



Proposal for Actuarial Consulting Services for the Ohio Retirement Study Council

Submitted to the Ohio Retirement Study Council by:

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July 22, 2014

Ms. Bethany Rhodes, Director
Ohio Retirement Study Council
88 East Broad Street, Suite 1175
Columbus, OH 43215

Re: RFP for Actuarial Consulting Services for the Ohio Retirement Study Council

Dear Ms. Rhodes:

On behalf of Milliman, Inc., we are pleased to present this proposal to provide actuarial consulting services to the Ohio Retirement Study Council ("ORSC"). Milliman has a long history of serving large and complex public retirement systems. We are well-qualified to perform the services requested.

We have over 65 years of experience providing actuarial services to large public employee retirement systems. Our work as consulting actuaries for many other public employee retirement systems provides a broad range of valuable experience to assist in this project.

We will assign consultants to this project who are nationally recognized experts in the public sector and who have extensive experience providing actuarial consulting services to large state-wide public employee retirement systems.

This proposal follows the format set forth in the RFP and describes our firm, our approach to providing these services, our people and our proposed fees.

Full contact information for the lead consultant of the project team is:

Glenn D. Bowen, FSA, EA, MAAA
Milliman, Inc.
1550 Liberty Ridge Drive Suite 200
Wayne, PA 19087-5572
610-975-8051
610-995-9321 (fax)
glenn.bowen@milliman.com

We are authorized to contractually bind Milliman.

We would be happy to discuss any aspect of this proposal in more detail should you have any questions upon review. Thank you for the opportunity to present Milliman's capabilities to the System and we look forward to working with you.

Sincerely,



Glenn D. Bowen, FSA, EA, MAAA



Katherine A. Warren, FSA, EA, MAAA

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Section 1

Proposal Summary

Since 1968, the Ohio Retirement Study Council, "ORSC", has been charged with advising and informing the state legislature on all matters relating to the benefits, funding, investment, and operation of Ohio's five state retirement systems: the Public Employees Retirement System (PERS), the Ohio Police and Fire Pension Fund (OP&F), the State Teachers Retirement System (STRS), the School Employees Retirement System (SERS), and the Highway Patrol Retirement System (HPRS). As of January 1, 2014, Ohio's five state retirement systems have assets totaling approximately \$187.87 billion. The systems provide retirement, disability, and survivor coverage to approximately 1.8 million members, retirees, and their beneficiaries. The statutes governing the ORSC are found in Chapter 171 of the Ohio Revised Code. Additionally, all five retirement systems have discretionary authority to offer comprehensive hospital, medical, and prescription drug coverage to retirees and their dependents. Participants in the retirement systems are not covered under Social Security with respect to their public employment.

We understand that ORSC wishes to retain a qualified independent consulting actuary to provide actuarial services to assist them in meeting the following statutory duties as set forth on page 2 of the RFP:

- (3) Studies all proposed changes to the retirement laws and reports to the legislature on their probable costs, actuarial implications, and desirability as a matter of public policy (R.C. 171.04(C));
- (8) Reviews the adequacy of the police and fire contribution rates and makes recommendations to the legislature that it finds necessary for the proper financing of OP&F benefits (R.C. 742.311); and
- (9) Prepares an independent actuarial study every three years on the required employer supplemental contributions to be made on behalf of eligible employees of public institutions of higher education electing an alternative retirement plan in lieu of the retirement systems (R.C. 171.07).

To assist the ORSC in meeting the above statutory duties, we understand that the consulting actuary will perform the following scope of actuarial services.

- Conduct actuarial and cost analyses of various legislative proposals. Some of these analyses will have short deadlines.
- On an annual basis, review the adequacy of the contribution rates made under OP&F and make recommendations to the legislature for the proper financing of the benefits provided by OP&F (R.C. 742.311).
- Prepare an independent actuarial study every three years on the required employer supplemental contribution to be made on behalf of eligible employees of public institutions of higher education electing an alternative retirement plan in lieu of the retirement systems as required by R.C. 171.07 and detailed under R.C. 3305.06.
- Provide consultation and advice on questions and issues that arise relevant to the powers and duties of the ORSC.
- Provide information and technical assistance, including attendance at ORSC meetings, as requested, to present analyses, studies, and reports completed by the actuary and provide testimony to legislative committees.

We understand that the schedule of actuarial services will be variable. There may be periods of little to no work as well as periods with a high volume of work.

As discussed further in this proposal, we propose a team of highly qualified actuaries with extensive experience providing actuarial services to large state-wide public employee retirement systems to assist the ORSC.

Section 2

Capabilities and Experience

The Proposed Project Team to ORSC is drawn primarily from the employee benefits practice in Milliman's Philadelphia office, which has extensive experience providing actuarial consulting services to large state-wide public employee retirement systems.

Our experience in serving large systems of comparable complexity to the five Ohio Retirement Systems includes the following current clients:

- Since 1996, we have served as retained consulting actuary to the Teachers' Pension and Annuity Fund of New Jersey (TPAF), which provides pension and health insurance benefits to retired teachers. Our services have included preparing the annual actuarial valuation, triennial experience studies, 30-year projection models of contributions and funded status that the client uses to forecast future alternative scenarios regarding contributions, investment results, and possible plan modifications. TPAF has 151,000 active members, 92,000 retirees and beneficiaries, and \$27 billion of assets.
- Since 2007 we have served as retained consulting actuary to the Teachers' Retirement System of Puerto Rico. This system has 42,000 active members, 38,000 retirees and beneficiaries, and \$2 billion of assets.
- Since 2009 we have served as retained consulting actuary to the Government Employees' Retirement System of Puerto Rico. This system has 126,000 active members, 124,000 retirees and beneficiaries, and \$1 billion of assets.
- Since 1986, we have served the Pennsylvania Public Employee Retirement Commission. Our services primarily include providing actuarial cost notes on proposed legislation affecting the 2 largest state-wide systems in Pennsylvania – the Public School Employees' Retirement System and the State Employees' Retirement System.
- Since 2006 we have served the Pennsylvania Secretary of the Budget regarding the long-term contributions to the Public School Employees' Retirement System and the State Employees' Retirement System under various alternative scenarios.
- Since 2011 we have consulted with the New York State Division of the Budget regarding the state-wide retirement systems in New York (the prior Milliman lead consultant served NYS DOB from the late 1980's until his retirement).
- Since 2012 we have served the City of Detroit regarding the General Retirement System and the Police and Fire Retirement System.

In addition, from 1989 to 2013, we served the Ohio Retirement Study Council in meeting their oversight responsibilities regarding the five state-wide Ohio Retirement Systems.

Within the past 10 years we have completed one-time special projects for the following clients:

- In 2012 we audited the United Nations Joint Staff Pension Fund. It has \$37 billion in assets and over 179,000 members.
- In 2009 we audited the State Teachers Retirement System of Ohio. It has \$67 billion of assets and over 315,000 members.
- In 2006 and 2001 we audited the Pennsylvania Public School Employees' Retirement System, which has \$51 billion of assets and 589,000 members.
- In 2005 we audited the Pennsylvania State Employees' Retirement System, which has \$24 billion of assets and 229,000 members.
- In 2005, we were retained by the Legislative Budget and Finance Committee, LB&FC, to provide a comprehensive analysis of legislative proposals to provide cost-of-living increases and early retirement incentives to members of the Public School Employees' and State Employees' Retirement Systems. The study included projections of the costs of those initiatives over the next 10 years, the impact of past early retirement incentives and past cost-of-living increases and the potential impacts on the mix of critical skills and experience of public employees.

Other Milliman offices also do extensive work for large state-wide public employee retirement systems. In particular, the Milwaukee office has served the Minnesota Legislative Commission on Pensions and Retirement since 2009. More information about Milliman's public sector clients appears in Appendix C.

We confirm that the Proposed Project Team has met the minimum criteria cited in the RFP, as specified below.

- As evidenced by the above list of current clients and special projects, we have provided actuarial services similar to that requested by ORSC in the past three years.
- Milliman has been providing actuarial services to large state-wide public employee retirement systems since its founding in 1947. See Appendix C for more information about Milliman's public sector clients.
- The proposed lead consultant, Glenn D. Bowen, has 18 years of experience in providing actuarial consulting services to institutional fund clients. The proposed consulting actuary and project manager, Katherine A. Warren, has 23 years of experience in providing actuarial consulting services to institutional fund clients.
- The proposed lead consultant, Glenn D. Bowen, is a member in good standing of the American Academy of Actuaries, a Fellow of the Society of Actuaries, and an Enrolled Actuary under ERISA. The proposed consulting actuary and project manager, Katherine A. Warren, is a member in good standing of the American Academy of Actuaries, a Fellow of the Society of Actuaries, and an Enrolled Actuary under ERISA.

Section 3

References

The following is a list of large public employee retirement systems for which the Pension Practice in Milliman's Philadelphia office completed actuarial consulting services. We have also provided names, addresses and phone numbers of individuals who may be contacted for reference purposes.

New Jersey Teachers' Pension and Annuity Fund – consulting actuary since 1996

Mr. John Megariotis
Assistant Director, Finance
State of New Jersey
Department of the Treasury
Division of Pensions & Benefits – CN295
Trenton, NJ 08625-0295
John.Megariotis@treas.state.nj.us
609-292-3674

New York State Division of the Budget – consulting actuary since 2012

Mr. Daniel Yanulavich
Senior Budget Examiner
New York State Division of the Budget
Labor Relations & General State Charges
State Capitol
Room 129
Albany, NY 12224
Daniel.Yanulavich@budget.ny.gov
518-474-4916

Ohio State Teachers Retirement System – 2009 Actuarial Audit

Mr. Michael J. Nehf
Executive Director
State Teachers Retirement System of Ohio
275 East Broad Street
Columbus, OH 43215-3771
nehfm@strsoh.org
614-227-4090

Pennsylvania Secretary of the Budget – consulting actuary since 2006

Mr. Charles Zogby
Secretary of the Budget
czogby@pa.gov

Ms. Ann Spishock
Special Advisor to the Budget Secretary
aspishock@pa.gov

Commonwealth of Pennsylvania
238 Main Capitol Building
Harrisburg, PA 17120
717-787-4472 or 717-772-9006

Pennsylvania Public Employee Retirement Commission – consulting actuary since 1986

Mr. James McAneny
Executive Director
Public Employee Retirement Commission
510 Finance Building
Harrisburg, PA 17120
jmcaneny@state.pa.us
717-783-6100

Puerto Rico Government Puerto Rico Government Employees and Judiciary Retirement System Administration – consulting actuary since 2009

Francisco del Castillo Orozco, Interim Administrator
437 Ponce de León Avenue
Hato Rey, PR 00917-3711
fdelcastillo@retiro.pr.gov
787-777-1662

Puerto Rico Teachers Retirement System – consulting actuary since 2007

Wanda Santiago Lopez, Interim Executive Director
235 Arterial Hostos Avenue, 8th Floor
San Juan, PR 00918
wasantiago@srm.pr.gov
787-777-1414 Ext 2237 until August 14, Ext 2800 effective August 15

United Nations Office of Internal Oversight Services – 2012 Actuarial Audit of the United Nations Joint Staff Pension Fund

Ms. Carmen Vierula, Chief, New York Audit Service
Internal Audit Division, OIOS
United Nations
380 Madison Avenue, Room M-10061
New York, New York 10017
vierula@un.org
917-367-2167

Section 4

Staff Qualifications

Qualifications of Proposed Project Team

The lead consultant and supervising actuary will be Glenn D. Bowen. Glenn is a Principal of Milliman, a Fellow of the Society of Actuaries, an Enrolled Actuary and a Member of the American Academy of Actuaries and has extensive experience preparing actuarial valuations for retirement programs. He currently manages the retirement consulting practice in Milliman's Philadelphia office. His experience with public retirement systems includes work for:

- the City of Detroit,
- the Metropolitan Transit Authority of New York,
- the New Jersey Teachers Pension and Annuity Fund,
- the New York City Office of Management and Budget,
- the New York State Division of Budget,
- the Ohio Retirement Study Council,
- the Pennsylvania Legislative Budget and Finance Committee,
- the Pennsylvania Secretary of the Budget,
- the Puerto Rico Government Employees Retirement System,
- the Puerto Rico Teachers' Retirement System,
- the General Organization for Social Insurance in the Kingdom of Saudi Arabia, and,
- the Texas County & District Retirement System.

Glenn has peer reviewed Milliman's audits of the Arizona State Retirement System and the United Nations Joint Staff Pension Fund, and has audited:

- the Retirement Systems of Alabama,
- the Indiana Public Employee Retirement Fund,
- the Kentucky Teachers Retirement System, and
- the State Teachers Retirement System of Ohio.

Other individuals of the consulting team are Katherine Warren, FSA, Scott Porter, FSA, and Tim Herman, FSA. Each of these consultants has extensive experience in working with public employee retirement systems; they are all highly qualified consulting actuaries and principals of Milliman. In addition, Richard Gordon, FSA, will be a consulting actuary on the proposed consulting team.

Kathy Warren serves as the consulting actuary for the Pennsylvania Public Employee Retirement Commission. Her other experience with public retirement systems includes work for:

- the City of Detroit,
- the Metropolitan Transit Authority of New York,
- the Ohio Retirement Study Council,
- the Puerto Rico Government Employees Retirement System, and
- the Puerto Rico Teachers' Retirement System.

Scott Porter serves as the actuary for the New Jersey Teachers' Pension and Annuity Fund, Manhattan and Bronx Surface Transit Operating Authority, Southeastern Pennsylvania Transportation Authority, and City of Dover, Delaware. He also serves as a consulting actuary to the Pennsylvania Secretary of the Budget. He has audited numerous systems including:

- the Indiana Public Employee Retirement Fund,
- the Manhattan and Bronx Surface Transit Operating Authority,
- the Pennsylvania Public School Employees' Retirement System (twice),

- the Pennsylvania State Employees' Retirement System,
- the Staten Island Rapid Transit Operating Authority, and,
- the United Nations Joint Staff Pension Fund.

Tim Herman, located in the Milwaukee office, will serve as peer review actuary for ORSC. His experience with public retirement systems includes work for the Minnesota Legislative Commission on Pensions and Retirement, the Pennsylvania Secretary of the Budget and the General Organization for Social Insurance in the Kingdom of Saudi Arabia. Tim is also the fund actuary for the City of Wichita Employees Retirement Plan and Police and Fire Retirement Plan, has performed actuarial audits of large public systems (State of Wisconsin, City of Austin, Milwaukee County, special consulting to the City of Milwaukee for the Global Pension Settlement), and provides internal peer review support for other Milliman offices on public retirement systems.

Rick Gordon will serve as a consulting actuary for ORSC. He served as consulting actuary on our actuarial audit of the State Teachers Retirement System of Ohio. Rick currently serves as consulting actuary to the New Jersey Teachers' Pension and Annuity Fund and Manhattan and Bronx Surface Transit Operating Authority. Rick is a GASB 67/68 subject expert and also is on the Milliman Public Pension Funding Study project team.

Information on many of the retirement systems listed above is included in Section 2. Each system above provides defined benefit benefits, with certain systems also providing defined contribution benefits.

Additional PERS resources within Milliman who can be called on to assist ORSC include Matt Larrabee, FSA and Mark Olleman, FSA. Matt Larrabee, located in the Portland, OR, office, is the lead actuary to the Oregon Public Employees Retirement System and a consulting actuary to the Florida Retirement System. Mark Olleman, located in the Seattle office, serves as actuary to the California State Teachers Retirement System, the Idaho Public Employees Retirement System, and the Texas County & District Retirement System.

In addition, Kara Tedesco, located in the Albany office, specializes in consulting on the plan design and operation of defined contribution plans. Kara has assisted the Pennsylvania Secretary of the Budget on potential defined contributions plan designs.

Management Plan

As indicated above, Glenn Bowen would serve as lead actuary for ORSC. Kathy Warren will serve as consulting actuary and project manager. Scott Porter will serve as additional consulting actuary if the need arises. Tim Herman would serve as peer review actuary.

Matt Larrabee, Mark Olleman, and Kara Tedesco would assist as needed depending on the projects requested by ORSC.

The time allocation among the senior staff members on the ORSC project team for the ORSC projects is approximately 35% for the lead actuary, 45% for the project manager, and 20% for the peer review actuary.

Resumes

Resumes for the proposed project team are on the following pages.

Glenn D. Bowen FSA, EA, MAAA
Principal, Consulting Actuary

Current Responsibility

Glenn is a principal and consulting actuary with the Philadelphia office of Milliman. He joined the firm in 2001.

Experience

Glenn is experienced in the actuarial valuation of pension and welfare benefits. Special projects have included actuarial audits of two multi-billion public retirement systems, strategic funding analyses, plan redesign studies, executive benefit studies and cost projection models. Glenn was the project leader for a major study of early retirement incentives and cost-of-living adjustments for Pennsylvania school and state employees that was commissioned by the Pennsylvania Legislative Budget & Finance Committee. He currently serves as actuary to the Puerto Rico Government Employees, Judiciary, and Teachers Retirement Systems and the City of Detroit. Glenn led Milliman's research and development efforts for employee stock option valuation. Prior to joining Milliman, Glenn worked in actuarial consulting for five years at Towers Perrin.

Professional Activities

Glenn is the former Chair of Milliman's Public Plan Specialty Practice Group. He is a frequent speaker on employee benefits topics, having addressed many groups, including:

- American Academy of Actuaries
- American Institute of Certified Public Accountants
- Government Finance Officers Association of Pennsylvania
- National Association of State Comptrollers
- Pennsylvania Association of Public Employee Retirement Systems
- Pennsylvania Association of School Business Officials
- Pennsylvania State Association of County Controllers

Selected Bibliography

- Discount Rates: Pension Case Study (International Actuarial Association monograph, in progress, 2011)
- Back to the Benefits Basics: DB or not DB – That is the Question (Benefits Quarterly, 2007, with Alan Perry)
- New GASB Rules for Other Postemployment Benefits Finalized (Milliman Periscope, 2004)
- How Fit is Your Funding Policy? (Milliman Benefits Perspectives, 2003)
- Potential Year-End FAS132 Issues (Philadelphia office client publication, 2001, 2002)

Professional Designations

- Fellow, Society of Actuaries
- Enrolled Actuary, ERISA
- Member, American Academy of Actuaries

Affiliations

- Instructor, Society of Actuaries' "Applied Modeling" examination seminar
- Member, American Academy of Actuaries Employee Stock Option Valuation Task Force

Education

BS, Civil Engineering, University of Delaware
MS, Civil Engineering, University of Delaware

Richard L. Gordon FSA, EA, MAAA
Consulting Actuary

Current Responsibility

Rick is a consulting actuary in the Philadelphia office of Milliman. He joined the firm in 2001.

Experience

Rick has 16 years of pension and employee benefits consulting experience. Rick serves both public and private sector clients regarding their defined benefit pension and retiree medical plans. Client assignments include actuarial valuations; plan design cost studies; FASB valuations for developing expense and year-end disclosure for SFAS ASC Topic 715; and government filings. He has developed asset/liability projection models for private and public sector clients to determine future funding levels and the cost of proposed plan changes. Rick has experience in performing audits for pension plans, including analysis of data, actuarial procedures, and assumptions. He also has extensive knowledge of Milliman's pension valuation system and has helped to initially set up and program new clients into the system.

Selected Bibliography

- GASB 67/68: Relationship between valuation date, measurement date, and reporting date (PERiScope, March 2014)
- Discount Rates: Pension Case Study (International Actuarial Association monograph, 2011)
- GASB's Preliminary Views on New Pension Accounting Rules (PERiScope, July 2010)
- GASB Exposure Drafts on Pension Accounting and Financial Reporting – Exploring the Proposed Changes for Single Employers (PERiScope, September 2011)
- GASB Exposure Drafts on Pension Accounting and Financial Reporting – Exploring the Proposed Changes for Cost-Sharing Employers and Governmental Nonemployer Contributing Entities (PERiScope, October 2011)

Professional Designations

- Fellow, Society of Actuaries
- Enrolled Actuary, ERISA
- Member, American Academy of Actuaries

Education

BS, Mathematics, Elizabethtown College, Elizabethtown, Pa.

Timothy J. Herman FSA, EA, MAAA
Principal, Consulting Actuary

Current Responsibility

Tim is a principal and consulting actuary in the Milwaukee office of Milliman. He has 20 years of experience and rejoined the firm in 2011. Tim is currently the lead consultant for a number of clients with work relating to various types of retirement plans.

Experience

Tim has spent more than 20 years providing retirement consulting services to plan sponsors that range from small privately held companies to large publicly traded companies and large public plans. He has served plan sponsors on a variety of subjects, including employee benefit plan design, experience studies, actuarial valuations, cost estimates, individual benefit calculations, merger and acquisition consulting, actuarial audits, and plan governance issues. He has also performed stochastic projections of both assets and liabilities for several large public plan clients. He has assisted several public employers with the analysis of the impact of their retiree medical plan under Government Account Standards Board (GASB) Statement Number 45.

Tim served on the Society of Actuaries Education and Examination Committee. He has been a speaker on pension and employee benefit matters at Milliman technical meetings and at various professional meetings. He has also taught classes in the Certified Employee Benefits Specialists program (CEBS).

Professional Designations

- Associate, Society of Actuaries
- Enrolled Actuary, ERISA
- Member, American Academy of Actuaries
- Director, Wisconsin Retirement Plan Professionals Ltd.

Education

BS, Mathematics, University of Wisconsin

MS, Actuarial Science, University of Wisconsin

Matt Larrabee FSA, EA, MAAA
Principal, Consulting Actuary

Current Responsibility

Matt is a principal and consulting actuary in Milliman's Portland, Oregon, office. He worked for the firm from 1998 to 2001 and rejoined in 2012 after having served as the Portland retirement practice leader of a major national competitor for the prior six years.

Experience

Matt has 18 years of actuarial consulting experience, with expertise in pension and retiree medical programs sponsored by governmental and corporate entities. During that time, he has consulted with a variety of plan types and sponsors. Of particular note, Matt serves as the lead actuary for the Oregon Public Employees Retirement System (OPERS) and in a consulting actuary role for the Florida Retirement System (FRS).

He assists clients with a variety of matters, including actuarial valuations, financial reporting, contribution strategy, stakeholder communications, plan design, experience studies, legislative impact assessments, economic scenario analysis, and plan administration. Matt's projects have included:

- Stochastic analysis of funding strategy alternatives for public sector systems
- Extensive plan design and legislative cost analysis for large public sector systems
- Plan redesign and consolidation analysis for an acquisitive corporate sponsor that had accumulated 10 widely different benefit designs at its U.S. locations
- Stochastic assessment of long-term property tax levy adequacy for a large pay-as-you-go public system
- Redesign and wind-down analysis for a pre-funded corporate retiree medical and life program covering a closed employee group
- Contribution strategy design consulting for a multiple-employer plan covering more than a dozen joint sponsoring employers of varying sizes and financial conditions
- Financial reporting under governmental (GASB), U.S. GAAP (FASB), international (IFRS), and statutory (SSAP) accounting standards

Presentations

Matt has been frequently quoted in the local media for his work with governmental sponsors. He is an experienced public speaker, including having the honor of speaking at the annual National Association of State Retirement Administrators (NASRA) conference. Matt has also made numerous executive- and board-level presentations for his corporate clients.

Publications

Matt authored a 2012 Milliman PERiScope article summarizing the effects of upcoming changes to pension plan financial reporting requirements on governmental entities.

Professional Designations

- Fellow, Society of Actuaries
- Member, American Academy of Actuaries
- Enrolled Actuary under ERISA

Education

BS, Mathematics, University of Utah

BSEE, Electrical Engineering, University of Utah

Mark C. Olleman FSA, EA, MAAA
Principal, Consulting Actuary

Current Responsibility

Mark is a principal and consulting actuary with the Seattle office of Milliman. He joined the firm in 1990.

Experience

Mark's area of expertise is the employee benefits field. The majority of his practice is providing service to multiemployer plans and public employee retirement systems. Mark assists clients with many aspects of defined benefit plans, including actuarial valuations, economic and demographic experience studies, asset/liability modeling, cost and population projections, plan administration, participant communications, funding strategies, and plan design.

Mark's projects have included:

- Redesign of the corporate asset/liability model
- Consulting on retirement plan redesign issues
- Funding strategy reviews
- High-level internal quality control reviews

Presentations and Publications

Mark is a regular instructor for the International Foundation of Employee Benefit Plans' Certificate of Achievement in Public Plan Policy and speaks on retirement issues at various national meetings.

Mark has authored articles on the plan design of public employee retirement systems.

Professional Designations

- Fellow, Society of Actuaries
- Member, American Academy of Actuaries
- Enrolled Actuary under ERISA

Education

BS, Mathematics and Chemistry, Whitworth College

Scott F. Porter FSA, EA, MAAA
Principal, Consulting Actuary

Current Responsibility

Scott is a principal and consulting actuary with the Philadelphia office of Milliman. He joined the firm in 1992.

Experience

Scott serves both public and private sector clients regarding their defined benefit pension and retiree health plans. Client assignments include actuarial valuations, cost studies, GASB valuations under 25, 27 and 45. Assignments also include FASB valuations for developing expense and year-end disclosure for FASB ASC Topic 715, and government filings. He has developed cost projection models for private and public sector clients to determine future funding levels and the cost of proposed plan changes. Scott has experience in performing audits for pension plans, including analysis of data, actuarial procedures, and assumptions.

Scott currently consults to the New Jersey Teachers' Pension and Annuity Fund.

Scott also currently consults on the following public pension plans: the Southeastern Pennsylvania Transportation Authority, the Manhattan and Bronx Surface Transit Operating Authority and City of Dover, Delaware General Employees and Police Pension Plans. He also serves as the consulting actuary for the Philadelphia Phillies and the Grand Lodge of Pennsylvania. He has performed GASB 45 actuarial valuations for the Southeastern Pennsylvania Transportation Authority, Delaware County Community College and eight agencies of the Metropolitan Transportation Authority (NYC). Previous actuarial review experience includes the Pennsylvania Public School Employees Retirement System, the Pennsylvania State Employees Retirement System, the New York City Transit Authority (Manhattan and Bronx Surface Transit Operating Authority Pension Plan, and Staten Island Rapid Transit Operating Authority Pension Plan), the Alabama Retirement Systems, and the United Nations Joint Staff Pension Fund.

Bibliography

- Public Plans: Using Risk Profiles to Manage Funding Goals (White paper for Society of Actuaries)

Professional Designations

- Fellow, Society of Actuaries
- Enrolled Actuary, ERISA
- Member, American Academy of Actuaries

Education

BBA (magna cum laude), concentration in Actuarial Science, Temple University

Kara W. Tedesco CPC, QPA
Principal, Employee Benefits Consultant

Current Responsibility

Kara is a principal and employee benefits consultant and is the manager of the Traditional Defined Contribution Services team in Milliman's Northeast Defined Contribution Regional Processing Center in Albany, New York. The team provides pension plan design, qualification, and administration. Kara joined Milliman in 1994.

Experience

The Traditional DC Services team provides consulting, administration, compliance and recordkeeping services for Milliman's clients in the Northeast.

Kara consults with defined contribution clients on plan design and compliance with ERISA and related regulations. She is an expert on controlled group analysis and how to structure benefit plans within a controlled group of corporations.

Kara consults with clients on both qualified and nonqualified retirement plans to help clients meet their retirement income goals. Her approach often includes using "cross testing" in order to maximize the benefits provided in the qualified plan.

She is a board member of the New York State Employee Benefits Conference and Construction Financial Management Association.

She also assists clients in the administration and compliance of other employee benefit plans, such as flexible spending plans and dependent reimbursement plans.

Professional Designations

- Certified Pension Consultant (CPC), a designation sponsored by the American Society of Pension Professionals and Actuaries (ASPPA)
- Qualified Pension Administrator (QPA), a designation sponsored by the American Society of Pension Professionals and Actuaries (ASPPA)
- Kara regularly attends seminars and training courses to keep current with trends and regulations in the industry.

Education

BA, Economics and English, St. Lawrence University
MBA, The College of Saint Rose

Katherine A. Warren FSA, EA, MAAA
Principal, Consulting Actuary

Current Responsibility

Kathy is a principal and consulting actuary with the Philadelphia office of Milliman. She joined the firm in 1991.

Experience

Kathy serves both public and private sector clients regarding their defined benefit pension plans. Client assignments include actuarial valuations, cost studies, FASB valuations for developing expense and year-end disclosure for FASB ASC Topic 715, and government filings, including preparation of Act 205 filings. Kathy also serves clients with postretirement benefit plans (other than pensions) by performing FASB valuations to comply with FASB ASC Topic 715. She also assists clients in complying with GASB 25, 27, 43, and 45. Kathy has experience developing computer models for valuing the potential costs of an early retirement window and performing asset/liability modeling studies. She also has worked extensively on a client's stand-alone benefit calculation program. Kathy has also assisted several clients through the plan termination process.

In the public sector, Kathy assists the Pennsylvania Public Employee Retirement Commission and has assisted the Ohio Retirement Study Council by primarily providing estimated costs of proposed legislation. She also assists the Puerto Rico Government Employees, Judiciary, and Teachers Retirement Systems and the City of Detroit. Kathy has also served in an internal peer review capacity on several public employee retirement systems, leading a replication valuation of a large state-wide retirement system. Previous actuarial review experience includes the Pennsylvania Public School Employees Retirement System, the Pennsylvania State Employees Retirement System, and the United Nations Joint Staff Pension Fund.

She currently serves on the Editorial Committee of Milliman's *Benefits Perspectives* and chairs Milliman's Systems Enhancement Committee providing oversight into Milliman's valuation software programs. She has also assisted the Joint Board for the Enrollment of Actuaries and the Society of Actuaries in developing the Enrolled Actuaries examinations.

Professional Designations

- Fellow, Society of Actuaries
- Enrolled Actuary, ERISA
- Member, American Academy of Actuaries

Education

BA (summa cum laude), Mathematics, University of Pennsylvania

Section 5

Methodology

We discuss below our proposed methodology for the first three items listed under the scope of services in Section 1.

Actuarial and cost analyses of various legislative proposals

We will work with the ORSC to determine the best approach for providing the requested analysis of legislative proposals. Possible approaches include (1) performing a reasonableness review of the cost estimate of the legislative proposal that was prepared by the system actuary for the impacted System(s) or (2) performing an independent valuation of the proposed legislative change. The time available for performing the review may dictate the approach utilized.

If a reasonableness review is requested, the proposed team will review the cost estimate for the reasonableness of its assumptions, the reasonableness of the methodology, and the reasonableness of its results. Beyond the cost estimate prepared by the system actuary, we may request further information from the system actuary (such as detail behind the liability analysis or the exact actuarial assumptions used). Such an approach was taken in our work for ORSC in 2007 when House Bill 152 would have expanded alternative retirement program eligibility in STRS and SERS.

If an independent valuation is requested, we would perform an independent valuation of the proposed change using full census data for those members impacted, the current actuarial assumptions and methods used by the system actuary (subject to revision depending on the legislative proposal), and the applicable plan provisions. To perform the independent valuation, we would need the edited census data for those members impacted and the complete set of actuarial assumptions and methods. Such an approach was taken in our work for ORSC in 2003 and 2004 when we reviewed the adequacy of the contribution rates of the five Ohio retirement systems.

Adequacy of Contribution Rates for OP&F

The OP&F Adequacy of Contribution Rates study is in response to the requirement of Section 742.311 of the RC that the ORSC review the adequacy of OP&F's contribution rates. This review is to determine whether the current contribution rates, which are established by statute, remain adequate to fund the retirement system and, if not, to indicate the magnitude of changes in contribution rates and/or benefit provisions that may be appropriate to restore the system's actuarial status. As the employer contribution rates are different for police (19.50% of pay) and fire (24.00% of pay) employers, another purpose of this review is determine what an appropriate equal employer contribution rate would be, along with the impact of the OP&F funding period.

This study would include the following:

- Review of the latest OP&F valuation with respect to the 30-year funding requirement of any Unfunded Actuarial Accrued Liability ("UAAL"),
- Determination of the employer contribution rates necessary to meet the 30-year funding requirement of the statutorily mandated benefits,
- Provide alternatives, in general, for meeting the 30-year funding requirements for the ORSC and legislature to consider,
- Determine an equalized employer contribution rate for both police and fire employers and the impact on OP&F's funding period,
- Determination of the equalized employer contribution rate necessary to meet the 30-year funding requirement of the statutorily mandated benefits, and
- Suggestions for future actuarial valuations reports, if any.

The information necessary for the OP&F Adequacy of Contribution Rates study includes the following:

- The latest OP&F valuation,
- The expected benefit payments by year, separately for police and firefighters, underlying the Present Value of Future Benefits (PVFB) for the pension benefits shown in the latest OP&F valuation.
- The expected benefit payments by year, separately for police and firefighters, underlying the Present Value of Future Benefits (PVFB) for the Medicare Part B benefits shown in the latest OP&F valuation.

Triennial ARP Supplemental Contribution Rate

For the triennial ARP Supplemental Contribution Rate (“SCR”) study, we would continue the approach that Milliman has used since the inception of the ARP SCR. That methodology is described below.

The portion of the Supplemental Contribution Rate attributable to pension benefits will be based on the excess of (1) the anticipated contributions which would have been made into the Retirement System by the member and employer during the three fiscal years after the study’s measurement date over (2) the anticipated Entry Age normal cost during the three fiscal years after the study’s measurement date for the benefits which would have been provided by the Retirement System to the member in the future at retirement, death, disability, etc. assuming, if applicable, the member belongs to the traditional defined benefit plan of the System. A three year period was used as this study is to be performed every three years according to the Code.

The portion of the Supplemental Contribution Rate attributable to health insurance costs will be calculated based on the amount of the lost subsidy for healthcare benefits expressed as a percentage of payroll for the ARP members.

This methodology produces a Supplemental Contribution Rate for a specific three-year fiscal year period. The supplemental contribution rate determined for the next three-year fiscal year period could be different due to changes in the demographics of ARP members, including the average payroll, and other factors specific to the System.

The information necessary for the ARP SCR study includes the following:

- Census data for active employees participating in the ARP instead of the Retirement System as of the study’s valuation date,
- The latest valuation for the respective Retirement System,
- Complete set of actuarial assumptions used in the latest valuation of the Retirement System.
- Member handbook for traditional defined benefit component of the Retirement System.

Section 6

Glossary

Actuarial Accrued Liability

That portion of the present value of future pension plan benefits and expenses which is allocated to prior years as of the valuation date by the actuarial cost method.

Actuarial Assumptions

Assumptions as to the occurrence of future events affecting pension costs, such as: mortality, withdrawal, disablement and retirement; changes in compensation and national pension benefits; rates of investment earnings and asset appreciation or depreciation; procedures used to determine the actuarial value of assets; and other relevant items.

Actuarial Cost Method

A particular technique used to establish the amount and incidence of the annual actuarial cost of plan benefits.

Actuarial Equivalent

Of equal actuarial present value, determined as of a given date with each value based upon the same set of actuarial assumptions.

Actuarial Gain or Loss

A measure of the difference between actual experience and that which is expected based upon a set of actuarial assumptions, during the period between two actuarial valuation dates, as determined in accordance with a particular actuarial cost method.

Actuarial Value of Assets

The value of cash, investments and other property belonging to a pension plan, as used by the actuary for the purpose of an actuarial valuation.

Amortization Payments

That portion of the pension plan contribution which is designated to pay interest on and to amortize unfunded liabilities.

ERISA

The Employee Retirement Income Security Act of 1974.

Normal Cost

That portion of the present value of future pension plan benefits and expenses which is allocated to a valuation year by the actuarial cost method.

Unfunded Actuarial Accrued Liability

The excess, if any, of the actuarial accrued liability over the actuarial value of assets.

Section 7

Cost Information

The 2014 hourly billing rates for the proposed employee benefits project team are shown below. Out-of-pocket expenses (such as travel expenses and shipping charges) will be billed based on actual charges incurred.

Employee Benefits Person	2014 Hourly Rate
Lead Consultant	\$440
Consulting Actuary	420
Actuary	345
Employee Benefits Consultant	345
Enrolled Actuary	300
Associate Actuary	275
Analyst	225
Clerical	95

The Hourly Rates shown above would be subject to adjustment each calendar year based on the increase in the CPI-U from September 2013 to the September immediately preceding that calendar year.

Our standard Consulting Services Agreement is attached in Appendix A. Milliman assumes no responsibility for performance prior to the execution of a contract acceptable to both parties.

Estimated Cost for Adequacy of Contribution Rates for OP&F Study

The following table outlines the estimated cost of performing the Adequacy of Contribution Rates for OP&F Study during 2014. As indicated below the estimated cost is \$24,815. This cost assumes that Glenn Bowen would present the results of the study at an ORSC meeting. The actual cost will be based on actual time and expense charges for completing the study.

Person / Expense	Estimated Number of Hours	Hourly Rate	Total Fees
Lead Consultant (Glenn Bowen)	16	\$440	\$7,040
Consulting Actuary	16	420	6,720
Consulting Actuary – Peer Review (Tim Herman)	4	420	1,680
Actuary	20	345	6,900
Analyst	6	225	1,350
Clerical	1	95	95
Subtotal	63		23,785
Airfare			680
Hotels/meals			250

Person / Expense	Estimated Number of Hours	Hourly Rate	Total Fees
Out-of-pocket travel			100
Total			\$24,815

Estimated Cost for Triennial ARP Supplemental Contribution Study for STRS only

The following table outlines the estimated cost of performing the triennial ARP Supplemental Contribution Study during 2014 for STRS only. As indicated below the estimated cost is \$33,980. This cost assumes that Glenn Bowen would present the results of the study at an ORSC meeting. The actual cost will be based on actual time and expense charges for completing the study.

Person / Expense	Estimated Number of Hours	Hourly Rate	Total Fees
Lead Consultant (Glenn Bowen)	16	\$440	\$7,040
Consulting Actuary	18	420	7,560
Consulting Actuary – Peer Review (Tim Herman)	4	420	1,680
Actuary	35	345	12,075
Analyst	20	225	4,500
Clerical	1	95	95
Subtotal	94		32,950
Airfare			680
Hotels/meals			250
Out-of-pocket travel			100
Total			\$33,980

As indicated above, the Triennial ARP Supplemental Contribution Study was assumed to be performed for STRS only. The cover memo by Aristotle Hutras to the last ARP Supplemental Contribution Study indicates there is uncertainty as to whether the ARP Supplemental Contribution Rate would resume for PERS or SERS. If an ARP Supplemental Contribution Study is required for either PERS or SERS, the estimated cost would be comparable to the amount shown above for STRS.

Section 8

Supplemental Required Information

The requested supplemental required information is provided below.

1. *Has your firm, or any of its principals, officers, or any affiliate ever been a party to any litigation or allegations concerning fraud, negligence, criminal activity, violation of law or regulations, or fiduciary responsibility?*

With over 30 offices throughout the United States, Milliman is subject to litigation from time to time in the normal course of its business activities. Such suits can arise in a variety of contexts. No litigation currently pending against Milliman will interfere with or jeopardize Milliman's ability to provide any of the services included in this proposal.

During the preceding 7 years, there has been no litigation or other legal proceeding involving the principals, practices or offices of Milliman that will be providing the services under this proposal. It is not Milliman's practice to provide information about claims or litigation unrelated to the office or practice involved in a proposal.

2. *Will the firm contractually agree to disclose all conflicts of interest that exist or occur and disclose all sources of revenue, affiliations, and details of other relationships that may present conflicts of interest? Does the firm have any active contractual agreements with any of the five state retirement systems? Has your firm, in the past two years, served as the consulting actuary of any of the state retirement systems? If so, what methods would be used to ensure that no conflict of interest is present in your work with respect to your contract with the retirement system or the ORSC?*

Yes, we will agree to disclose all conflicts of interest that exist or occur. Note that Milliman is independent of and has no financial relationships with outside organizations providing insurance, investment consulting services, accounting services, banking services, legal services, etc. Our income is derived solely from fees for services provided to our clients. This ensures that our advice and counsel will be independent and objective.

Although they have not performed any work in the past few years, the Milwaukee Health practice has an open-ended contract with the School Employees Retirement System of Ohio to provide health care consulting services. As the proposed project team for ORSC is not comprised of any members of the Milwaukee Health practice, no conflict of interest would occur. In addition, based on our understanding of the services that will or may be provided under this contract, it is not very likely that we would be asked to review any of the health care related work that would be provided by the Milwaukee Health practice.

In the past two years, Milliman has not served as consulting actuary to any of the five Ohio state retirement systems.

3. *Does the firm intend to utilize any subcontractors in delivering any elements of actuarial consulting services? If yes, explain.*

No.

4. *Provide the following information about the firm:*

- a. *A brief description of the structure of the firm, including the legal form of organization, the parent company, and any affiliated companies, strategic partnerships, and joint ventures.*

Milliman employs approximately 2,800 people, including a professional staff of over 1,400 qualified actuaries and consultants.

Milliman is wholly owned and managed by approximately 400 Principals, who have been elected in recognition of their technical, professional and business achievements. Our sole business is providing independent consulting services. We are not affiliated with any public accounting or brokerage firms. The consultants of the firm are not permitted to own stock in any insurance or reinsurance company, nor are our consultants allowed to own stock in client organizations. In these ways, Milliman is able to provide analyses and opinions that are totally independent and objective.

Milliman is a corporation, with its Chief Executive Officer, Chief Financial Officer, and most corporate staff located in Seattle. Milliman's Board of Directors includes the Chairman, CEO, Practice Directors from the four primary service areas and five at-large members who are also Principals of the firm. Milliman is entirely owned and managed by its Principals.

While not a formal affiliation, Milliman enjoys a long-standing professional relationship with Eckler in Canada, one of Canada's first actuarial practices, with offices located in major centres across Canada and the Caribbean.

- b. *With the past three years, have there been any significant developments in your organization such as changes in ownership, restructuring, or personnel reorganizations? Do you anticipate any significant structural changes in your organization in the next 12 months?*

No significant developments have occurred in the past three years and none are expected to occur in the next 12 months.

5. *Discuss rates of staff turnover for the past three calendar years, including the professional staff that left the firm in each period and reason for departure.*

Within the Philadelphia employee benefits practice, no staff turnover has occurred in the last three calendar years.

Milliman has a remarkable history of continuity in its professional staff. In fact, over the last 5 years, our turnover rate among Principals is less than 3%, and among all consultants is only 8%. These percentages have not varied much through Milliman's history, demonstrating incredible stability in our professional staff over the years.

Despite this history of stability, backup procedures are in place in the unlikely event that key professionals leave prior to retirement. The fact that Milliman has a significant number of leading consultants in multiple offices throughout the country gives us the ability to withstand the impact of the rare, unexpected personnel departure by drawing upon the expertise in those other offices, if needed, thus providing for an orderly transition should any key professional leave unexpectedly.

6. *Describe your firms' philosophy as it pertains to providing actuarial services. What role does the firm see itself playing for a client such as the ORSC? What do you see as the value your firm can provide to the ORSC?*

Milliman's philosophy to providing actuarial and consulting services is to provide the best quality and independent service to our clients. Our consultants achieve the highest credentials in their fields and are unmatched in the industry. We pride ourselves on our responsiveness and customized solutions. Furthermore, the results of actuarial analyses are necessarily complex, and we pride ourselves on our ability to clearly communicate these results to our clients. In summary, we are committed to bringing depth, clarity and context to the issues and challenges that our clients face every day

Project Team Roles

The role of the proposed project team is to provide objective analysis and independent, unbiased advice to the ORSC. Providing reports and analyses in a timely manner is also a very important role. Communicating the results in a non-technical manner will also be an important role for the project team.

Another key role is to inform ORSC with the knowledge, factors and results to make key informed decisions. In many cases, the impact of making decisions today about pension funds will not be known for several years. Understanding the various assumptions utilized and the sensitivity to changes in those assumptions in determining results is a very important element in communicating the results.

Milliman's Commitment to Public Sector

Governmental actuarial services are our priority, as the firm's largest clients are in the public sector. Milliman has performed actuarial studies or valuations for over two-thirds of the state retirement systems.

Milliman offers a wide range of consulting expertise on the federal, state and municipal levels. Milliman consultants have experience with several hundred public retirement systems. Our expertise covers all aspects of PERS including actuarial valuations, experience investigations, development of plan costs, actuarial reviews, working with PERS staff on administrative, disclosure, communication and record keeping issues, and testifying before legislative committees and governing boards.

Milliman's commitment to the public sector is substantial by any measure:

- Milliman publishes PERiScope, a newsletter that covers current issues and trends in public sector plans.
- Milliman consultants frequently speak at national meetings and serve on advisory committees to such public groups as the Governmental Accounting Standards Board.
- Milliman has been instrumental in the preparation and authorship of two texts, Retirement Systems for Public Employees and Benefit Design in Public Retirement Systems. These texts are recognized by legislators and trustees as authoritative references in the area of public employee retirement systems.

Samples of recent publications are included in Appendix B.

This commitment to the public sector will bring value to the ORSC as our experience with other public retirement systems will enhance our ability to serve ORSC.

Appendix A

Consulting Services Agreement

We have shown below our standard consulting services agreement. We would be glad to use this agreement for our work for the ORSC or negotiate other mutually agreeable provisions.

CONSULTING SERVICES AGREEMENT

This Agreement is entered into between Milliman, Inc. (Milliman) and the Ohio Retirement Study Council ("Plan Sponsor") as of _____. Plan Sponsor has engaged Milliman to perform actuarial and consulting services related to its retirement plan(s). Such services may be modified or expanded from time to time. In consideration for Milliman agreeing to perform these services, Plan Sponsor agrees as follows:

- 1. Engagement Terms.** Plan Sponsor acknowledges the obligation to pay Milliman for services rendered, whether arising from Plan Sponsor's request or otherwise necessary as a result of this engagement, at Milliman's standard hourly billing rates for the personnel utilized plus all out-of-pocket expenses incurred. Milliman will bill Plan Sponsor periodically for services rendered and expenses incurred. All invoices are payable upon receipt. Milliman reserves the right to stop all work if any bill goes unpaid for 60 days. Furthermore, Milliman's engagement may be terminated upon ninety days written notice by Milliman or Plan Sponsor. Regardless of the reason for termination of services, Milliman shall be entitled to payment for services completed prior to such termination and Milliman shall retain any records it has relating to the Plan Sponsor plans for a period of at least three years from date of termination. If Milliman's assistance is reasonably required past termination, such services shall be provided at Milliman's then standard hourly rate unless another basis is agreed to by both parties.
- 2. Tool Development.** Milliman shall retain all rights, title and interest (including, without limitation, all copyrights, patents, service marks, trademarks, trade secret and other intellectual property rights) in and to all technical or internal designs, methods, ideas, concepts, know-how, techniques, generic documents and templates that have been previously developed by Milliman or developed during the course of the provision of the Services provided such generic documents or templates do not contain any Plan Sponsor Confidential Information or proprietary data. Rights and ownership by Milliman of original technical designs, methods, ideas, concepts, know-how, and techniques shall not extend to or include all or any part of the Plan Sponsor's proprietary data or Plan Sponsor Confidential Information. To the extent that Milliman may include in the materials any pre-existing Milliman proprietary information or other protected Milliman materials, Milliman agrees that Plan Sponsor shall be deemed to have a fully paid up license to make copies of the Milliman owned materials as part of this engagement for its internal business purposes and provided that such materials cannot be modified or distributed outside the Plan Sponsor without the written permission of Milliman.
- 3. Limitation of Liability.** Milliman will perform all services in accordance with applicable professional standards. The parties agree that Milliman, its officers, directors, agents and employees, shall not be liable to Plan Sponsor, under any theory of law including negligence, tort, breach of contract or otherwise, for any damages in excess of three (3) times the total professional fees paid to Milliman during the 12 month plan year cycle during which the work in question is performed. In no event shall Milliman be liable for lost profits of Plan Sponsor or any other type of incidental or consequential damages. The foregoing limitations shall not apply in the event of the intentional fraud or willful misconduct of Milliman. The provisions of this Section will survive the expiration or termination of this Agreement.

4. Disputes. Dispute Resolution

- a. **Mediation.** In the event of any dispute arising out of or relating to the engagement of Milliman by Plan Sponsor, the parties agree first to try in good faith to settle the dispute voluntarily with the aid of an impartial mediator who will attempt to facilitate negotiations. A dispute will be submitted to mediation by written notice to the other party or parties. The mediator will be selected by agreement by the parties. If the parties cannot agree on a mediator, a mediator will be designated by the American Arbitration Association at the request of a party. The mediation will be treated as a settlement discussion and therefore will be confidential. Any applicable statute of limitations will be tolled during the pendency of the mediation. Each party will bear its own costs in the mediation. The fees and expenses of the mediator will be shared equally by the parties.
 - b. **Arbitration.** If the dispute has not been resolved within 60 days after the written notice beginning the mediation process (or a longer period, if the parties agree to extend the mediation), the mediation will terminate, and the dispute will be resolved by final and binding arbitration under the Commercial Arbitration Rules of the American Arbitration Association. The arbitration will be before a panel of three arbitrators. Within 30 days of the commencement of the arbitration, each party will designate in writing a single neutral and independent arbitrator. The two arbitrators designated by the parties will then select a third arbitrator. The arbitrators will have a sufficient background either in employee benefits, actuarial science, or law to reasonably prepare them to decide a dispute. The arbitrators will have the authority to permit limited discovery, including depositions, prior to the arbitration hearing, and such discovery will be conducted consistent with the Federal Rules of Civil Procedure. The arbitrators will have no power or authority to award punitive or exemplary damages. The arbitrators may, in their discretion, award the cost of the arbitration, including reasonable attorney fees, to the prevailing party. Any award made may be confirmed in any court having jurisdiction. Any arbitration shall be confidential, and except as required by law, neither party may disclose the content or results of any arbitration hereunder without the prior written consent of the other parties, except that disclosure is permitted to a party's auditors and legal advisors.
- 5. No Third Party Distribution.** Milliman's work is prepared solely for the use and benefit of Plan Sponsor in accordance with its statutory and regulatory requirements. Milliman recognizes that materials it delivers to Plan Sponsor may be public records subject to disclosure to third parties; however, Milliman does not intend to benefit and assumes no duty or liability to any third parties who receive Milliman's work, and Milliman may include disclaimer language on its work product so stating. Plan Sponsor agrees not to remove any such disclaimer language from Milliman's work. To the extent that Milliman's work is not subject to disclosure under applicable public records laws, Plan Sponsor agrees that it shall not disclose Milliman's work product to third parties without Milliman's prior written consent; provided, however, that Plan Sponsor may distribute Milliman's work to (i) its professional service providers who are subject to a duty of confidentiality and who agree to not use Milliman's work product for any purpose other than to provide services to Plan Sponsor, or (ii) any applicable regulatory or governmental agency, as required.
- 6. Handling of Data and Other Confidential Information.** Milliman shall use reasonable efforts to identify errors in data and obtain corrections to erroneous data, but Milliman cannot warrant the correctness of data supplied by Plan Sponsor or other parties, nor can Milliman be responsible for data not provided in a timely manner. Any information received from Plan Sponsor will be considered "Confidential Information." However, information received from Plan Sponsor will not be considered Confidential Information if (a) the information is or comes to be generally available to the public during the course of Milliman's work; (b) was independently developed by Milliman without resort to information from the Plan Sponsor; or (c)

Milliman Proposal

Milliman receives the information from another source who is not under an obligation of confidentiality to Plan Sponsor. Milliman agrees that Confidential Information shall not be disclosed to any third party.

- 7. **Status of Milliman.** Milliman will provide the services covered by this agreement as an independent contractor. No other relationship to the Plan Sponsor nor the plan is implied or intended. Milliman shall not be deemed to be a "named fiduciary" or "plan administrator" as these terms are defined under ERISA or any similar or successor law.

- 8. **Choice of Law.** The construction, interpretation, and enforcement of this Agreement shall be governed by the substantive contract law of the State of New York without regard to its conflict of laws provisions. In the event any provision of this Agreement is unenforceable as a matter of law, the remaining provisions will stay in full force and effect.

MILLIMAN, INC.

OHIO RETIREMENT STUDY COUNCIL

By: _____

By: _____

Name: _____

Name: _____

Title: _____

Title: _____

Date: _____

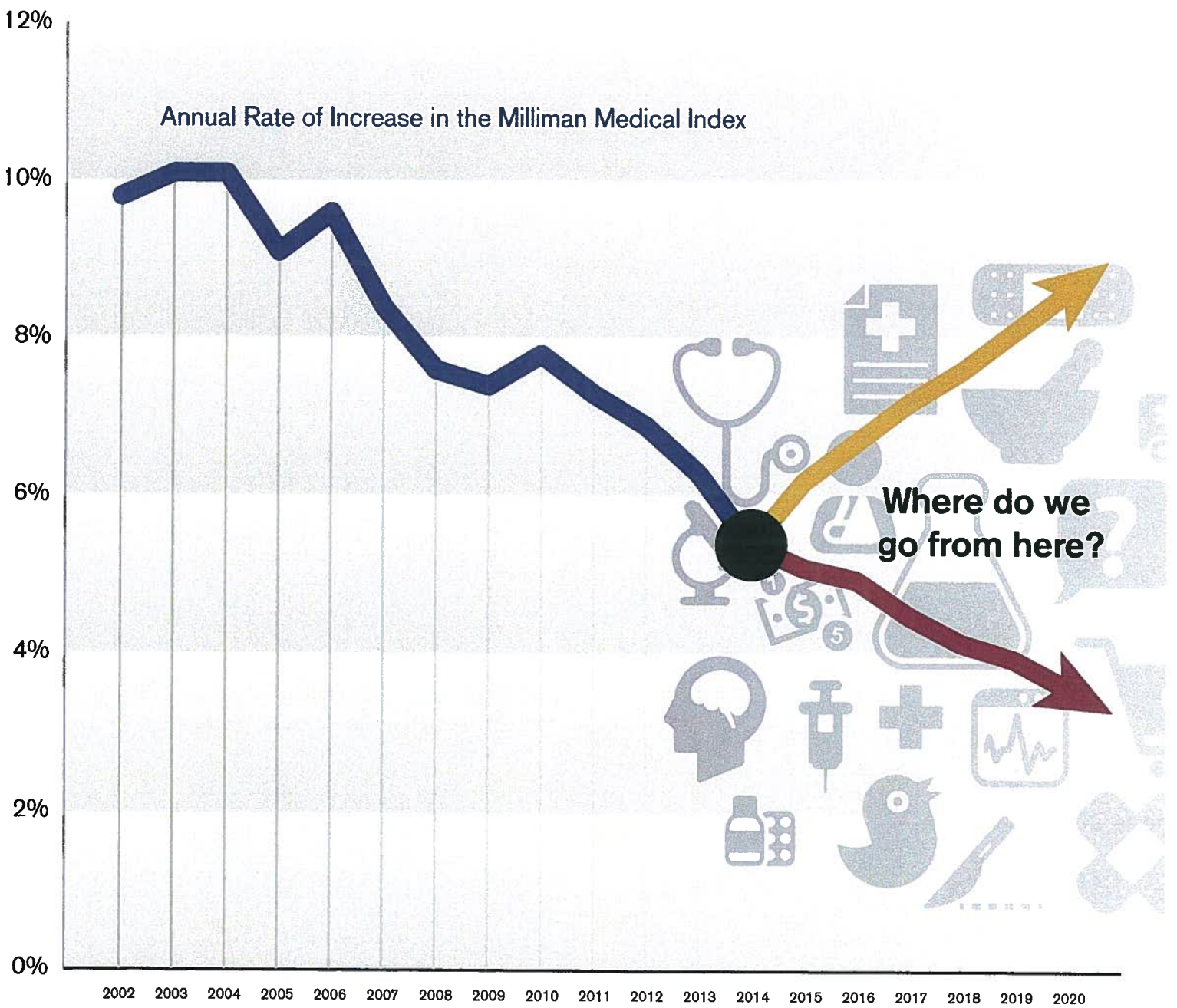
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Appendix B

Sample Milliman Publications



2014 Milliman Medical Index





Executive summary	1
Components of cost	3
Employees' share of healthcare costs	5
Drivers of annual cost increase	7
Technical appendix	9

EXECUTIVE SUMMARY

\$23,215. That's how much is spent in 2014 on healthcare for a typical American family of four covered by an average employer-sponsored health plan according to the 2014 Milliman Medical Index (MMI).¹ And yet while the amount has more than doubled over the past 10 years, growing from \$11,192 to \$23,215, the 5.4% growth rate from 2013 to 2014 is the lowest annual change since the MMI was first calculated in 2002.

Employers pay the largest portion of healthcare costs, contributing \$13,520 per year, or 58% of the total. However, increasing proportions of costs have been shifted to employees. Since 2007, when the economic recession began, the average cost to employers has increased 52%—an average of 6% per year—while the expenses borne by the family, through payroll deductions and out-of-pocket costs, have grown at an even faster rate, 73% (average of 8% per year).

Throughout this report we review the various components of the cost increases, how they are shared between employers and employees, and what key drivers are most likely to affect healthcare costs in 2014 and beyond.

Key findings

As measured by the 2014 MMI, the total annual cost of healthcare for a typical family of four covered by an employer-sponsored preferred provider plan (PPO) is \$23,215 (see Figure 1). Key observations are:

- The MMI has more than doubled over the past 10 years (107% increase from 2004 to 2014), growing from \$11,192 in 2004 to \$23,215 in 2014.
- Although healthcare costs continue to rise, the overall annual rate of increase in the cost of care for the family of four is at its lowest level since we first calculated the MMI in 2002. During those years, the annual increase in cost ranged from a high of 10.1%, in both 2003 and 2004, to a low of 5.4% in 2014. The rate of increase dropped by nearly a full percentage point, from 6.3% in 2013 to 5.4% in 2014. As discussed later in this report, this significant decline was likely due to a confluence of forces rather than any single event.
- In almost every year of the past 10, growth rates have decelerated. Figure 2 shows the most recent five years of that deceleration.

FIGURE 1

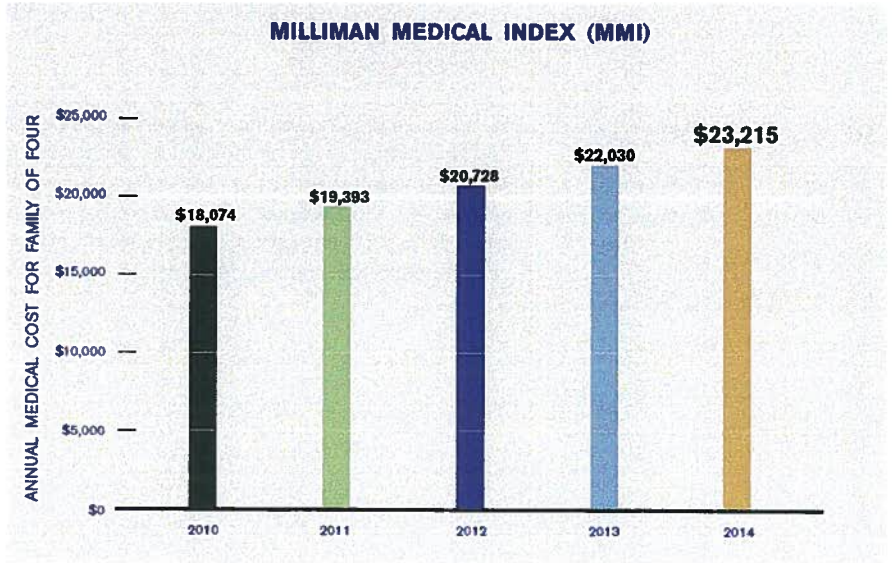
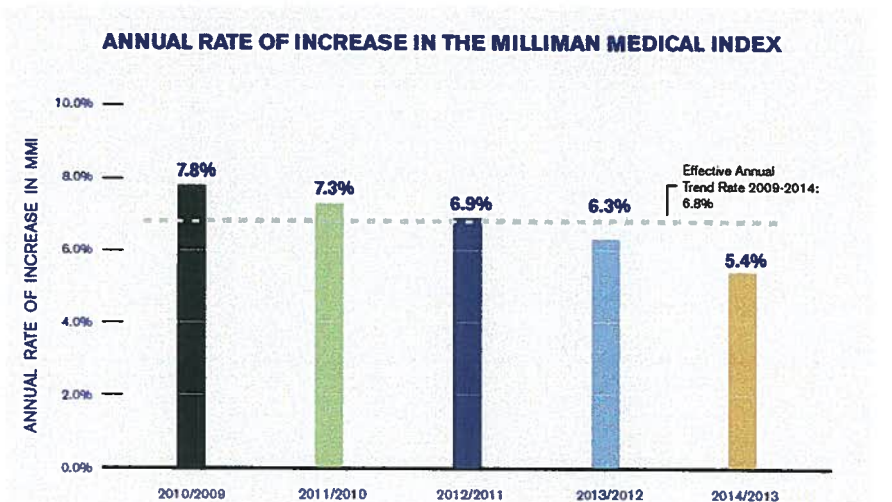


FIGURE 2



¹ The Milliman Medical Index is an actuarial analysis of the projected total cost of healthcare for a hypothetical family of four covered by an employer-sponsored preferred provider organization (PPO) plan. Unlike many other healthcare cost reports, the MMI measures the total cost of healthcare benefits, not just the employer's share of the costs, and not just premiums. The MMI only includes healthcare costs. It does not include health plan administrative expenses or profit loads.

- In each of the past four years, employees have assumed an increasing percentage of the total cost of care. The total employee cost (payroll deductions plus out-of-pocket expenses) increased by approximately 32% from 2010 to 2014, while employer costs (premium contributions) increased by 26%.

Although the annual rate of increase is down, it is still well above the rate of growth in the consumer price index (CPI).

Although the annual rate of increase is down, it is still well above the rate of growth in the consumer price index (CPI).² However, when and how future annual rates of increase will continue to change is unclear, and may depend on a number of factors such as:

- The economy
- Supply and demand influences
- Healthcare provider engagement in cost control
- Specialty pharmacy
- Transparency

So far, the emerging reforms required by the Patient Protection and Affordable Care Act (ACA) have had little direct impact on the cost of care for our family of four.

So far, the emerging reforms required by the Patient Protection and Affordable Care Act (ACA) have had little direct impact on the cost of care for our family of four in 2014 because this family tends to be insured through large group health plans. Some of the most far-reaching reforms are focused on access to insurance in the individual and small employer markets. Additionally, while the reforms are having immediate impacts on premium rates in those markets (the individual market, in particular), it is unclear whether they will ultimately have meaningful effects on growth in the cost of healthcare services.

² Over the 10-year period from 2004 through 2014, CPI has increased by approximately 2.3% per year, while the MMI has average annual increases of 7.6%.

COMPONENTS OF COST

The MMI examines the cost of healthcare under five separate categories of services:

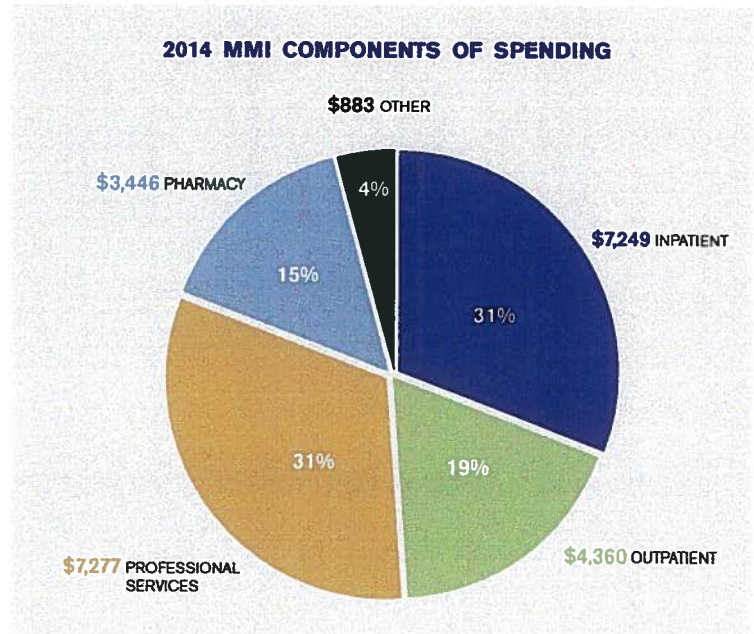
- Inpatient facility care
- Outpatient facility care
- Professional services
- Pharmacy
- Other services

As shown in Figure 3, for the MMI family of four, care provided by physician and other professional services accounts for 31% of the total spending. Inpatient and outpatient facility care account for 31% and 19% of the total, respectively, while pharmacy costs represent 15% of the total cost of healthcare for our family of four. The "Other" category of healthcare spending is the 4% of care that doesn't fall into one of the other four categories. It includes such things as durable medical equipment, miscellaneous supplies, ambulance, and home health.

At \$7,249 in 2014 (see Figure 4 on page 4), inpatient facility costs grew by 5.7% (see Figure 5 on page 4), a rate similar to the 5.4% total growth rate for all services combined. Notably, inpatient hospital utilization rates, as measured by total days in the hospital, increased slightly. Over the previous five years, annual increases in inpatient utilization have averaged just below zero, meaning that utilization decreased slightly during that time. The utilization uptick may be one sign of a recovering economy, as people opt for procedures that they postponed during times of greater economic uncertainty. It may also be due, in part, to the "wearing off" of one-time utilization reductions resulting from implementation of hospital performance incentives, such as the readmission penalty program that the ACA established for Medicare patients. Although the MMI measures employer health plan costs, not Medicare costs, there are spillover effects from the high-volume Medicare patient population that affect how commercial and other patients are treated as well.

In recent years, increases in outpatient facility costs have also moderated. In 2014, outpatient facility costs increased 8.0%, down from an average of 9.9% over the previous five years. Much of the decline in outpatient facility cost growth has been attributable to slower growth in average costs per service. In the past it was common for health plans to contract with hospitals such that they would be paid a percentage discount from billed charges (e.g., a 30% discount from the hospital's normal billed charges). In its simplest form, that method does not control the growth rate in average costs per service, because hospitals have some discretion in how much they increase their billed charge amounts. Increasingly, however, health plans are contracting using methods that more effectively control unit costs. Such methods include paying fixed case rates for services such as emergency room services or MRIs, or defining rates according to some benchmark that tends to grow more slowly, such as Medicare allowable fee levels.

FIGURE 3



3 As it has in prior MMIs, the professional services category includes doctors, physician assistants, nurse practitioners, chiropractors, hearing and speech therapists, physical therapists, and other clinicians.

FIGURE 4

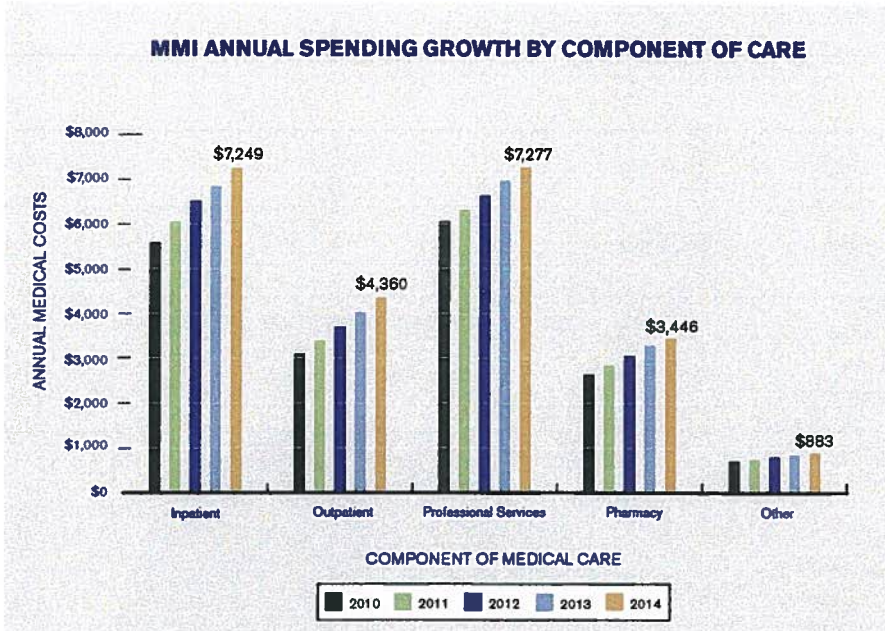
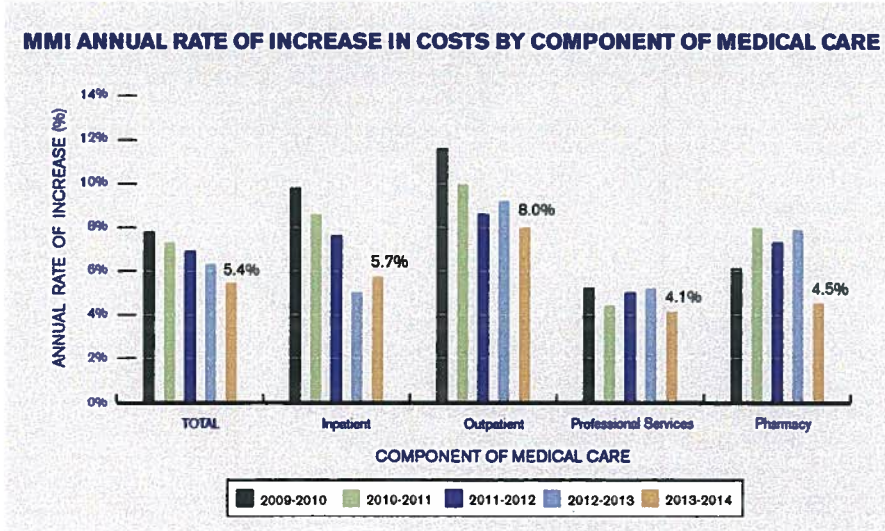


FIGURE 5



The 2014 increase in physician costs and other professional services was 4.1%. This is somewhat lower than the 5.2% average over the previous five years. In most years, including 2014, approximately 1% of the increase has been due to utilization increases (more services delivered, per person). The rest of the 4.1% is due to increases in average cost per service. Part of the average cost per service increase is a result of changes in the mix of services. For example, when local practice patterns change and expensive procedures, such as colonoscopies, are shifted from outpatient hospital departments into physician offices, it tends to affect the average cost per service in both treatment settings.

Pharmacy costs for the MMI family of four increased 4.5% over 2013. The shift of utilization from brand-name drugs to generics continues, but at a slower pace than in past years. Recently there have been fewer new brand-name drugs, and the patents have expired on several existing brand-name drugs, resulting in more prescriptions moving to generic. Pharmacy benefits also have somewhat limited protection from annual price increases, like hospital charges as discussed earlier in this report section. The price that a health plan is willing to pay for a prescription drug is often contractually defined as a discount from average wholesale price (AWP), particularly for brand-name drugs, but those AWP amounts are outside the control of insurance companies.

EMPLOYEES' SHARE OF HEALTHCARE COSTS

The total cost of healthcare for the MMI family of four is shared by employers and employees. To clearly define each payment source, we use three main categories:

- **Employer subsidy.** Employers that sponsor health plans subsidize the cost of healthcare for their employees by allocating compensation dollars to pay a large share of the cost. The portion paid by the employer typically varies according to the benefit plan option that the employee selects.
- **Employee contribution.** Employees who choose to participate in the employer's health benefit plan typically also pay a substantial portion of costs, usually through payroll deductions.
- **Employee out-of-pocket cost at time of service.** When employees receive care they also often pay for a portion of these services via health plan deductibles and/or point-of-service copays. While these payments are capped by out-of-pocket maximums as legislated by the ACA,⁴ these costs are still material to the employee.

The MMI is unique in that it measures only healthcare costs rather than insurance premiums, which would include loads for a health plan's administrative expenses, taxes, and profit. Premiums exclude out-of-pocket costs at time of service that are borne entirely by employees. To form a complete picture, the MMI includes these out-of-pocket costs as a component of the total healthcare spending.

Figure 6 shows the relative proportions of the three categories we track annually. Employers continue to subsidize their employees' healthcare costs by paying an average of 58% of the total cost of healthcare in 2014. Of the \$23,215 medical cost for a typical family of four, the employer pays about \$13,520 while the employee pays the remaining \$9,695, which is a combination of \$5,908 in employee payroll deductions and \$3,787 in out-of-pocket costs when they utilize medical services.

FIGURE 6

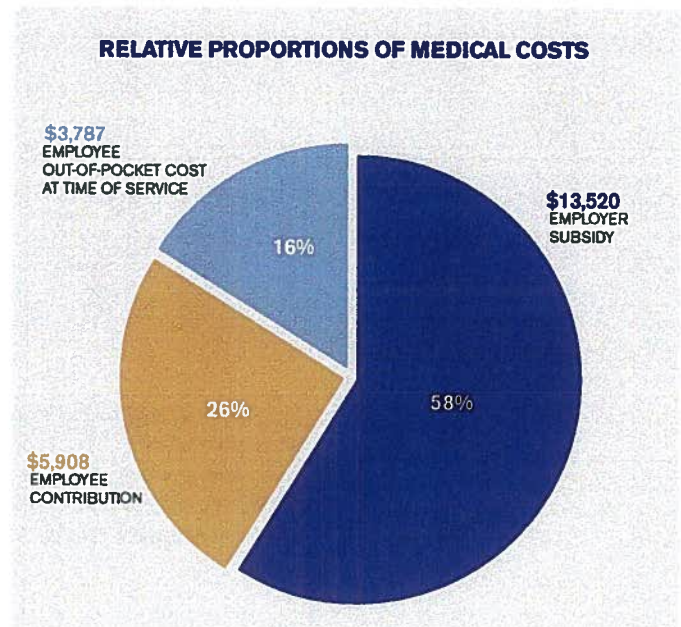
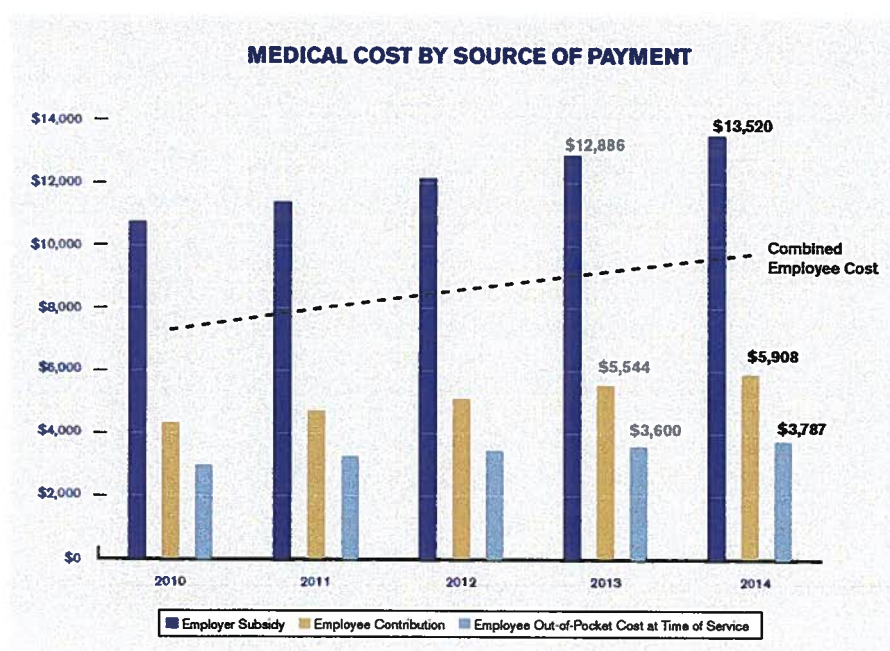


FIGURE 7

Employee costs (combined employee contributions and out-of-pocket costs) increased by 6.0% in 2014. This year's increase is less than in prior years (6.5% in 2013 and 7.2% in 2012). This good news for employees is offset by the fact that employees continue to bear more of the overall healthcare spending, according to the MMI—rising from 40.6% in 2010 to 41.8% in 2014.

Figures 7 and 8 illustrate how cost sharing has evolved over time. Employers adjust benefits each year in line with their healthcare budget constraints. In 2014, employers assumed \$633 of the total increase in the cost of care for the family of four. Employees saw a dollar increase of \$552 (\$365 from increased payroll deductions and \$187 from more out-of-pocket expenses). The employees' 6.0% increase is comprised of a 5.2% increase in employee out-of-pocket costs and 6.6% increase in payroll deductions. In other words, while both employer and employee costs increased, the employee experienced a larger percentage increase.



⁴ Out-of-pocket maximums for 2014 must not exceed \$6,350 per person and \$12,700 per family.

FIGURE 8

ANNUAL INCREASE IN SPENDING SPLIT BY EMPLOYER AND EMPLOYEE PORTIONS					
	2010/09	2011/10	2012/11	2013/12	2014/13
TOTAL MEDICAL COST (EMPLOYER & EMPLOYEE)	7.8%	7.3%	6.9%	6.3%	5.4%
EMPLOYEE OUT-OF-POCKET COST AT TIME OF SERVICE	6.6%	9.2%	5.8%	3.7%	5.2%
EMPLOYEE CONTRIBUTION	8.0%	9.3%	8.2%	8.4%	6.6%
EMPLOYER SUBSIDY	8.0%	6.0%	6.7%	6.1%	4.9%

The ACA introduced the concept of “metallic levels” for benefit plans starting in 2014. Individual and small group policies provided on the state exchanges must have a metallic level of “bronze” or higher; bronze implies that, on average, the plan will pay 60% of the costs for the essential health benefits (EHBs) that must be provided by the benefit plan. To help avoid penalties, larger employers must provide plans that, on average, pay at least 60% of the cost of covered services, a threshold deemed “minimum value.” The MMI plan has an actuarial value of approximately 83.7%.

In addition to a typical PPO plan, many employers offer their employees other plan options. A common alternative to a PPO is a “consumer-driven option” that includes higher out-of-pocket cost sharing. In return, many employers contribute to a health savings account (HSA) or a health reimbursement arrangement (HRA) and otherwise incentivize employees to participate in these plans as part of a larger effort to promote greater cost awareness by patients. For more on consumer-driven health plans, see the sidebar below.

Consumer-driven health plans and the MMI

The annual Milliman Medical Index measures the total cost of healthcare for a typical family of four covered by a preferred provider plan. Because 72% of firms offer some form of consumer-driven health plan (CDHP)—with 22% of employers planning to implement a total replacement CDHP in 2013**—many people ask how the MMI would change for a family of four covered by one of these plans instead of a PPO. Here we begin to answer some of those questions.

Employee out-of-pocket. Employees typically pay more at the point of service with CDHPs because deductibles and other cost-sharing features are often higher versus the MMI PPO plan.

Employee contribution. Payroll deductions are often lower for CDHP plans. In some instances, employers set a fixed defined contribution that is the same for all plans offered. Since CDHP premiums are lower cost than other plans, this results in a lower payroll deduction.

Employer contribution to CDHP account. The accounts paired with CDHPs offer a way to save for future expenses that the typical PPO does not. Keep in mind that, on average, employees will use a good portion of the contribution made by their employers on plan cost sharing for deductibles and coinsurance. However, employees that use few healthcare services and/or regularly invest in these accounts can accumulate meaningful amounts to be spent on future healthcare expenses on a pre-tax basis.

Total cost of care. CDHPs tend to have higher deductibles than other plans, which encourages lower utilization of services, and therefore yields lower total healthcare costs.

Milliman will publish additional research on typical costs for a family of four covered by a CDHP later this year.

** National Business Group on Health (August 28, 2013). Large U.S. Employers Project a 7% Increase in Health Care Benefit Costs in 2014, National Business Group on Health Finds. Accessed May 15, 2014, at <http://www.businessgrouphealth.org/pressroom/pressRelease.cfm?ID=214>

COMPARING HEALTHCARE COSTS UNDER PPO VS. CDHP COVERAGE

	PPO	CDHP
EMPLOYEE OUT-OF-POCKET	\$3,787	↑
EMPLOYEE CONTRIBUTION	\$5,908	↓
EMPLOYER SUBSIDY	\$13,520	DEPENDS
EMPLOYER CONTRIBUTION TO CDHP ACCOUNT	NA	↑
TOTAL COST OF CARE (MMI)	\$23,215	↓

DRIVERS OF ANNUAL COST INCREASE

While costs increased at a slower rate in 2014, it is a difficult challenge to isolate the exact drivers of the phenomenon, given the number of changes going on in healthcare.

The economy

The slow economy has influenced healthcare spending in recent years. For our family of four, annual cost increases have been held at bay due to less income being available for discretionary healthcare spending and reduced provider investment. History tells us that an improvement in the U.S. economic environment will give an upward push to annual healthcare cost increases. However, experts disagree on the strength of the current economic recovery and when it will begin to exert upward pressure on healthcare costs. This year's MMI assumes that the recovery will have limited effect on healthcare costs in 2014, with the cost pressure lagging behind economic improvement. Additionally, some recent one-time impacts are likely to persist even after the economy recovers, such as large employers' actions to reduce costs through higher cost sharing and reduced spousal and family coverage.

Supply/demand influences

While the ACA may not have a significant direct impact on the employer group market measured by the MMI, changes to other markets are likely to have ripple effects. The expansion of coverage through Medicaid and the exchanges could increase demand for healthcare services. Some of that demand will be short-term, due to pent-up demand for services, but more critically, the long-term demand will probably be higher as a greater percentage of the U.S. population has health insurance coverage. This greater demand for services will put pressure on supply, possibly leading to higher provider reimbursement rates and costs. A systemic increase in utilization could crowd out our typical family of four from receiving certain services, thereby impacting their utilization. We may also see cost shifting to the employer group market because the reimbursement rates tend to be lower in the markets that are expanding; on the other hand, insurers' negotiations with providers for the exchange market may push down the rates across all lines of business. Finally, some providers may be willing to accept lower rates than in the past, perhaps due to a reduction in uncompensated care for the uninsured. The interactions are complex, and the impacts are likely to vary by geographic area.

Healthcare provider engagement in cost control

Increased provider engagement in cost control has helped keep annual cost increases down in recent years. In some cases there may have been one-time cost decreases, such as the reduction in hospital readmissions that is due to changes to Medicare reimbursement policies; other payment reforms may have implications in 2015 and beyond. Provider organizations are becoming more accustomed to risk-taking and looking for efficiencies through clinical integration, thereby influencing costs throughout the system.

While many of the payment reform programs, such as accountable care organizations (ACOs) and bundled payment models, have been introduced in the Medicare program (and to a lesser extent in Medicaid), they have spillover effects for all payors. Use of these models is expected to expand in future years, and may continue to influence future annual cost increases as the more effective models become permanent parts of the healthcare delivery and financing systems.

Specialty pharmacy

Specialty drug utilization rates are increasing. Specialty drugs are currently used by a small percentage of people to treat such conditions as hepatitis C, multiple sclerosis, cystic fibrosis, and cancer, but their costs are extremely high. Medicare defines a specialty drug as one that costs more than \$600 per month, but many specialty drugs cost much more.

History tells us that an improvement in the U.S. economic environment will give an upward push to annual healthcare cost increases. However, experts disagree on the strength of the current economic recovery and when it will begin to exert upward pressure on healthcare costs.

Increased provider engagement in cost control has helped keep annual cost increases down in recent years.

Increased transparency of pricing and expected out-of-pocket costs will ensure that patient costs are a part of the purchasing decision, which has not historically been true in healthcare when people are covered by relatively rich benefit plans.

The act of being able to sort available plans by price will ensure that consumers can act in their own economic self-interest while also motivating health insurance companies to offer affordable plans.

Transparency

Costs may be pressured downward as healthcare delivery and purchasing becomes more transparent. Key examples of this include:

Consumerism. The consumerism movement is about engaging consumers to maximize value in their healthcare purchases. Value may be defined in terms of cost, quality, choice, or other metrics. Increased transparency of pricing and expected out-of-pocket costs will ensure that patient costs are a part of the purchasing decision, which has not historically been true in healthcare when people are covered by relatively rich benefit plans. With the excise “Cadillac” tax coming online in 2018, some employer plans that have traditionally been very rich have begun to shift toward leaner plans—resulting in a more meaningful opportunity to participate in the consumerism movement.

Premium rate filing transparency. Individual and small group premium rates—and in some states, large group rates—must be submitted to insurance regulators for review and approval. Those rate filings are increasingly publicly available and the requested rate increases, particularly for large carriers, often end up in the newspaper. The heightened public scrutiny may accentuate existing efforts to keep premium rate increases low. While premium rates include loads for carrier administrative expenses and profit, which are not included in the MMI, most of a premium (usually 80% to 90%, or more) pays for healthcare expenses.

Product homogenization. The ACA has made plan comparability a high priority in the individual and small group markets through introduction of metallic-level benefit richness requirements, and it has simplified comparison shopping in all markets by prohibiting dollar-based benefit limits, setting limits on out-of-pocket maximums, introducing minimum value standards, and imposing other requirements that affect all commercial health insurance plans.

Exchanges. Health insurance exchanges facilitate transparency and comparison of products. The act of being able to sort available plans by price will ensure that consumers can act in their own economic self-interest while also motivating health insurance companies to offer affordable plans. Over time, we expect this to affect large group plans as well. For more information, see the sidebar on private exchanges below.

How we balance our competing desires to have the best care, freedom of choice, cost control, and appropriate rewards for innovation, investment, and positive patient outcomes will steer future healthcare cost trends up or down. Creative solutions will be needed. The ACA may have planted some seeds that will ultimately bear fruit through increased transparency, experimentation with provider risk taking, and focus on outcomes such as through the new Patient Centered Outcomes Research Institute. As these efforts mature, we may begin to see what effects they will have on healthcare costs. And we will see whether additional (and possibly paradigm-changing) innovations will still be needed.

Private exchange movement and the MMI

What is a private exchange?

A private exchange is a virtual marketplace, similar to the individual and small group health insurance exchanges established by the ACA. However, the private exchanges are developed by employer coalitions, employee benefits consulting firms, or other entities, and are primarily intended to serve large employer groups.

Why are employers interested in private exchanges?

Private exchanges can provide flexible one-stop shopping solutions for employers and employees to purchase a variety of benefits, including health insurance, life insurance, and other ancillary insurance products. Multiple carriers may participate in the exchanges, providing variety of choice and facilitating price competition through transparency and through competitive bidding by carriers for the opportunity to sell in

the exchange. The exchanges also help employers implement defined contribution approaches where they contribute a fixed amount per employee. Employees can then choose from any benefit plan offered in the exchange and contribute their share of the health insurance premium with pre-tax dollars.

How will private exchanges impact health care costs and trends?

Whether the private exchange movement will have any material effect on the overall cost of care tracked by the MMI is uncertain. Time will tell if the improved transparency and ease of comparison among products and prices will help to control healthcare costs. For more information on private exchanges, reference our library of private exchange publications.*

* www.healthcarenation.com/?p=7466

TECHNICAL APPENDIX

The Milliman Medical Index (MMI) is made possible through Milliman's ongoing research in healthcare costs. The MMI is derived from Milliman's flagship health cost research tool, the Health Cost Guidelines™, as well as a variety of other Milliman and industry data sources, including Milliman's MidMarket Survey.

The MMI represents the projected total cost of medical care for a hypothetical American family of four (two adults and two children) covered under an employer-sponsored PPO health benefit program. The MMI reflects the following:

- Nationwide average provider fee levels negotiated by insurance companies and preferred provider networks
- Average PPO benefit levels offered under employer-sponsored health benefit programs⁵
- Utilization levels representative of the average for people covered by large employer group health benefit plans in the United States

Variation in costs

While the MMI measures costs for a typical family of four, any particular family or individual could have significantly different costs. Variables that impact costs include:

Age and gender. There is wide variation in costs by age, with older people generally having higher average costs than younger people. Variation also exists by gender. Our MMI-illustrated family of four consists of a male age 47, a female age 37, a child age four, and a child under age one. This mix allows for demonstration of the range of services typically utilized by adult men, women, and children. Average utilization and costs of specific services will be different for other demographic groups.

Individual health status. Tremendous variation also results from health status differences. People with severe or chronic conditions are likely to have much higher average healthcare costs than people without these conditions.

Geographic area. Significant variation exists among healthcare costs by geographic area because of differences in healthcare provider practice patterns and average costs for the same services. For example, the relative cost of living affects healthcare costs, as labor costs (e.g., nurses and technicians) tend to be higher in areas where the cost of living is higher. Access to advanced technology also affects the utilization of services by geographic area.

Provider variation. The cost of healthcare depends on the specific providers used. Even in the same city, costs for the same service can vary dramatically from one provider to another. The cost variation results from differences in billed charge levels, discounted payment rates that payors have negotiated, and implementation of payment methodologies that may influence utilization rates, such as capitation or case rates.

Insurance coverage. The presence of insurance coverage and the amount of required out-of-pocket cost sharing also affects healthcare spending. With all other variables being equal, richer benefit plans usually have higher utilization rates and costs than leaner plans.

For further perspective on how the Milliman Medical Index fits in the evolving healthcare system, visit our blog at:

[www.healthcaredownhall.com/
?tag=milliman-medical-index](http://www.healthcaredownhall.com/?tag=milliman-medical-index)

⁵ For example, for 2014 average benefits are assumed to have an in-network deductible of \$725, various copays (e.g., \$131 for emergency room visits, \$29 for physician office visits, \$11/18%/28% for generic/formulary brand/non-formulary brand drugs), and coinsurance of 18% for non-copay services, etc.



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BENEFITS PERSPECTIVES

Current Issues in Employee Benefits

Qualified Plans Must Come to Terms With Death: Who Is the Beneficiary?

Dawilla Madsen, APM, CLU, ERPA | Dominick Pizzano, CEBS

In a perfect world, all tax-qualified retirement plan participants would live to enjoy their retirement benefits throughout their golden years. However, this is not always the case, and just as individuals should plan for the possibility of premature death, plan sponsors also should do so.

There are numerous federal requirements governing retirement plan distributions upon the death of a participant. There are also a few rules that give a plan sponsor some flexibility in the payment features it wishes to include. The determination of who receives a participant's death benefit falls into both camps with its share of legally required and discretionary provisions. Accordingly, the qualified plan document and its underlying forms should contain tightly drafted language that is compliant with the current regulations and clear enough to guide the plan administrator on the practical execution of such provisions. In addition, the plan sponsor must have administrative procedures that facilitate the accurate identification of the intended beneficiary and provide sufficient supporting evidence for such determination. Failure to do so may result in scenarios where not only does the plan wind up paying death benefits that do not correspond with the participant's final wishes, but also the plan sponsor finds itself faced with legal challenges from disgruntled survivors.

This article examines some of the key issues that qualified retirement plan sponsors should consider when reviewing and updating plan documents and administrative procedures to ensure compliance with current beneficiary designation rules.

Law-abiding beneficiary designations

The foremost step plan sponsors can take is making sure that the document language and plan administration meet the minimum requirements mandated by law. In the case of beneficiary designations, both the Employee Retirement Income Security Act (ERISA) and the Internal Revenue Code (IRC) must be considered:

- ERISA states that the term "beneficiary" means "a person designated by a participant, or by the terms of an employee benefit plan, who is or may become entitled to a benefit thereunder."
- The IRC requires most qualified plans to provide spouses a survivor benefit, including a qualified joint-and-survivor annuity and preretirement survivor annuity. Certain defined contribution plans that do not offer annuities are exempt from this requirement, provided that the beneficiary of any death benefit is the spouse.

A plan may permit a nonspouse beneficiary if the spouse consents to another person being the beneficiary in writing, witnessed by a notary or plan representative. Accordingly, the accurate identification of the beneficiary and consent are essential for a plan administrator to determine who must receive the death benefits. While this requirement may seem straightforward on the surface, various factors may complicate the identification of the "spouse" and there is some leeway in defining what constitutes "consent."

Who is the spouse?

The answer to this question has been the topic of considerable debate over the last several years. Prior to the enactment of the Defense of Marriage Act (DOMA) in 1996, "spouse" was determined under state law. After DOMA, the term was limited to opposite-gender marriages for qualified plan purposes regardless of state law. Since the June 2013 U.S. Supreme Court ruling that a key section of DOMA is unconstitutional, both the IRS and the Department of Labor have confirmed that qualified plans must again look to the applicable state law for the definition of a spouse. Plan sponsors must be sure to accurately communicate this definitional change to affected participants and administer their plans accordingly.

Other issues arising out of the definition of “spouse” that plan sponsors and administrators should consider include:

What about same-gender domestic partners?

To circumvent the restrictions against same-gender partners being able to qualify as a “spouse” under the plan—either because of DOMA or the applicable state’s nonrecognition of such marriages—some plan sponsors included language to treat “domestic partners” as spouses if they met various requirements. These could include evidencing such a partnership through a joint bank account, common ownership of property, or co-habitation for a specified period of time. Some definitions were written to apply to both opposite-gender and same-gender couples, while others were limited only to same-gender partners.

If a plan’s domestic partnership language only applies to same-gender couples and the participants live in a state that recognizes such marriages, the plan has now gone from equalizing spousal benefits for same- and opposite-gender couples to one that actually provides an additional right to same-gender couples only, i.e., the right to spousal benefits whether or not a couple is married.

Wait until the honeymoon is over?

Some plans require that participants complete one year of marriage before their spouses are recognized as such. If this rule is written into the plan, until that first anniversary is celebrated, the spouse is not automatically the beneficiary or entitled to any automatic pre-retirement spousal benefits payable upon the participant’s death. However, if the participant and spouse are married on the benefit commencement date, even though they have not been married for the one-year period, the plan must treat them as married. In that case, if they do not remain married for at least one year, the plan may provide that the spouse loses any right to survivor benefits. In addition, the participant’s benefit is not required to be increased to reflect the loss of the survivor benefit.

The rules of consent

While the strict IRS requirement is that a participant may not name a non-spouse beneficiary without obtaining the spouse’s written consent, this rule permits flexibility when plan sponsors administer it, thereby creating many choices. For example, who should the plan designate as the “required witness”—a plan representative or a notary? While the plan representative is acceptable, the notary option is the safest method because it provides a level of independence to the process, helping to reduce the number of claims involving fraud, collusion, or undue influence. Two other questions that must be addressed are the irrevocability and specificity of the spousal consent waiver. Many plans provide that a spouse’s consent is irrevocable to avoid the inherent complications, such as where a spouse has consented to a beneficiary designation and then changes his or her mind. Specificity refers to whether the plan permits a general spousal waiver or limits the waiver to a specific designation. For example, the plan and forms could contain spousal consent for the current beneficiary designation

and prohibit changes without spousal consent. Without such specific language, once spousal consent to another beneficiary is given, the primary beneficiary may be changed without further spousal consent.

One final rule to note is that spousal consent is only valid if it is given post-nuptials. As a result, the plan sponsor is not permitted to honor a pre-nuptial agreement under which the spouse agrees to waive all rights to the participant’s retirement benefits.

The default defense

The preemptive power of ERISA provides plan sponsors with an incredibly strong ally against lawsuits from disgruntled “wannabe” beneficiaries and conflicting state laws. However, to take maximum advantage of the ERISA edge, the plan document and underlying forms must be tightly drafted to remove areas of uncertainty that could leave the plan vulnerable to a successful challenge. Great strides toward this goal can be made by the inclusion of expansive and well-constructed default provisions.

The plan’s default provision describes the rules that automatically “kick in” to fill the beneficiary voids that occur during certain circumstances. These include, for example, no beneficiary designation or an invalid designation on file, or designated beneficiaries pre-deceasing the participant. The most common order used for a default is: the current spouse, children, parents, siblings, and the estate. If using this default, the plan must also designate how the benefits will be split in case more than one survivor remains in any of the individual categories. For parents and siblings, an equal shares approach is the norm; however, with regard to children, the *per stirpes* method is common (e.g., if two children, they share 50% each; then if one child pre-deceases the participant, 50% goes to the surviving child and 50% will be split evenly among the children of the child who died before the participant). The alternative to *per stirpes* is *per capita* (e.g., if two children, they share 50% each; then if one child pre-deceases the participant, 100% goes to the surviving child).

Plans can also safeguard against the unintended consequence that may occur if the participant forgets to revisit beneficiary designations after a divorce. To do so, the plan should include a uniform provision that automatically nullifies any existing spousal designations upon the occurrence of a divorce. This forces the participant to affirmatively designate the now ex-spouse, if desired, by completing a new designation. Of course, if such a provision is included in the document, the administrator should vigilantly communicate it to participants and follow up with those who become affected. Plans may also opt to include other default provisions to protect themselves from rare but possible disputes that may arise from conflicts with state laws. Two examples are “slayer statutes” and “simultaneous death” provisions. Having the plan automatically prohibit a beneficiary from collecting a benefit if the beneficiary is responsible for the participant’s death and providing a hierarchy where both the participant and the beneficiary die can go a long way toward avoiding these types of disputes.

What does the box say?

A well-drafted plan document is only the first step in creating a smooth, functioning beneficiary designation process. Extreme care and thought must also go into the design of the beneficiary designation forms so that they can be easily understood and completed by participants. This will help to ensure that the information from, and the boxes checked by, the participant provide the plan administrator a crystal clear picture of who should receive the death benefits.

There are a number of optional provisions that must be considered as well. A designation form should elicit enough details on beneficiaries that they can be easily identified and located. For example, asking for the beneficiary's relationship to the participant, his or her Social Security number, or the current contact information will facilitate this process. In addition, the forms should provide clear instructions on the naming of multiple and contingent beneficiaries (including information regarding the previously described *per stirpes* or *per capita* choice when children are named).

Staying true to form

While clear and proactive plan and form designs are a great head start, the path toward deterring beneficiary disputes does not stop there. Plan sponsors also must efficiently and effectively:

- communicate to participants the importance of completing and updating their beneficiary designation forms;
- deliver to and retrieve the forms from the participants;
- review the completed forms to ensure that they are accurate; and
- maintain and manage the forms.

In addition, a best practice is for plan sponsors to periodically remind participants to review their beneficiary designations in the event of a change in family status.

Technology-based solutions can improve the above processes. For example, an electronic system for designating beneficiaries could ensure that all items are complete on a form before it can be submitted. Electronic storage makes retaining and reproducing (even on demand) designations easy. In addition, current electronic (e-signature) technology might help reduce claims of forgery. Unfortunately, current statutory and regulatory requirements for qualified plans make having a totally paperless process impossible. This is true even though:

- under the spousal consent requirements, the spouse's signature can be an electronic one in accordance with E-SIGN or state law, and
- regulations permit a notary or plan representative to electronically acknowledge witnessing the spouse's signature.

Despite these helpful rules, the spouse is still required to be in the physical presence of the plan representative or notary witnessing the signing of the consent form.

Where there is a will, there is a way

Survivors left behind when a loved one passes away are already in an emotional state; if their mourning is intensified by a perception that they are being cheated out of funds intended for them, a legal challenge could arise. In cases where beneficiary designation disputes occur, plan fiduciaries are required to spend time, as well as financial and other resources, to identify the correct beneficiary. Fiduciaries may have to take various actions such as defending lawsuits, commencing interpleader actions in court, or expending time and financial resources to locate the correct beneficiary. Paying benefits to an erroneous beneficiary could expose the plan and its fiduciaries to liability.

For example, a fiduciary could be placed in the unfortunate position of having to pay the same benefit twice—once to the mistaken beneficiary and again to the correct beneficiary after the appropriate identification and clarification. To avoid such consequences, plan sponsors should make sure that their plan documents and beneficiary designation forms include clear and concise language that anticipates various scenarios and thus leaves little room for ambiguity upon a participant's death. The plan sponsor also must implement and maintain an ongoing process that provides for effective and efficient delivery, receipt, and maintenance of beneficiary designations. A proactive approach would also entail periodically following up with participants to ensure that the designation presently in place reflects their current intentions.

Many plan sponsors have employed a third party to review the plan language and related forms that apply to beneficiary designations. Such assistance often can identify potential problem areas. Taking the initiative to control how a plan complies with the laws and regulations, as well as how it administers the designation provisions, offers a best practice approach for increasing the chance that the deceased participant's benefits wind up with the survivors he or she would have wanted—which is the most favorable outcome for survivors and also for the plan sponsor.



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PERiSCOPE

Public Employee Retirement Systems

New accounting rules for public pension plans in the United States are set to take effect beginning in 2014. Successful implementation of the new rules will require an understanding of a variety of technical concepts regarding the various newly required calculations. In this multi-part PERiScope series, we will explore these technical topics in detail. The series begins with the current article, "GASB 67/68: Beginning implementation and overview," to introduce the technical concepts at a high level, as well as to outline important points for beginning implementation in 2014. See sidebar for more information on upcoming technical articles in this series.

GASB 67/68: Beginning implementation and overview

Jennifer Sorensen Senta, ASA, MAAA

The Governmental Accounting Standards Board (GASB) in 2012 released new accounting standards for public pension plans and participating employers. These standards, GASB Statements No. 67 and 68, have substantially revised the accounting requirements previously mandated under GASB Statements No. 25 and 27. Required implementation is imminent, with GASB 67 effective for plan fiscal years beginning after June 15, 2013, and GASB 68 effective for employer fiscal years beginning after June 15, 2014.

Milliman has established a GASB 67/68 Task Force, one of the primary directives of which is the publication of a detailed miniseries of educational articles regarding the various key implementation and technical issues surrounding the new statements. Look for these articles to be published on a regular basis following the publication of this summary.

Fundamental changes to accounting

Perhaps the highest level of publicity for the new statements has centered around the new hard-line division of accounting from funding. The new GASB statements require a liability for pension obligations, known as the net pension liability (NPL), to be recognized on the balance sheets of the plan and participating employers. Similarly, a pension expense (PE) will be recognized on the income statement. These measures will be wholly unsuitable for measuring the funding of the plan, and GASB in fact intended them to be so. As stated by GASB in its "Setting the record straight" pension fact sheet, "[A]fter reexamining the prior standards for pensions, the GASB concluded that approaches to funding are not necessarily the best approach to accounting for and reporting pension benefits."¹

Did you know? Milliman's GASB 67/68 Task Force will release an upcoming miniseries on technical and implementation issues surrounding GASB 67 and 68. Each article will be released through *PERiScope*. Look for the following articles in coming months:

- Relationship between valuation date, measurement date, and reporting date
- Depletion date projections
- Long-term expected investment returns and the money-weighted rate of return
- Calculation specifics on individual entry age normal and recognition of deferred inflows/outflows
- Substantively automatic plan provisions
- Balance sheet items and projections from valuation date to measurement date
- Calculation of pension expense
- Proportionate share calculations
- Special funding situations

Additionally, a Frequently Asked Questions document will be maintained, with links to relevant miniseries articles as they become available.

Visit www.milliman.com/GASB6768 for all the latest resources on the new GASB statements.

¹ Governmental Accounting Standards Board, GASB's new pension standards: Setting the record straight. Accessed at <http://www.gasb.org/cs/ContentServer?c=Page&pagename=GASB%2FPage%2FGASBSectionPage&cid=1176160432178>

This means that pension plans that relied on the prior GASB definition of Annual Required Contribution (ARC) as a de facto funding measure will now need to define their own funding metric, whether through legislation or the implementation of a formalized funding policy. Significant attention is currently being paid to this area by the actuarial community; guidance already published by the Government Finance Officers Association (GFOA) is likely to be followed shortly by guidance from the Conference of Consulting Actuaries.

Getting started: Determining plan type

Implementation of the GASB statements should begin with a determination of GASB plan type, as the plan type under the GASB definition will determine specific requirements for the plan under both Statement 67 and Statement 68. The three types of plans for these purposes are single-employer, cost-sharing multiple-employer, and agent multiple-employer. Additionally, any of these plan types may also have a special funding situation, which will further impact calculations under GASB 68.

A *single-employer plan* is perhaps self-evident: a single pension plan that covers the employees of a single employer. A *multiple-employer plan* likewise is a single pension plan that covers the employees of more than one employer, e.g., a state-wide plan covering teachers. GASB has indicated that the difference between a *cost-sharing multiple-employer* and an *agent multiple-employer plan* hinges on the legal availability of plan assets to pay benefits. If plan assets are segregated for each participating employer and cannot legally be used to pay the benefits of other participating employers, then the plan may qualify as an agent multiple-employer plan under GASB. However, if plan assets are not legally segregated and may therefore be used to pay the benefits of any participating employer, then the plan would be classified as a cost-sharing multiple-employer plan under the new GASB standards. It is worth noting that many plans that consider themselves agent multiple-employer plans from an administrative standpoint may actually fall under the category of cost-sharing multiple-employer plan for GASB purposes. A multiple-employer plan should consult its attorneys when determining plan type for GASB purposes.

GASB 67: Accounting for the plan

GASB Statement 67 (replacing Statement 25) will be the first statement required to be implemented, as it applies for *plan* fiscal years beginning after June 15, 2013. Therefore, plan financial statements for fiscal years ending (FYE) in the latter half of 2014 (most commonly FYE June 30, 2014, or December 31, 2014) will be required to reflect the guidance of GASB 67. Note that a plan's fiscal year might not be the same as the employer's fiscal year. Even if the plan does not issue standalone financial statements, but rather is considered a pension trust fund of a government, it will be subject to GASB 67 implementation.

A broad technical overview

From an actuarial perspective, implementation of GASB 67 begins with the establishment of the GASB *measurement date* and the *actuarial valuation date* on which calculations will be based. For GASB 67, the measurement date must be the *plan's* current fiscal year-end. Thus, for initial reporting for a plan at fiscal year-end June 30, 2014, the measurement date will be June 30, 2014. Note that for GASB 67, there is no distinction between the reporting date and the measurement date (in contrast with GASB 68—see below for more on this).

The actuarial valuation date may be any date up to 24 months prior to the measurement date; however, the actuarial results must then be projected forward from the valuation date to the measurement date. This projection must reflect any source of material impact (e.g., a changing municipal bond rate's impact on the single equivalent discount rate; see below for details) between the valuation date and the measurement date. Additionally, if benefit changes are legally agreed upon or adopted prior to the measurement date, the actuarial valuation results must reflect those changes if material, even if the effective date of the change is later than the measurement date itself.

Once the valuation and measurement dates have been established, a depletion date projection for the plan would be performed to determine whether at any point in the future plan assets are projected to be insufficient to pay benefits to current members.

This calculation projects the *fiduciary net position* (i.e., the market value of assets) of the plan, subject to particular constraints imposed by GASB. In particular, projected contribution inflows to the plan are limited to contributions that are intended to fund the benefits of current plan participants. This means that normal cost contributions expected to be made for future participants may not be included in the projection of the fiduciary net position. Contributions expected to be made *by* future participants may be included if those contributions are anticipated to exceed the gross normal cost of benefits for those future participants, i.e., they are anticipated to be used to pay down the unfunded liability of current plan participants. Projected investment returns on fiduciary net position should be calculated using the long-term expected investment return assumption for the plan's portfolio, subject to certain requirements specified in the GASB statements.

The single equivalent discount rate

Once the fiduciary net position has been projected in accordance with GASB's specified methodology, this projection is compared with the projected plan benefit payments for current participants. Projected benefit payments for future participants are excluded. Benefit payments must reflect any benefits that are deemed to be "substantively automatic," regardless of whether they would typically be included for funding valuation purposes. For example, a plan with an ad-hoc cost-of-living adjustment (COLA) might not reflect this provision in the current actuarial valuation due to

the uncertain nature of future granting. However, under the new GASB statements, if the COLA is determined to be substantively automatic, it must be reflected in the projected benefit payments. Whether a benefit is substantively automatic must be determined on a case-by-case basis. While the GASB statements indicate that an expectation of receiving the benefit may play into this determination, it will generally be up to the plan board, staff, and auditors to determine whether benefits for a given plan fall into this category.

For years in which the projected fiduciary net position is anticipated to be sufficient to cover projected benefit payments, the benefit payments may be discounted at the GASB-compliant long-term assumed rate of return. For years in which benefit payments are *not* projected to be covered by the projected fiduciary net position, a discount rate reflecting a 20-year tax-free municipal bond yield or index must be used. The resulting present value of benefits from this dual-discount methodology is then used to calculate the single equivalent discount rate for all years, which produces the same present value as the dual discount rates. This *single* equivalent discount rate is the plan discount rate for GASB purposes.

Total pension liability and net pension liability

The *total pension liability* (TPL) under the new GASB standards will be equal to the actuarial accrued liability for the plan, calculated under the GASB-specified individual entry age normal actuarial cost method, and using the single equivalent discount rate as determined above. This number, as of the GASB 67 measurement date, will then have the fiduciary net position as of the measurement date subtracted from it to obtain the GASB 67 total plan *net pension liability* (NPL). Note that the NPL is analogous to the figure typically referred to as the unfunded actuarial accrued liability.

Disclosures

Implementation of GASB 67 will result in required enhancements to financial statement disclosures. For single-employer and cost-sharing multiple-employer plans, the notes to the financial statements will need to include information regarding the components of the NPL and the year-over-year change in NPL. For all plan types, a variety of other specific information regarding the pension plan will be required to be disclosed in the notes to financial statements.

In addition, certain required supplementary information (RSI) will be required under GASB 67. While single-employer and cost-sharing multiple-employer plans will be required to produce a number of 10-year schedules of various results, agent multiple-employer plans will be required to show only a schedule of money-weighted returns under this area of GASB 67. Note that the 10-year historical schedules need include only information for years in which the new GASB statements have been implemented; 10 years are not required to be shown in the early years of implementation (i.e., retroactive calculations are not required).

GASB 68: Accounting for the employer

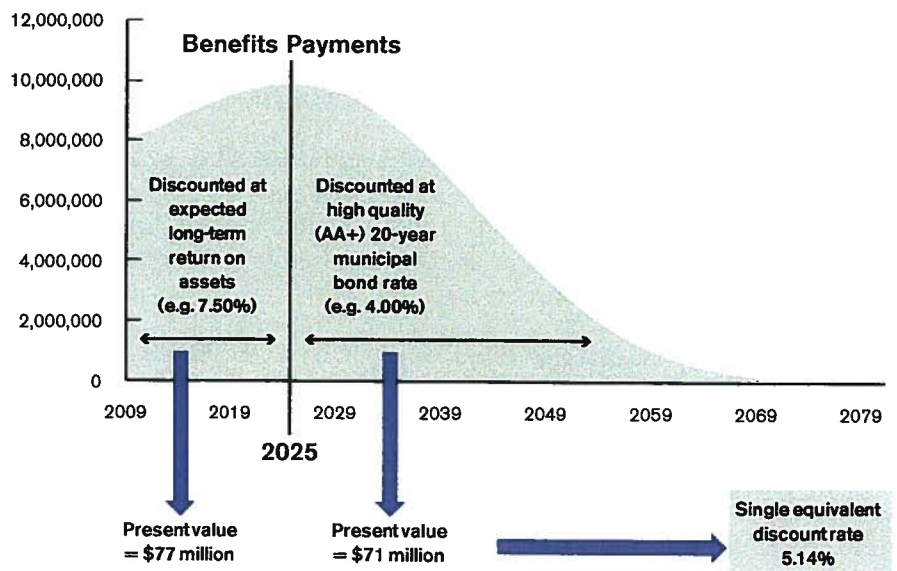
GASB 68 governs the specifics of accounting for public pension plan obligations for participating employers. This statement must be implemented for *employer* fiscal years beginning after June 15, 2014. Because this places required implementation in 2015 and later, GASB has not yet released a detailed implementation guide for this statement. Further guidance is anticipated in early 2014.

The two key technical concepts of GASB 68 are calculation of pension expense and a determination of how NPL and pension expense will be recognized among employers (proportionate share).

Under GASB 68, the plan type is key to determining how NPL and pension expense will be recognized among employers.

Calculations for a single-employer plan will generally be straightforward, particularly if no special funding situation applies. For agent multiple-employer plans, each employer will merit an individual calculation of a specific NPL, since individual employer TPL and fiduciary net position will be available. For cost-sharing multiple-employer plans, a “proportionate share” of the NPL and total pension expense must be calculated for each employer. A special funding situation may result in a similar proportionate share calculation being required for any plan type under GASB 68.

FIGURE 1: EXAMPLE OF DUAL DISCOUNT RATES: PLAN IS PROJECTED TO RUN OUT OF ASSETS IN 2025



Pension expense

The pension expense in GASB 68 is an accounting item designed to recognize for the current period certain changes to the TPL. Additionally, changes to the TPL not fully recognized in a given year's pension expense will be tracked as deferred inflows and deferred outflows, and recognized incrementally in the pension expense over time. Differences between actual and expected investment return will be recognized over a closed five-year period; differences between actual and expected experience, and the impact of any changes in assumptions or inputs, will be recognized over a closed period equal to the remaining service life of all active and inactive members. Benefit changes will be recognized immediately in the year of adoption.

The basic formula for calculating pension expense is as follows:
 Service cost + interest on TPL + current-period benefit changes
 – member contributions – expected earnings on plan investments
 + administrative expenses + recognition of deferred outflows –
 recognition of deferred inflows.

The year-to-year pension expense number is likely to be volatile, and should not be considered a proxy for funding or contribution levels.

Proportionate share

Proportionate share calculations apply for cost-sharing multiple-employer plans or any plan for which a special funding situation applies. The purpose of the proportionate share calculation is to determine the amount of the total NPL and pension expense that should be recognized by each employer; the statements recommend that the "projected long-term future contribution effort" of the employer be considered in the determination of an employer's proportionate share.

However, GASB has specifically allowed flexibility with respect to this definition in the final version of its statements. In particular, the current contribution effort of an employer may be used if this is deemed to be a reasonable method of determining the proportionate share for a given plan.

Special funding situations

A *special funding situation* arises when a non-employer entity makes contributions directly to the plan and one of the following conditions holds:

1. The non-employer contributing entity is the only entity required to contribute to the plan, or
2. The amount of contributions legally required from the non-employer contributing entity is not dependent on a factor unrelated to pensions, such as tax revenues on certain items.

One example of a special funding situation is a state-wide plan covering teachers, where the state (which does not employ the teachers) is the legal source of contributions, and the employers of the teachers covered by the plan (i.e., local school districts) bear no part of the direct cost of the pension plan. Alternatively, if the school districts are required to contribute, the special funding situation will apply only if the state contributions are defined as specified above (for instance, if the state contributes a set percentage of plan payroll, a special funding situation applies; if the state contributes sales tax revenue, a special funding situation would not apply).

A special funding situation may apply to any of the three GASB plan types. When such a situation applies, the non-employer contributing entity will have its own proportionate share of the NPL and pension expense. The adjustment to the recognition of the employer NPL will be straightforward; the non-employer contributing entity's proportionate share of NPL will reduce the amount of NPL required to be recognized by the employers. However, the pension expense attributable to the non-employer contributing entity will be allocated among and recognized by the employers. Those employers will also recognize as revenue a share of the contributions made by the non-employer contributing entity to the plan.

Fiscal years ending 2014: Practical points

For public pension plan fiscal years beginning after June 15, 2013, GASB 67 will be implemented beginning in 2014. Following is a list of key milestones leading to a successful implementation of GASB 67:

- Determine GASB plan type as early as possible, as this will impact requirements under both Statement 67 and Statement 68. Again, note that plans that typically operate administratively as agent plans actually may not meet the GASB definition of agent plan under the new statements; legal counsel should be consulted.
- Form a committee to facilitate work on GASB implementation. Plan staff, the plan actuary, the plan auditors, and staff from any participating employers may need to be involved throughout the process.
- Form a timeline for implementation. Under GASB 67, additional financial statement disclosures will be needed. Staff must have sufficient time to produce these notes and exhibits, and auditors should be involved to ensure their familiarity with and approval of the process.
- If the plan provides an ad-hoc COLA or other benefit provision that may not be granted every year, begin discussion as to whether the benefit meets the definition of "substantively automatic" under GASB. This may be a complicated question, and sufficient time should be allowed to ensure the agreement of staff and auditors.

- Determine with the plan actuary which valuation date will be used for the first GASB measurement date. In some cases, this may be governed by the date on which information will be needed in order to produce the financial reports in a timely manner. For example, it may be best to project the prior valuation calculations forward to the measurement date if GASB results are needed before the new actuarial valuation is likely to be completed.
- Typically, the actuary will produce the depletion date projection and calculation of the single equivalent discount rate; a calculation of TPL and NPL; and a statement of changes in TPL, plan fiduciary net position, and NPL. Note that if a projected depletion date exists, the board may need to formally adopt the municipal bond rate assumption used by the actuary throughout the remaining GASB calculations.
- Design exhibits and rework the structure of notes to financial statements. Plans should carefully review the required disclosures for GASB 67 in order to ensure compliance. In particular, the notes to financial statements and the required supplementary information should be carefully reviewed to ensure compliance by plan type.
- Make use of the GASB implementation toolkit, recently released on the GASB website.²
- Contact your local Milliman consultant, and check back for *PERiScope* articles to assist with implementation!

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² Governmental Accounting Standards Board, GASB toolkit helps pension plans implement new accounting standards. Accessed at: http://www.gasb.org/cs/ContentServer?c=GASBContent_C&pagename=GASB%2FGASBContent_C%2FGASBNewsPage&cid=1176163601459.



PERiSCOPE

Public Employee Retirement Systems

The actuarially calculated cost of public pension plans, whether being used for funding or financial reporting, has lately attracted unprecedented levels of public attention. By setting actuarial assumptions in accordance with plan experience and the best expectations of actuarial modeling, we attempt to minimize the differences between expected and actual experience as it emerges over time, with the ultimate aim of appropriately funding the plan. Two of the key assumptions that drive actuarial costs are the rate at which liabilities are discounted and the expected longevity of members receiving and expected to receive benefits. In this two-part PERiSCOPE series, we will explore recent trends and theories pertaining to the setting of these assumptions. Part I, "Setting the Discount Rate for Valuing Pension Liabilities," discussed the fundamental approaches to discount rate setting, recent changes in such rates among public pension plans, and how these rates comply with GASB regulations. Part II, "Longevity Trends and Mortality Assumptions: An Actuarial Perspective," explores recent trends in longevity, mortality assumption changes among public pension plans, and how these assumptions comply with Actuarial Standards of Practice.

Longevity trends and mortality assumptions: An actuarial perspective

Jennifer Sorensen Senta, ASA, MAAA

Rates of mortality are a significant driver of pension costs: As retirees live longer, benefits are paid out over correspondingly longer periods. Recent trends in mortality indicate that, on the whole, life expectancies in North America are continuing to increase, and government sector pension plans are adjusting mortality assumptions to reflect this experience. Meanwhile, new requirements in the Actuarial Standards of Practice pertaining to mortality assumptions mandate that actuaries take into account these expected future improvements for actuarial valuation purposes.

Recent trends in longevity

Studies of longevity have a broader appeal than to a strictly actuarial audience. Recent comprehensive studies of mortality have been conducted not only by actuarial research groups but also by a variety of independent researchers and agencies. These studies broadly describe a recent period of increases in longevity. Furthermore, and perhaps more relevantly, they indicate an expected continuing increase in future longevity. Intuitively, many people feel that the prevalence of obesity, cancer, and other similar factors in the United States must ultimately result in an overall decline in life expectancy. However, research has shown that advances in treatments for heart and infectious disease, decreases in smoking, and medical advances related to other ailments that benefit from early detection have been more than offsetting these detrimental factors, resulting in definitive overall increases in life expectancy over time,¹ particularly for socioeconomically advantaged groups.²

The generally recognized authority for mortality assumptions in the United States in recent years has been the Society of Actuaries (SOA), whose Retirement Plans Experience Committee (RPEC) published the RP-2000 mortality tables currently in wide use among public and corporate pension plans. In combination with the RP-2000 tables, the RPEC recommended the application of a projection scale to adjust for expected future mortality improvements. This scale, known as Scale AA, was first published and recommended for use with other tables in 1995, and is now commonly in use to project mortality improvements from the base year of many published mortality tables. The improvements found in Scale AA can be applied to a table of base mortality rates in two ways:

- A *static* projection applies the improvements for a set number of years, thereby creating a new mortality table that does not change from year to year after the initial projection, but which generally makes some pre-recognized allowance for mortality improvements.
- In contrast, a *generational* projection will apply a year of improvement for each future projected year. The concept of projected mortality improvement is intended to quantitatively model the somewhat intuitive notion that a person who is age 60 today is not expected to live quite as long as a person who turns age 60 ten years from now, all else being equal.

This concept of explicitly projecting expected future increases in longevity based on specially modeled improvement scales, such

¹ Ryan, Daniel. "Come Together: Building a Better Mortality Model." *Contingencies*, March/April 2012, pages 36-40. American Academy of Actuaries.

² Waldron, Hilary. "Trends in Mortality Differentials and Life Expectancy for Male Social Security-Covered Workers, by Socioeconomic Status" *Social Security Bulletin*, Vol. 67 No. 3, 2007.

as Scale AA, represented advancement in actuarial methodology compared with the majority of older pension plan mortality assumptions. Previous mortality tables were published without separate projection scales and were intended to contain a margin for future longevity improvement similar to the static projection approach. These previous mortality tables relied on updates to the base tables of mortality rates to stay current, whereas the projection scales are intended to improve the base tables gradually each year.

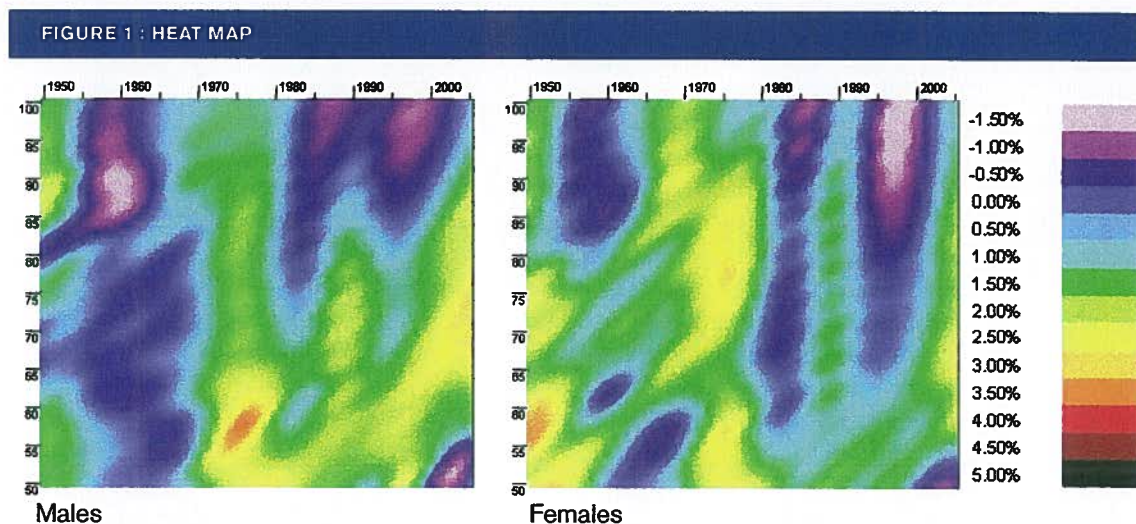
Upcoming two-dimensional mortality tables

The research on mortality and the improvement of mortality over time has continued since the publication of the RP-2000 tables. To that end, the RPEC anticipates the release of new mortality base rate tables and new improvement scales toward the end of 2013 or early in 2014. In the meantime, the RPEC has published a September 2012 report on its recent mortality improvement research, in which a more sophisticated trend in mortality improvement was isolated: the idea that mortality improvement varies not only by age, as forecast by the current Scale AA, but additionally by specific calendar year.³ Calendar-year-dependent improvements typically take one of two broad forms:

- Time-specific improvements in mortality indicate an observed change in mortality improvement at all or most ages during certain years or periods (for example, the development of certain antibiotics may have caused an observable increase in life expectancy for all ages at a specific point in time).
- Cohort effects on mortality improvement show that different groups (or cohorts) of people born in similar time periods may tend to experience specific mortality improvements over their lifetimes; these mortality improvements may vary from those experienced by other

cohorts born in different time periods. Such cohort-based differences in mortality improvement may be due to historical occurrences with a broader effect on mortality over time (for example, the impact of asbestos, smoking, or HIV/AIDS may be stronger on certain cohorts than on others, causing different rates of improvement in the groups affected).

Such year-dependent improvement patterns, also referred to as “two-dimensional” mortality improvements due to their dependence on both age and year, have been quantifiably observed in many previous credible research papers by various agencies outside the SOA, including the Continuous Mortality Investigation (CMI) bureau⁵ and independent researchers from Canada and Germany.⁶ However, it is a matter of debate whether such historical evidence gives us sufficient information to project future year-dependent improvements on a long-term basis in pension plan actuarial valuations. Furthermore, the implementation of such complex mortality improvement assumptions is likely to require some technological revisions to current actuarial software in the United States.



“Heat map” illustration shows how historical improvements in mortality vary by both age and calendar year. Scale shows change in rate of improvement (toward red on scale is higher improvement, and therefore lower mortality). Vertical color patterns indicate time-based improvements, while cohort-based improvements appear diagonally from left to right. For example, a male who was age 50 in 1975 would be a part of the green and yellow vertical time effect shown in the year 1975 at left above. The same male would experience a cohort effect that persists into age 51 in 1976, age 52 in 1977, etc., illustrated by the yellow diagonal pattern beginning in the bottom middle of the above left chart.

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³ Society of Actuaries, “Mortality Improvement Scale BB Report,” September 2012.

⁴ Ibid.

⁵ Institute of Actuaries and Faculty of Actuaries, “Continuous Mortality Investigation Reports, Number 17” 1999.

⁶ Andreev, K. & Vaupel, J. “Patterns of Mortality Improvement over Age and Time in Developed Countries: Estimation, Presentation and Implications for Mortality Forecasting.” Princeton Population Association of America 2005 Annual Meeting.

Interim mortality table

In addition to quantifying the two-dimensional nature of historical mortality improvements, the report issued by the RPEC indicates that actual mortality improvement over the last 20 years has been outpacing that predicted by Scale AA, particularly for ages over 55. This implies that, whether or not a fully two-dimensional table is the best choice, some stronger scale of mortality improvement is indicated to better reflect actual experience. Thus, the RPEC has issued an interim scale for mortality improvements, known as Scale BB, to temporarily replace Scale AA for suggested use with the existing RP-2000 tables.⁷

Scale BB attempts to capture the recently modeled two-dimensional mortality improvements in a one-dimensional table similar in format to Scale AA, and would likely be used only until final improvement scales are released. While Scale BB would be just as easy for current actuarial software to utilize as Scale AA, the new scale would be intended to have the advantages of reflecting to some extent the newer concept of two-dimensional projected improvements, as well as providing stronger projections for improvement than Scale AA. Since Scale BB contains some year-specific information, it should not be set back or forward to better reflect actual plan experience. Additionally, the RPEC recommends that Scale BB be used on a fully generational basis.

Because Scale BB predicts stronger mortality improvements than Scale AA, the substitution of Scale BB for Scale AA could lead to increases in calculated pension liabilities. The SOA RPEC study indicated accrued liabilities might possibly increase by 2% to 4% when moving from generational Scale AA to generational Scale BB. However, these results are expected to vary widely by individual plan based on factors such as male/female composition, COLA provisions, and current actuarial assumptions.

In any case, the actuarial consensus regarding the use of Scale BB is far from final. During the comment period on the RPEC's initial Exposure Draft version of the mortality improvement report, some actuaries suggested significant revisions. Perhaps most noteworthy among these comments was the June 30, 2012, comment letter issued by the American Academy of Actuaries.⁸ This letter outlined a number of concerns with the SOA Scale BB exposure draft, including a concern related to the ultimate projected mortality improvement rate included in Scale BB. Additionally, the Academy pointed out that a scale that can only be used on a fully generational basis might deprive actuaries of the ability to exercise sufficient actuarial judgment.

In the final RPEC report, some allowance has been made for static projection of Scale BB to be used for specific purposes. However, no changes were made to Scale BB itself in response to concerns from the actuarial community.

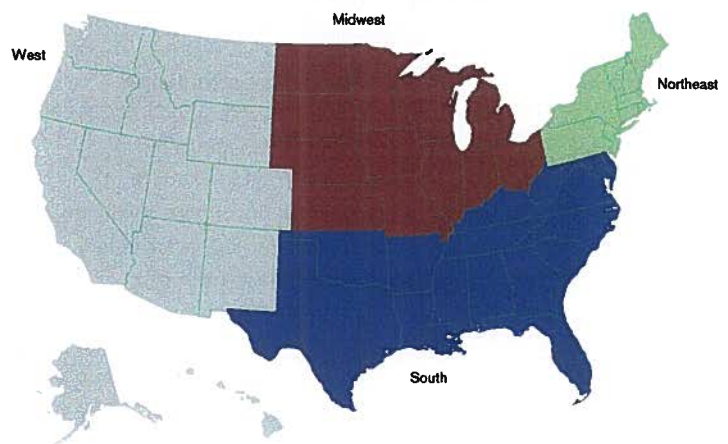
Current mortality and longevity assumptions among public pension systems

As longevity has trended on a broad basis toward increased lifetimes, most public pension plans have correspondingly strengthened their mortality assumptions, often including some provision for future improvements in mortality. The mortality assumptions in use for public pension plan actuarial valuations are typically set based on studies of actual plan experience over set periods of time (often three- to five-year periods). These experience studies allow large public plans to choose and adjust published mortality tables based on actual plan experience over time, assuming credible experience. Whereas U.S. corporate pension plans are required by the Internal Revenue Service to perform actuarial calculations on a uniform, mandated mortality assumption basis, the mortality assumptions used among public plans may vary by system type, geographic region, or other factors contributing to a difference in actual plan longevity.

The life expectancies generated by the mortality assumptions currently in use by a particular public plan provide a useful method for direct comparison among public plan longevity experience. In a survey of public systems throughout the country, the most commonly applied mortality tables were RP-2000, with some projection (either static or generational) applied. However, a fair number of plans still implemented older mortality base tables, with adjustments to reflect actual plan experience. Most plans showed a history of updating their mortality assumption in the most recent experience study performed for the plan, indicating that the plan had experienced a change in mortality experience over time.

The chart below shows average current total life expectancies by geographic region for both teachers' and non-teachers' retirement systems. These life expectancies are calculated for an age 60 retiree.

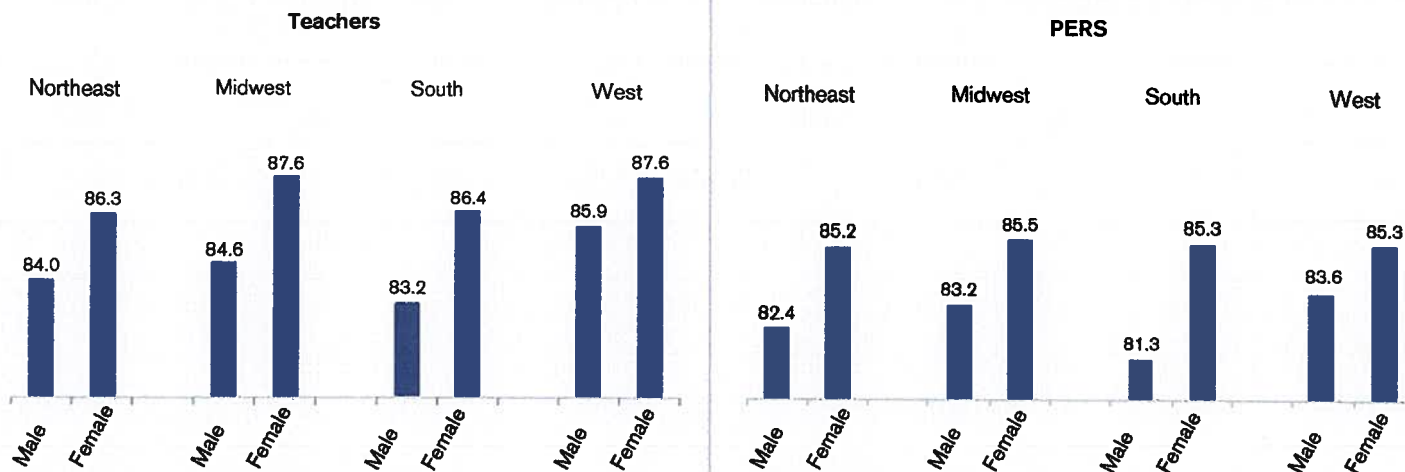
FIGURE 2 : REGIONAL SPLIT FOR LONGEVITY CALCULATIONS



⁷ Society of Actuaries, "Mortality Improvement Scale BB Report."

⁸ http://actuary.org/files/Academy_Scale_BB_Letter_063012.pdf.

FIGURE 3 : AVERAGE TOTAL EXPECTED LIFETIME BY GEOGRAPHIC REGION*
(BASED ON CURRENT RETIREE AGE 60)



*Average life expectancy by region utilizes post-retirement mortality assumption information available in published actuarial valuations or CAFRs. Each average life expectancy represents data from at least three randomly selected representative plans. Where full generational mortality applies, a projection to 2027 has been used for illustrative purposes.

Mortality assumptions and ASOP 35

Mortality assumptions are a key actuarial cost driver for public pension plans. If a plan underestimates how long a retiree will live, the cost to the system will be understated and the risk of unexpected failure to meet obligations will increase.

As increasing longevity has become more widely understood to be a phenomenon that is expected to continue well into the future, it has become relevant for all plans to consider incorporating projections of expected future improvements into actuarial mortality assumptions. In fact, this notion of continued improvement has become so broadly accepted that, in 2010, the Actuarial Standards Board (ASB) revised its standard on demographic and other non-economic assumption setting, Actuarial Standard of Practice (ASOP) 35, to reflect this principle.

The revised version of ASOP 35, effective for all actuarial valuation dates on or after June 30, 2011, requires any electively adopted mortality assumption to include an assumption for expected future improvements in longevity. This means that rather than basing the mortality assumption for a plan solely on the experience seen over the recent study period, the actuary should make some explicit assumption for improvements expected to occur, but not yet necessarily observed, in the plan's population. ASOP 35 does allow for an assumption of zero

future mortality improvement, but states that "...the existence of uncertainty about the occurrence or magnitude of future mortality improvement does not by itself mean that an assumption of zero future improvement is a reasonable assumption."⁹ Actuaries must use professional judgment to determine whether an assumption of zero future mortality improvement meets the criteria for reasonableness with respect to a particular plan. In short, the ASB has effectively taken the stance that actuarial expectation of future mortality improvement must be considered when setting assumptions in determining pension liabilities.

The final decision on all actuarial assumptions, including mortality, typically rests with the board of retirement or similar entity, based on recommendations by the actuary. Board members and other plan fiduciaries must consider the recommendations of the actuary, with the ultimate goal of prudently funding the benefits promised by the plan. Although a mortality assumption reflecting stronger expectations for future longevity will increase calculated costs in the short term, it will not change actual experience. More accurate predictions of future mortality experience will therefore ultimately serve to better fund public pension plans over time.

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⁹ Actuarial Standards Board, "Actuarial Standard of Practice No. 35: Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations" September 2010.

29 plans lowered their interest rate assumptions, which increased their accrued liabilities and lowered their funded ratios

Most plans are setting their interest rate assumptions in a realistic manner consistent with long-term market return expectations

Funded ratios are down slightly



Rebecca A. Sielman
FSA, MAAA, EA

Introduction

The Milliman Public Pension Funding Study uses an approach to measure the aggregate funded status of the 100 largest U.S. public pension plans that is unique among studies assessing the health of the country's public pension plans. Our study independently determines an actuarial interest rate assumption for each plan based on its unique asset allocation and Milliman's current outlook on future long-term investment returns, then uses the actuarially determined interest rates to recalibrate each plan's accrued liability. We found that the total recalibrated accrued liability for the plans in the study was just 2.6% larger than the total accrued liability reported by the plans. While the challenge of funding future pension promises remains considerable, our study results indicate that most plans have set their interest rate assumptions and measured their pension liabilities in a realistic, actuarial manner that is consistent with long-term market return expectations. There is more than one way to put a dollar figure on the value of future pension benefits; the focus of this study is the traditional budgeting approach of assessing liability based on the long-term returns expected to be earned by plan assets.

Milliman 2012 Public Pension Funding Study. The median interest rate used by the plans decreased from 8.00% in the 2012 study to 7.75% in the 2013 study. This drop is in line with a generally declining market consensus on expected long-term investment returns; our study's median actuarially determined interest rate similarly decreased from 7.65% in the 2012 study to 7.47% in the 2013 study. Note that lower interest rate assumptions cause accrued liabilities to increase and funded ratios to fall.

Plans report on the size of their assets in two ways: *market value*, which is well understood; and *actuarial value*, which reflects asset smoothing techniques designed to moderate year-to-year fluctuations in contribution amounts but which may deviate significantly from market value in periods of sizeable market gains or losses. The 100 plans in this study reported assets totaling \$2.58 trillion on a market value basis and \$2.73 trillion on an actuarial value basis. By comparison, reported assets in the Milliman 2012 Public Pension Funding Study stood at \$2.51 trillion on a market value basis and \$2.71 trillion on an actuarial value basis.

A notable finding of this year's study is that 29 of the 100 plans in the study have lowered their interest rate assumptions since the

Funded ratios have fallen slightly in the Milliman 2013 Public Pension Funding Study relative to the 2012 study, reflecting changes in both

FIGURE 1: MILLIMAN 100, AGGREGATE FUNDED STATUS

\$ TRILLIONS	2012		2013	
	REPORTED FIGURES	RECALIBRATED FIGURES	REPORTED FIGURES	RECALIBRATED FIGURES
Interest rate (median)	8.00%	7.65%	7.75%	7.47%
Interest rate (liability-weighted)	7.80%	7.55%	7.67%	7.44%
Accrued liability	\$3.60	\$3.71	\$3.77	\$3.86
Market value of assets	\$2.51	\$2.51	\$2.58	\$2.58
Actuarial value of assets	\$2.71	\$2.71	\$2.73	\$2.73
Funded ratio using market value of assets	69.8%	67.8%	68.5%	66.8%
Funded ratio using actuarial value of assets	75.1%	73.0%	72.4%	70.6%
Unfunded accrued liability using market value of assets	\$1.09	\$1.20	\$1.19	\$1.28
Unfunded accrued liability using actuarial value of assets	\$0.89	\$1.00	\$1.04	\$1.13

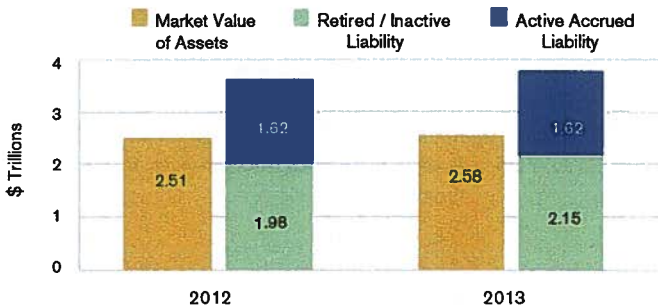
assets and liabilities. On the asset side, for more than half of the plans in this study the most recent valuation information available is as of July 1, 2012. The 12-month period from July 2011 to July 2012 generally saw disappointing investment results, with market returns hovering around 1% to 2%. On the liability side, 29 of the plans in this study lowered their interest rate assumptions and therefore increased their reported accrued liabilities.

The larger plans in the study tend to be somewhat better funded than the smaller plans in the study. The top quartile of plans by reported funded ratio accounts for 35% of the aggregate reported accrued liabilities, whereas the bottom quartile of plans accounts for just 18% of the aggregate reported accrued liabilities.

Liabilities

The plans reported aggregate accrued liabilities of \$3.77 trillion. This total breaks down into \$1.62 trillion for the 12.6 million plan members who are still working plus \$2.15 trillion for the 11.8 million plan members who are retired and receiving benefits or who have stopped working but have not yet started collecting their pensions. The number of active members has declined by 200,000 relative to the Milliman 2012 Public Pension Funding Study, whereas the number of inactive members has grown by 900,000. In aggregate, the plans currently have assets sufficient to cover 100% of the reported accrued liability for retirees and inactive members but only 27% of the assets needed to cover the reported accrued liability for active plan members.

FIGURE 2: ACCRUED LIABILITY



Interest rate assumption

There are three sources of money to pay for public pension benefits: payroll deductions from active members, contributions from plan sponsors, and investment income generated by plan assets. When actuaries advise plan sponsors on contribution policy, they estimate what level of future investment income a plan's assets are likely to earn. Different types of investments carry different long-term expectations for investment earnings, so the actuary starts with return assumptions for each of the different asset classes. Collectively, these return assumptions, along with the associated variances and coefficients of correlation with other asset classes, are known as *capital market assumptions*. The actuary then takes into account each particular pension plan's allocation of investments across the different asset classes and arrives at the expected long-term average annual rate of return for the pension plan. This expected rate of return is used to discount projected future benefit payments back to the present time so that those future payments are expressed in today's dollars. Using this methodology to determine the plan's liabilities, if the plan sponsor always pays the amounts determined using actuarially sound methods and if the actual future investment results are equal to the interest rate assumption, then the plan should accumulate sufficient assets to pay benefits when due.

Capital market assumptions

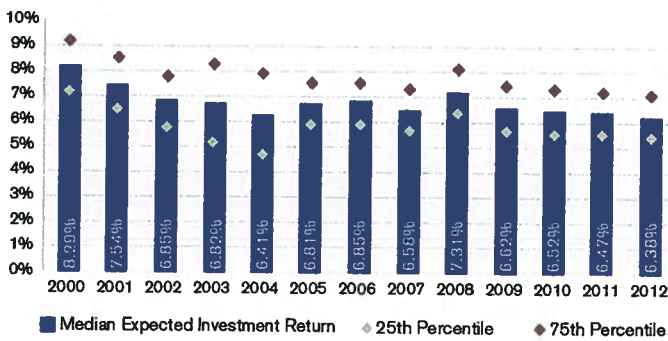
One of the most significant trends over the past decade is that the market's consensus views on long-term future investment returns have slid downward. Figure 3 illustrates this trend by showing the expected long-term return for a hypothetical asset allocation based on Milliman's capital market assumptions for each year since 2000. Over this period, expected returns on both equity and fixed-income investments have fallen by about 200 basis points. Pension plans have reflected this trend by lowering their interest rate assumptions, in some cases by making a single significant cut and in other cases by making gradual reductions. Where assumptions of 8.5% were once commonplace, over half of the plans in the study now have assumptions of 7.75% or below. With lower interest rate assumptions come higher reported accrued liabilities; for many public pension plans, a 100-basis-point reduction in the interest rate assumption causes an 11% to 15% increase in accrued liability, which in turn causes a reduction in the

Methodology

This study is based on the most recently available Comprehensive Annual Financial Reports and valuation reports, which reflect valuation dates ranging from June 30, 2010, to December 31, 2012; about two-thirds are from June 30, 2012, or later. For the purposes of this study, the reported asset allocation of each of the included plans has been analyzed to determine an independent measure of the expected long-term annual geometric average rate of return on plan assets. The reported accrued liability for each plan has then been recalibrated to reflect this actuarially determined interest rate. This study therefore adjusts for differences between each plan's assumed rate of investment return and a current market assessment of the expected return based on actual asset allocations. This study is not intended to estimate the plans' liabilities for settlement accounting purposes or to analyze the funding of individual plans.

reported funded ratio and an increase in the contributions needed to fund the plan over the long term. If market outlooks remain at current levels or continue to decline, it is likely that plans will continue to reduce their interest rate assumptions.

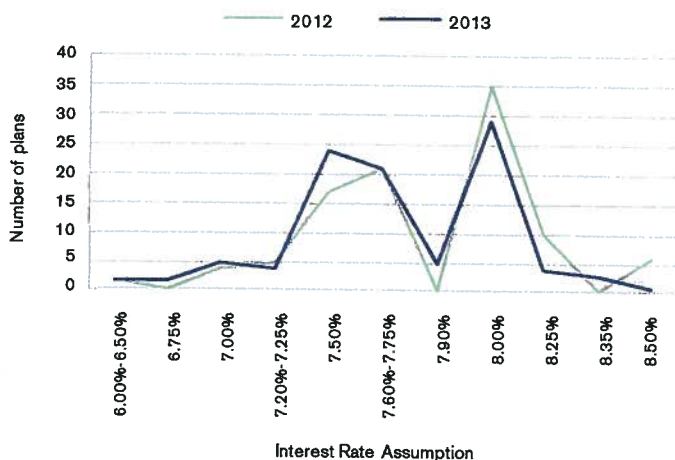
FIGURE 3: EXPECTED RETURN FOR A HYPOTHETICAL ASSET ALLOCATION BASED ON MILLIMAN'S CAPITAL MARKET ASSUMPTIONS



Asset allocation: 35% broad U.S. equities, 15% developed foreign equities, 25% core fixed income, 5% high yield bonds, 10% mortgages, 5% real estate, and 5% cash; inflation assumption is fixed at 2.5% for all years.

There is a wide diversity of investment allocations among the plans in this study, which in and of itself would naturally result in a diversity of interest rate assumptions. Expert opinion also varies regarding the expected long-term returns for different asset classes, and plans may have different attitudes about the appropriate level of conservatism to build into their interest rate assumptions. It is therefore not surprising that there is a wide spread of interest rate assumptions reported by the plans in this study, as shown in Figure 4.

FIGURE 4: INTEREST RATE ASSUMPTIONS REPORTED BY PLANS



The median of the interest rate assumptions reported by plans in this study is 7.75% (7.67% on a liability-weighted basis), down from a median of 8.00% (7.80% liability-weighted) in the Milliman 2012 Public Pension Funding Study. Since the 2012 study, 29 of the plans have lowered their interest rate assumption, most by 25 to 50 basis points. At an aggregate level, there were no significant changes in asset allocations during this period, so the drop in interest rate assumptions reflects the general consensus trend among investment professionals toward lower expected long-term returns on most asset classes.

Recalibrating the accrued liability

We independently applied a “building-block approach” to each plan’s unique asset allocation, and determined the 50th percentile 30-year geometric rate of return based on Milliman’s December 31, 2012, capital market assumptions. We then applied the plan’s reported inflation assumption to arrive at our independent, actuarially determined interest rate. The median of the resulting interest rates is 7.47%, which is 28 basis points lower than the median interest rate assumption reported by the plans and 18 basis points lower than the 7.65% median rate from the Milliman 2012 Public Pension Funding

Interest rates and accrued liabilities: Asking the right question

How much are our pension promises worth? This is a question being asked with increasing urgency as plan sponsors grapple with how to cope with underfunded pension plans. But there is more than one way to determine the answer to this question, and the choice of calculation method depends on why the question is being asked.

To illustrate, consider a very different question: How much is New York City’s Central Park worth? If the question is being asked in the context of gauging its aesthetic value, or its value as a recreational space, or its value as a green space converting carbon dioxide to oxygen, then the answer can be determined accordingly. But imagine how different the answer would be if the question is being asked in the context of developing Central Park’s acreage and filling those green spaces with high-rise apartments and office buildings.

Similarly, putting a dollar figure on pension promises depends on the background for asking the question. If the context for the question is to determine what it would cost to shut down the pension plan today or to transfer responsibility for future pension benefits to an insurance company, then the answer is arrived at by discounting future pension payments using current market interest rates. But if the context for the question is to do long-range budgeting and to work out how much should be contributed to the plan this year and next year and 20 years from now, then the answer is arrived at by discounting future pension payments using the long-term expected return on the plan’s investments. Neither answer to the question is more “right” than the other; they are just different answers to a question asked in different contexts.

Study. Figure 5 details how the actuarially determined interest rates compare to the interest rate assumptions reported by the plans; Figure 6 compares the 2013 actuarially determined interest rates to the 2012 actuarially determined interest rates.

FIGURE 5: ACTUARIALLY DETERMINED INTEREST RATE VS. REPORTED INTEREST RATE

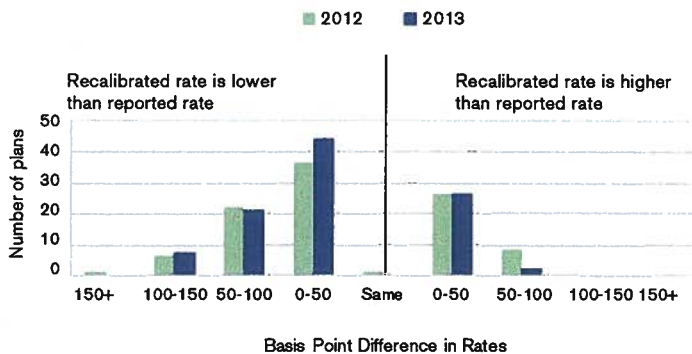
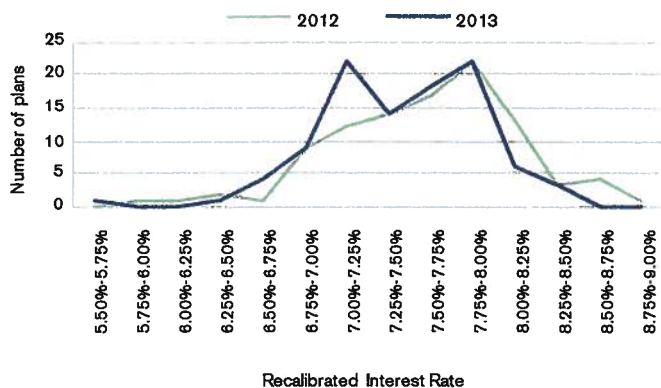


FIGURE 6: ACTUARIALLY DETERMINED INTEREST RATES IN 2013 VS. 2012

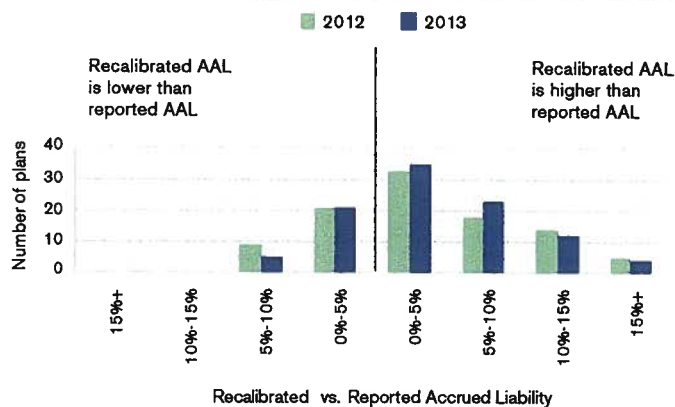


Note that for 28 of the 100 plans the actuarially determined interest rate is higher than the interest rate assumption reported by the plan; this suggests that those plans have included a margin for conservatism in their interest rate assumption.

Recalibrated accrued liabilities

Using each plan's actuarially determined interest rate to recalibrate the accrued liabilities, these plans have an aggregate accrued liability of \$3.86 trillion. For most plans in the study, as was the case in 2012, the recalibrated accrued liability is not substantially different from the reported accrued liability, as shown in Figure 7.

FIGURE 7: RECALIBRATED VS. REPORTED ACCRUED LIABILITY



Sensitivity analysis

A relatively small change in the interest rate assumption can have a significant impact on the accrued liability. The magnitude of the accrued liability impact is a function of the makeup of the plan's membership: a less "mature" plan with more active members than retirees has a higher sensitivity to interest rate changes than a more mature plan with a bigger retiree population. Using an interest rate that is 100 basis points higher or lower than the actuarially determined interest rate moves the aggregate recalibrated accrued liability by 10.6% to 13.5% (see Figure 8), but can move accrued liability by as little as 9.2% for the most mature plans or as much as 15.1% for the least mature plans.

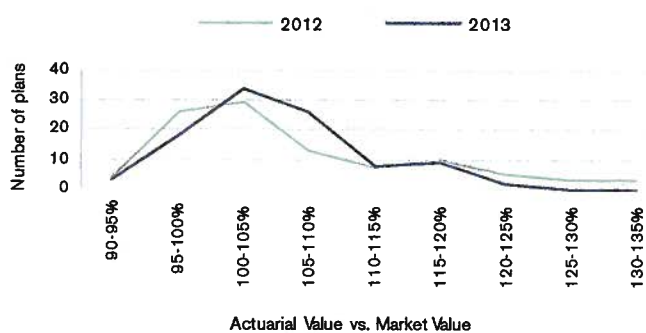
FIGURE 8: EFFECT OF CHANGING THE INTEREST RATE ASSUMPTION

RECALIBRATED ACCRUED LIABILITY (\$ TRILLIONS)	ACTUARIALLY DETERMINED INTEREST RATE	
	- 100 BASIS POINTS	+ 100 BASIS POINTS
Most mature 25 plans	\$0.75 (+11.6%)	\$0.68 (-9.2%)
Second most mature 25 plans	\$1.68 (+13.1%)	\$1.49 (-10.4%)
Second least mature 25 plans	\$0.91 (+14.1%)	\$0.71 (-11.1%)
Least mature 25 plans	\$1.04 (+15.1%)	\$0.80 (-11.7%)
All 100 plans in aggregate	\$4.38 (+13.5%)	\$3.86 (-10.6%)

Investments

The plans reported an aggregate market value of assets of \$2.58 trillion and an aggregate actuarial value of assets of \$2.73 trillion, compared with \$2.51 trillion and \$2.71 trillion, respectively, reported in the Milliman 2012 Public Pension Funding Study. Actuarial asset values are designed to reduce year-to-year contribution volatility by systematically recognizing market gains and losses over a multiyear period, typically three to five years. The advantage of asset smoothing techniques is that contribution levels are more consistent from year to year. After periods of large market losses, such as 2000 to 2002 and 2007 to 2009, actuarial asset values may be larger than market values. After periods of large market gains such as the late 1990s, the opposite is generally the case. Figure 9 shows the relationship of these two asset measures for the plans in this study. In both 2012 and 2013, the median ratio of actuarial value to market value was 104%, but the spread of values is somewhat narrower in 2013 than was the case in 2012; that is, fewer plans have a very large divergence between actuarial value and market value.

FIGURE 9: ACTUARIAL VALUE VS. MARKET VALUE



Most pension plans suffered significant asset losses in the timeframe of 2007 to 2009 and additional modest losses in 2011–2012. While there were sizeable gains experienced during 2009 to 2011, those gains were typically not as large as the losses, leading generally to plans with reported actuarial asset values larger than market values. Note that in the pension funding context, a “gain” or “loss” is based on the plan’s actual investment performance relative to the interest rate assumption. While market indices have generally returned to pre-financial crisis levels, many pension plans have not fully recovered from the effects of the market meltdown. As the market gains and losses that were experienced over the past several years are gradually recognized, the relationship of actuarial value to market value will continue to shift. Most notably, much of the large losses suffered during the financial crisis have already been recognized, and many plans will have fully recognized those losses by 2013.

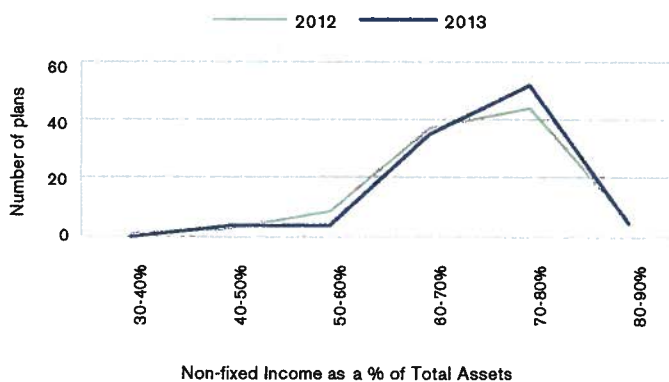
The plans included in this study are invested in a wide array of asset classes, as shown in Figure 10.

FIGURE 10: ASSET ALLOCATIONS

CLASS	2012	2013
Equities	51%	49%
Real estate	6%	8%
Private equity, etc.	13%	15%
Total non-fixed income	70%	72%
Fixed income	26%	25%
Cash	4%	3%
Total fixed income	30%	28%

While the aggregate 2013 investment allocation is 72% in non-fixed income classes and 28% in fixed income, there is considerable investment allocation variation from plan to plan. Figure 11 illustrates this variation, showing the percentage of plan assets invested in non-fixed income classes.

FIGURE 11: PERCENTAGE ALLOCATION TO NON-FIXED INCOME ASSET CLASSES



Asset volatility ratio

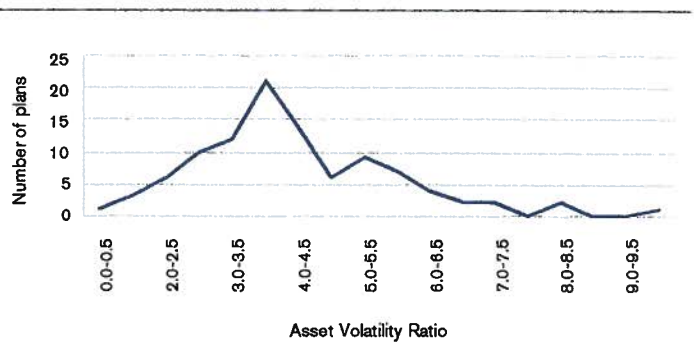
The *asset volatility ratio* is a metric that has been garnering attention lately for its ability to help plan sponsors anticipate the impact of investment volatility on contribution levels. The asset volatility ratio is simply the ratio of plan assets to the payroll for active members covered by the plan. A lower ratio means that plan assets are relatively small compared with payroll; this implies that a large single-year investment gain or loss will not move the contribution rate much. A higher ratio, on the other hand, signals that a fairly small deviation in asset performance could translate into a surprisingly large shift in the contribution rate. It is unsurprising that, as pension plans have accumulated assets and their member populations have matured over the past several decades, asset volatility ratios have risen. These higher ratios mean that contribution rates are now more sensitive than they once were to investment volatility, despite the use of asset-smoothing methods to help mitigate the impact of market movements. Figure 12 illustrates how changes in the asset volatility ratio over time can alter the relationship between investment volatility and contribution volatility.

FIGURE 12: ASSET VOLATILITY RATIO ILLUSTRATION FOR A HYPOTHETICAL PENSION PLAN

	1983	1993	2003	2013
Market value of assets	\$30,000	\$110,000	\$260,000	\$390,000
Covered payroll	20,000	40,000	70,000	80,000
Asset volatility ratio = assets ÷ payroll	1.50	2.75	3.71	4.88
Increase in contribution rate resulting from a 10% asset loss (using 15-year level dollar amortization)	1.58%	2.90%	3.91%	5.14%

The median asset volatility ratio for the plans included in this study is 3.9, and most plans fall within a range of 3.1 to 5.4. However, 18 of the plans have an asset volatility ratio of 5.5 or higher, indicating that their contributions will be more volatile in reaction to market swings.

FIGURE 13: ASSET VOLATILITY RATIOS



Acknowledgements

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Reported Data

PLAN NAME	VALUATION DATE	ACCRUED LIABILITY	MARKET VALUE			ACTUARIAL VALUE			COUNT OF ACTIVE MEMBERS	COUNT OF INACTIVE / RETIRED MEMBERS
			VALUE OF ASSETS	SURPLUS / (UNFUNDED) ACCRUED LIABILITY	FUNDED RATIO	VALUE OF ASSETS	SURPLUS / (UNFUNDED) ACCRUED LIABILITY	FUNDED RATIO		
Employees' Retirement System of Alabama	09/30/11	14,367	8,057	(6,310)	56%	9,456	(4,911)	66%	85,633	52,254
Teachers' Retirement System of Alabama	09/30/11	28,776	16,597	(12,179)	58%	19,430	(9,346)	68%	135,768	97,807
State of Alaska Public Employees' Retirement System	06/30/11	10,919	6,268	(4,651)	57%	6,762	(4,157)	62%	24,393	33,773
Arizona Public Safety Personnel Retirement System	06/30/12	10,328	5,075	(5,251)	49%	6,052	(4,274)	59%	18,542	12,562
Arizona State Retirement System	06/30/12	38,044	26,048	(11,996)	68%	28,549	(9,495)	75%	203,994	328,931
Arkansas Public Employees Retirement System	06/30/12	8,163	5,878	(2,485)	70%	5,825	(2,538)	69%	45,937	42,335
Arkansas Teacher's Retirement System	06/30/11	15,521	11,895	(3,626)	77%	11,146	(4,375)	72%	76,780	44,538
California Public Employees' Retirement System	06/30/11	328,600	241,740	(86,860)	74%	271,389	(57,211)	83%	779,481	851,014
California State Teachers' Retirement System	06/30/12	214,765	134,835	(79,930)	63%	144,232	(70,533)	67%	421,499	440,693
University of California Retirement Plan	07/01/12	54,620	41,806	(12,814)	77%	42,965	(11,655)	79%	116,888	126,252
Chicago Public Schools	06/30/12	17,376	9,437	(7,939)	54%	9,364	(8,012)	54%	30,366	30,171
Municipal Employees' Annuity and Benefit Fund of Chicago	12/31/12	13,475	5,183	(9,292)	38%	5,073	(8,402)	38%	31,926	38,115
Colorado Public Employees' Retirement Association	12/31/11	60,735	37,164	(23,571)	61%	37,185	(23,550)	61%	199,741	186,673
Connecticut State Employees Retirement System	06/30/12	23,019	8,488	(14,551)	37%	9,745	(13,274)	42%	47,868	45,448
Connecticut State Teachers' Retirement System	06/30/12	24,862	13,474	(11,388)	54%	13,735	(11,127)	55%	49,808	46,179
County Employees' Annuity and Benefit Fund of Cook County	12/31/12	13,418	8,080	(5,358)	60%	7,834	(5,584)	58%	21,447	28,030
Delaware State Employees' Pension Plan	06/30/12	7,950	6,915	(1,035)	87%	7,270	(680)	91%	35,427	26,393
Florida State Retirement System	07/01/12	148,050	122,921	(25,129)	83%	127,892	(20,158)	86%	517,287	475,399
Employees' Retirement System of Georgia	06/30/12	16,778	11,537	(5,241)	69%	12,261	(4,517)	73%	63,942	47,051
Teachers' Retirement System of Georgia	06/30/11	65,979	54,084	(11,895)	82%	55,428	(10,551)	84%	216,167	178,581
Employees' Retirement System of the State of Hawaii	06/30/12	20,683	11,286	(9,397)	55%	12,242	(8,441)	59%	65,599	47,683
Public Employee Retirement System of Idaho	07/01/12	13,397	11,330	(2,067)	85%	11,308	(2,091)	84%	65,270	47,973
Illinois Municipal Retirement Fund	12/31/11	30,963	24,834	(6,129)	80%	25,711	(5,252)	83%	175,233	234,182
State Employees' Retirement System of Illinois	08/30/12	33,091	10,961	(22,130)	33%	11,477	(21,614)	35%	62,729	85,602
State Universities Retirement System of Illinois	06/30/12	33,170	13,705	(19,465)	41%	13,950	(19,220)	42%	81,156	81,341
Teachers' Retirement System of the State of Illinois	06/30/12	90,025	36,517	(53,508)	41%	37,945	(52,080)	42%	182,217	204,499
Indiana Public Employees' Retirement Fund	06/30/12	15,784	12,244	(3,540)	78%	12,088	(3,696)	77%	145,519	142,066
Indiana State Teachers' Retirement Fund	06/30/12	20,860	9,077	(11,783)	44%	8,915	(11,945)	43%	70,573	56,338
Iowa Public Employees' Retirement System	06/30/12	29,446	23,025	(6,421)	78%	23,530	(5,916)	80%	164,200	171,454
Kansas Public Employee Retirement System	12/31/11	22,607	12,477	(10,130)	55%	13,379	(9,228)	59%	155,054	126,205
Kentucky Employees Retirement Systems	06/30/12	12,114	3,459	(8,655)	29%	3,599	(8,515)	30%	46,282	51,802
Kentucky Teachers' Retirement System	06/30/12	26,974	14,797	(12,177)	55%	14,891	(12,283)	54%	75,951	52,762
County Employees Retirement System of Kentucky	06/30/12	12,150	7,051	(5,099)	58%	7,295	(4,855)	60%	92,182	64,870
Los Angeles City Employees' Retirement System	06/30/12	14,394	9,059	(5,335)	63%	9,935	(4,459)	69%	24,917	23,031
Water and Power Employees' Retirement Plan of the City of Los Angeles	07/01/12	9,693	7,389	(2,304)	76%	7,574	(2,119)	78%	8,962	10,158
Los Angeles County Employees Retirement Association	06/30/12	50,809	38,307	(12,502)	75%	39,039	(11,770)	77%	91,952	68,859
Los Angeles Fire and Police Pension Plan	06/30/12	17,031	13,269	(3,762)	78%	14,252	(2,779)	84%	13,396	12,442
Louisiana State Employees' Retirement System	06/30/12	16,158	9,516	(6,642)	59%	9,028	(7,132)	56%	52,352	98,111
Teachers' Retirement System of Louisiana	06/30/12	24,540	14,189	(10,351)	58%	13,584	(10,956)	55%	84,513	94,802
Maine Public Employees Retirement System	08/30/12	11,553	8,454	(3,099)	73%	8,881	(2,672)	77%	39,360	30,485
Maryland State Employees' Combined System	06/30/12	20,284	12,631	(7,653)	62%	12,668	(7,616)	62%	85,174	92,511
Maryland Teachers	06/30/12	34,253	22,502	(11,751)	66%	22,524	(11,729)	65%	103,694	88,732
Massachusetts State Board of Retirement System	01/01/12	27,785	18,643	(9,142)	67%	20,508	(7,277)	74%	85,935	58,671
Massachusetts Teachers' Retirement System	01/01/12	36,483	20,129	(16,354)	55%	22,141	(14,342)	61%	86,860	57,408
Michigan Public School Employee's Retirement System	09/30/11	63,427	34,675	(28,752)	55%	41,038	(22,389)	65%	236,660	207,525
Michigan State Employees Retirement System	09/30/12	15,597	8,775	(6,822)	56%	10,212	(5,385)	65%	17,860	62,043
Municipal Employees' Retirement System of Michigan	12/31/11	9,844	5,933	(3,911)	60%	7,150	(2,694)	73%	35,111	35,362
Minnesota State Retirement System	07/01/12	11,083	9,098	(1,985)	82%	9,182	(1,921)	83%	48,207	47,677
Teachers Retirement Association of Minnesota	07/01/12	23,025	16,686	(6,339)	72%	16,805	(6,220)	73%	76,649	95,217
Public Employees Retirement Association of Minnesota	06/30/12	18,599	13,578	(5,021)	73%	13,662	(4,937)	73%	139,330	119,889
Public Employees' Retirement System of Mississippi	06/30/12	34,493	19,781	(14,712)	57%	19,993	(14,500)	58%	162,311	217,970
Missouri State Employees' Plan	06/30/12	10,794	7,582	(3,212)	70%	7,897	(2,997)	73%	51,332	55,342
Public School Retirement System of Missouri	06/30/12	35,588	27,817	(7,771)	78%	29,013	(6,575)	82%	77,529	50,207

Milliman 2013 Public Pension Funding Study

PLAN NAME	VALUATION DATE	ACCRUED LIABILITY	MARKET VALUE			ACTUARIAL VALUE			COUNT OF ACTIVE MEMBERS	COUNT OF INACTIVE / RETIRED MEMBERS
			VALUE OF ASSETS	SURPLUS / (UNFUNDED) ACCRUED LIABILITY	FUNDED RATIO	VALUE OF ASSETS	SURPLUS / (UNFUNDED) ACCRUED LIABILITY	FUNDED RATIO		
Nebraska Public Employees Retirement Systems School Retirement System	06/30/12	9,609	7,246	(2,363)	75%	7,359	(2,250)	77%	39,477	40,068
Public Employees' Retirement System of the State of Nevada	08/30/10	35,078	20,906	(14,172)	60%	24,725	(10,353)	70%	102,594	55,726
New Hampshire Retirement System	06/30/12	10,362	5,774	(4,588)	56%	5,818	(4,544)	56%	48,625	29,826
Public Employees' Retirement System of New Jersey	07/01/12	45,393	25,176	(20,217)	55%	28,887	(16,506)	64%	280,158	153,625
Teachers' Pension and Annuity Fund of New Jersey	06/30/12	51,405	26,038	(25,367)	51%	31,079	(20,326)	60%	150,200	89,700
The Police and Fireman's Retirement System of New Jersey	07/01/12	31,732	21,126	(10,806)	67%	23,687	(6,045)	75%	40,819	39,767
Educational Retirement Board of New Mexico	06/30/12	15,837	9,489	(6,348)	60%	9,806	(6,231)	61%	60,855	71,368
Public Employees Retirement Association of New Mexico	06/30/12	17,788	11,600	(6,188)	65%	11,612	(6,176)	65%	48,483	36,623
New York City Employees' Retirement System	06/30/10	62,935	35,384	(27,551)	56%	40,433	(22,502)	64%	184,982	141,428
New York City Police Pension Fund	06/30/10	38,134	19,985	(18,149)	52%	22,909	(15,225)	60%	34,597	44,634
Teachers' Retirement System of the City of New York	06/30/10	55,138	26,398	(28,740)	48%	32,478	(22,660)	59%	111,647	80,526
New York State and Local Employees Retirement System	04/01/11	140,087	130,506	(9,581)	93%	128,395	(13,692)	90%	513,092	478,769
New York State Teachers' Retirement System	06/30/11	89,825	89,890	85	100%	86,892	(2,933)	97%	280,435	146,843
New York State and Local Police & Fire	03/31/12	24,169	22,357	(1,812)	93%	22,205	(1,964)	92%	31,024	34,799
North Carolina Local Governmental Employees' Retirement System	12/31/11	19,374	17,908	(1,466)	92%	19,326	(48)	100%	121,638	96,050
North Carolina Teachers and State Employees Retirement System	12/31/11	61,847	53,402	(8,445)	86%	58,125	(3,722)	94%	310,827	282,472
Ohio Police and Fire Pension Fund	01/01/12	16,347	9,688	(6,659)	59%	10,309	(6,038)	63%	27,463	30,029
Ohio Public Employees Retirement System	12/31/10	79,629	63,816	(15,813)	80%	60,599	(19,030)	76%	356,734	617,999
Schools Employees' Retirement System of Ohio	06/30/12	16,372	10,219	(6,153)	62%	10,284	(6,088)	63%	121,811	81,648
State Teachers Retirement System of Ohio	07/01/12	106,302	60,694	(45,608)	57%	59,490	(46,812)	56%	173,044	160,581
Oklahoma Public Employees Retirement System	07/01/12	8,335	6,821	(1,514)	82%	6,882	(1,653)	80%	42,569	35,760
Teachers' Retirement System of Oklahoma	06/30/12	18,588	10,195	(8,393)	55%	10,190	(8,398)	55%	87,778	61,403
Orange County Employees Retirement System	12/31/11	13,523	8,466	(5,057)	63%	9,064	(4,459)	67%	21,421	17,695
Oregon Public Employees Retirement System	12/31/11	61,198	51,389	(9,809)	84%	50,168	(11,030)	82%	170,972	158,915
Pennsylvania State Employees' Retirement System	12/31/11	42,282	24,371	(17,911)	58%	27,618	(14,664)	65%	107,021	121,531
Public School Employees' Retirement System of Pennsylvania	06/30/12	87,761	48,534	(39,227)	55%	58,228	(29,533)	66%	273,504	324,301
Puerto Rico Government Employees Retirement System	06/30/12	27,646	1,237	(26,409)	4%	1,237	(26,409)	4%	134,566	117,861
Puerto Rico Teachers Retirement System	06/30/11	11,449	2,386	(9,063)	21%	2,386	(9,063)	21%	43,402	36,129
Rhode Island Employees Retirement System	06/30/12	10,670	5,757	(4,913)	54%	6,167	(4,503)	58%	24,378	27,305
Sacramento County Employees' Retirement System	06/30/12	7,838	6,074	(1,764)	77%	6,530	(1,308)	83%	12,155	12,090
San Bernardino County Employees' Retirement Association	06/30/12	8,570	6,173	(2,397)	72%	6,789	(1,781)	79%	19,306	13,518
San Diego County Employees Retirement Association	06/30/12	10,943	8,437	(2,506)	77%	8,607	(2,336)	79%	16,457	20,205
City and County of San Francisco Employees' Retirement System	07/01/12	19,394	15,294	(4,100)	79%	16,028	(3,366)	83%	28,282	30,748
South Carolina Retirement System	07/01/11	40,016	22,395	(17,621)	56%	25,605	(14,411)	64%	192,865	268,382
South Dakota Retirement System	07/01/12	8,453	7,843	(610)	93%	7,828	(625)	93%	38,207	37,161
Tennessee Consolidated Retirement System	07/01/11	40,089	33,662	(6,407)	84%	36,681	(3,386)	92%	215,076	116,585
Texas County & District Retirement System	12/31/12	22,953	19,530	(3,423)	85%	20,250	(2,703)	88%	121,963	115,524
Texas Municipal Retirement System	12/31/12	22,683	20,491	(2,192)	90%	19,784	(2,899)	87%	101,827	87,958
Employees' Retirement System of Texas	08/31/12	29,377	21,826	(7,551)	74%	24,273	(5,104)	83%	132,669	177,989
Teacher Retirement System of Texas	08/31/12	144,427	111,460	(32,977)	77%	118,328	(26,101)	82%	815,155	404,166
Utah Retirement Systems	01/01/12	20,743	15,756	(4,987)	76%	16,615	(4,126)	80%	87,220	81,354
Virginia Employees Retirement System	06/30/11	75,185	50,267	(24,918)	67%	52,559	(22,626)	70%	326,357	186,423
Washington Public Employees' Retirement System	06/30/11	31,382	28,274	(3,108)	90%	29,880	(1,502)	95%	152,417	207,853
Washington State Law Enforcement Officers' and Fire Fighters' Plan 1 and 2	06/30/11	9,710	11,550	1,840	119%	12,186	2,476	125%	17,055	12,264
Washington State Teachers' Retirement System	06/30/11	15,557	13,741	(1,816)	88%	14,626	(931)	94%	66,203	50,913
West Virginia Teachers' Retirement System	06/30/11	9,445	5,075	(4,370)	54%	5,075	(4,370)	54%	35,855	34,291
Wisconsin Retirement System	12/31/11	76,565	71,455	(5,110)	93%	76,466	(99)	100%	256,232	353,525

Study Technical Appendix

Methodology: Expected rate of return on assets

For the purposes of this study, we recalibrated liabilities for included plans to reflect discounting at the expected rate of return on current plan assets. To develop the expected rate of return used in these calculations, we relied on the most recently available asset statements for each plan, particularly on Statements of Plan Net Assets as disclosed in published Comprehensive Annual Financial Reports (CAFRs). We did not make adjustments for potential differences between actual asset allocations and target policy asset allocations.

Our method for calculation of the expected rate of return was the "building-block method" as outlined in Actuarial Standard of Practice No. 27, using geometric averaging methodology. We used Milliman's December 31, 2012, capital market assumptions to calculate the 50th percentile 30-year geometric real rate of return, and then added the plan's inflation assumption to arrive at the total expected investment return on plan assets. Where the plan inflation assumption was not available, we used Milliman's December 31, 2012, capital market inflation assumption of 2.50%. We did not make any adjustment to the expected rate of return for plan expenses, nor did we include any assumption for investment alpha (i.e., we did not assume any excess return over market averages resulting from active versus passive management).

Methodology: Liability recalibration

We performed the recalibration of liabilities for pension plans included in the study using adjustment benchmarks based on detailed calculations for certain pension plans meeting broad categorization definitions. For these benchmark plans, we developed precise liability durations separately for active, terminated vested, and retired member populations. These calculated liability durations were modified durations, further adjusted for plan- and population-specific convexity. We applied a variety of cost of living adjustments (COLAs) to the various benchmark plans, resulting in a library of adjustment factors taking into account plan type, plan provisions, demographic group, and COLA.

We then selected liability adjustment factors for each plan in the study based on plan type, COLA provisions, and average demographic characteristics where available. For example, a teachers' plan was typically matched with a set of teachers' plan adjustment factors, with similar COLA provisions. If average ages, service levels, or expected working lifetimes were available, we also used these criteria to aid in choosing the adjustment factors. For each liability recalibration calculation, we then recalculated the selected benchmark durations to reflect the actual starting plan interest rate assumption. We performed separate liability adjustments for active, terminated vested, and retired liabilities, thereby adjusting for varying plan maturity levels.

The liability durations used for adjustment provide an estimate of the sensitivity of the present value of benefits (PVB) to changes in the interest rate assumption. We assumed that for active populations, the actuarial accrued liabilities (AAL) varied 85% as much as the PVB when liabilities were reported under the projected unit credit cost method, and 70% as much as the PVB when liabilities were reported under the entry age normal cost method. These assumptions for the relative change in AAL compared with PVB were based on the average results of a survey of actual changes in AAL versus PVB for selected Milliman clients. Although most plans in the study reported liability results under one of these two cost methods for Government Accounting Standards Board (GASB) reporting purposes, a handful of plans disclosed liabilities only under the frozen initial liability cost method. For those plans, we used the entry age normal assumption for the relative change of AAL to PVB.

Where any discrepancy occurred between liabilities disclosed for GASB reporting and liabilities disclosed elsewhere, the GASB reporting numbers were relied upon.

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Appendix C

Public Sector Clients

Milliman's experience performing actuarial services for large public employee retirement systems dates back to our engagement with the Washington State Employees Retirement System in 1947. The following representative list of our current PERS clients speaks to our ability to provide actuarial services to complex public retirement systems. We perform recurring services such as actuarial valuations and experience investigations for these systems, as well as asset/liability studies, projection models and other special studies.

- California State Teachers' Retirement System
- Florida Retirement System
- General Organization for Social Insurance in the Kingdom of Saudi Arabia (*Philadelphia office assists*)
- Government of Guam Retirement Fund
- Idaho Public Employees Retirement System
- Los Angeles County Employees Retirement Association
- New Jersey Teachers' Pension and Annuity Fund (*Philadelphia office leads*)
- New York City Metropolitan Transportation Authority (*Philadelphia office leads*)
- Oregon Public Employees Retirement System
- Puerto Rico Government Employees Retirement System (*Philadelphia office leads*)
- Puerto Rico Teachers Retirement System (*Philadelphia office leads*)
- San Mateo County Employees Retirement Association
- Santa Barbara County Employees Retirement System
- Seattle City Employees Retirement System
- Southeastern Pennsylvania Transportation Authority (*Philadelphia office leads*)
- Texas County and District Retirement System (*Philadelphia office assists*)

The following table summarizes statistics for the US systems listed above with at least 75,000 members.

Retirement System	Client Since	Number of Members	Market Value of Assets (\$ billions)
California State Teachers' Retirement System	1999	848,000	146.0
Florida Retirement System	1986	982,000	119.4
Idaho Public Employees Retirement System	1965	77,000	11.0
Los Angeles County Employees Retirement Association	1999	149,000	30.5
New Jersey Teachers' Pension and Annuity Fund	1995	243,000	27.0
Oregon Public Employees Retirement System	2012	300,000	55.0
Puerto Rico Government Employees Retirement System	2009	250,000	1.0
Puerto Rico Teachers Retirement System	2007	80,000	1.9
Texas County and District Retirement System	1999	218,000	15.5