors are provided with the tools needed to make contributions less volatile and are given the choice of whether or not to use those tools.

Chart 11

The proposal permits a less volatile pattern of contributions.
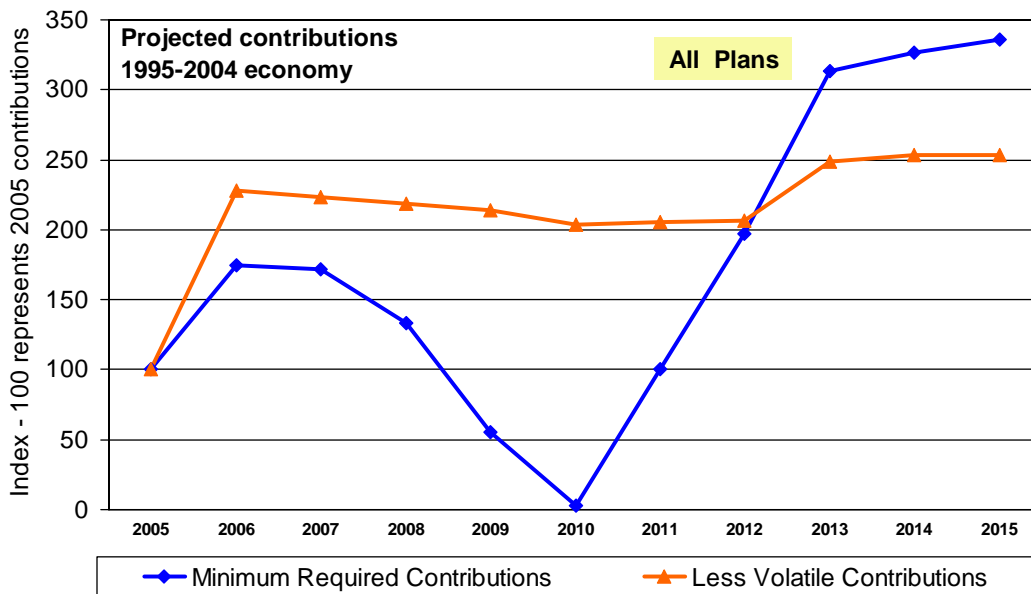
In addition to the "baseline economy" and the "perfect storm" economy, PBGC has modeled three additional economic scenarios that are not discussed in this paper: 1969-1978, the 1980s, and the 1990s. Under all of these scenarios, the funding proposal results in smaller losses to participants and the pension insurance program.

Conclusion

The results of the simulations reported in this paper strongly suggest that the Administration's single-employer defined benefit funding proposal will accomplish its primary goals of increasing the retirement security of defined benefit participants and decreasing losses to the pension insurance program. Stochastic modeling indicates that benefit losses and claims are much more likely to be lower under the proposal than under current law in a wide range of economic environments.

APPENDIX

Modeling Methodology and Assumptions
Used to Analyze the Administration's Funding Proposal

I. Pension Insurance Modeling System Methodology

The analysis in this paper was performed using the PBGC's Pension Insurance Modeling System (PIMS). PIMS has a detailed database of about 400 actual plans, sponsored by nearly 300 firms, which represent about 50 percent of liabilities and underfunding in the defined benefit system. The database includes the plan demographics, plan benefit structure, asset values by type, liabilities, and actuarial assumptions. It also includes key financial information about the employer sponsoring the plan.

PIMS simulates contributions and underfunding for these plans using the minimum funding rules under the Administration's proposal and current law, and then extrapolates the results to the universe of single-employer plans. It also uses the employer financial information as the starting point for assigning probabilities of bankruptcy, from which it projects losses to the insurance program under both current law and the funding proposal.

The PIMS model is not predictive. That is, it is not intended to provide a single best estimate of future events. It does not take into account possible incentive effects from the Administration's proposal. For example, it does not take into account the possibility that plan sponsors will take advantage of the increased "cushions" that will allow them to make larger tax-deductible contributions in good years, or the possibility that they will make additional contributions to reduce their PBGC premiums. The model also does not incorporate behavioral responses to economic conditions, such as the possibility that companies in a single industry will seek to terminate their plans in response to the termination of their competitors' plans.

II. Assumptions

The PIMS projections are performed in either a fixed path (deterministic) or random (stochastic) mode, and the assumptions depend on which mode is used. All results are in nominal dollars (not discounted to today's value).

A. Deterministic Runs (Charts 1, 2, 5, 7, 9, 10, and 11)

Projections of required contributions and funded ratios were made for a given economic scenario in a "non-random" or "deterministic" manner.

- o Interest rates, stock returns and related variables were set to a fixed path. For the "baseline" economy projections in Charts 1, 2, 5, and 7, interest rates and equity returns were set (approximately) to the medians of their historical values. Those rates, and other key parameters, were set as follows:

30-year Treasury yield	5.0%
Equity return	9.0%
Plans' return on assets	6.9%
Inflation	2.5%
Wage and benefit growth	4.2%

- o For Charts 9, 10, and 11, the deterministic economic assumptions shown above were replaced by a set of assumptions that followed the pattern of the 1995-2004 economy but were scaled to fit with PIMS starting values.

- o Sponsor financial-health variables were fixed at their initial values.

- o Plan asset allocations were fixed at mean values for all plans.

- o Plan demographics. The number of active participants was fixed at the initial value, but age and service varied depending on retirement and hiring assumptions. The number, age, and benefits of retired and terminated vested participants varied depending on mortality, separation and retirement assumptions.

B. Stochastic Runs (Charts 3, 4, 6, and 8)

Projections of claims against the insurance program were made stochastically. In the stochastic (random) mode, PIMS provides a range of possible future outcomes and quantifies the likelihood of these outcomes.

Claims against the pension insurance program were modeled by simulating the occurrence of bankruptcy for plan sponsors. The model reflects the historical relationship between the probability of bankruptcy and the firms' 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 runs 500 economic scenarios (varying interest rates, equity returns, employment levels, bankruptcy probabilities, etc.) on the plans in the database for each year in the projection period. PIMS then extrapolates the results of these simulations to the universe of insured single-employer plans.

All the following variables were stochastically projected:

- o Interest rates, stock returns and related variables (e.g., inflation and wage growth are determined by interest rates in PIMS).
- o Sponsor financial-health variables (equity-to-debt ratio, cash flow, firm equity, and employment).
- o Each plan's asset allocation was randomly selected from a pool of allocations that reflects historic differences across plans in investment strategies. Each plan's asset return also has a stochastic element that is uncorrelated with the simulated market rates and is uncorrelated across plans.
- o Plan demographics. The number of active participants for a plan varied with its sponsor's total employment level. Age and service also varied over time due to retirement and hiring assumptions. The number, age, and benefits of retired and terminated vested participants varied depending on mortality, separation and retirement assumptions.
- o Sponsors were subjected to an annual stochastic chance of bankruptcy. A plan presented a loss to participants and/or the pension insurance program if its sponsor was simulated to experience bankruptcy and the plan was less than 80% funded for termination liability. Losses to the insurance program were calculated by averaging the losses in all simulations across all scenarios.

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 that come from a distribution that reflects historical experience going back to 1926. Unlike stock returns, interest rates are correlated over time. With the model, the interest rate for a given period is expected to be equal to the interest rate for the prior period, plus or minus some random amount. The random draws affecting the bond yield and stock returns are correlated according to an historical estimate. Stock returns are more likely to be high when the bond yield is falling and vice versa.

For further background on the PIMS methodology, see page 10 of the *Pension Insurance Data Book (1998)* on the PBGC's website:
http://www.pbgc.gov/publications/databook/databk98.pdf