SOCIETY OF ACTUARIES

THE RISING TIDE OF PENSION CONTRIBUTIONS POST-2013: HOW MUCH AND WHEN?

An Updated Analysis of Funding for the U.S. Private Sector Single-Employer Defined Benefit System

FEBRUARY 2015

THE RISING TIDE OF PENSION CONTRIBUTIONS POST-2013: HOW MUCH AND WHEN? An Updated Analysis of Funding for the U.S. Private Sector Single-Employer Defined Benefit System

SOA RESEARCH REPORT

In October 2011, the Society of Actuaries published an outlook on future contribution requirements for the private sector single-employer defined benefit system.[1] The analysis showed that, under specific assumptions about future plan experience, the amount of cash contributions required of plan sponsors participating in the system would increase noticeably over the coming decade.[2] Since the 2011 projection, plan sponsors contributed more than four times the required amount,[3] the Federal law governing required contributions changed twice,[4] and financial markets performed better than expected through the beginning of 2014.[5]

In this brief, we update our projection of future contribution requirements to take into account more recent plan experience and a more current view of future economic experience. We also test the economic sensitivity of our results by analyzing three alternate economic scenarios.[6] For this analysis, we base assumptions about future capital market changes on explicit macroeconomic scenarios produced by Moody's Analytics. All future scenarios were calibrated to an economic outlook as of June 30, 2014. Our analysis shows that:

- Despite excess contributions by plan sponsors and market experience that outperformed expectations, the single-employer defined benefit system still faces significant increases in future funding requirements.
- While Moody's places an even chance on economic performance above or below their baseline projection, underperformance can be much more consequential for short-term funding of the defined benefit system than outperformance, based on their July 2014 view of the business cycle.
- Rising interest rates alone will not resolve future increases in funding requirements.

We note that interest rate declines since June 2014 have reduced measures of plan funding relative to our baseline scenarios. Therefore, a current projection would show slightly higher contribution requirements over the next decade.

METHODOLOGY

The methodology for this study differs from most actuarial projection studies in that inflation and capital market assumptions are derived from explicit macroeconomic scenarios, rather than a capital markets model. As such, this analysis is better described as showing the sensitivity of required defined benefit funding to alternative macroeconomic scenarios than its sensitivity to alternative capital market scenarios.

For the macroeconomic scenarios, we relied on the July 2014 baseline and standard alternative scenarios produced by Moody's Analytics.[7] Moody's Analytics staff developed the capital market data associated with each scenario, and we reviewed the capital market projections for reasonableness as of a June 30, 2014 measurement. While the

scenarios were deemed reasonable for purposes of showing the sensitivities in this analysis, we recognize that alternative views – of the baseline scenario in particular – may also be reasonable.

This analysis will address three alternatives to the baseline scenario:

S1 – A stronger near-term rebound in the economy,
S3 – A moderate recession, and
S6 – Oil price increase and dollar-crash inflation.

Each alternative scenario reverts to a long-term target set of assumptions within the projection period. As such, these scenarios present the sensitivity of the system to short-term economic developments and are not indicative of sensitivities to long-term trends, such as extended periods of low or declining interest rates.

Greater detail on methods and assumptions used in the production of this analysis can be found in an appendix to this report.

THE BASELINE SCENARIO

The baseline scenario assumes that interest rates rise in a steady and orderly fashion, with 10-year Treasury yields peaking just above 5% in late-2016 before settling just below 5% afterwards. Corporate earnings are also assumed to rise steadily, supporting further stock price increases. Unemployment abates through the projection period, and Washington comes close to a goal of stabilizing the debt-to-GDP ratio by the end of the decade. Table 1 summarizes how the baseline outlook translates to key capital market variables in our projection.

TABLE 1

Baseline Capital Market Assumptions

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Level-equivalent Treasury Rate[8]	3.71%	4.06%	4.91%	5.53%	5.02%	4.95%	4.98%	4.96%	5.05%	5.05%
Level-equivalent Corporate Rate	4.89%	5.14%	5.80%	6.32%	5.88%	5.83%	5.84%	5.77%	5.82%	5.82%
Portfolio Return	5.40%	4.90%	2.28%	6.02%	6.20%	6.40%	6.77%	5.90%	6.08%	6.09%

Exhibits 1 and 2 illustrate the projected effects of Moody's baseline scenario on required funding of the single-employer defined benefit system. Exhibit 1 illustrates 10 years of projected contribution requirements[9] for the U.S. private sector single-employer defined benefit system. Despite forecasted interest rate increases, we expect contribution requirements to increase significantly as the effects of pension funding stabilization wear away. Over the 10 years beginning in 2014, we project contribution requirements to average $75 billion per year, adjusting for inflation. This is down from our 2011 analysis, which projected an average $87 billion per year for the 10 years beginning in 2010 after adjusting for inflation.[10]

It is also worth noting that while we expect contribution requirements to increase over the next decade, an average annual requirement of $75 billion per year is less than the average $92 billion that sponsors contributed to the system each year from 2010 through 2012[11] and the annual average $87 billion that sponsors contributed over the 10-year period ending with 2012. Therefore, in our baseline scenario, we expect an overall downward trend in actual contributions to the system.

Exhibit 2 illustrates the projected effects of Moody's baseline scenario on the funded status of the private sector single-employer defined benefit system. To measure the funded position, we use the market values of plan assets and liabilities based on U.S. corporate credit rates. Surplus assets – assets in excess of a plan's liability – are excluded to avoid offsetting the unfunded liabilities of other plans.

A comparison of Exhibits 1 and 2 reveals several observations. First, contribution requirements do not react to changes in the system's funded percentage. This phenomenon can largely be attributed to layers of smoothing mechanisms built into the calculation of contribution requirements. Second, corporate interest rate fluctuations have a greater effect on the funded position of the system than sponsor contributions. Several years of high contributions in the last half of the projection period have approximately the same effect on the system's funding as the one-year change in interest rates from 2015 to 2016. Finally, Exhibit 2 reinforces that forecasted interest rate increases will not resolve the system's underfunding, even after accounting for the effects of interest rate stabilization.

EXHIBIT 1

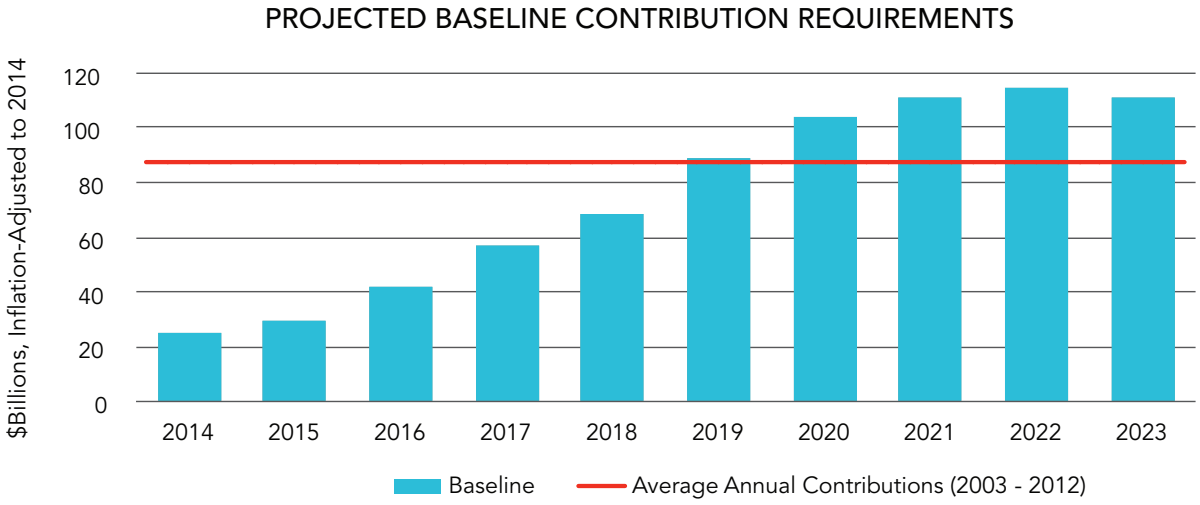
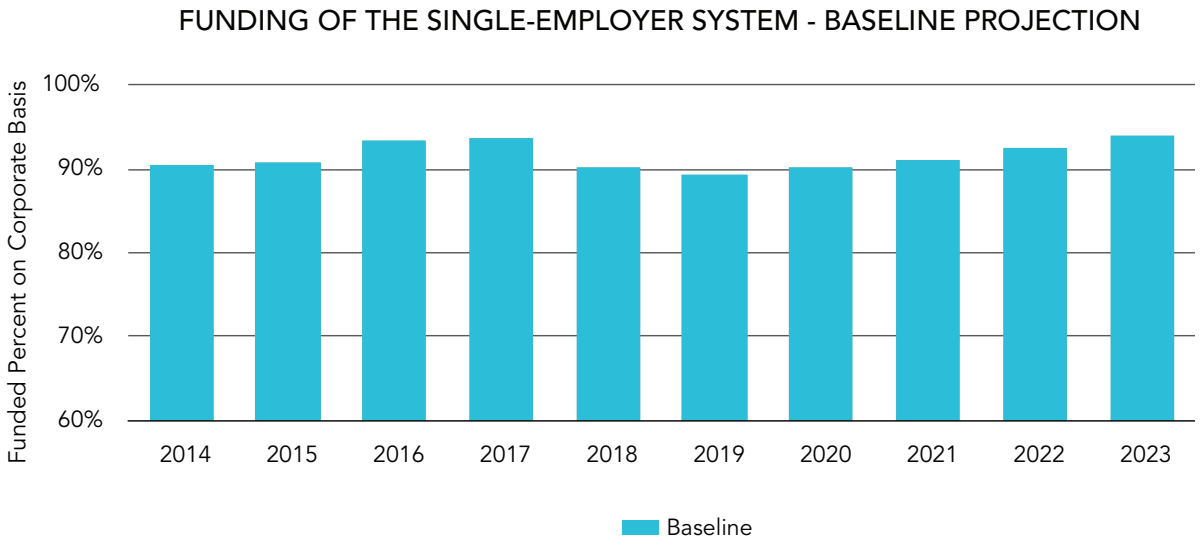


EXHIBIT 2



SENSITIVITY ANALYSIS

Actual future contribution requirements will vary from the baseline projection – perhaps significantly. The baseline projection involves many assumptions about future plan experience, including demographic changes, economic changes, and the behaviors of plan sponsors. This section analyzes how the baseline projection would change under several alternative macroeconomic scenarios.[12]

Exhibits 3 and 4 show the effects of two alternative macroeconomic scenarios: one in which the economy grows faster than assumed in the baseline projection and one in which the economy suffers a moderate recession. The economists at Moody's Analytics estimate a 10% chance that the economy will perform better than the accelerated growth scenario and a 10% chance that the economy will perform worse than the recession scenario.

EXHIBIT 3

SENSITIVITY OF CONTRIBUTION REQUIREMENTS TO ALTERNATE ECONOMIC SCENARIOS

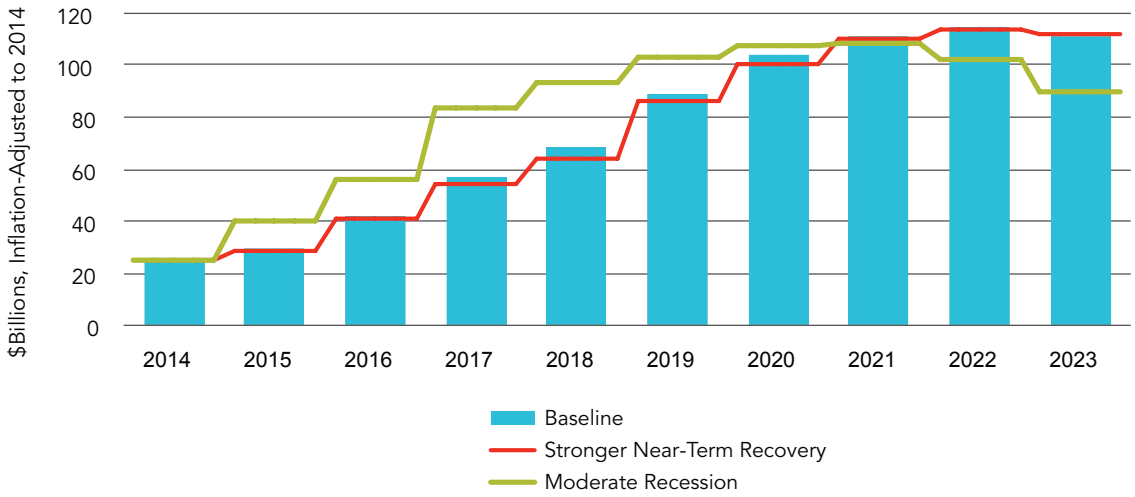
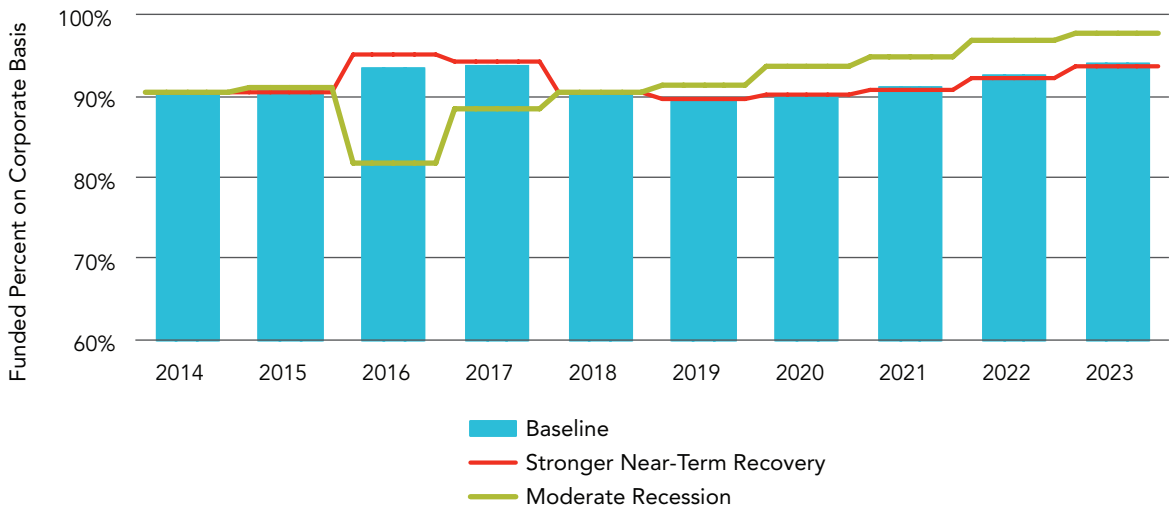


EXHIBIT 4

SENSITIVITY OF SINGLE-EMPLOYER SYSTEM FUNDING TO ALTERNATE ECONOMIC SCENARIOS



In the accelerated growth scenario, employment and consumption pick up faster than assumed in the baseline. This

has little effect on the progression of interest rate increases. However, the accelerated consumption leads to earlier growth of equity valuations. As such, the accelerated growth scenario has little or no long-term effect on projected funding of the single-employer defined benefit system. It merely accelerates funding for a brief period of time.

The recession scenario models a one-year recession that lasts from the fourth quarter of 2014 through the third quarter of 2015. The scenario assumes that Treasury rates initially rise on concerns about the wind-down of quantitative easing and later declines as confidence returns and the Fed addresses the recession with monetary policy. Equity values decline sharply after the third quarter of 2014 before recovering in 2016 and later years.

The recession scenario demonstrates several interesting effects. Though the 2015 measure of plan funding improves relative to the baseline projection, contribution requirements for the scenario exceed the baseline requirements by more than 35 percent. This occurs because the calculation of contribution requirements is more sensitive to changes in asset levels than changes in interest rates, so the 2015 contribution requirements reflect much of the recessionary decline in asset values but little of the liability decline attributable to increased interest rates.[13] The scenario also provides a measure of the cyclicality in the system. The 35 percent higher contribution requirements occur at a time when the scenario projects an unemployment rate that is almost three percentage points higher than in the baseline scenario and corporate profits that are less than 80 percent of the baseline level. This means potentially increasing contributions and tax expenditures at a time when corporate profits and the income tax base are depressed.

Finally, the amounts by which the alternative scenarios deviate from the baseline scenario present a compelling case for plan sponsors to assess their comfort with their short-term exposures to an economic downturn. In the scenarios provided by Moody's Analytics, the amount by which economic growth can exceed the baseline rate is constrained because the baseline assumes that the economy reaches full employment within the next several years. Therefore, while Moody's places an even chance of economic performance above or below the baseline, the effect of a recession can be much more consequential than the effect of accelerated growth at this point in the business cycle.

Exhibits 5 and 6 illustrate an inflationary scenario. In this scenario, oil prices rise sharply at the same time that foreign investors reduce their purchases of U.S. Treasury securities. The Fed reacts by tightening monetary policy, and 10-year Treasury yields reach 6 percent in 2015. As a result of this disruption, the economy drops into a recession that lasts from mid-2015 through mid-2016. This affects funding requirements for the single-employer defined benefit system in a similar way to the moderate recession scenario, except that interest rates peak at a higher level and the recession affects contribution requirements at a later point in time.

EXHIBIT 5

SENSITIVITY OF CONTRIBUTION REQUIREMENTS TO AN INFLATIONARY SCENARIO

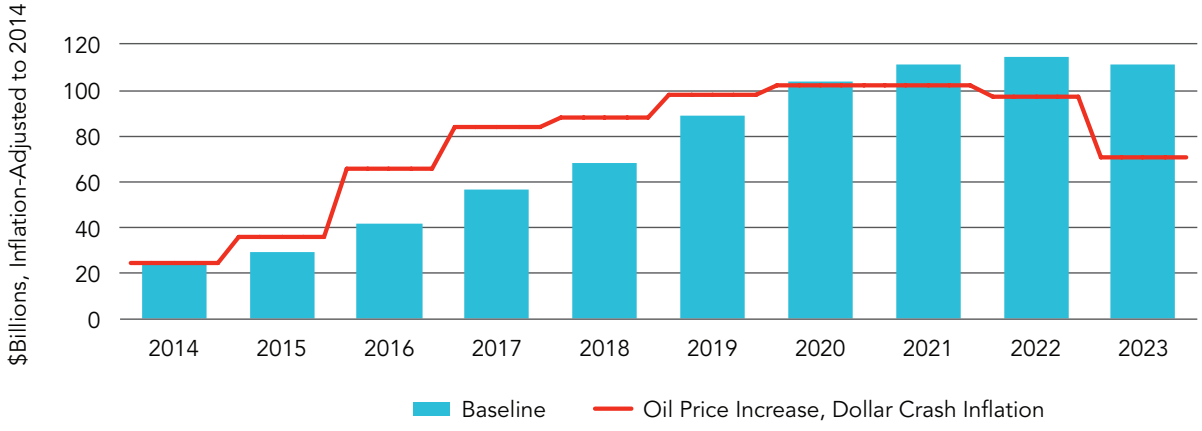
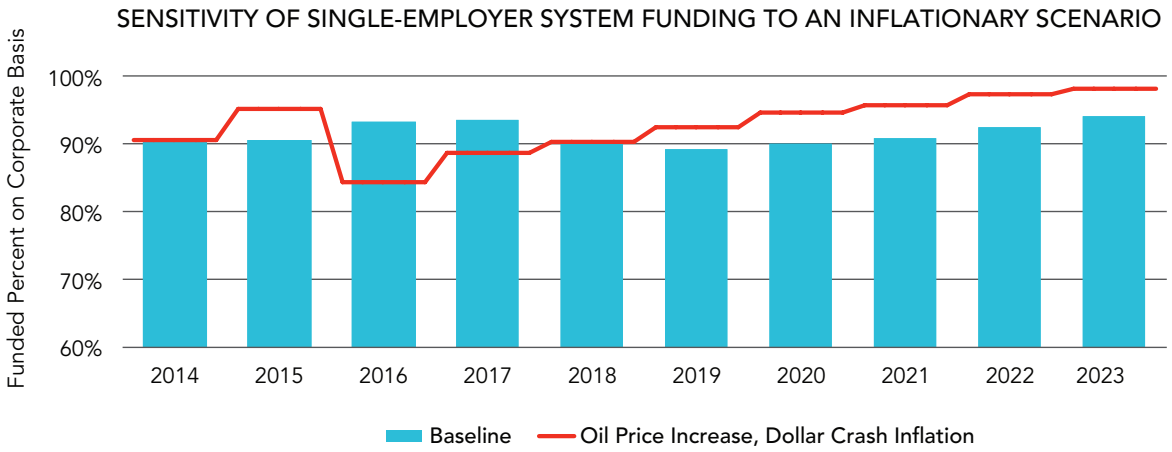


EXHIBIT 6



The "oil-price increase and dollar-crash inflation" scenario provides insight to the effects of future interest rate increases, should they happen. The inflationary scenario highlights that, when considering the effect of future interest rate increases on the funding of defined benefit plans, the influence of rate increases on other aspects of plan operations – such as the influence on asset portfolio returns – should also be considered. While increasing interest rates may come with positive asset returns (as in the baseline scenario), this scenario provides an example where rising interest rates may generate a poor return for investors. The inflationary scenario, along with the baseline scenario, show that increasing interest rates cannot be expected to entirely resolve the projected increases in contribution requirements.

CONCLUSION

Our analysis shows that the outlook for funding of the private sector single-employer defined benefit system has improved since we published *The Rising Tide of Pension Contributions* in 2011. The 10-year average of projected contribution requirements for the private sector single-employer defined benefit system has declined by more than 5% since the prior projection, from an average $79 billion per year (after adjusting for inflation) over the 10 years beginning with 2010 to an average $75 billion over the 10 years beginning with 2014.

Despite this reduction, significant increases in aggregate contribution requirements are still ahead. As of June 30, 2014, contribution requirements were projected to rise under a range of macroeconomic projection scenarios – quadrupling over six years in our baseline scenario. Our analysis shows that projected contribution requirements remain sensitive to fluctuations in equity markets, since interest rate fluctuations had little effect in the alternative scenarios. Our analysis also shows that the projected increases in the system's contribution requirements will not be resolved by expected interest rate increases.[14]

As was the case in 2011, resolution of the forthcoming rise in contribution requirements will depend largely on decisions made by individual plan sponsors and policymakers. Since 2011, plan sponsors have responded by contributing well in excess of the required amounts, and policymakers have responded by lowering near-term contribution requirements. Questions remain about the significance of efforts to "de-risk" defined benefit plans or change the allocation of retirement risks between employers and their employees.[15] Sensitivity analysis that includes a range of potential actions by the sponsor community may help to illustrate the effect that these decisions could have on future funding of the system and provide insight to the eventual resolution of future funding requirements.

Appendix: Methods and Assumptions

The data in this report are based upon deterministic projections of the funded status and statutory contribution requirements of plans in the U.S. private sector single-employer defined benefit system, with the intent of estimating future contribution requirements for the system as a whole and testing the sensitivity of aggregate contribution requirements to a variety of alternative macroeconomic scenarios as of June 30, 2014.

The Pension Insurance Modeling System (PIMS), developed by the PBGC, was used to project changes in funded status and contribution requirements. The model uses data from Form 5500 filings[16] to establish the initial state of each plan in a sample of more than 400 single-employer (SE) plans. The sample represents about half of the SE benefit obligations insured by the PBGC. Plan-specific weights are applied such that the sample can be used to draw conclusions for the full universe of SE plans.[17] While we cannot verify the accuracy of all the model's detailed plan-specific inputs, they were reviewed for general consistency and reasonability.

Minimum contribution requirements were modeled on the provisions in the Pension Protection Act of 2006, as amended through the Highway and Transportation Funding Act of 2014 (HATFA).

Unless otherwise stated in the report, sponsors were assumed to contribute the minimum amount required after application of their available funding balances. Actual contributions were used if they were included on a Form 5500 Schedule SB filed by October 2013 and exceeded the modeled minimum requirement. The model assumes that sponsors increase their prefunding balances for contributions in excess of the minimum requirements only to the extent their Adjusted Funding Target Attainment Percentages (AFTAPs) would be above 80 percent after the increase. Contributions attributable to a plan year were assumed to occur at the end of the plan year, and benefit payments were assumed to be disbursed in the middle of each plan year.

We assumed that all sponsors elect to use segment rates (as opposed to the full yield curve described in Internal Revenue Code section 430(h)(2)(D)(ii)) to measure plan liabilities used in the determination of statutory requirements. The Actuarial Value of Assets (AVA) equaled the Market Value of Assets (MVA) if those values were equal in a plan's Schedule SB filing; otherwise, we assumed 24-month smoothing of the MVA for the AVA.

No bankruptcies or plan changes (including plan freezes) were assumed during the projection period. The valuation of plans with a fiscal year beginning after June 30 used assumptions for the next calendar year. All participants were assumed to elect a single life annuity form of payment.

The following tables summarize key deterministic assumptions used in our analysis:

TABLE A1

Inflation

Scenario	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Baseline	2.18%	2.27%	2.70%	2.90%	2.73%	2.40%	2.28%	2.28%	2.27%	2.25%
Accelerated Growth	2.41%	2.43%	2.30%	2.83%	2.72%	2.40%	2.28%	2.28%	2.27%	2.25%
Moderate Recession	1.33%	0.01%	2.83%	3.06%	2.56%	2.40%	2.41%	2.39%	2.37%	2.36%
Inflation Shock	3.40%	3.60%	0.82%	1.71%	2.41%	2.42%	2.46%	2.49%	2.28%	2.26%

TABLE A2

Level-Equivalencies of Treasury Spot Rate Curves

Scenario	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Baseline	3.71%	4.06%	4.91%	5.53%	5.02%	4.95%	4.98%	4.96%	5.05%	5.05%
Accelerated Growth	3.71%	3.94%	5.17%	5.55%	5.02%	4.95%	4.98%	4.96%	5.05%	5.05%
Moderate Recession	3.71%	4.93%	4.08%	4.80%	5.07%	4.94%	4.97%	4.96%	5.04%	5.04%
Inflation Shock	3.71%	5.41%	5.16%	5.55%	5.11%	4.95%	4.98%	4.96%	5.05%	5.05%

TABLE A3

Level-Equivalencies of Corporate Spot Rate Curves

Scenario	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Baseline	4.89%	5.14%	5.80%	6.32%	5.88%	5.83%	5.84%	5.77%	5.82%	5.82%
Accelerated Growth	4.89%	5.02%	6.02%	6.37%	5.93%	5.88%	5.85%	5.76%	5.82%	5.82%
Moderate Recession	4.89%	5.97%	5.38%	5.99%	6.06%	5.88%	5.83%	5.73%	5.79%	5.79%
Inflation Shock	4.89%	6.26%	6.33%	6.63%	6.23%	5.94%	5.85%	5.75%	5.83%	5.83%

TABLE A4

Plan Asset Portfolio Returns

Scenario	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Baseline	5.40%	4.90%	2.28%	6.02%	6.20%	6.40%	6.77%	5.90%	6.08%	6.09%
Accelerated Growth	6.40%	4.94%	1.81%	5.62%	6.26%	6.52%	6.83%	5.93%	6.11%	6.12%
Moderate Recession	-3.55%	0.26%	9.99%	8.06%	8.92%	8.01%	7.37%	6.06%	6.04%	6.10%
Inflation Shock	1.41%	-9.10%	9.86%	12.69%	11.82%	9.05%	7.05%	5.95%	6.13%	6.14%

TABLE A5

Asset Allocation

Equity: United States	32.5%
Equity: International	17.5%
Bonds: Investment grade	40.0%
Bonds: High yield	3.5%
Real estate	3.5%
Cash	3.0%
Total	100.0%

TABLE A6

Wage Growth and Benefit Increases

	Valuation	Experience
Wage growth	1.0% plus a merit increase derived from participant data	Inflation plus 1.67% plus a merit increase derived from participant data
Unit benefit increases for non-pay-related plans	None	Inflation plus 1.67%

TABLE A7

Demographic Assumptions

	Valuation	Experience
Active head count	Closed group	Constant for ongoing plans
Termination rates	As disclosed on Schedule SB	As disclosed on Schedule SB
Disability rates	As disclosed on Schedule SB	As disclosed on Schedule SB
Retirement rates	As disclosed on Schedule SB	As disclosed on Schedule SB
Mortality rates (pre- and postretirement)	RP2000 projected 10 years beyond the valuation date, assuming 60/40 male/female population	RP2000 projected to the valuation date, assuming 60/40 male/female population

The inflation and capital market assumptions (Tables A1 to A4) were based on projected spot rate curves, asset class returns, and inflation values provided by Moody's Analytics. (The SOA is grateful for their assistance.) The projected data provided by Moody's Analytics was derived from their July 2014 baseline and standard alternative scenarios. The projected capital market data was reviewed for reasonableness as of June 30, 2014 and consistency with the baseline and standard alternative scenarios.

Endnotes

1 See The Rising Tide of Pension Contributions: How Much and When?, 2011

2 Aggregate contribution requirements for the system were expected to increase from an average $66 billion per year for the ten years ending with 2009 to an average $90 billion per year for the ten years beginning with 2010.

3 For the 2010 through 2012 plan years, sponsors contributed more than $276 billion. The total of cash contribution requirements for these years was a little more than $61 billion.

4 The Moving Ahead for Progress in the 21st Century (MAP-21) Act introduced "Pension Funding Stabilization" provisions that had the net effect of deferring contribution requirements into later years. (See Proposed Pension Funding Stabilization: How does it Affect the Single-Employer Defined Benefit System?, 2012.) The Highway and Transportation Funding Act of 2014 (HATFA-14) modified the pension funding stabilization provisions to further defer contribution requirements.

5 The Rising Tide report assumed that a $1.00 contribution at the beginning of 2010 would cover approximately $1.05 of pension obligations (discounted at corporate spot rates) at the beginning of 2014. Based on market experience, we now estimate that it would have covered approximately $1.08 as of the beginning of 2014.

6 This analysis does not include related effects, such as decisions to modify asset allocations or benefit offerings as a result of economic experience. Nor does it include sensitivity to demographic experience.

7 See https://www.economy.com/products/alternative-scenarios/standard-scenarios.

8 The level equivalent values shown in this report are based on spot rate curves and projected benefit payments from the single-employer defined benefit system. The level equivalent Treasury rates are not to be confused with 10-year Treasury yields.

9 Projected contribution requirements assume that sponsors contribute the minimum amount required after application of their available funding balances. See the Methods and Assumptions Appendix for more information.

10 Page 3 of the Rising Tide report specifies an average $90 billion per year for the 10 years beginning in 2010, unadjusted for inflation. We adjusted the 10 years of requirements to 2014 using the 2.3% inflation rate assumed in the Rising Tide report and re-averaged them.

11 Per Form 5500 filings, plan sponsors contributed an adjusted $88.0 billion, $97.1 billion, and $91.0 billion to the single-employer system for the 2010, 2011, and 2012 plan years, respectively.

12 Capital market assumptions for all scenarios, including the sensitivity scenarios, are disclosed in the appendix on Methods and Assumptions.

13 Our measure of plan funding does not "weight" the recognition of asset returns or interest rate changes and is therefore a better indicator of how assets perform relative to liabilities in the short-term. In the recession scenario, we see that interest rate increases at the end of 2014 actually outweigh the late-year decline in asset prices.

14 We note that the July 2014 long-term estimate of 10-year Treasury yields provided by Moody's Analytics is slightly higher than the long-term estimates in the August 2014 baseline from the Congressional Budget Office and the First Quarter 2014 Survey of Professional Forecasters published by the Federal Reserve Bank of Philadelphia.

15 A change in the allocation of risks between sponsors may entail closure of defined benefit plans with replacement by defined contribution plans and/or a change in the nature of future defined benefit accruals, such as a switch to hybrid forms of accruals.

16 Our analysis uses a sample drawn primarily from plan year 2011 filings.

17 Plan weights are based on 2011 benefit liabilities (funding targets) for the sample and for the universe as a whole. To develop the weights, the plans in the sample were categorized by the funded status of the largest plan at its sponsoring firm (322 firms sponsored 413 plans in the sample). Weights were then developed to equalize the weighted liability of the sample with that of the universe, separately for each funded status category

About the Society of Actuaries

The Society of Actuaries ("SOA"), formed in 1949, is one of the largest actuarial professional organizations in the world dedicated to serving 24,000 actuarial members and the public in the United States, Canada, and worldwide. In line with the SOA Vision Statement, actuaries act as business leaders who develop and use mathematical models to measure and manage risk in support of financial security for individuals, organizations, and the public.

The SOA supports actuaries and advances knowledge through research and education. As part of its work, the SOA seeks to inform public policy development and public understanding through research. The SOA aspires to be a trusted source of objective, data-driven research and analysis with an actuarial perspective for its members, industry, policymakers, and the public. This distinct perspective comes from the SOA as an association of actuaries, who have a rigorous formal education and direct experience as practitioners as they perform applied research. The SOA also welcomes the opportunity to partner with other organizations in our work where appropriate.

The SOA has a history of working with public policymakers and regulators in developing historical experience studies and projection techniques as well as individual reports on healthcare, retirement, and other topics. The SOA's research is intended to aid the work of policymakers and regulators and follow certain core principles:

Objectivity The SOA's research informs and provides analysis that can be relied upon by other individuals or organizations involved in public policy discussions. The SOA does not take advocacy positions or lobby specific policy proposals.

Quality The SOA aspires to the highest ethical and quality standards in all of its research and analysis. Our research process is overseen by experienced actuaries and non-actuaries from a range of industry sectors and organizations. A rigorous peer-review process ensures the quality and integrity of our work.

Relevance The SOA provides timely research on public policy issues. Our research advances actuarial knowledge while providing critical insights on key policy issues, and thereby provides value to stakeholders and decision makers.

Quantification The SOA leverages the diverse skill sets of actuaries to provide research and findings that are driven by the best available data and methods. Actuaries use detailed modeling to analyze financial risk and provide distinct insight and quantification. Further, actuarial standards require transparency and the disclosure of the assumptions and analytic approach underlying the work.

SOCIETY OF ACTUARIES
475 N. Martingale Road, Suite 600
Schaumburg, Illinois 60173
www.SOA.org