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Proposal for
Actuarial Consulting Services

July 23, 2014

Submitted to:

July 23, 2014

CONFIDENTIAL

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

Dear Bethany:

Pension Trustee Advisors (PTA), partnering with KMS Actuaries (KMS), is delighted to present this competitive offer in response to Ohio Retirement Study Council's (ORSC) request for proposals (RFP) for providing independent actuarial services.

This type of assignment is our primary business. Unlike most actuarial firms, most of PTA's work involves a second actuary. We would be privileged to continue to serve the ORSC and look forward to the opportunity to present our qualifications to you and in person and on the following pages.

We understand the work to be done and will make a commitment to perform the work as scheduled. PTA and KMS have the ability, willingness, knowledge, experience and resources to not only meet your needs, but exceed them, subject to the terms of the RFP. William (Flick) Fornia and Linda Bournival will be the primary consultants for ORSC.

William B. Fornia, FSA, EA, MAAA
President
Pension Trustee Advisors, Inc.
7600 E Arapahoe Road, Suite 125
Centennial, CO 80112
Tel: 303.263.2765
e-mail: flick@pensiontrusteeadvisors.com

Linda L. Bournival, FSA, EA, MAAA
Consulting Actuary
KMS Actuaries, LLC
814 Elm Street, Suite 204
Manchester, NH 03101
Tel: 603.792.9494
e-mail: lindab@kmsactuaries.com

Public Pension Focus

The recent turmoil in public pensions is not unique to Ohio. Flick Fornia and Linda Bournival have been involved considerably in this arena both currently as well as historically. Our participation has ranged from actuarial valuations, audits and studies of numerous pension systems to working outside the pension systems to help our clients

effect change. These engagements have been on all sides of the pension reform. For example, PTA is working with bondholders on the bankruptcy of Detroit, the largest US municipal bankruptcy filing in history, with more than $1.4 billion at stake. Flick has also assisted the City of Baltimore to defend pension reform, which included testifying in Federal Court and has saved the City millions of dollars. And of course, we are extremely proud of the role we played with ORSC leading to one of the most comprehensive and balanced pension reforms in the country.

We have substantial involvement in the forefront of the public pension scene. Linda has a sound foundation of public pension and health actuarial valuations both large and small, through KMS and prior firms. Flick is a nationally recognized public plan actuary and advisor. He was recently asked by the leadership of the Government Finance Officers Association, the Federal Reserve Bank of Cleveland, the International Foundation of Employee Benefit Plans and the National Conference of Public Employee Retirement Systems to educate their membership on key public pension issues. He is well known throughout the public pension community for his ability to explain complex matters to a lay audience.

Our Philosophy

Our objective is to provide ORSC with accurate, well-understood information so that it can make the right decisions. Pensions are controversial these days and difficult to understand. We analyze the facts and present them in a manner that will enable the best decisions to be made. We do this through (1) timely and responsive client service; (2) accurate, peer-reviewed, thorough actuarial analysis; and (3) effective oral and written communication of our findings. We encourage you to contact our clients (including ORSC Councilmembers and SERS representatives) to confirm how we have accomplished our mission in the past.

We are happy to answer any questions on this proposal and look forward to discussing this with you further.

Sincerely,

William B. Fornia, FSA
President
Pension Trustee Advisors

Sincerely,

Linda L. Bournival, FSA
Consulting Actuary
KMS Actuaries, LLC

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SECTION 1 – PROPOSAL SUMMARY

In response to your Request for Proposal (RFP) for Actuary Consulting Services issued June 12, 2014, we are pleased to provide this proposal presenting our services for actuarial advisory and related consulting to the Ohio Retirement Study Council (ORSC).

We offer the extensive experience and expertise in performing these actuarial services that you require. Flick Fornia, founder and President of Pension Trustee Advisors, and Linda Bournival, founder and owner of KMS Actuaries, LLC, have provided actuarial services to many public sector clients and have, in combination, over 55 years of actuarial experience. Flick has provided actuarial consulting services in many retirement-related areas, including financing, plan design, bond analysis, asset-liability studies, retiree healthcare and legislative testimony. He has performed consulting services for 22 statewide retirement systems, including twelve audits for large defined benefit public retirement systems. Linda has provided actuarial services to a large number of public retirement systems and governmental entities, including state, regional and local retirement systems, small, medium and large cities, towns, counties and regional school districts.

Below we present a summary of our understanding of the services that are sought by the ORSC.

Based on information provided in the RFP and our experience with the ORSC, we understand that the ORSC has broad oversight for all five of the statewide retirement plans. While the retirement plans perform their own actuarial analyses, the ORSC is seeking their own actuary for review and special projects.

The ORSC has issued an RFP requesting proposals from qualified actuarial consulting firms interested in performing actuarial services. The RFP specifically is requesting the following services:

1. Perform actuarial cost studies as needed for legislative proposals
2. Annually review Ohio Police & Fire Pension Fund (OP&F) contribution rates
3. Every three years, calculate supplemental rates for higher educational employees
4. Advise on issues pertaining to other questions that arise, subject to the powers and duties of the ORSC
5. Provide information and technical assistance, including attendance at appropriate meetings

SECTION 1 – PROPOSAL SUMMARY

This proposal will demonstrate PTA's and KMS' ability to perform the consulting services that the ORSC requires. Flick and Linda provide proactive, actuarial consulting advice based on years of experience with public sector plan sponsors and related entities such as the ORSC. Not only should you review our qualifications and experience that we have detailed in Sections 2 and 4, but we encourage you to contact the references we provide in Section 3 so you can gain confidence in our ability to provide these services. The fact that we have provided actuarial services during the last 30-35 years to a large number of public sector clients speaks to our ability to provide strong actuarial and advisory services.

This type of work is more than half of our combined business. Unlike the majority of actuarial consulting firms, we extensively act as a third party advising an entity such as the ORSC on the actuarial work done by others.

Of course, our most important reference is the ORSC itself. From November 2011 through July 2012, we worked with the ORSC and the systems nearly every day reviewing plan details and actuarial calculations as a component of our pension reform study. We know the ORSC and your plans quite well and have a thorough understanding of them and the actuarial nuances.

SECTION 2 – CAPABILITIES AND EXPERIENCE

PTA and KMS have provided actuarial consulting services to dozens of clients including the following:

- Ohio Retirement Study Council
- Municipal Employees Retirement System of Michigan
- City of Baltimore
- New York City Office of the Comptroller
- State of New Hampshire
- Puerto Rico General Employees Retirement System
- Colorado Fire and Police Pension Association
- Fort Worth Employees Retirement System
- San Diego City Employees Retirement System
- National Conference of Public Employee Retirement Systems
- Alvarez and Marsal [Advisor to Detroit COPs holders in Bankruptcy]
- International Association of Firefighters' (IAFF) Locals in eight jurisdictions
- Alaska Public Pension Coalition
- Worcester Regional Retirement System
- Manchester, New Hampshire
- Massachusetts Water Resources Authority
- Plymouth, Massachusetts
- Dukes County, Massachusetts (Cape Cod Islands)
- Massachusetts Public Employee Retirement Administration Commission

Flick, the proposed lead actuary and consultant for the ORSC, specializes in the type of actuarial consulting services that the ORSC is requesting. He has conducted fourteen audits for large defined benefit public retirement systems. Flick is well known for his ability to explain complex concepts to lay audiences. He is an author and frequent speaker at organizations such as the National Association of State Retirement Administrators (NASRA), the National Council on Teacher Retirement (NCTR), the National Association of Public Pension Attorneys (NAPPA), the National Conference on Public Employee Retirement Systems (NCPERS), the Conference of Consulting Actuaries, the International Foundation of Employee Benefit Plans, The Conference Board, the Government Finance Officers Association (GFOA), and the Brazilian Association of Pension Plans (ABRAPP).

PTA, founded in 2010, is the leading provider of specialized non-routine actuarial services relating to state and local government retirement systems.

SECTION 2 – CAPABILITIES AND EXPERIENCE

Linda Bournival has provided actuarial consulting and retirement system valuation services for several municipalities and governmental entities over the past 25 years. In addition, she provides Governmental Accounting Standards Board Statement Number 45 (GASB 45) valuation services and retiree health care consulting services to many large, medium and small public sector clients. Over the years, she has provided a variety of services with respect to retirement plans, including the design and preparation of comprehensive employee benefit statements, the design and development of a complex automated benefit calculation system, the administration and establishment of qualification procedures for domestic relations orders and pension valuations of retirement benefits in divorce situations

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KMS, founded in 2011, already has a significant presence in the public sector, providing services to over seventy entities, including state and local retirement systems, cities, towns, counties, school districts and enterprise units.

Following are descriptions of several projects completed by PTA and/or KMS that are similar to what the ORSC is or may be requesting:

- *Conduct actuarial and cost analyses of various legislative proposals. Some of these analyses will have short deadlines.*

  Memphis' Mayor had proposed changes to its retirement system. PTA was engaged by the IAFF to analyze the proposal and determine how much the proposal would cost or save the City. Within a very tight time frame, PTA prepared a report and testified to the City Council.

  PTA is also working for another City involved in litigation. As part of potential settlement negotiations, PTA has been called upon to provide costs of various settlement proposals. These have often been subject to a short deadline.

  KMS is frequently asked to provide cost analyses of local benefit options available to Massachusetts Public Retirement Systems, including increased death and COLA benefits.

- *On an annual basis, review the adequacy of the contribution rates made under the Ohio Police and Fire Pension Fund (OP&F) and make recommendations to the legislature for the proper financing of the benefits provided by OP&F (Ohio Revised Code 742.311).*

  PTA/KMS' assignment in the 2012 pension reform study included a review of the adequacy of contributions under all five Ohio retirement systems, along with recommendations to the legislature on the pension reform thirty-year plans.

PTA has also reviewed contribution adequacy for other clients. When advising Assured Guaranty Corporation on the bankruptcy of the City of Stockton, PTA reviewed the adequacy of the CalPERS calculated contribution rates. In extensive work in Puerto Rico over the past five years, PTA has advised the Governor's Commission on Pension Reform as to the adequacy of the pension contribution rates.

KMS' work with Massachusetts retirement systems includes development of various funding alternatives that fully fund the systems' liabilities within statutory requirements and presenting these options to the Boards.

- *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.*

  PTA has often compared the costs of alternative retirement plans (defined contribution plans) in lieu of defined benefit plans. Each analysis is governed by slightly different laws and methodologies, but all generally involve the basic principles of amortization of unfunded liabilities and the differences in the nature of DC plans with DB plans. Examples include:

  - 2005 report (pre-PTA) to New Mexico Legislature of costs of DC plan
  - Report to the New York City Office of the Comptroller on supplemental costs of DC plan
  - Testimony to Alaska Legislature (on behalf of Alaska Public Pension Coalition) on supplemental costs of DC plan
  - Testimony on labor arbitration hearing on behalf of City of Philadelphia on costs and benefits provided under hybrid DB/DC plan

  KMS served on an advisory adjunct to a Special House Committee of the New Hampshire House of Representatives to study the possible transition from the current defined benefit plan applicable to New Hampshire public employees to a defined public employee contribution plan for all new state employee hires and for other New Hampshire local and county governments.

SECTION 2 – CAPABILITIES AND EXPERIENCE

- *Provide consultation and advice on questions and issues that arise relevant to the powers and duties of the ORSC.*

  We can assist in any relevant and appropriate actuarial manner. We have extensive experience providing actuarial consulting and advice.

  An excellent example of disparate advice and questions by PTA to bondholders is in the Detroit bankruptcy. These bondholders are at risk of losing up to $1.4 billion and are seeking a rigorous understanding of the issues pertaining to the Detroit retirement systems. This advice is anticipated to include an expert witness report, deposition, and possibly testimony.

  Two other examples that PTA/KMS worked on together were two Michigan public entities with different actuarial issues with third parties which required actuarial review of methodology and advising our clients with the ramifications of various potential issues.

  Other examples are mentioned above and some are included as attachments.

- *Provide information and technical assistance, including attendance at ORSC meetings as requested, to present analysis, studies, and reports completed by the actuary and provide testimony to legislative committees.*

  We have presented to ORSC nearly ten times, and once to the Ohio House Committee for Health and Aging Subcommittee on Retirement and Pensions Hearing legislature. Flick has also presented to legislatures in eight other states.

  Examples of actuarial work products, testimony, presentations and publications are included in the Appendices.

SECTION 3 – REFERENCES

Below, we provide references that you can contact and learn more about our strength in providing actuarial services.

Municipal Employees' Retirement System of Michigan

Contact: Kristin Bellar, Senior Deputy General Counsel
Address: 1134 Municipal Way
Lansing, Michigan 48917

Phone: (517) 703-9030
Email: kbellar@mersofmich.com

In 2013, PTA and KMS were hired to complete a specific actuarial review study for MERS.

Colorado Fire and Police Pension Association

Contact: Dan Slack
Address: 5290 DTC Parkway, Suite 100, Greenwood Village, Colorado 80111

Phone: (720) 479-2308
Email: DSlack@FPPAco.org

Flick served FPPA as ongoing actuary from 1997 to 2006. He conducted actuarial valuations, experience studies and an asset liability study. In 2012 at PTA he conducted the strategic planning module at their annual board retreat.

Alaska Retirement Management Board and Alaska Public Pension Coalition

Contact: Sam Trivette
Address: Glacier Hwy, Juneau, AK

Phone: (907) 723-3220
Email: samtriv@gci.net

Flick provided actuarial review and services to ARMB from 2005 to 2006 and 2008 to 2009. Since 2010, he has worked with the APPC to support legislation returning a defined benefit program to certain employees. Sam is an ARMB trustee and member of APPC.

SECTION 3 – REFERENCES

Worcester Regional Retirement System

Contact: Kevin Blanchette, Chairperson
Address: 23 Midstate Drive
Auburn, MA 01501

Phone: 508.832.6314
Email: kpblanchette@worcesterregionalretirement.com

KMS performs actuarial valuations of the Retirement System pursuant to Chapter 32 of the Massachusetts General Laws. Other services we have provided include a cost-of-living study to value the cost of increasing the COLA base, presentation of the valuation results to the 95 member units and a pension forum presenting the cost of disability retirements. Linda has provided services to Worcester Regional since 2010, and previously while with Buck Consultants, from 1992 – 2000.

SECTION 4 – STAFF QUALIFICATIONS

Pension Trustee Advisors (Flick Fornia) is partnering with KMS Actuaries (Linda Bournival) to provide actuarial consulting services to the ORSC. Flick and Linda are both pension and retirement system actuaries with significant experience in providing actuarial consulting services to public sector clients. Flick and Linda are fully credentialed Fellows of the Society of Actuaries (FSA), the highest level of professional accreditation that an actuary can achieve. Both Flick and Linda are members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries necessary to perform the services requested in this RFP and render actuarial opinions with respect to the calculations required.

As we did for our ORSC pension reform study and SERS audit, our team may include another experienced retirement system actuary who provides strategic planning and years of expertise working with public sector retirement systems. Paul Schrader has 45 years of experience with retirement and other employee benefit programs with major employers in both the private and public sectors. Paul retired from Buck Consultants and since retirement, has consulted with several public retirement systems in areas of strategic planning and policy setting, including the South Dakota Retirement System. Paul played an instrumental role in our ORSC pension reform study, and will serve the ORSC in a similar role.

Flick will serve as the lead actuary and consultant to the ORSC. He will be responsible for management of the overall relationship and projects. Linda will perform any required data processing, calculations and modeling using an actuarial valuation system called ProVal, widely used by many national firms. Paul will assist Flick and Linda and provide the necessary consulting and peer review of the work presented here. We estimate the time spent by each for completion of the various tasks in general to be as follows:

1. Flick Fornia 50%
2. Linda Bournival 45%
3. Paul Schrader 5%

We provide a summary of Flick, Linda and Paul's professional qualifications and experience on the following pages.

SECTION 4 – STAFF QUALIFICATIONS

William B. (Flick) Fornia

Flick, the proposed lead actuary and consultant for the ORSC, is founder and President of Pension Trustee Advisors (PTA). PTA provides consulting services on public pensions with focus on pension advice.

Previous Work History

He was senior vice president at Aon Consulting, leading their public sector pension actuarial consulting practice from 2006 to 2010. Flick has more than 35 years of consulting and actuarial experience, primarily in the areas of retiree pension and healthcare benefits. Prior to Aon, he managed the Denver Retirement Practice of Buck Consultants and has served nationally as a Senior Consultant for Gabriel, Roeder, Smith & Co., both specializing in public pensions.

Work Experience

Flick Fornia has expertise in all retirement-related areas, including financing, plan design, bond analysis, asset-liability studies, retiree healthcare and legislative testimony. His career includes serving as corporate actuary for The Boeing Company and as consultant for numerous multinational corporations in Brazil and Argentina during his ten years at Towers Perrin. Previously, he was corporate actuary for Boeing.

He has performed consulting services for 22 statewide retirement systems in Alaska, California, Colorado, Louisiana, Missouri, New Mexico, North Dakota, Oklahoma, Puerto Rico, Utah, Vermont, Wyoming and others. He led ORSC's pension reform study and audit of SERS. Other clients have included the US Department of State, Cities of Baltimore, New York and Philadelphia, IBM, US WEST and Ford Motor Company.

Articles and Speech Presentations

Flick is well known for his ability to teach complex concepts to lay audiences. He is an author and frequent speaker at organizations such as the Pension Research Council, the National Conference of State Legislators (NCSL), National Association of State Retirement Administrators (NASRA), the National Council on Teacher Retirement (NCTR), the National Association of Public Pension Attorneys (NAPPA), the National Conference on Public Employee Retirement Systems (NCPERS), the Conference of Consulting Actuaries, the Western Pension and Benefits Conference, the International Foundation of Employee Benefit Plans, The Conference Board, the Government Finance Officers Association (GFOA), and the Brazilian Association of Pension Plans (ABRAPP).

SECTION 4 – STAFF QUALIFICATIONS

Articles and speeches have addressed all aspects of retirement programs including retiree healthcare plans, and the challenges of public sector defined contribution plans. He co-authored *"A Better Bang for the Buck – The Economic Efficiencies of Defined Benefit Plans"* with the National Institute of Retirement Security in 2008.

Professional Organizations and Education

He is a Fellow of the Society of Actuaries, Enrolled Actuary, Member of the American Academy of Actuaries, and Fellow of the Conference of Consulting Actuaries. He currently serves on the steering committee of the Conference of Consulting Actuaries Public Pensions Subcommittee, and is on the faculty of the Society of Actuaries Fellowship Admissions Course. Flick earned a Bachelor of Arts in Mathematics at Whitman College.

SECTION 4 – STAFF QUALIFICATIONS

Linda L. Bournival

Linda L. Bournival formed KMS Actuaries, LLC, after nearly 25 years of actuarial consulting experience with a wide-range of retirement plan and postemployment benefit assignments and issues. A significant portion of her experience includes consulting and actuarial services for pension plans and postemployment benefit programs for governmental entities, including states, cities, towns, school districts and authorities.

Previous Work History

Prior to forming KMS Actuaries, Linda was a Director and Consulting Actuary at Buck Consultants and most recently Executive Vice President at Ricci Consultants. Linda has over 25 years of consulting and actuarial experience and includes services for pension plans and postemployment benefit programs for private and public sector entities. She has worked with clients regarding qualified and non-qualified defined benefit and defined contribution plans.

Work Experience

She has provided a variety of services with respect to retirement plans, including the design and preparation of comprehensive employee benefit statements for the Vermont State Retirement Systems, the design and development of a complex automated benefit calculation system for the Massachusetts Bay Transportation Authority Retirement Fund (MBTA), the administration and establishment of qualification procedures for domestic relations orders for Florida Progress Corporation and pension valuations of retirement benefits in divorce situations.

Since the implementation of Statement Numbers 43 and 45 issued by the Governmental Accounting Standards Board, Linda has been retained by a growing number of municipalities in New England, including the City of Manchester NH, the Manchester NH School District, Dukes County OPEB Trust, the University of Maine, the Towns of Belmont, Littleton and Weston, Massachusetts, Wachusett Regional School Districts and others.

Since 1988, she has provided pension valuation and consulting services to several public retirement systems in Massachusetts, including most recently Worcester Regional, Braintree, Hingham, Lowell and Reading. She also has provided actuarial consulting services to private sector clients, including Florida Progress Corporation, High Voltage Engineering Corporation, Massachusetts Hospital Association and MediaNews Group.

She recently presented on "Pension Reform and Plan Design: Around the Country" at Massachusetts Public Employees Retirement Administration Commission's Emerging Issues Forum.

Professional Organizations and Education

She is a Fellow of the Society of Actuaries, an Enrolled Actuary, a Member of the American Academy of Actuaries, and a Fellow of the Conference of Consulting Actuaries. Linda graduated magna cum laude from Providence College earning a Bachelor of Arts in Mathematics.

SECTION 4 – STAFF QUALIFICATIONS

R. Paul Schrader

Paul Schrader has 45 years of experience with retirement and other employee benefit programs with major employers in both the private and public sectors.

Previous Work History

Paul spent most of his career with A. S. Hansen, Inc. in Denver as a consulting actuary with responsibility for the firm's activities in the Rocky Mountain region. He served as a Vice President, member of the Board of Directors and Executive Committee of Hansen, and later as a Managing Director of William M. Mercer, Inc. after their acquisition of Hansen. Paul retired from Buck Consultants as a consulting actuary with responsibility for Buck's activities in this region.

Work Experience

Paul has assisted in the consolidation of several independent statewide public employee retirement systems into one unified system with common benefits and practices. He served as consulting actuary and principal consultant to a statewide public employee retirement system for over 35 years, and continues to serve as a strategic planning and policy consultant. He has designed a consolidated, total benefit plan for a multi-bank holding company after merger and consulted with a Fortune 500 employer on adoption of investment policy and funding actuarial assumptions and methods to match corporate objectives of minimizing future contributions to plan due to substantial over-funded status. Paul has conducted numerous asset/liability forecast studies to test long-term and most likely effects of alternative investment policies, actuarial assumptions and methods, and benefit changes.
Additional work experience includes the development of a strategic plan including benefit and funding policies for a retirement system covering over 50,000 members. Paul has also led numerous retirement plan reviews for public sector retirement systems considering the conversion of a defined benefit plan to a defined contribution or hybrid plan.

Professional Organizations and Education

Paul graduated from the University of Texas with a degree in Actuarial Science. He is an Associate of the Society of Actuaries, Member of the American Academy of Actuaries, Member of the Western Pension & Benefits Conference and an Enrolled Actuary.

Paul is a frequent speaker at professional and industry organizations, an author of several benefits articles, and has provided expert testimony in the development of public retirement policies.

SECTION 5 – METHODOLOGY

Based on our understanding of the requested services in the RFP, we will provide actuarial consulting services to the ORSC. Our proposed methodology for completion of the scope of services and other consulting services, along with the desired work products, follows:

1. Conduct actuarial and cost analyses of various **legislative proposals**.
    - Annually, in advance:
        - Meet with ORSC staff, and possibly system staff in advance to try to anticipate potential legislation and issues with actuarial and cost analysis
        - Collect actuarial membership data from the systems
        - Develop internal actuarial models for testing of proposed changes
    - Once legislation is introduced or an analysis is requested:
        - Discuss interpretation with retirement system
        - Conduct actuarial analysis
        - Review with ORSC and system staff, as appropriate
        - Report to the ORSC, and legislature or system as appropriate
    - We anticipate about five hours per year of time by each the ORSC and system staff

2. Annually review the adequacy of the **contribution rates made under the Ohio Police and Fire Pension Fund (OP&F)** and make recommendations to the legislature for the proper financing of the benefits provided by OP&F

    - Meet with ORSC staff and OP&F staff to understand process of contribution rate development and interpretation of this requirement.
    - Develop model to project OP&F contribution rates, similar to that developed for 2012 and 2013 rate reviews conducted by PTA/KMS.
    - Once OP&F Rates are calculated, conduct the analysis
    - Prepare a written report that is in language clearly understood by lay readers, containing details of the review, detailed recommendations and conclusions where appropriate.
    - Present report to the ORSC, legislature or OP&F as appropriate

3. 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

SECTION 5 – METHODOLOGY

- Meet with ORSC staff and STRS staff to understand process of supplemental contribution rate development and interpretation of this requirement.
- Develop model to calculate supplemental contribution rates, based on understanding developed from above and 2012 pension reform study conducted by PTA/KMS.
- Test model and compare with previous calculations.
- Conduct the analysis for the current year
- Prepare a written report that is in language clearly understood by lay readers, containing details of the review, detailed recommendations and conclusions where appropriate.
- Present report to the ORSC, legislature or STRS as appropriate

4. Provide **consultation and advice** on questions and issues that arise relevant to the powers and duties of the ORSC

   As indicated in Section 2, we can assist in any relevant and appropriate actuarial manner. We have extensive experience providing actuarial consulting and advice. Please see our response below where we combine this and the following project.

5. 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
   - Annually, in advance, meet with ORSC staff, and possibly system staff in advance to try to anticipate potential issues
   - Once an issue arises or an analysis is requested:
     - Discuss interpretation with retirement system
     - Conduct actuarial analysis
     - Review with the ORSC and system staff, as appropriate
     - Report to the ORSC, and legislature or system as appropriate

SECTION 6 – GLOSSARY

Below, we provide a glossary of all abbreviations, acronyms and technical terms used to describe the services contained in our proposal.

ABRAPP – Brazilian Association of Pension Plans.

Actuarial Assumptions – Assumptions as to the occurrence of future events affecting pension and OPEB costs, such as mortality, withdrawal, disablement and retirement; changes in compensation and Government provided pension benefits; rates of investment earnings and asset appreciation or depreciation; procedures used to determine the Actuarial Value of Assets; characteristics of future entrants for Open Group Actuarial Cost Methods; and other relevant items.

Actuarial Cost Method – A procedure for determining the Actuarial Present Value of pension plan benefits and expenses and for developing an actuarially equivalent allocation of such value to time periods, usually in the form of a Normal Cost and an Actuarial Accrued Liability.

DB Plan – Defined Benefit Plan.

DC Plan – Defined Contribution Plan.

CALPERS – California Public Employees' Retirement System.

FSA – Fellow of the Society of Actuaries, the highest educational standard for actuaries.

GASB – Governmental Accounting Standards Board.

GASB 45 – Accounting and Financial Reporting by Employers for Postemployment Benefits Other Than Pensions.

GFOA – Government Finance Officers Association.

IAFF – International Association of Firefighters' Locals.

KMS – KMS Actuaries, LLC.

MBTA – Massachusetts Bay Transportation Authority Retirement Fund.

NAPPA – National Association of Public Pension Attorneys.

NASRA – National Association of State Retirement Administors.

SECTION 6 – GLOSSARY

NCPERS – National Conference on Public Employee Retirement Systems.

NCTR – National Council on Teacher Retirement.

OP&F – Ohio Police & Fire Pension Fund.

ORSC – Ohio Retirement Study Council.

PERS – The Public Employees Retirement System of Ohio.

ProVal – Winkelvoss Technologies actuarial software used for funding and accounting valuations of retirement benefits and OPEB.

PTA – Pension Trustee Advisors, Inc.

SERS – School Employees Retirement System of Ohio.

STRS – School Teachers Retirement System of Ohio.

SECTION 7 – ADDITIONAL INFORMATION

1. Neither PTA nor KMS, or any of the principals, officers, or any affiliate has been a party to any litigation or allegations concerning fraud, negligence, criminal activity, violations of law or regulations or fiduciary responsibility.

2. We are not aware of any conflicts of interest that exist. Both PTA and KMS will contractually agree to disclose all sources of revenue, affiliations, and details of other relationships that may present conflicts of interest.

   We do not currently have any active contractual agreements with any of the five state retirement systems, although we recently submitted a proposal to provide actuarial audit services to PERS.

   Neither PTA nor KMS has served as the consulting actuary to any of Ohio's state retirement systems.

3. As stated in Section 4 – Staff Qualifications, we will likely use the services of Paul Schrader in delivering actuarial services.

4. Pension Trustee Advisors was incorporated in Colorado in 2010 by its sole owner, William Fornia. KMS Actuaries, formed in 2011 by its sole owners, Linda Bournival (99%) and Gerald Collins (1%), is a limited liability company. Our firms provide actuarial, retirement, benefit and technology services. PTA's and KMS' actuarial consulting services to the public sector, particularly special projects such as these requested by the ORSC, represent the vast majority of all the combined services our firms provide. There is currently no plan for retirement of key executives or for any changes to our ownerships or organization structures.

5. Neither PTA nor KMS has had any staff turnover.

6. PTA and KMS are not your typical actuarial consulting firms. Our key strength for the ORSC in these engagements is that we specialize in these types of studies of large public pension systems. The majority of our combined work involves other actuaries, either through audits, special studies, litigation, or negotiations.

   As we discussed in Section 2 – Capabilities and Experience, we are extremely experienced and at the national forefront of thought pertaining to actuarial

SECTION 7 – ADDITIONAL INFORMATION

funding of large public pension systems. Because we are a smaller firm than most that we anticipate you will be considering, you would be an extremely high priority client to us. You would get the complete attention, quality and service that you deserve. We will meet the agreed-upon deadlines that you impose as well as be extremely responsive to your other needs.

But don't think that because we are small that we have no depth or limited capacity. We do have the availability to perform the requested services within the timeframe you require, and we have several other subcontractors that we can call upon for further assistance should the need arise. In particular, we have worked with Paul Schrader, a seasoned pension actuary with 45 years of experience with retirement and other employee benefit programs with major employers in both the private and public sectors. Linda has deep expertise with actuarial valuations as well as a strong understanding of public pensions. And Flick has unsurpassed knowledge of US public pension funding as well as the strength to review actuarial valuations. All are skilled communicators of this complex information.

Although we have extensive experience performing ongoing actuarial services, since 2010 we have carved out a niche with important high visibility unique actuarial consulting pertaining to public retirement systems. Our largest client is the ORSC and as you know, we conducted a massive review of pension reform in 2011-2012 and recently completed an actuarial audit of SERS.

We have consulted on high visibility lawsuits including the Detroit and Stockton, California bankruptcies. We work not only for pension systems, but for government bodies, labor groups, and third parties. Our philosophy is to get the facts on the table and well understood so that decision-makers can make the right decisions.

Both Flick and Linda are fully credentialed Fellows of the Society of Actuaries as well as Enrolled Actuaries under ERISA. There is no higher US qualification for pension actuaries. Flick has served on the American Academy of Actuaries Public Pension Committee and currently serves on the Conference of Consulting Actuaries (CCA) Public Plans Community Steering Committee. His CCA role included as a major author of a recent draft report on public pension funding policy. He is considered a thought leader on public pension funding policy and has spoken on the subject to the AARP, National Conference of State Legislators, GASB, as well as numerous actuarial organizations and other organizations specializing in public pensions throughout the world.

SECTION 7 – ADDITIONAL INFORMATION

We have been exposed to dozens of different public plans and their actuarial software and methods from Alaska to Puerto Rico and Maine to California. PTA/KMS has a well-established process for conducting actuarial studies, developed based on years of conducting audits and actuarial valuations. We have reviewed the actuarial work from numerous actuarial firms, and understand many of the nuances of various actuarial methods and techniques.

SECTION 8 - COST INFORMATION

Fees are determined based on our estimate of the time required to perform the requested services. We propose that invoices, which will include the hourly rate and number of hours worked by specific personnel, will be submitted on a monthly basis.

Our cost proposal is presented below and includes hourly rates for the professional staff assigned to the actuarial consulting services and an estimate of the number of hours anticipated. In support of our commitment to the ORSC and to demonstrate our sincere desire to continue working with you, our hourly rates will be those used in the 2012 pension reform study and we will continue to use those rates throughout the term of the four-year contract.

ORSC Fee Development

Task	Team Member Name	Hours	Hourly Billing Rate	Estimated Cost
Hourly Rate	William Fornia	N/A	$430	N/A
	Linda Bournival	N/A	$300	N/A
Review OP&F Contribution Rates	William Fornia	24.50	$430	$10,535
	Linda Bournival	26.00	300	7,800
	Paul Schrader	1.00	300	300
	Total			$18,635
Perform actuarial study of employer supplemental contribution under alternative retirement plan	William Fornia	26.00	$430	$11,180
	Linda Bournival	28.25	300	8,475
	Paul Schrader	1.00	300	300
	Total			$19,955
Travel Costs (per trip to Columbus)	William Fornia			$1,250
	Linda Bournival			1,250
	Total			$2,500

APPENDIX A

SAMPLE ACTUARIAL WORK PRODUCTS

ROBERT F. CHERRY. Jr, *et al.*

v.

Mayor and City Council of Baltimore City, *et al.*

Expert Report

Prepared By

William B. Fornia, FSA

January 24, 2011

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Cherry v Baltimore

Section I – Background and Qualifications

Introduction

1. I am the owner of Pension Trustee Advisors, a Colorado corporation. I entered the actuarial profession in 1979, am a Fellow of the Society of Actuaries, and have been since 1984. I earned Membership in the American Academy of Actuaries in 1983, Enrollment by the Joint Board for the Enrollment of Actuaries in 1984 and Fellowship in the Conference of Consulting Actuaries in 2005. I have performed a significant amount of actuarial consulting and expert testimony work in public pension related matters. Attached hereto as Appendix 1 is a true and correct copy of my current *curriculum vitae*, which lists my qualifications, including a complete list of all publications authored by me in the previous ten years. It also shows that I have not testified as an expert at trial or by deposition during the previous four years.

2. I have been retained by Kramon & Graham, P.A. on behalf of the City of Baltimore ("the City") to act as expert and report to the Court with respect to various actuarial matters within my expertise that arise out of Cherry's claims against the City in these proceedings. My fee is $484 per hour. I was retained both as senior vice president for Aon prior to September, 2010 and as president of my current firm since then.

3. The facts and matters which I set out in this report, except where I have said otherwise, are within my own knowledge or derive from reading the documents made available to me. Documents to which I refer in this report are cited in Appendix 2 to this report. These include, in particular:

    a. 2010 Actuarial Valuation report of The Fire and Police Employees' Retirement System of the City of Baltimore ("FPERS"), prepared by William M. Mercer, Inc. ("Mercer")
    b. 2009 Mercer Actuarial Valuation report of FPERS
    c. Various reports by Mercer measuring the costs and projections of costs of various plan alternatives, as enumerated in Appendix 2
    d. Report of Greater Baltimore Committee Task Force on Sustainable Funding of Baltimore City's Fire and Police Pension System ("GBC report")

4. I am familiar with the provisions of FPERS. I have thoroughly reviewed the 2009 and 2010 actuarial valuation reports.

Section II – Analysis of Potential Changes to the System

Summary of Conclusions

5. The FPERS in place prior to Ordinance 10-306 was not sustainable and not affordable to the City, requiring modification. Changes made by Ordinance 10-306 resulted in a system which is more sustainable and affordable, while at the same time continuing to provide retirement benefits which are adequate for full career employees, with a minimum of disruption. These changes are necessary in that the plan prior to the ordinance was not affordable or sustainable. The changes are reasonable in that benefit adequacy is preserved with a minimum disruption.

Introduction

6. I was senior vice president at Aon Consulting, Inc. from 2006 to 2010, and their most experienced public pension consultant. My assignment in this matter was to:
    a. Provide actuarial support for PFM, financial consultant to the City, so they had a solid understanding of short-term and long-term FPERS pension costs;
    b. Review Mercer's conclusions that the FPERS was not sustainable at the then current interest rate assumptions, so long as the variable benefit remained in place;
    c. Assist the City in the analysis of potential changes to FPERS. This was done in a manner that addresses the sustainability and affordability shortfalls, while preserving benefit adequacy and with a minimum of disruption to plan members. This led to the adoption of Ordinance 10-306.

I reserve the right to supplement my report if additional information becomes available.

7. Together with the City, our charge was to modify the plan in keeping with the goals of necessity and reasonability, which were further specified as:
    a. Sustainability – A retirement program needs to last generations and be sustainable. The plan must not become insolvent due to lack of adequate plan assets, causing additional costs for future generations.
    b. Affordability – The sponsor of a retirement program has limited financial resources, and the retirement program costs need to fit into the financial constraints of the sponsor.
    c. Benefit Adequacy – The purpose of any retirement program is to allow full career workers to leave the work force and be able to maintain a similar standard of living at retirement.

d. Minimum disruption – When changing plan provisions, reasonable care must be taken to modify the plan with a minimum amount of change in workers retirement plans.

Initial analysis of alternatives

8. We reviewed the report of the Greater Baltimore Committee Task Force on Sustainable Funding of Baltimore City's Fire and Police Pension System. This report opened on a bleak note:

> "The City of Baltimore is facing a serious fiscal challenge. Current contributions to fund the City's Fire & Police Employees' Retirement System, (referred to elsewhere in this report as the F&P Pension plan or system) are inadequate to fully cover the existing and anticipated liabilities required under the pension system. The most recent Comprehensive Annual Financial Report states, 'negative investment performance of 21.9%, the recognition of additional accumulated losses from the separate reserves used in previous years to provide benefit improvements to members and retirees, contribution reductions by the City, and costly post-retirement benefit increase provisions, will drive the employer contribution requirements to unsustainable new highs.' Meanwhile, the City's unfunded liability continues to grow. Currently, the actuarial funded ratio of the F&P system is 84.8%, while the funded ratio according to market value stands at only 58.2%. The problem threatens the city's fiscal stability and could result in a reduction in City services, increased taxes, and a decline of the City's bond rating – a combination of adverse circumstances that would result in immediate and long term financial burdens on the City and its citizens."

Our independent analysis of the various reports was consistent with the GBC report. The GBC report identified six changes to the FPERS benefit structure:

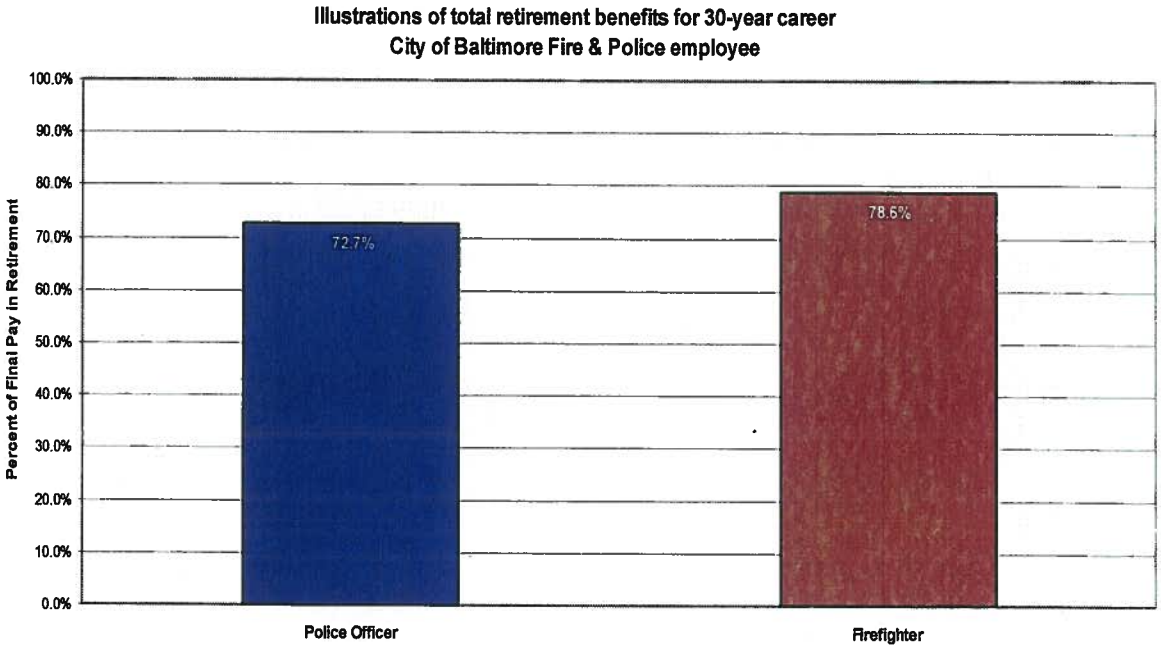
a. Replacing the current "variable benefit"
b. Lengthening the age and service requirements
c. Terminating the provisions of the Deferred Retirement Option Plan (DROP2) for those members who have not yet achieved 15 years of service
d. Revising the calculation for the average final compensation
e. Increasing the employee contributions supporting the F&P system
f. Considering a Defined Contribution Plan for future hires

Our analysis included these six items as well as a few others, with many modifications to the GBC recommendations.

9. For twenty years, Aon Consulting and Georgia State University have published data on retirement income needs. The *Replacement Ratio Study* is a premier source of retirement planning information for employers, employees and their advisors, and is built on the 1980 edition issued by the President's Commission on Pension Policy.

   This study analyzes the replacement income needed for retirees to maintain their pre-retirement standard of living after retirement. The primary data source for this analysis is the U.S. Department of Labor's Bureau of Labor Statistics' Consumer Expenditure Survey, essentially the same database used to construct the Consumer Price Index.

   As a first step in measuring benefit adequacy, we looked at a typical full career FPERS retiree and how they would measure up with FPERS benefits compared to their needs as identified by this Aon/Georgia State study.

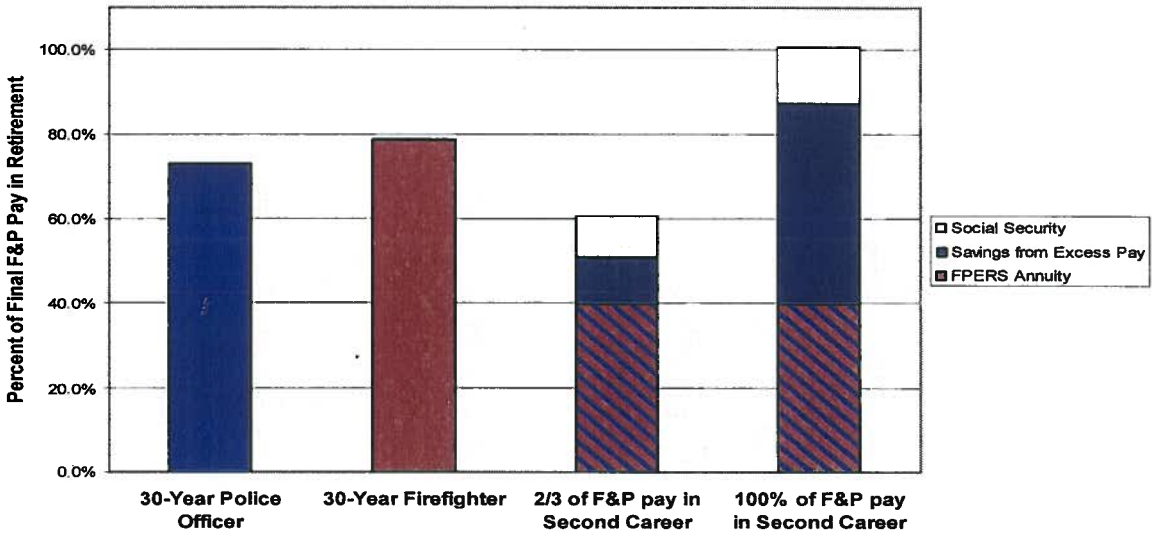


We calculated benefits for a typical FPERS member hired at age 27, assuming they work 20 years, then enter the DROP period for three years, and continue working until retiring at age 57 with 30 years of service. The FPERS benefit would be 72.7% of pay for a Police Officer member and 78.6% of pay for a Firefighter member. These amounts are close to the 77%-78% cited by Aon/Georgia State as needed by retirees at these pre-retirement income levels. For the Police Officer who falls slightly short of that target, the

remainder can be acquired through modest savings prior to age 27 or after age 57. From this analysis, it is clear that the program met needs for full career workers. Our approach was thus to not modify the core accrual rate feature of FPERS and thus preserve the benefit adequacy.

The next step was to calculate benefits for a hypothetical FPERS member who leaves Baltimore employment after 20 years of service (at age 47), works 15 years in private employment, then retires. If the worker's private employment is at the same pay level and they save up their pension, they would be able to use those savings to pay out substantial additional income at ultimate age-62 retirement. When adding these two income sources plus Social Security, the former Baltimore employee would have retirement income in excess of 100% of their pre-retirement pay.

Total retirement benefits for 20-year City of Baltimore Fire & Police employee with a second 15-year career compared to full 30-year career employee



Calculation assumes employee at average pay, retirement from F&P plan after 20 years of service. Second career for 15 years at indicated percentage of F&P pay. Assumes that standard of living is maintained and any excess funds are saved for future retirement income. Also assumes that employee worked in a Social Security covered job for seven years prior to Baltimore F&P hire at age 27.

This analysis confirms that in lengthening age and service requirements, benefits are preserved for true full career public servants, but the ability to build up benefits that exceed the levels identified as adequate by Georgia State after leaving public service at a young age is reduced. Thus this is the type of change which would not undermine benefit adequacy.

10. For each alternative, we analyzed both the cost savings anticipated to materialize as well as the impact on the benefit level of the retiree. Some cost estimates were performed by Aon using actuarial software and simplified employee data. For certain

alternatives, we asked the City to have Mercer, the FPERS actuary, perform the cost estimates. This is because Mercer has complete confidential demographic data on FPERS members and because Mercer, as the actuary to FPERS will be ultimately performing the calculations once complete.

We reviewed each of these Mercer cost estimates and found that they were consistent with our estimates and reasonable.

11. We have experience with many other state and local government retirement systems. Many of these are currently under difficult financial situations, like Baltimore and FPERS. We reviewed the changes that these systems are considering or have adopted. This information was available primarily for statewide retirement systems through the National Conference of State Legislatures or the National Association of State Retirement Administrators. In addition, I had first-hand knowledge of changes considered and adopted by the cities of Denver, Philadelphia and San Antonio.

12. The Union proposed changes to the retirement system on June 10, 2010. These included:

    a. Replacing Variable Benefit with fixed 2% Cost of Living Adjustment (COLA) and retroactive increases based on Paid-Up Benefits Fund;
    b. Increasing the member contributions from 6% to 9%;
    c. Changing the actuarially assumed rate of investment return;
    d. Lengthening the period for amortization of unfunded liability from twenty to thirty years;
    e. Back-loading the amortization of unfunded liability by starting payments at a lower amount and increase by 3% each year for thirty years; and
    f. Increasing benefits for certain retirees.

    Mercer evaluated the cost savings of this proposal and finalized that analysis in their June 11 letter to James Ulwick. Mercer noted that these changes would reduce the City required contribution from $101.8 million for 2011 based on City Code to $96.8 million.

    I calculate that the $96.8 million contribution would actually be $118.1 million without the back-loaded amortization technique. This means that about $20 million of the savings are merely deferral of costs to future Baltimoreans. These costs are illustrated in charts included in Appendix 3, Item 2.

    We find that much of the reduction is due to the change in actuarial assumptions and method employed by the Union and not due to actual changes in benefits paid. Mercer further noted that these liberalizations in accounting and actuarial methods and

assumptions are contrary to what is expected from the Governmental Accounting Standards Board (GASB) project on Postemployment Benefit Accounting and Financial Reporting. GASB has reaffirmed this position several times, including at their regional hearing on public comments at which I testified in October.

Analysis of specific alternatives

13. Changes for New Hires only

We analyzed the possibility of modifying benefits only for future workers. Our analysis concluded that this approach would not attain the objectives of sustainability and affordability. This is because a change which impacts only future workers has very little short term savings. Even if future workers were given no pension benefits at all, the savings impact would be minimal over the next decade. All of the current (unaffordable) costs are attributed to workers currently hired. The City normal cost of the plan structure is 22.30% of pay. This means that the value of benefit received by each worker from the City is on average 22.30% of their pay.

Mercer in their March 31, 2010 letter indicated that "in previous analysis we performed for the GBC, we estimated that three years after the benefit change, the cost decrease would be between 2.6% and 8.6% of the cost decrease for changing the benefits for current members." This suggests that even if no benefits were provided to future workers the cost decrease would only be between $2 million and $6 million in 2014.

For another approach, suppose that even 10% of the workforce is replaced each year, and that the new plan was worth as little as 0% of pay. This means that in the second year, 90% of the workers would be getting a benefit worth 22.30% of pay and the remaining 10% of workers are getting 0%, for an average of 20.07% of pay and City savings of 2.23% of pay. Even in this simple example, a 2.23% of pay City savings is not significant.

Consistent with the Mercer findings, the actual savings are even lower for a variety of reasons including:

- The replacement plan must be worth more than nothing in order to maintain the exemption from Social Security and Social Security taxes
- The cost for the remaining workers increases as they get older and closer to retirement

In conclusion, not only would this approach not meet objectives of sustainability and affordability, but benefits might not be adequate, and disruption could occur because of a concern that often arises in these two-tiered situations, particularly in public safety plans. That is for those who work closely with one another in life-and-death situations; it is desirable to not have wildly different benefit levels.

14. Modifications to Variable Benefit

The FPERS Variable Benefit paid an increased benefit to retirees based on investment returns from the pension fund in excess of a 7.5% rate. In years when the return on assets exceeded 7.5%, a portion of those excess returns is used to provide increased benefits.

The formula grants all of the additional earnings between 7.5% and 10.0% and half of the additional earnings above 10% to the increased benefit. For example, during Fiscal Year 2007, the fund earned 19.4%. This meant that 2.5% plus half of 9.4% of the retired life reserve assets were used for increased benefits. In FY2007, this equated to 7.2% or $94 million, which generated additional benefits and was unavailable to strengthen plan solvency.

Mercer has commented frequently of the higher cost of the variable benefit. When actuaries estimate the future investment returns, they realize that returns are volatile. In 2008, Mercer stated that "Problem #1 is that the expected future returns minus returns allocated to variable benefits is less than 6.8%". They identified four potential solutions:

a. Earn higher returns (12% per year);
b. Reduce volatility of returns (still earning 8.25%);
c. Change actuarial assumption (from 6.8% net of variable to 5.0% net of variable);
d. Change variable benefit.

Mercer indicated that neither they nor the investment consultants expected that alternative (a) or (b) were realistic. Aon concurred with that observation. This meant that the 6.8% return assumption was inconsistent with the structure of the variable benefit and that either the benefit must be modified or the assumptions modified.

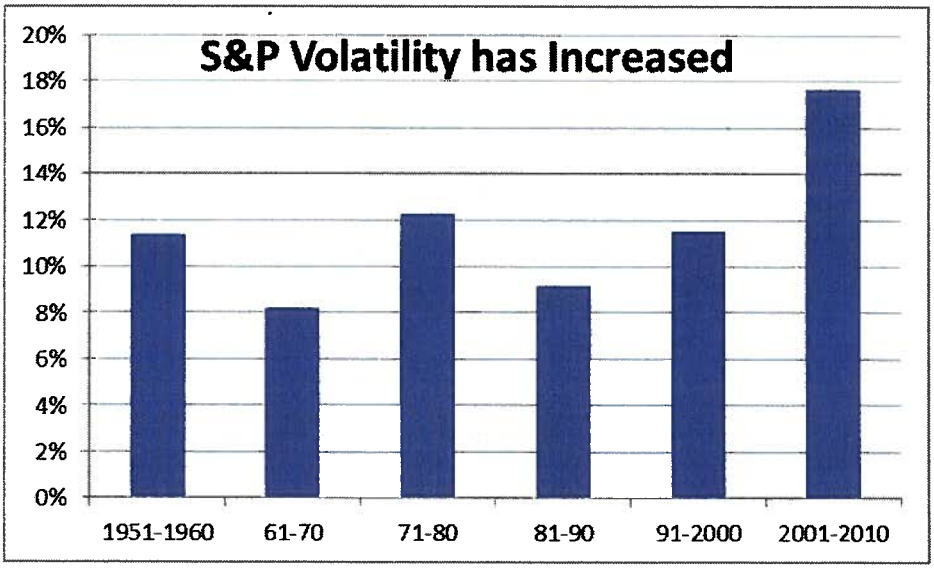
Baltimore FPERS is not the only plan to have found that variable benefits can be problematic. Cheiron, the actuary for the City Employees' Retirement System (ERS) met with the City Director of Finance on May 8, 2006 to address problems with the ERS Variable Benefit. The recommendations presented were to modify the variable benefit and include a guaranteed cost-of-living increase. These proposals were later discussed in a 2007 presentation which began with a picture of a sinking ship named "ERS". The report indicated that the variable benefit "allocation of excess returns creates an investment bias."

This investment bias can be illustrated using a simple example. Suppose the actuary expects an average return of 8.25%, where half the time the returns were 6.5% and half the time the returns were 10%. (8.25% is the average of these two figures). If a variable benefit structure is included which carves off part of the 10%, then the average would decrease. If under the variable structure, the 10% return reduces by 2.5% to 7.5%, then the average return decreases from 8.25% to 7.0%.

Variable benefit structures are not common around the country, but where they do exist, they generally have features in them which make them less draining on actuarial returns. Methods used by other systems include only providing variable benefits when there is a surplus of assets over liabilities, or using an actuarial smoothing technique in determining the so-called "excess return". A critical element is that there is a long-term excess return and not merely a one-year excess return.

In addition, Actuarial Standard of Practice No. 27 pertaining to Selection of Economic Assumptions for Measuring Pension Obligations states that the actuary must consider "the characteristic of the obligation to be measured." This means that for a benefit such as the FPERS variable benefit, where the obligation varies depending on the investment return, the actuary must consider this changing obligation when setting the actuarial assumed rate of investment return. With this in mind, Mercer determined that an assumed rate of investment return of 6.8% was not attainable if the variable benefit is in effect, and that this approach was not sustainable. A reduced rate of investment return results in a significant increase in plan costs, which demonstrates that the variable benefit is not affordable.

While the variable benefit structure might have been acceptable in the past, the recent high volatility in investment returns demonstrates the fundamental flaws of the variable benefit structure. In times with high swings in investment returns, the variable benefit is triggered more often, leaving fewer funds available to make up for down-side returns. For example, in the last ten years, the S&P annual return has varied from the 60 year average by 17.6% on the average. But in the 50 years preceding, the average variance was only 10.5%. This increased volatility results in more funds leaking out in the form of the variable benefit and not available to make up for heavy losses. This increased volatility is shown in the following chart:



Another reason for replacing the variable benefit is that it is ineffective at accomplishing what is needed by the retirees – a stable and predictable cost of living increase. The prior variable benefit structure tended to produce increased benefits to retirees at exactly the time when they were least needed – following a boom in the market. If the retirees had any additional retirement savings, they would find that they would be receiving variable benefit increases at the same time as their personal savings also gave them the ability for additional discretionary spending, and they would find that they receive no variable benefit increases at the same time that their personal savings were not producing to their expectations. A related timing problem is that because of the underfunded position of the plan and market cycles, the City is essentially paying for the variable benefits in times when they can least afford them.

As an alternative to the erratic variable benefit, we analyzed a fixed age-based cost of living allowance. This COLA grants guaranteed increase based on age:

- Once the retiree or their spouse attains age 65, the COLA will be 2% per year;
- Prior to age 65 but subsequent to age 55, the COLA is 1% per year;
- Prior to age 55, no COLA is paid.

This age-based schedule enhances solvency and affordability with still allowing retirees to anticipate the reduced COLAs prior to age 65 and plan accordingly. Those most in need of COLA due to advanced age are provided the highest COLA.

Furthermore, as a result of the potential loss of larger benefit increases, those who retired prior to the DROP benefit who have twenty or more years of service will have a minimum benefit of $24,000 and minimum survivor benefit of $12,000.

As a result of the above, it was determined that replacing the variable benefit with a modest cost-of-living adjustment would enhance affordability and plan sustainability, while still providing benefit adequacy and with a minimum of disruption.

Although the cost savings from replacing the variable benefit with a guaranteed cost-of-living adjustment was important, we found that the savings were not enough to achieve sustainability and affordability. These are shown in projections calculated by Aon and included on pages 8 and 12 of our report to City Council and included in Appendix 3, Item 1.

15. Basic rate of accrual

FPERS, like most pension plans and nearly all police and fire pension plans, calculates retirement benefits based on years of service and average final compensation. This is through the use of a "multiplier". The FPERS multiplier is 2.5% for the first twenty years and 2.0% for service beyond twenty years. For example, an officer with average final compensation (AFC) of $80,000 and 25 years of service would receive a benefit of 60%

of $80,000, or $48,000. This is because 20 years at a 2.5% multiplier equates to 50%, and 5 more years at a 2% multiplier equates to 10% more.

One approach to achieve affordability and sustainability would be to reduce the multiplier. This could be done by:

a. reducing the multiplier retroactively,
b. reducing the multiplier only prospectively (e.g., for service after 2010), or
c. reducing the multiplier only for future employees.

While a retroactive decrease in the multiplier would be the most powerful in terms of affordability and sustainability, it would be disruptive in that such a change would cut the basic level of benefits expected by those workers near retirement.

As to a prospective change in multiplier, we found mixed results. As mentioned previously, the City Normal Cost was 22.30% of pay. This is based on the multipliers of 2.5% and 2.0%. A prospective decrease in multipliers could have a pro-rata impact on this normal cost. But a prospective decrease in multiplier would have no impact on the additional 32.07% contribution recommended to pay off unfunded liabilities. So unless the prospective multiplier was cut drastically, the total City contribution requirement would remain at an unaffordable level. And if the prospective multiplier was cut drastically, the objective of benefit adequacy would not be met.

We examined changes only for new hires previously and concluded that such a change would not have a material impact on sustainability or affordability. In conclusion, changing the basic benefit rate of accrual would not solve the affordability and sustainability equation unless the resultant benefit was inadequate, causing significant disruption to the workers.

16. Lengthening age and service requirements

The GBC Task Force recommended a lengthening of age and service requirements. We found that this was an effective mechanism for improving affordability and sustainability without compromising benefit adequacy. (Indeed, FPERS began with a 25 years of service requirement, which was subsequently decreased to 22 years and then 20 years in times of prosperity.) Depending on the grandfathering, such a lengthening could be implemented without much disruption to an employee's retirement plans.

As shown in the bar charts from the Georgia State analysis, the prior structure provides adequate benefits for full career workers, but can provide benefits which exceed the adequate levels for workers who work less than a full career and use this pension plus social security plus future private sector wages. A lengthening of age and service benefits preserves the adequate benefits for full service workers while enhancing affordability and sustainability by eliminating the ability to generate benefits which exceed the levels identified as adequate in the Georgia State study.

In June, the age and service requirement was the earlier of 20 years of service and age 50. The proposed age and service requirement was the earlier of 25 years of service and age 55 (with at least 15 years of service). The following table illustrates the impact of the change on retirement age and service eligibility:

Age at hire	Prior age and service requirements	Revised age and service requirements
20	Age 40 / 20 years	Age 45 / 25 years
25	Age 45 / 20 years	Age 50 / 25 years
30	Age 50 / 20 years	Age 55 / 25 years
35	Age 50 / 15 years	Age 55 / 20 years
40	Age 50 / 10 years	Age 55 / 15 years
45	Age 50 / 5 years	Age 60 / 15 years

17. Modify average final compensation definition

Another plan change which we found met our objectives was to modify the definition of AFC. Previously, the AFC was based on an average of 18 months. This was changed to 36 months. While an actuarial analysis showed that this resulted in an approximately 3.5% decrease in retirement benefits and long term costs, an additional advantage to this modification is that it reduces the ability for employees to "spike" their benefit. For example, suppose under the prior arrangement that a worker is able to get a 15% pay increase just a year prior to retirement. Under the 18 month averaging period, the increase results in a lifetime pension increase of 10%. But under the 36 month period, the increase is diluted so that it results at only a 5% increase. The worker is able to leverage the pay raise into lifetime pension, but must work longer under the higher pay rate in order to do so. Salary spiking is a costly and controversial practice, which is significantly neutralized by a modest change in the AFC calculation.

18. Terminating DROP

Another highly publicized benefit is the Deferred Retirement Option Program, known as DROP. Under this provision, a worker, when eligible to retire, can elect to have benefit payments begin without actually retiring. During the period that they continue to work, the retirement payments are made into a DROP account, where they grow with interest, along with the employee pension contributions. When they are actually ready to discontinue working, the DROP account is paid as an additional lump sum benefit and pension payments continue to the retiree.

Unlike most DROP plans around the country, at the end of the FPERS DROP period, the benefit can be further increased based on the period since DROP began.

DROP plans can be expensive and are controversial. The GBC noted that more than $10 million was paid to DROP participants in 2009 and recommended eliminating the DROP program for those who did not have 15 years of service. DROP Plans, including Baltimore's are a frequent target in the press, and have been labeled with terms such as "egregious" and an "outrageous abuse". Many cities around the country are reconsidering their DROP programs.

While elimination of DROP2 could enhance affordability and sustainability with minimal impact on benefit adequacy, it was learned that the DROP program was such a valued benefit that it would be very disruptive to eliminate or phase out the program

19. Increasing employee contributions

    A straightforward mechanism for enhancing sustainability and affordability without compromising benefit adequacy or disruption is to increase the employee share of contributions to FPERS.

    Most of the employee contributions to the fund result in savings to the City. The only exception is the amount refunded to the workers who terminate City employment prior to eligibility for a pension benefit.

    Increasing employee contributions is one of the most common changes undertaken by cash-strapped governments in the past two years, particularly as employer contributions constitute a growing portion of the contributed funds. In FPERS' case, for example, the City made contributions of $94 million for the fiscal year ending June 30, 2010, while the employees contributed just $17 million. This represented 6% of employee pay. The new provisions increase the 6% rate by 1% each year until it reaches 10% of pay. In fact, the Union's counter-proposal itself included a similar provision that would have gradually increased employee contributions to 9%. Note that FPERS members do not contribute 6.2% to Social Security as do nearly all other workers.

20. Reduce rate for interest on employee contributions

    Prior to July 1, 2010, contributions made by members were credited with interest at an annual rate of 5.5%. This was reduced to 3.0% effective July 1, 2010. This change results in a modest savings to the City and enhanced solvency without impacting benefit adequacy or creating a disruption. Note that this plan change will only impact those employees who terminate prior to retirement and receive a refund of their contributions.

21. Consider a defined contribution program

Another severe approach which was discussed but not analyzed thoroughly would be to close the pension plan to future workers and offer instead a 401(k) style defined contribution plan. Although the GBC recommended consideration of this alternative, it was deemed to be more of a change than was necessary at this time. The change ultimately adopted resulted in enhanced affordability and sustainability without the disruption of risk of inadequate benefits that a change to a defined contribution program might have imposed.

22. Grandfathering

Underlying many of the changes is the concept of grandfathering. Those who are close to retirement would find it disruptive to have the benefit levels materially different from expected. For example, with the change in the service requirement from 20 years to 25 years, a worker who has nearly 20 years of service at the time that the plan changes will find that retiring at 20 years will result in a reduced benefit relative to what was expected. Consequently, it is desirable to have some level of "grandfathering" where an individual would not be subject to some of the plan changes if they met certain conditions.

When pricing the impact of the alternatives, Mercer was asked to analyze specific groups of workers who would be "grandfathered" and not subject to the change based on service or proximity to retirement age.

The grandfathering approach which was adopted was to apply certain changes only to those who were not eligible for retirement and did not have 15 years of service as of July 1, 2010. Those individuals were within five years of the 20 year threshold for full retirement age under the prior provisions. These changes for which these 15 year workers were exempt were:

a. Lengthening age and service requirement
b. Modification of AFC calculation from 18 months to 36 months
c. Decreasing DROP2 interest rate from 5.5% to 3.0%

23. Changes to actuarial assumptions and methodology

In addition to analyzing myriad plan design changes, we also explored whether the actuarial methodology or assumptions was a cause of the problem. We wanted to understand whether there were alternate actuarial methods or assumptions which would enhance affordability and preserve solvency without requiring any change in benefit adequacy or any disruption due to benefit changes.

When we analyze assumptions and changes for my clients, including those for whom I am conducting an actuarial audit, I look at each assumption and method and consider

whether each assumption tends to be conservative or aggressive, optimistic or pessimistic. If a system has many of its assumptions as aggressive or optimistic, I warn them that they have such a set of assumptions & methods. If they have many assumptions which are conservative or pessimistic, I advise them that they are in this position, so that they understand their built in conservatism or cushion. I would definitely not consider the basket of assumptions and methods used by FPERS as conservative, and there is little room for making the assumptions more aggressive.

The Union proposed specific changes in actuarial assumptions and methodology. These were to:

a. Change the actuarial assumed rate of investment return from a split rate of 8.25% pre-retirement and 6.8% (or 5.0% as recommended by Mercer) post-retirement to a single rate of return of 8.25%,
b. Lengthen the amortization period for payment of the unfunded liability from 20 years to 30 years, and
c. Amortize the unfunded liability by payments which increase 3% per year, consistent with an assumed growth in City public safety payroll of 3% per year. Currently, the liability is being amortized by level non-increasing annual payments.

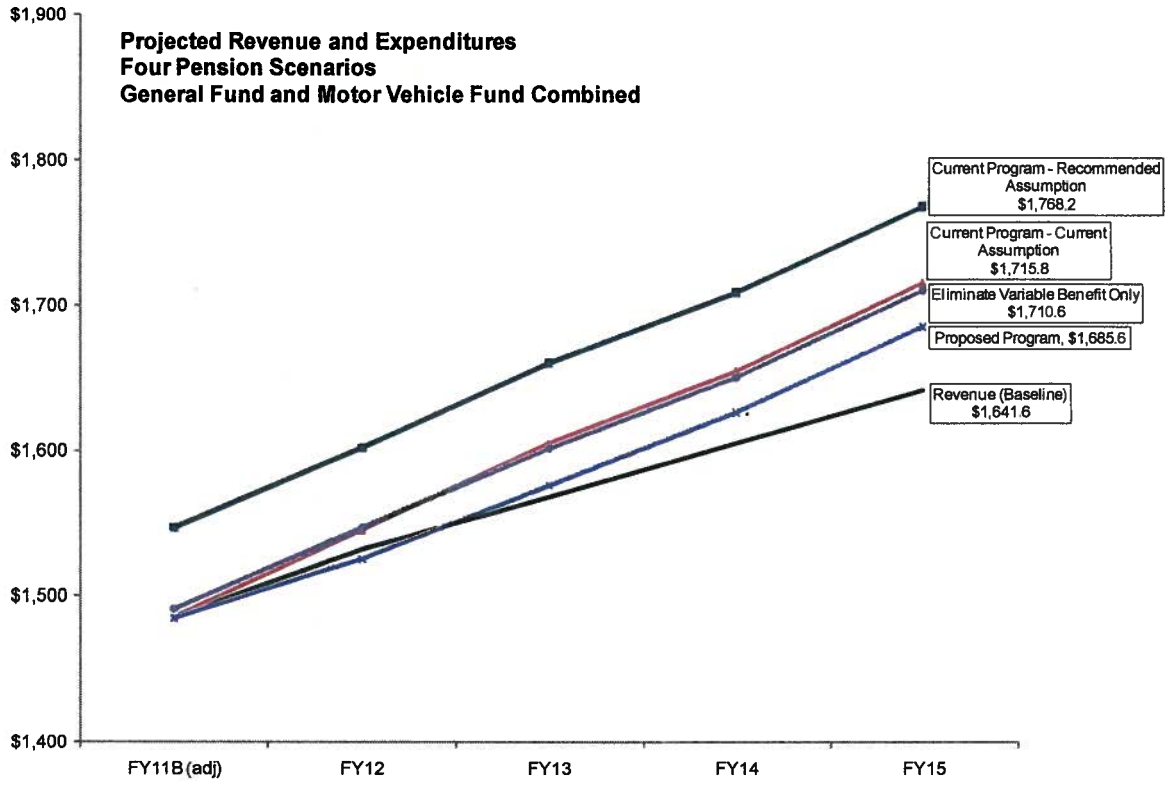
The proposed assumption change was suggested in tandem with replacing the variable benefit. I agree that combining the pre-retirement and post-retirement rates of investment return is appropriate if the variable benefit is replaced. I find the other two Union proposals problematic, however. A plan as poorly funded as FPERS cannot afford to delay contributions toward the unfunded liability. Stretching the period from 20 to 30 years and reducing contributions in tradeoff for escalated future contributions is not prudent for a plan that could actually have solvency problems should experience deteriorate further. In addition, actuarial norms are moving away from 30-year amortization periods toward shorter amortization periods and are moving away from using an increasing amortization technique. In fact, the Government Accounting Standards Board, in their current review of public pension accounting standards is proposing to eliminate both the 30 year amortization period and the escalating amortization – two of the Union proposed changes. Although Mercer found that these changes did result in modest cost savings, they did not recommend the changes, and neither do I.

I also find that the assumed rate of investment return of 8.25% is more optimistic than that assumed by most actuaries and most pension funds. It is my professional opinion that a change in actuarial investment return assumption to 8.00% is much more actuarially supportable and more appropriate than the current assumption of 8.25%. Attached as Appendix 3, Item 3 is my June letter addressing this issue.

Development and analysis of comprehensive program

24. Comprehensive package elements

Once we analyzed each of the potential changes, the next step was to put them together and analyze their effectiveness. To consider the affordability benchmark, we utilized the forecasts of revenues developed by PFM, financial consultant to the City. The key figures to be analyzed are included on the following graph:



The black line at the bottom shows that baseline City revenues are expected to increase modestly from just under $1.5 billion in fiscal year 2011 to $1.6416 billion by FY2015. The other four lines show City projected expenditures including pension costs under various pension scenarios. ("Current" refers to the status as of June, 2010.) The green line at the top shows these costs assuming that the City contributes based on the actuarial assumptions recommended by Mercer. Under this scenario, expenditures increase from $1.54 billion in FY11 to $1.7682 billion by FY15. This represents a revenue shortfall of over $125 million. Even if the City contributes at the red line level, in which case it ignores the actuaries' recommendations and funds a lower amount based on the more optimistic 6.8% post-retirement return assumption under City Code, the expenditures would escalate to $1.7158 billion by FY15, representing a revenue shortfall of nearly $75 million.

The final plan, as modified by City Council Bill 10-0519 contained the minimum changes that were needed to preserve solvency and restore affordability. The proposal included the following features:

a. Replace the variable benefit with an age-based guaranteed COLA;
b. Minimum benefit of $24,000 for pre-DROP retirees with 20 or more years of service and $12,000 for their beneficiaries;
c. Changing eligibility for full benefit from 20 years of service to the earlier of 25 years of service or age 55 with 15 years of service;
d. Adjusting DROP2 eligibility requirements to be consistent with the above;
e. Changing the average final pay formula to be based on 36 months of pay rather than 18 months of pay;
f. Include grandfathering provisions for those with at least 15 years of service so that they are not subject to items c, d and e above;
g. Increasing member contributions from 6% to 10% in 1% annual increments;
h. Changing rate of interest earnings on member contributions from 5.5% to 3.0%;
i. Changing system's investment return assumption from 8.25% to 8.00%.

Conclusions

25. Mercer estimated that cost savings of the plan changes under City Council Bill 10-0519. We reviewed these proposed savings and find them reasonable. As shown in the above chart, the proposal is anticipated to result in FY total City costs of $1.6856 billion. This still represents a $44 million revenue shortfall, but much less than the shortfall anticipated under the prior plan provisions.

26. The proposed plan still results in a strong level of benefits for adequacy for a full career worker.

27. The complete set of changes implemented as a result of 10-0519 meet the four objectives of the plan change
    a. Benefit Adequacy (reasonable) – benefits still provide enough income post-retirement to enable full career workers to maintain their pre-retirement standard of living.
    b. Affordability (necessary) – City expenditures are now closer to matching City revenues
    c. Sustainability (necessary) – The new plan is now significantly more likely to remain solvent
    d. Minimum disruption (reasonable) – Members near retirement will have little change in the benefits that they are expecting

28. I verify under penalty of perjury – having the same effect as an affidavit and consistent with 28 U.S.C. § 1746 – that the foregoing is true and correct.

Executed this 24th day of January, 2011, at Centennial, Colorado.

William B Fornia

APPENDIX 1 – CURRICULUM VITAE

Hingham Contributory Retirement System

Preliminary Results of the
January 1, 2014
Actuarial Valuation

June 24, 2014

Linda L. Bournival, FSA
Consulting Actuary
KMS Actuaries, LLC

KMS

Purpose of Valuation

- Periodic review of system experience
  - Liabilities
  - Assets
- Review assumptions and methods
  - Appropriate
  - Consistent
  - Reasonable
- Develop annual appropriations
- Adopt new funding schedule
- Determine cost for various benefit options

Key Findings

- Market Value of Assets
  - Returns for 2012 and 2013 exceeded expectations
  - 11.44% and 12.22% return, respectively
  - $6m gain during 2-year period
- Actuarial Value of Assets (AVA)
  - 8% expected
  - For 2012 and 2013, 1.05% and 10.38% return, respectively
  - 2012 and 2013 gains phased-in at 20% per year
  - $4m asset loss on AVA during 2-year period
- Modest demographic experience loss of $1.6m
- Funded Status increased from 69.4% to 69.8%

Plan Provisions

- Same as 2012 valuation
  - COLA: 3% of first $12,000
- Chapter 176 of the Acts of 2011
  - Changes eligibility and benefit provisions for members hired after April 1, 2012
  - Impacts benefits for 116 current members
  - No impact on Accrued Liability as of valuation
  - Normal Cost is lower for these members

Prior Assumptions

- Investment Return
  - 8%
- Salary Scale
  - 4% all ages, all Groups
- Payroll Growth
  - 4%
- Expenses
  - $150,000, added to normal cost
  - Increases 4% per year
- Mortality
  - RP-2000 Table for Healthy Lives, projected to 2012
  - Disabled lives, RP-2000 Table, set forward 2 years

Recommended Assumptions

- Investment Return at 7.75%
- Mortality Table Improvement
  - Pre-retirement mortality improvement projected to 2014
  - Post-retirement mortality improvement projected to 2014
  - Disabled lives projected to 2014, set forward 2 years
- Expenses
  - Remain at $150,000
  - Based on last three years experience
- 3(8)(c) Transfers
  - Net gain to system of approximately $30,000, therefore assumption is zero

Massachusetts Retirement Systems		
Investment Returns Are:	2012 Annual Report	As of April 1, 2014
Below 8%	25	46
At 8%	68	49
Above 8%	12	10

Membership

Valuation Date	January 1, 2014	January 1, 2012	Change
Active Members	597	533	12.0%
Retired Members & Beneficiaries	279	270	3.3%
Disabled Members	15	15	0.0%
Inactive Members	142	125	13.6%
Total Annual Salary	$27,037,796	$23,273,757	16.2%
Annual Pensions*	$6,689,972	$6,285,274	6.4%

* Excludes State reimbursed COLAs.

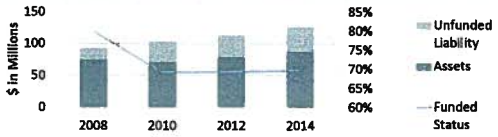
System Assets and Returns

(in millions)

Calendar Year	2013	2012	2011
Market Value of Assets (MV)	$91.7	$81.6	$73.4
Market Value of Assets Return	12.22%	12.19%	0.97%
Actuarial Value of Assets (AVA)	$88.8	$80.3	$79.7
Actuarial Value of Assets Return	10.38%	1.05%	0.97%
AVA as Percentage of MV	96.85%	98.46%	108.57%

AVA is the MV adjusted to phase-in investment gains and losses over a 5-year period, further constrained to be within 10% of the MV. Investment gains and losses are the excess or deficiency of the expected returns over the actual returns.

Valuation Results



Valuation Date	January 1, 2014	January 1, 2012	Change
Actuarial Accrued Liability (AL)	$127.3	$114.8	10.9%
Actuarial Value of Assets (AVA)	88.8	79.7	11.5%
Unfunded Actuarial Liability (UAL)	$38.4	$35.1	9.6%
Funded Status = AVA/AL	69.8%	69.4%	0.6%

Gain/Loss Analysis

For the 2-Year Period 2012 - 2013	
Unfunded Actuarial Accrued Liability, January 1, 2012	$35.1
Expected Unfunded Actuarial Accrued Liability, January 1, 2014	32.8
Actual Unfunded Actuarial Accrued Liability, January 1, 2014	38.4
(Gain)/Loss during 2012 – 2013	$5.6
Loss due to Demographic Experience	$1.6
Loss due to Asset Investment Return	4.0
Gain due to Chapter 176 Plan Changes	0.0
Loss due to Assumption Changes	0.0
Total (Gain) / Loss during 2012 – 2013	$5.6

Dollars in millions

Baseline Valuation Results

(in millions)

Valuation Date	January 1, 2014*	January 1, 2012	Change ($/%)
Funded Ratio	69.8%	69.4%	0.6%
Investment Return	8%	8%	-
Funding Schedule	4.0% Increasing	4.0% Increasing	-
Year Fully Funded	2032	2032	-
Unfunded Liability	$38.4	$35.1	9.6%
FY15 Appropriation	$4.182	$4.182	0.00%/$0.000
FY16 Appropriation	$4.668	$4.323	7.98%/$0.345
FY17 Appropriation	$4.814	$4.468	7.74%/$0.346
FY18 Appropriation	$4.964	$4.617	7.52%/$0.347
FY19 Appropriation	$5.117	$4.771	7.25%/$0.346

* Includes Chapter 176 plan changes and updated mortality

FY16 Appropriation

- Funding Schedule A
- Annual Appropriations Equal the sum of:
  - Employer Normal Cost
  - Expenses (excludes investment)
  - Amortization Payment to fully fund UAL
  - 3(8)(c) Transfers, if applicable
- Normal Cost increases annually by assumed payroll growth
- UAL payments increase by 4% per year
- 3(8)(c) Transfers are level, if applicable

Valuation Date	January 1, 2014*
Employer Normal Cost	$1,364,985
Expenses	156,000
Amortization Payment	3,147,475
3(8)(c) Transfers	0
Total Appropriation	$4,668,460

* Includes Chapter 176 plan changes and updated mortality

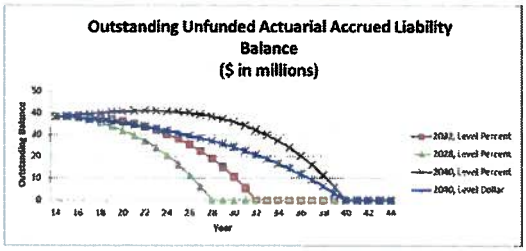
FY16 Appropriation

- Under Funding Schedule A
  - FY16 Appropriation is 11.62% higher than FY15
  - Fully funds UAL in 2032
  - Payments increase by 4% annually
- Options
  - Limit annual increases to 3% per year in the short term
  - Maintain current schedule
  - Extend fully funded date

Fiscal Year	Appropriation	Increase over Prior Year
2015	$4,182,459	3.38%
2014	4,045,905	3.39%
2013	3,913,402	3.43%
2012	3,783,740	19.74%
2011	3,159,968	

Annualized increase rate is approximately 7.26%.

Hypothetical Amortization Illustration



Changes to Assumptions and Methods for Consideration

- Decrease investment return rate
  - Currently 8%
    - 7.75%
    - 7.50%
- Limit annual increases for specified period of time
- Maintain current schedule
- Extend year UAL is fully funded
  - If on or before 2030, payments can increase up to 4.5%
  - If after 2030, payments can not increase more than 4%

Impact of Decrease in Investment Return Rate

- Same methods as prior valuation
  - Funding Schedule A
  - Fully funded date 2032
  - Amortization payments increase by 4%
  - Large FY16 increase under all investment return rate scenarios
    - Over 11% at 8%
    - Over 20% at 7.75%
    - Over 30% at 7.5%

Impact of Limiting Annual Increases

- Funding Schedule B
- 3% for three years, 4.5% thereafter
  - Amortization payments increase by 4%
  - Not viable under 7.5%
    - See Schedule D under 7.5%
  - FY16 increase
    - 3% under 8% and 7.75%
  - Fully funded date
    - 2033 under 8%
    - 2036 under 7.75%

Impact of Maintaining Current Schedule

- Funding Schedule C
- Maintain current schedule for five (5) years
- Not viable under 7.5%
  - See Schedule D under 7.5%
- FY16 increase
  - 3.36% under 8% and 7.75%
- Fully funded date
  - 2034 under 8%
  - 2038 under 7.75%

Impact of Extending Fully Funded Date

- Funding Schedule D
- 2012 schedule fully funded in 2032
  - Amortization payments increase by 4%
  - FY16 increase
    - 3.62% if extend to 2035 under 8.00%
    - 2.95% if extend to 2040 under 7.75%
    - Over 11% if extend to 2040 under 7.5%

Action Plan

- Discuss alternative assumptions
- Develop appropriation for FY16
- Select Funding Schedule
- Finalize January 1, 2014 Valuation Report
- Other considerations?

Funding Schedules

- Funding Schedule A
  - Baseline
  - Chapter 176 Plan Changes
  - Mortality Improvement
- Funding Schedule B
  - Limit Annual Increases to 3% (3 years)
  - 4.5% (thereafter)
  - Adjust fully funded date
- Funding Schedule C
  - Maintain Current Schedule (5 years)
  - Adjust fully funded date
- Funding Schedule D
  - Extend Fully Funded Date
  - No annual limits imposed

PENSION
TRUSTEE
ADVISORS

Rhode Island Joint Finance Committee Hearing on Pensions

William B. Fornia, FSA
On behalf of
Rhode Island Retirement Security Coalition
October 26, 2011

Agenda

- National Public Pension Issues
- Consequences of H6319/S1111
- Advantages of Defined Benefit Plans
- Discussion

William B. Fornia Credentials

- Highest Actuarial Credentials
  - Fellow of the Society of Actuaries (1986)
  - Enrolled Actuary under ERISA (1984)
  - Member of the American Academy of Actuaries (1983)
  - Active in national actuarial organizations
- Author and Frequent Speaker
  - "A Better Bang for the Buck" (with National Institute on Retirement Security), 2008
  - "The Pension Dimension", Rhode Island Poverty Institute, 2011
  - Frequent Testimony to Legislatures and City Councils
  - Regular Expert Witness

Findings

- Public Pensions are being targeted nationally
- H6319/S1111 has draconian financial implications for many Rhode Island public servants and retired public servants
- DB plans are more economical for Rhode Island than DC hybrid

Sample Work History

- Corporate Actuary for Boeing 1980-1984
- Senior Consulting Actuary specializing in public pensions
  - Buck Consultants 1996-2004
  - Gabriel, Roeder & Smith 2004-2006
- Consulting services for 22 statewide retirement systems in Alaska, Colorado, Missouri, North Dakota, Oklahoma, Puerto Rico, Utah, Texas, Vermont, Wyoming and others.
  - Served as system actuary for most of these (including CO, MO, ND, OK, PR, UT, WY, Houston)
- Expert Testimony and Consulting for Pension Systems, Governments, and Labor Groups
- Other clients have included the US Department of State, Cities of Baltimore, Oakland and Philadelphia, IBM, US WEST and Ford Motor Company

Definitions: DB and DC

Defined Benefit	Defined Contribution
A Pension	A Retirement Savings Account
We know what the benefit will be	We know what the contribution will be
An actuary calculates the contribution	Investment return and your estimate of lifespan determines the benefit you take out
Examples	
Most public pensions	401(k) plans
Company pensions	Deferred Compensation Plans
Social Security	Individual Retirement Accounts

Public Pensions are Being Targeted Nationally

- Shortfall of $1 trillion widely reported
  - Average funded status of 77%
- Center for Retirement Research at Boston College reports national retirement income deficit (public and private) as $6.6 trillion
  - Equates to about a 25% "funded status"
- Public pensions have been under particular scrutiny

Findings

- Public Pensions are being targeted nationally
- H6319/S1111 has draconian financial implications for many Rhode Island public servants and retired public servants
- DB plans are more economical for Rhode Island than DC hybrid

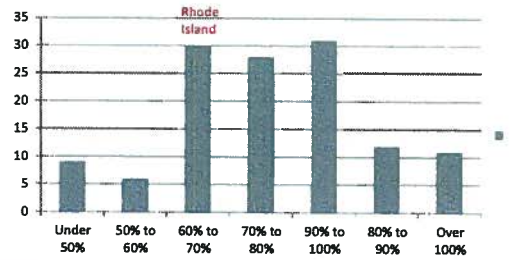
Public Pensions are Being Targeted Nationally

- Public Employee Pension Transparency Act
- American Enterprise Institute: "Public-Pension Deficits: How Big? Can They Ever Be Paid?"
- Wisconsin employee contributions increased more than 5%
  - Plan is 100% funded
  - Employees share risk through variable COLA

House Bill 6319 / Senate Bill 1111

- Cost implications
- Benefit implications

NASRA Reports Average Funded Ratio as 77%



Cost Implications of the Proposal

- Liabilities will decrease by $3.2 billion
- Employer costs will decrease by $276 million the first year
  - About a quarter of this savings is due to use of a reasonable actuarial method change
  - The rest – more than $200 million – comes from the workers, in the form of benefit cuts

29 MERS General Employee Plans will be more than 100% Funded

- Example 1 – Woonsocket
  - Currently 90% funded, will improve to 103%
  - Contribution rate will fall from 14.2% to 7.3%
- Example 2 – Coventry Lighting District
  - Currently 204% funded, will improve to 212%
  - No contributions are due, yet benefits will be cut
- Example 3 – Pawtucket Housing
  - Currently 118% funded, will improve to 149%
  - Contributions will fall to zero from 3.8%

Actuarial Issues – New Mortality Table

- New mortality table was based on recent Rhode Island experience
- New mortality table projects future improvement in mortality
  - If lifespans continue to increase, this will more accurately measure pension costs
  - Projecting mortality improvement is not a common practice in public pensions
- As an actuary, projecting mortality improvement is desirable
  - But as a taxpayer, it may be undesirable
  - Should current taxpayers set aside additional funds in anticipation of future mortality improvement?
    - Could that cost be left to future taxpayers?

Actuarial Issues

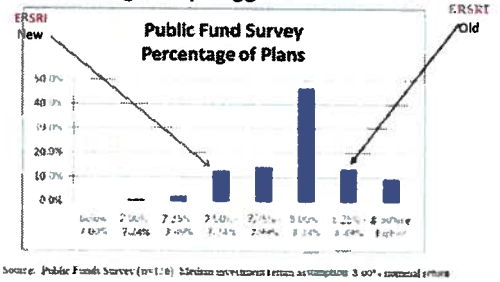
- Recent actuarial assumption changes "raised the bar" on pension contributions
- GRS experience study showed that assumption changes increased contributions by nearly 10% of pay – $64 million
- As an actuary, reduction in rate to 7.5% is desirable
  - But as a taxpayer, maintaining 8.25% is desirable
  - 80% of the states are using rates higher than 7.5%

Estimate of Costs – ERS State Employees

Period for paying off Unfunded Liability	Current Provisions	Reduced Benefits
19 Years	36.34%	24.38%
25 Years	30.8%*	20.35%
26 Years	30.2%*	NA
27 Years	29.6%*	NA
28 Years	29.0%*	NA
29 Years	28.5%*	NA
30 Years	28.0%*	NA

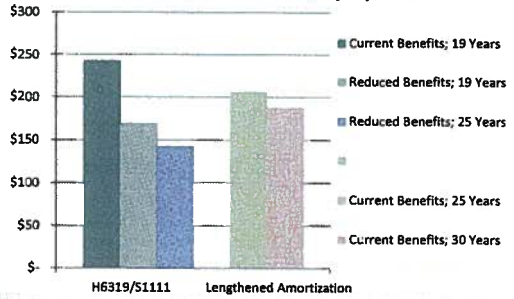
* Estimates by PTA, other sources: GRS

GRS Reports that Investment Return Change Leapfrogged the Norm

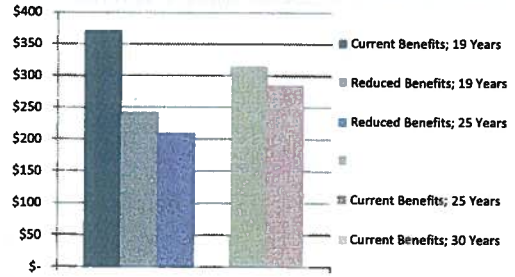


Source: Public Funds Survey (n=128) Median investment return assumption 8.00%, median return

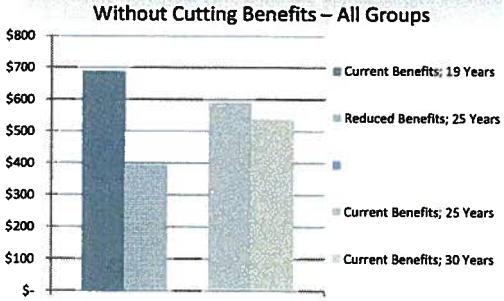
$56 Million Savings Can Be Realized Without Cutting Benefits– ERS State Employees



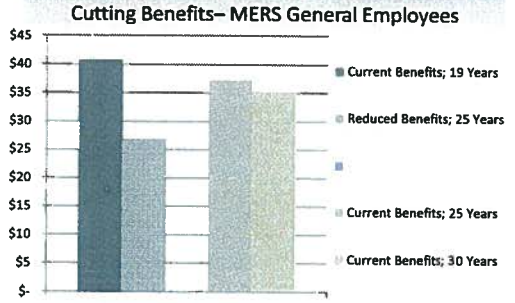
$86 Million Savings Can Be Realized Without Cutting Benefits– ERS Teachers



More than $150 Million Savings Can Be Realized Without Cutting Benefits – All Groups



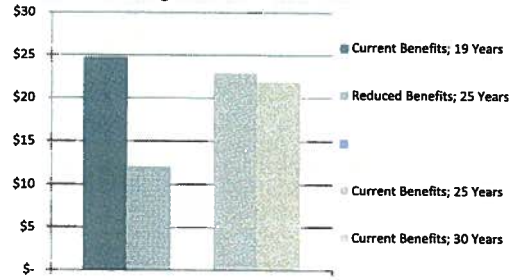
$5.6 Million Savings Can Be Realized Without Cutting Benefits– MERS General Employees



House Bill 6319 / Senate Bill 1111

- Cost implications
- Benefit implications

$2.9 Million Savings Can Be Realized Without Cutting Benefits– MERS Police & Fire

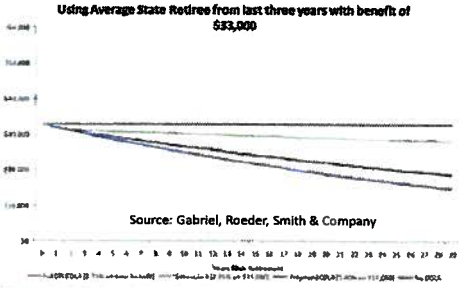


Major Benefit Implications of the Proposal

- Freeze Cost of Living Adjustments for many years for retirees
- Shift current workers into a Hybrid plan, which is a much reduced DB plan with 5% worker contributions and 1% employer contributions going to a DC plan

Illustration of Impact of COLA Freeze

Using Average State Retiree from last three years with benefit of $33,000



Source: Gabriel, Roeder, Smith & Company

Typical Teacher Illustration - Contributions

- She's contributed 9.5% of pay for 13 years
- She planned on another 17 years of 9.5%
- Under hybrid, she'll be contributing:
  - 3.75% to DB plan
  - 5.00% to DC plan
- Lifetime average contribution has decreased by 4% from 9.5% to 9.1%

Financial Impact of COLA Freeze

- Present Values of the Pensions Decrease if COLA reduces
  - Value under Schedule B is 4% less than Schedule A
  - Value under H6319/S1111 is 18% lower than Schedule A

Typical Teacher Illustration - Benefits

- Benefit rate of 22.4% at transition
- She planned on 56.3% after 30 years at 62
- Under hybrid, it will be:
  - 39.4% from DB, actuarially reduced to 31.1%
  - Plus whatever 6% DC contributions can support (5.6%)
  - We calculate this as a total of 36.7%
- Lifetime benefit value has decreased by 35%
  - This is more than 3 years' salary
  - Equates to more than a 20% pay cut
  - She could contribute 20% of pay to break even

Illustration of Impact of Hybrid – Female Teacher

- Consider typical mid career teacher
  - Currently age 45
  - Hired at 32, so 13 years of service
  - Current Salary of $69,000
  - She anticipated retiring at 62 with 30 years
  - Now must wait until 67 for full benefit
  - Or take an actuarially reduced benefit
    - This illustration will be based on age 62 benefit

Typical Teacher Illustration – Benefit Replacement at Age 62

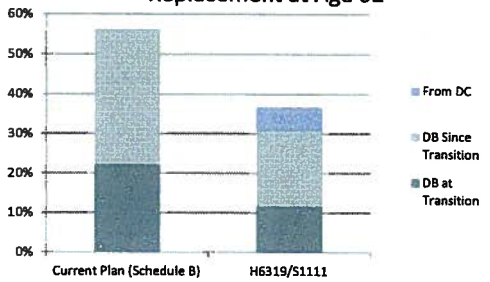
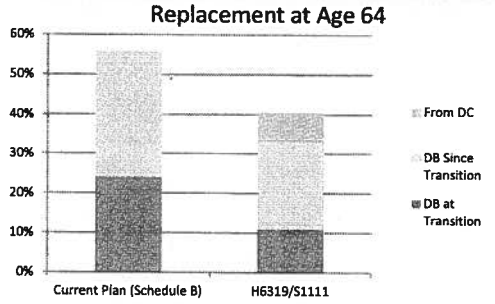


Illustration of Impact of Hybrid – Male State Worker

- Consider typical mid career state worker
  - Currently age 49
  - Hired at 35, so 14 years of service
  - Current Salary of $54,000
  - He anticipated retiring at 64 with 29 years
  - Now must wait until 67 for full benefit
  - Or take an actuarially reduced benefit
    - This illustration will be based on age 64 benefit

Typical State Worker Illustration – Benefit Replacement at Age 64



Typical State Worker Illustration - Contributions

- He's contributed 8.75% of pay for 14 years
- He planned on another 15 years of 8.75%
- Under hybrid, he'll be contributing:
  - 3.75% to DB plan
  - 5.00% to DC plan
- Lifetime average contribution has not changed

Why is this Such a Large Cut?

- DB pensions are most valuable late in one's career
- DC retirement is most valuable early in one's career
- H6319/S1111 is worst of both worlds for mid-career workers
  - Defined benefit for first part of their career
  - Defined contribution for last part of their career
  - Especially for women, who are likely to live longer
- DC doesn't have much time to work "magic" of compound interest

Typical State Worker Illustration - Benefits

- Benefit rate of 24.3% at transition
- He planned on 55.9% after 29 years at 64
- Under hybrid, it will be:
  - 39.3% from DB, actuarially reduced to 33.7%
  - Plus whatever 6% DC contributions can support (7.0%)
  - We calculate this as a total of 40.7%
- Lifetime benefit value has decreased by 27%
  - This is more than 2 years' salary
  - Equates to about a 13% pay cut

Other Thoughts on H6319/S1111

- This proposal generates one of the most substantial cuts in accrued public pensions nationally
- Cuts part time workers out of retirement vehicle
- Hybrid feature not expected to save money to Rhode Island taxpayer
- With Rhode Island's workforce mobility, lack of meaningful pension could be problematic

Findings

- Public Pensions are being targeted nationally
- H6319/S1111 has draconian financial implications for many Rhode Island public servants and retired public servants
- DB plans are more economical for Rhode Island than DC hybrid

Why DB? – Economic Impact

- Public pensions support $874 million in Rhode Island economic activity
- Provide some inflation protection
- Provide protection from poverty & needing other public assistance

Why are Defined Benefit Plans more Appropriate for Public Servants than Defined Contribution Plans?

- By their nature, Defined Benefit (DB) plans provide workers what they need for retirement
- DB plans deliver benefits more efficiently than Defined Contribution (DC) plans, thereby saving money
- Particularly necessary for those public servants not covered by Social Security

DB Plans Provide a "Better Bang for the Buck"

The DB approach saves money compared to the DC approach. Three reasons ...

1. DB pension plans pool "longevity risks"
2. DB pension plans can maintain a better diversified portfolio because, unlike individuals, they do not age
3. DB pension plans achieve better investment returns because of professional asset management and lower fees

Why DB? – Secure Retirement Benefit

- Because DB plans "define" the "benefit" received by retirees, they can ensure appropriate benefit levels
- Individuals do not need to be concerned with investment volatility under DB plans
- Individuals do not need to be concerned with outliving their savings under DB plans
- A reduction in expected investment returns will require greater contributions to be made to the plan in order to achieve the same target benefit.

Why DB? – More Economically Efficient

- ***Longevity Risk Pooling***
  - DB plans better manage longevity risk, or the chance of running out of money in retirement
  - DB plans avoid the "over-saving" dilemma and do more with less
- ***Maintenance of Portfolio Diversification***
  - DB plans are able to take advantage of the enhanced investment returns that come from a balanced portfolio throughout an individual's lifetime
- ***Superior Returns***
  - DB plans, which are professionally managed, achieve greater investment returns versus those of individual accounts

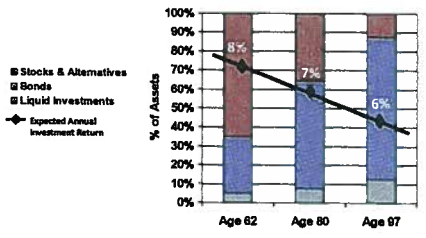
1st Strength of DB Plans
Longevity Risk Pooling

- Because they cover large numbers of retirees, DB plans can pay out over the *average* life expectancy, not *maximum* life expectancy
- An individual under a DC plan will want to avoid the risk of running out of money if they live a long life
- Because individuals must plan for a maximum life expectancy, much more money must be accumulated in a DC plan, compared to a DB plan

2nd Strength of DB Pension Plans
More Effective Portfolio Diversification

- DB plans can maintain a well diversified portfolio over time – unlike individuals, DB plans do not age
- To protect against market shocks, individuals in DC plans are advised to shift toward more conservative investments as they age, sacrificing some expected return
- Lower returns mean more money must be contributed to deliver the same level of benefits

As Individuals Shift DC Portfolio Allocation, Expected Return Reduced



3rd Strength of DB Pension Plans
Pooled, Professionally-Managed Assets

- Assets in DB plans are professionally managed. Despite their best efforts, individuals tend to underperform when it comes to investing in DC plans
- Pooled investments in DB plans can lower expenses
  - Large group pricing negotiation
  - Avoid expenses of individual recordkeeping, investment education, investment transactions
- Studies generally have shown that DB plan returns outperform DC plans by at least 1% annually
  - Towers Watson 1995-2008 large plans 1.27% outperformance
  - CEM Benchmarking 1998-2005 found 1.80% difference
  - Recent national public plan experience shows even larger DC shortfall
  - Even a mere 1% differential generates tremendous efficiencies – more than 20%

What about Unfunded Liabilities?

- Unfunded Liability has grown to $7 billion
  - "Unfunded Liability" is attributable to prior benefits, not future benefits
  - H6319/S1111 decreases Unfunded Liability by cutting benefits already earned
- Reversion to hybrid does not decrease unfunded liabilities
  - It's the cut in earned benefits which decreased unfunded liability
  - To the extent that actuarial assumptions' conservatism is borne out, maintenance of DB would actually decrease unfunded liabilities
- DB systems are advance funded, not left to future generations
  - Historic lack of employer funding contributed to unfunded liability

Conclusions

- Public Pensions are being targeted nationally
- H6319/S1111 has draconian financial implications for many Rhode Island public servants and retired public servants
- DB plans are more economical for Rhode Island than DC hybrid

William B. Fornia, FSA | President

November 7, 2013

CONFIDENTIAL

Mr. Thomas Malone
President
International Association of Fire Fighters Local 1784
Memphis Fire Fighters Association
Via email

Re: Memphis Pension Reform Report Review

Dear President Malone:

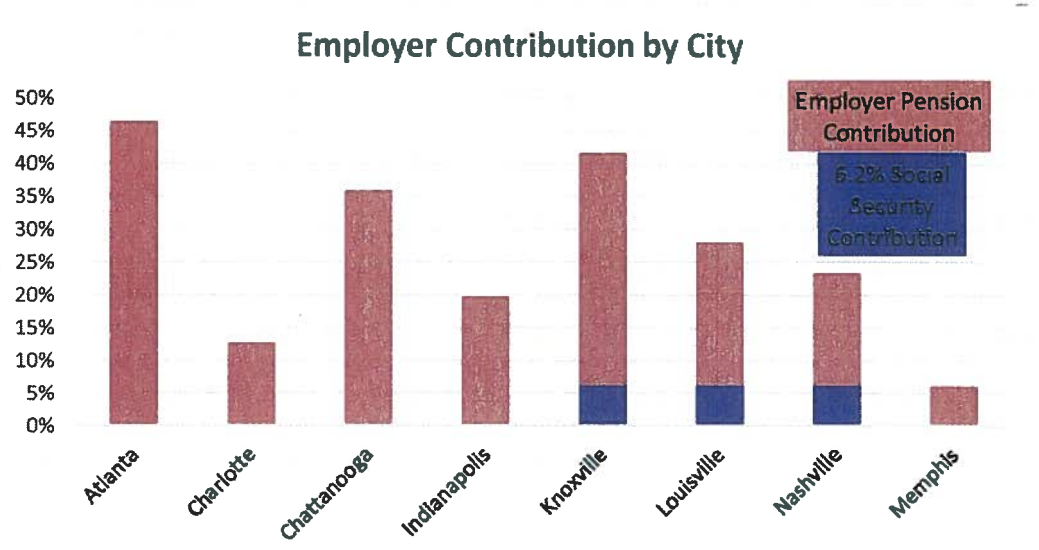
At your request, Pension Trustee Advisors (PTA) has reviewed the September 14, 2013 report on City of Memphis Retirement Benefit Alternatives. While we commend the City for its efforts to improve the funding position of the City of Memphis Retirement System, there are several findings and conclusions in the "Alternatives" report which we wish to bring to your attention.

We believe that these critical points include:

- The City contributions have been only 6% of pay, which is less than private sector employers make to Social Security. We are not aware of any fire department in the country where contributions are this low. The contribution rates of seven comparable cities range from 12.65% to 46.41% -- two to more than seven times as much as Memphis.
- The so-called unsustainability is primarily due to the City not making adequate contributions. Even if the financial crisis had not occurred and returns had not been poor, it is impossible to finance a pension benefit which costs more than 6% of pay by contributing only 6% of pay.
- Memphis benefit levels are not excessive when compared with firefighter benefit levels of comparable cities
- Several assumptions, methods and techniques are used in the cost illustrations which make the costs appear particularly onerous. With reasonable changes to actuarial methods and assumptions, costs might be reduced significantly
- Several assumptions, methods and techniques are used in the benefit illustrations which make the proposed benefit changes appear less draconian than we believe they are.

I - City contributions are much lower than peers

We understand that Memphis routinely compares it labor costs to seven comparably sized regional cities. As shown on the following table, the contribution made to the Memphis Retirement System is much smaller than those made by the seven peer cities to their plans which cover firefighters.

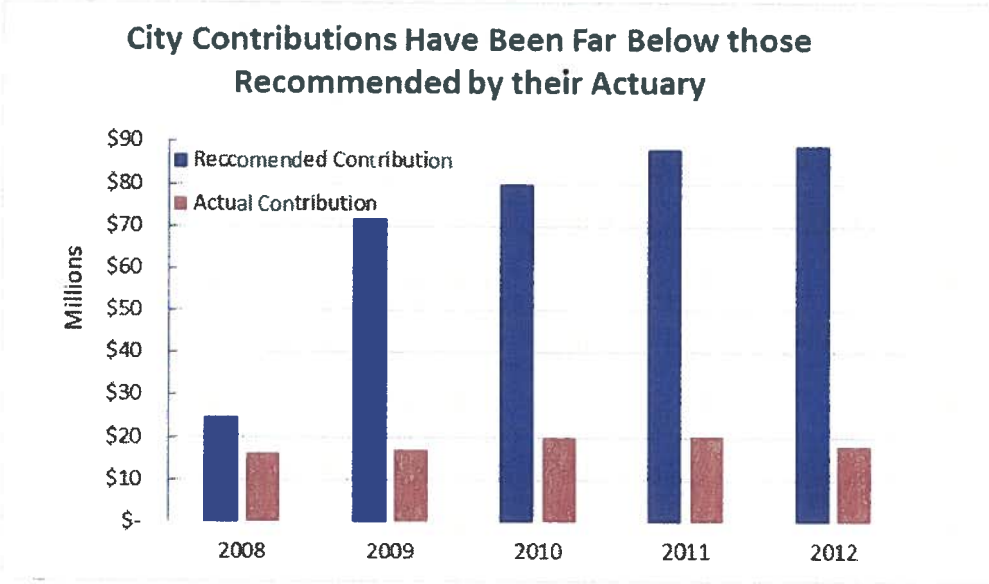


As you can see all of the cities contribute at least twice as much as Memphis. Three of these cities have their firefighters covered by Social Security, so they pay 6.2% of pay to social security in addition to the retirement system contribution. In fact, the Memphis 6% contribution is even less than the 6.2% Social Security contribution made by other US employers who provide no pension whatsoever to their workers.

II - Inadequate city contributions have created underfunding.

The July 2012 plan actuaries report indicated that the City's normal cost for the plan is approximately 12% of pay, after reduction for 6.5% firefighter contributions and adjustment for end of year payment. This means that the City would need to contribute 12% of pay, just to keep up with the value of benefits promised each year. The actuary also calculated a full recommended contribution level of 30.3% of pay, to help pay off unfunded liability. While the drop in the financial markets played a major part in creating the unfunded liability, the City contributions which were not even equal to the normal cost share is a major reason that the costs continue to escalate. It is impossible

to pay for a promise which costs 12% of pay by only making pension contributions of 6% of pay. The following table illustrates the history of the City's inadequate contributions.



III - Firefighter benefit levels are modest

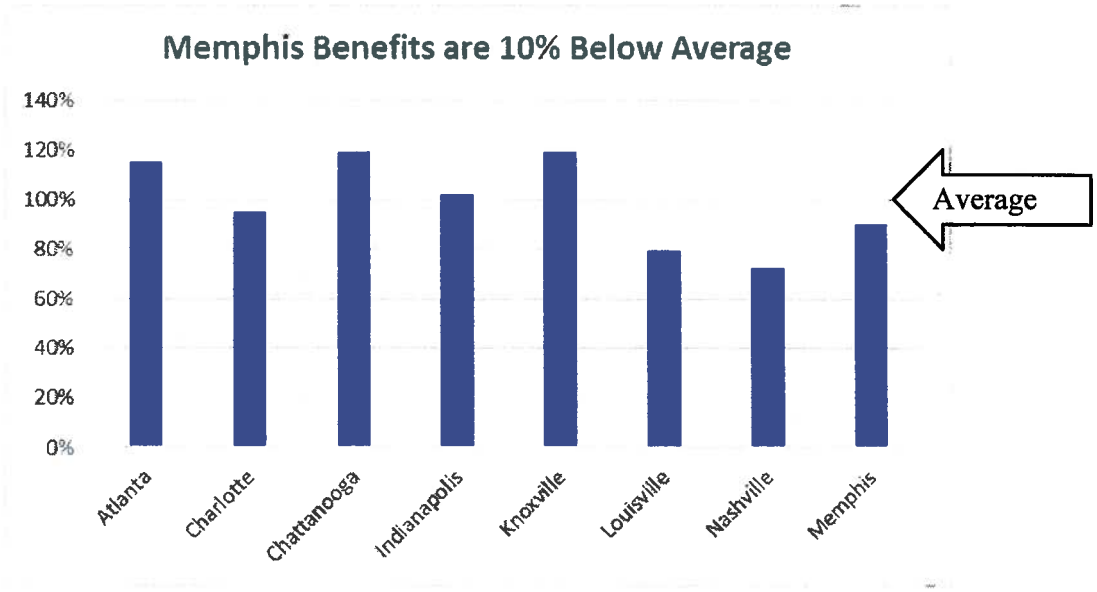
We have obtained information about the benefit levels for firefighters at the seven peer cities and quantified the value of the benefits for the typical firefighter. We used data and assumptions from PriceWaterhouseCoopers (PWC), the City's actuary.

We find that the level of Memphis benefits is 10% below the average of the other seven cities. This reflects the benefit levels of the various systems, including cost-of-living adjustments and surviving spouse benefits. The following table illustrates key benefit provisions for our average firefighter aged 40 with 12 years of service as of 2012:

Key Plan Features

Peer City	Retirement Age & Service	Benefit Multiplier	Average Pay Period	Cost of Living Adjustment	Surviving Spouse Benefit
Memphis	53 & 25	62.50%	3 years	Ad Hoc (assume 0.5%)	75%
Atlanta	55 & 27	81.00%	3 years	1.00%	75%
Charlotte	53 & 25	65.00%	2 years	Ad Hoc (assume 0.5%)	67%
Chattanooga	53 & 25	68.75%	3 years	3.00%	None
Indianapolis	52 & 24	58.00%	Base of First Class Firefighter	CPI (assume 2.25%)	60%
Knoxville	53 & 25	62.50%	2 years	3.00%	50%
Louisville	55 & 27	67.50%	3 years	None	None
Nashville	53 & 25	50.00%	5 years	80% CPI (assume 1.75%)	None

The following chart compares the value of cumulative lifetime benefits (at age 40) for each of these plans, when all of these factors above are considered, based on the PWC actuarial assumptions.



Many of the other plan characteristics are comparable between the plans:

	DROP	Disability Benefit	Vesting Period	Social Security
Memphis	Yes	Yes	10 years	No
Atlanta	No	Yes	5-10 years	No
Charlotte	No	Yes	5 years	No
Chattanooga	Yes	Yes	10 years	No
Indianapolis	Yes	Yes	20 years	No
Knoxville	Yes	Yes	5 years	No
Louisville	Yes	Yes	5 years	Yes
Nashville	Yes	Yes	5 years	Yes

IV- Certain actuarial assumptions and techniques cause plan to look more expensive

While the costs of the retirement program are not insignificant, (and are certainly more than the 6% that the City is contributing or the 6.2% that all private sector employers pay) there are several actuarial assumptions and techniques which cause this plan to look more expensive than would be portrayed under more mainstream actuarial assumptions and techniques. These include:

- Salary growth – The PWC actuarial report is based on an assumed growth in salaries of 5%. Based on the participant salary information received, the average annual salary increase over the past 9 years is only 3.49%. While PWC may have other reasons to believe that 5% is an appropriate assumption for the future, this has the effect of increasing costs substantially.
- Return on Assets – Although the PWC assumed rate of investment return of 7.5% is in the range of typical actuarial assumptions, it is in the low end of that range. The most recent survey of assumed rates of investment returns from the National Association of State Retirement Administrators indicates that less than one-third of the statewide plans use assumptions as low as 7.50%, while the majority of plans use assumed rates of return of 7.90% or higher. The use of such a low rate of return causes the costs and funding position of the plan to look worse than would be indicated by more mainstream assumptions. While the use of a conservative rate would be fiscally responsible if the City were actually contributing based on those rates, its use in this instance serves no other apparent purpose than to create the appearance of excessive costs.

- Asset smoothing – The PWC costs and projections reflect a "smoothed value" of assets which is nearly $100 million lower than the actual market value of assets. Based on strong investment return of 11.15% for the fiscal year ending June 30, 2013, this disparity grows to more than $150 million. Because of the projection techniques and funding policy used, this $150 million is completely ignored in projected costs and assumed to be never available for a reduction in pension costs. While it is certainly possible that the fund will return less than 7.5% over some period of time, making substantial benefit cuts without considering $150 million that actually exists seems premature. Most systems use an asset smoothing method which recognizes unusual gains or losses over a period of five years. The current method will never recognize this $150 million gain as long as it remains less than 10% of the assets. While this would be a reasonable method and comply with actuarial standards of practice if the City were funding on this basis, it has the current effect today of ignoring $150 million in assets which really exist. And since the City has not funded on an actuarial basis for several years, the deferral of the $150 million has been truly meaningless.
- Expression of projected costs as dollar amounts – Most of the graphs shown in the September 14 "Retirement Benefit Alternatives" illustrate City costs as increasing at an upward slope. But much of this upwardly sloping increase is as a result of the assumed salaries growing at 5%. If these charts were expressed as a percentage of worker pay (or City revenues, or City tax base or any other variable actually related to the economy) instead of constant 2012 dollars, the graphs would be far less alarming.

While developing funding policy on a rigorous or conservative basis is a strong policy, because the City does not actually make contributions on this basis, such a policy is merely arbitrary and meaningless. A more appropriate approach would be to develop a policy which the City might be able to actually utilize for its contributions, and perhaps later strengthen the policy over time. Below is a comparison of 2013 costs under current policy with one estimated using a policy which:

- Is based on 3.5% payroll growth assumption rather than 5.0%
- Is based on market value of assets rather than $150,000,000 less
- Amortizes the unfunded liability as a constant percentage of payroll over 20 years rather than a level dollar amount over 30 years

Estimated Impact of Change in Funding Policy as of July 1, 2013 ($000)

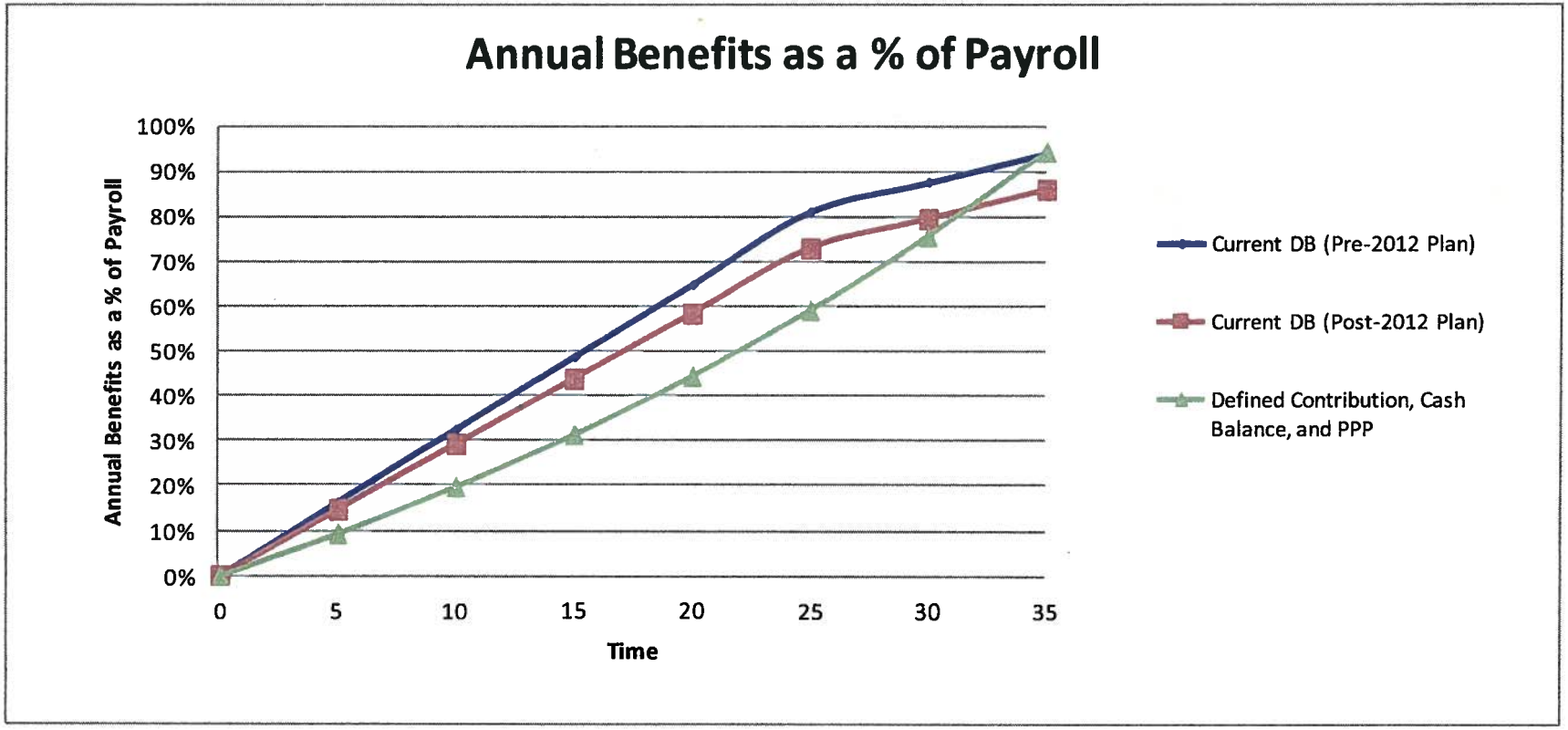
	Current Policy	Proposed Policy
Salary Growth Assumption	5.0%	3.5%
Actuarial Liability	$2,566,000	$2,341,000
Asset Valuation Basis as of 2013	Actuarial Value	Market Value
Value of Assets	$1,884,000	$2,040,000
Unfunded Liability	$682,000	$301,000
Estimated Normal Cost	$57,000	$43,000
Employee Contributions	$22,000	$22,000
Basis for Amortization of Unfunded Liability	30 years, level dollar	20 years, increasing by 3% per year
Amortization of Unfunded Liability	$55,000	$21,000
Interest to End of Year	$7,000	$3,000
Total Actuarial Required Contribution	$96,000	$46,000

The numbers in the proposed column are estimates. We encourage the City and PWC to make precise calculations and seriously consider each of the adjustments identified (salary assumption, market value of assets, amortization policy). While it might not be prudent to adopt all three of these modifications, clearly the reduction in ARC from more than $90 million to less than $50 million suggests that there may be potential to target a funding number in the range of $60 million (as PWC has proposed) without resorting to drastic benefit reductions.

V - Certain actuarial assumptions and techniques cause proposed plan to look more reasonable

We have reviewed benefit illustrations conducted by the International Association of Firefighters which attempted to replicate the benefit illustrations included in the September 14 report.

That report illustrated that the benefit value for the current plan would grow to more than 70% of pay after 25 years and approximately 85% of payroll by 35 years. The proposed program was comparable, approaching 60% after 25 years, then exceeding 90% after 35 years. This is illustrated in page 38 of the September 14 PWC report.

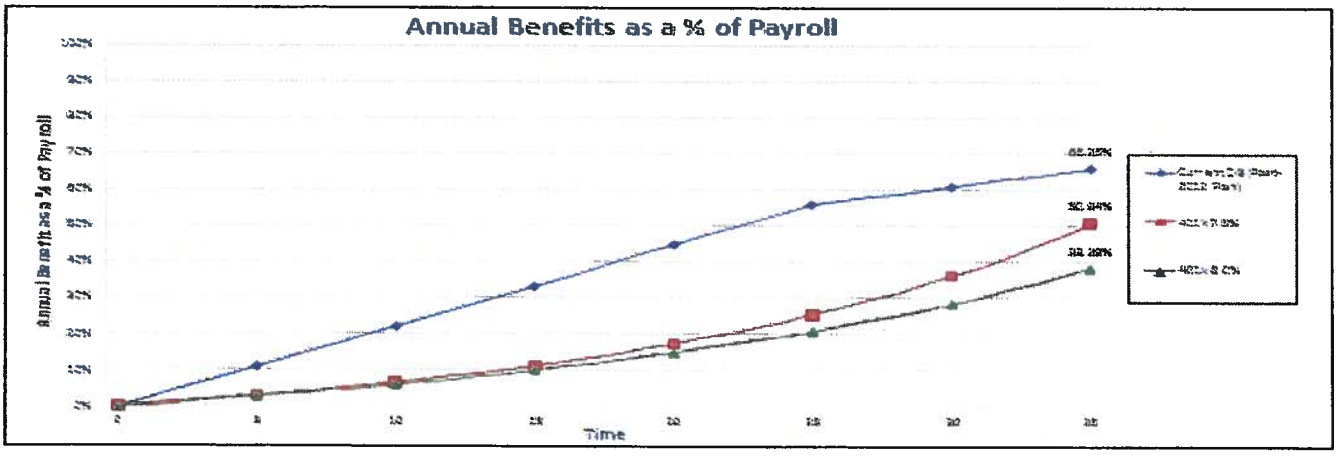

Annual Benefits as a % of Payroll
Annual Benefits as a % of Payroll
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
5
10
15
20
25
30
35
Time
Current DB (Pre-2012 Plan)
Current DB (Post-2012 Plan)
Defined Contribution, Cash Balance, and PPP

The IAFF calculations, which I have reviewed, paint a much more moderate picture. The current program provides benefits of just 56% of pay after 25 years, topping at 66% after 35 years. This is consistent with the actual plan provisions of 2.25% per year of service for the first 25 years, plus 1% per year beyond 25 years.

Furthermore, the IAFF calculations use more realistic assumptions for investment return and annuitization costs. Many studies show that investment returns earned by individuals in their 401(k) plans are lower than those returned by professionally managed defined benefit plans. The IAFF illustrated returns at both the DB rate of 7.5% as well as more realistic returns at 6.0%. Although there is currently no availability of annuities earning 4%, the IAFF analysis conceded that this might be a reasonable approach for comparison. We have not been able to replicate the PWC approach, but it appears that they assumed much more favorable DC returns and annuity rates. The IAFF calculations are shown below:

Annual Benefits as a % of Payroll

- Police & Fire – Illustration of Accrual Pattern as a Percentage of Pay
- Age 25, $50,000 salary, 4.11% salary scale, 7.5/6.0% investment return, 4.0% annuity interest rate



In addition to the different results, we find that another assumption produces misleading comparisons. The comparison of the current defined benefit program with proposed alternative program is based on an individual hired at age 25. According to the actuarial report, the average hire age for general employees is 37 and the average hire age for Police Officers and Firefighters is 28, for a combined average of 31. The use of a younger hire age makes an alternative program appear stronger than the use of an older hire age Defined contribution plans are most effective when they are started early in one's career. It makes a big difference if savings starts at age 25 versus age 31. If a worker has six more years to have their investments grow, they would have about fifty percent more. The PWC analysis does not represent the heavy reductions in benefits which would occur under the proposed plan versus the current program.

For the majority of members, a change to the proposed 401(k)-type or Cash Balance program would result in dramatically reduced benefits. This is even more pronounced if applied to the current workforce mid-career, where there is little time for a defined contribution type program to catch up in value to the defined benefit program. The most misleading feature of the illustrations is the failure to consider its impact on these current Memphis workers, but only focusing on a hypothetical 25 year old hire under a single program for their entire career.

For example, consider the average firefighter age 40 with 12 years of service. Under the current program, they would be eligible to retire once they've worked 25 years. This would provide them a benefit of 62.50% of their average pay at retirement. Using the PWC 5% salary growth assumption, this equates to 59.6% of their final pay. But if this individual is transferred today to a DC plan or its equivalent, the loss in benefits is substantial. Twelve years of service entitles the firefighter to a pension of 30% of pay. But since this is pay 13 years before retirement, the 30% erodes to only 15.2% of pay. This means that the replacement 6% DC plan must be used to fill the 44.4% gap. But as you can see from PWC's own graphs, after 13 years, a DC program can only provide about 25% of pay. And this is probably based on retirement at age 65, not age 53. We also believe that this is an optimistic estimate for the investment return reasons discussed above.

The bottom line is that our average firefighter would have their total benefit more than cut in half if the proposed program goes into effect.

The following table illustrates the dramatic drop in benefit value for the average firefighter:

	Current Program	Proposed Program
Service at Transition	12 years	12 years
DB Service after Transition	13 years	None
Total DB Service	25 years	12 years
Pension Multiplier	62.5%	30.0%
Salary at Retirement	$102,932	$102,932
Average Earnings	$98,108	$52,029
Pension	$61,318	$15,609
6% DC Contribution – First Year	$0	$3,275
Accumulated DC Value at Retirement	$0	$86,083
Equivalent Pension Amount	NA	$6,469
Total Pension	$61,318	$22,078
Pension as % of Pay at Retirement	59.6%	22.4%
Loss in Annual Pension		$39,240

Alternative Solutions

The September 14 report recommended that the City triple its contributions to a level more appropriate with a meaningful pension system. They proposed an annual contribution of roughly $60 million. This would be a substantial improvement of the current policy which is to fund less than even the Social Security requirement.

In order to make up the difference between $60 million and the actuarial required contribution, the report proposes dramatic cuts in benefits. We propose instead the following approach:

- Begin contributing at the $60 million level as currently recommended
- Increase this contribution each year to match payroll growth
- Ask PWC to investigate measurement of the liabilities based on a more appropriate salary growth rate to recapture some of the $200 million difference
- Gradually phase-in the recognition of the $150 million deferred investment gains

- Ask PWC to measure the long run sustainability of the plan
- If a gap exists, propose modest changes in contributions or benefits as necessary to close the gap

As mentioned above, we encourage the City and PWC to analyze the various actuarial funding policy changes to see their impact on City contributions.

Conclusions

Our findings are threefold. First is that much of the pension problems are attributable to inadequate City contributions, which are even less than other Memphis taxpayers make to Social Security.

Second is that while the plan needs to be funded properly, the September 14 analysis uses actuarial techniques, assumptions and illustrations which paint a problem much worse than would be demonstrated using more conventional techniques, assumptions and illustrations. In particular, we find that the unfunded liability is being painted as particularly onerous. The assets, including projection of future assets, do not include approximately $150 million of "smoothed" assets. And the liabilities, based on an assumed salary growth rate of 5.0%, are approximately $200 million higher than they would be if based on the historical growth rate of 3.49%. These two factors account for more than half of the projected unfunded liability as of 2013. Consequently, if the City increases its contributions to the $60 million level proposed by PWC, such contributions should be able to adequately fund the current program.

Finally is that the proposed "solution" would cause dramatically lower benefits for nearly all Memphis workers, particularly if applied prospectively to current workers.

I am happy to discuss this further at your convenience.

Sincerely,

William B. Fornia, FSA
President

APPENDIX B

ACTUARIAL PUBLICATIONS

WILLIAM B. FORNIA

Pension Trustee Advisors, Inc.
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Centennial, CO 80112
PensionTrusteeAdvisors.com
303.263.2765

Personal Summary

William B. (Flick) Fornia is founder and president of Pension Trustee Advisors. PTA provides consulting services on public pension and retirement benefits with a focus on trustee education to more than twenty-five clients. Previously, he was senior vice president of Aon Consulting, leading their public sector retirement plan actuarial consulting practice. His professional expertise is the analysis, design and modeling of postretirement employee benefits (pensions and health), particularly in the public sector.

Client Experience

Mr. Fornia's work experience includes consulting for public and private sector retirement plans. He has consulted with numerous state and local government bodies regarding their public retirement systems, as well as with private sector and not-for-profit employers in the United States, Brazil and Argentina. He has also worked on federal, state and local compliance and accounting issues for many clients.

A frequent speaker, Mr. Fornia has testified before legislative and judicial bodies in nine states. He serves his client as expert witness and has testified in Federal Court. Mr. Fornia has written papers on pension and retiree health issues and has been interviewed by various periodicals on pension issues. He has served public sector clients in thirty-two states and Puerto Rico, and has consulted on retirement issues involving seven of the ten largest US cities.

Professional Organizations

Mr. Fornia is a Fellow of the Society of Actuaries (1986), an Enrolled Actuary under ERISA (1984), a Member of the American Academy of Actuaries (1983), and Fellow of the Conference of Consulting Actuaries (2005).

He is currently on the faculty of the Society of Actuaries Fellowship Admission Course and Associateship Professionalism Course, on the Public Pensions Subcommittee of the American Academy of Actuaries, and is Vice Chair of the steering committee of the Conference of Consulting Actuaries Public Plans Community. He has previously served as chair and vice-chair of the Enrolled Actuaries Meeting Program Committee, on the Conference of Consulting Actuaries Committee on Professionalism and on the Society of Actuaries Education and Examination Committee.

Education

He graduated from Whitman College with a Bachelor of Arts degree in Mathematics (1980).

* * *

Papers, Testimony and Selected Presentations

Papers, Discussions and Testimony – William B. Fornia

Faculty – Society of Actuaries Fellowship Admission Course – August 2013, Vancouver

Faculty – Society of Actuaries Associateship Professionalism Course – April 2013, Los Angeles

Expert Witness Testimony – El Paso County Colorado District Court – Trustees of the Springs Transit Company Employee's Retirement and Disability Plan vs. City of Colorado Springs; First Group America, Inc.; and First Transit, Inc. – April 2013

Expert Witness Deposition – City of San Diego vs. San Diego City Employees Retirement System – April, 2013

Expert Witness Deposition – El Paso County Colorado District Court – Trustees of the Springs Transit Company Employee's Retirement and Disability Plan vs. City of Colorado Springs; First Group America, Inc.; and First Transit, Inc. – February and April, 2013

Faculty – Society of Actuaries Associateship Professionalism Course – November 2012, Chicago

Faculty – Society of Actuaries Associateship Professionalism Course – September 2012, San Francisco

Faculty – Society of Actuaries Fellowship Admission Course – August 2012, Toronto

Participant – Governing Magazine's Pension Reform Policy Roundtable – August 2012, Washington DC

Expert Testimony – Pension Reform Legislation, Ohio House Committee for Health and Aging Subcommittee on Retirement and Pensions Hearing – July 2012, Columbus

Faculty – Society of Actuaries Associateship Professionalism Course – April 2012, San Francisco

Expert Testimony – Pension Reform Legislation, Alaska Senate Finance Hearing – March 2012, Juneau

Illinois Commission on Government Forecasting and Accountability Monthly Briefing, "Actuarial Funding Methods", February 2012

National Conference on Public Employee Retirement Systems PERSist, Volume 25, No. 1, "Disclosure, Disclosure, Disclosure: GASB, PEPTA & NABL", Winter 2012

Expert Witness Testimony – U.S. District Court for the District of Maryland – Cherry vs. Baltimore – February 2012

Participant – Pension Disclosure Task Force, National Association of Bond Lawyers – January 2012, October, August 2011, Washington DC

Expert Testimony – Rhode Island Joint Finance Committee Hearing on Pensions – October 2011

Public Hearing Testimony – Exposure Draft, Accounting and Financial Reporting for Pensions, and Financial Reporting for Pensions, Government Accounting Standards Board -- October 2011

Expert Testimony – Pension Reform Legislation, Alaska Senate State Affairs Hearing -- October 2011, Fairbanks

Expert Witness Deposition – Lathan vs. DRS & Washington State, September 2011

Participant – "Getting from Here to There: Research to Implement Teacher Pension Reform" George W. Bush Institute, September 2011, Dallas

Expert Testimony – Pension Reform Legislation, Alaska Senate State Affairs Hearing – September 2011, Anchorage

Faculty – Society of Actuaries Associateship Professionalism Course -- September 2011, New Brunswick NJ

Faculty – Society of Actuaries Associateship Professionalism Course -- August 2011, Atlanta

Global Business Magazine – "The State of Public Pensions in the U.S." – July 2011

Expert Testimony – City Council of Atlanta – April 2011

Expert Witness Deposition – Cherry vs. Baltimore – March 2011

Expert Testimony – City Council of Oakland – February 2011

Faculty – Society of Actuaries Associateship Professionalism Course, December 2010, Grapevine TX

Faculty – Society of Actuaries Fellowship Admission Course, December 2010, Grapevine TX

Expert Witness – City of Philadelphia Deputy Sheriffs Arbitration Hearing - Financial impact of retirement proposals, November 2010

Public Hearing Testimony – Preliminary Views, Accounting and Financial Reporting for Pensions, and Financial Reporting for Pensions, Government Accounting Standards Board – October 2010, Dallas

Expert Witness – City of Philadelphia and AFSCME Arbitration Hearing - Financial impact of retirement proposals, September 2010

Expert Witness – City Council of City of Baltimore - Actuarial impact of retirement proposals, June 2010

Participant – Puerto Rico Governor's Commission on Pension Reform – May 2010, San Juan

Faculty – Society of Actuaries Fellowship Admission Course, December 2009, Grapevine TX

Expert Witness – Illinois Pension Modernization Task Force – Comparison of Public and Private Retirement Benefits, Approaches to Financing, Changes Proposed in Other States, August 2009, Chicago

Expert Witness – City of Philadelphia and Fraternal Order of Police Arbitration Hearing - Financial impact of retirement proposals, 2008-2009

Journal of Pension Benefits – Defined Benefit Plans: A Better Bang for the Buck, Winter 2009 (with B Almeida)

Faculty – Society of Actuaries Fellowship Admission Course, September 2008, Toronto

Expert Witness – Kentucky Governor's Working Group on Pension Reform - Economic Efficiencies of Defined Benefit Pension Plans, September 2008

Expert Witness – City of Philadelphia and International Association of Firefighters Arbitration Hearing - Financial impact of retirement proposals, August 2008

"A Better Bang for the Buck – Economic Efficiencies of Defined Benefit Pension Plans" - National Institute on Retirement Security, August 2008 (with B Almeida)

"Reform Paths for Public Plans - Discussant" - Pension Research Council - Wharton Impact Conference, May 2008 (with R Crane, M Heller, B Waring, P Yakaboski), Philadelphia

Roundtable Member – Society of Actuaries and American Academy of Actuaries Roundtable – Public Pension Plan Disclosures: Who Needs to Know What—and Why, New York University, February 2008

Faculty – Society of Actuaries Fellowship Admission Course, August 2007, Toronto

Expert Witness – Illinois Legislative Committees – Comparison of Public and Private Retirement Benefits: Funding, Accounting and Design – February 2007, Springfield

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"Defined Benefit Schemes", Rethinking the Economics of Pensions Conference – Economic & Social Research Council, March 2013, London

"Changes and Trends: A Legislative Update", Mountain States Institutional Investor Forum, US Markets, March 2013 (with A Franklin, G Garrett), Denver

"Overview of Actuarial and Financing of State and Local Pensions", National Conference of State Legislators Pension Funding Policy Task Force, December, 2012 (with K Brainard, R Schultze), Washington DC

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"What GASB has in store for Public Funds", Oklahoma Public Funds Trustee Educational Conference, September 2012, Stillwater

"A Tour of Public Pension Reform" Keynote Speaker, Western Benefit Conference, July 2012, Seattle

"The Reality of Pension Reform Across the Country", 28th Annual Florida Public Pension Trustee Association Conference, June 2012 (with T Lussier, K Mallette, R Edmondson), Orlando

"Pensions in Depth", International Foundation of Employee Benefit Plans Public Employee Benefits Update, June 2012 (with K Hesse, D Oakley), Boston

"Interpreting Actuarial Information" Government Finance Officers Association 106th Annual Conference, June 2012 (with R Harris, C Wilson), Atlanta

"Actuarial Funding Issues", National Council on Teacher Retirement 25th Annual System Directors Workshop, June 2012, Denver

"Public Pension Plans ... Where are We Going?" 68th Annual Southern Conference on Teacher Retirement, May 2012 (with R Fitzpatrick, J Flaminio, D Stella), Nashville

""GASB – Gee, Actuarial Stuff isn't Boring!" National Council on Teacher Retirement Administrative Assistants Workshop, May 2012, Denver

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"Lessons From Well-Funded Public Pensions", Institutional Investor Roundtable for Public & Taft-Hartley Plans", April 2012 (with I Boivie, L Kosiba, H Shapiro), Los Angeles

"Pension Reform and Plan Design Case Studies", Public Plans Update; Post EA Meeting Seminar, Enrolled Actuaries Meeting, March 2012, Washington DC

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"Why Actuaries are Important to the Process of Portfolio Management" – Pacific Pension Institute Asian Pension Fund Roundtable, November 2011 (with S Shin), Kuala Lumpur

"Hot Topics with Public Pensions", Milliman Employee Benefits Consultant Forum, September 2011, New Orleans

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"The State of the Public Pension System", Future of Fiduciary Responsibility Summit, June 2011 (with J Mond, C Resendez, H Griffin, J Cuneo), New York

"Rethinking Pension Design", U.S. Retirement Savings: Looking for A Better Way", University of Wisconsin School of Business, June 2011, Madison

"Public Employee Retirement Systems Workshop", Enrolled Actuaries Meeting, March 2011 (with L Johansen), Washington DC

"The Pension Dimension" – Rhode Island Poverty Institute Budget Conference March 2011 (with F Karpinski)

"Responses to Pension Funding Crisis" – National Association of Police Organizations Police, Fire, EMS and Municipal Employee Pension & Benefits Seminar, February 2011 (with D Caliendo), Las Vegas

"Risk Consciousness" – National Association of Police Organizations Police, Fire, EMS and Municipal Employee Pension & Benefits Seminar, February 2011, Las Vegas

"Actuarial & Demographic Analysis Driven Investments" – Pacific Pension Institute Asian Pension Fund Roundtable, October 2010 (with S Shin, G Hirt), Hong Kong

"Actuarial Frontiers" – Colorado Public Plan Coalition, September 2010, Keystone Colorado

"Actuarial Issues" National Council on Teacher Retirement Annual Trustee Workshop, July 2010, Portland OR

"Historical Look at Defined Benefit Plans – Corporate DB Demise" Missouri Association of Public Employee Retirement Systems, July 2010

"Fiscally Sustainable Retirement Plan Design" Government Finance Officers Association 104th Annual Conference, June 2010 (with P Pharris), Atlanta

"Pension Symposium", Enrolled Actuaries Meeting, April 2010 (with A Biggs), Washington DC

"Public Plans Seminar", Enrolled Actuaries Meeting, April 2010 (with P Angelo, N Jones, R McCrory, T Lowman, E Friend), Washington DC

"Current Issues with Public Employee Retirement Systems", Enrolled Actuaries Meeting, April 2010 (with R Reed, M Smith), Washington DC

"Accounting Standards: How to Navigate" – Public Funds Summit, March 2010 (with R Reed, R Mitchell, P Morin), Huntington Beach CA

"Threat Level Orange: Underfunded Pension Plans and Response Scenarios" – Recovery Risks and Rewards – An Institutional Investor Summit, March 2010 (with D Love), New York

"Public Plan Issues- Update on GASB Project" – Conference of Consulting Actuaries Audiocast, February 2010 (with P Angelo, J Rizzo)

"The Value and Relevance of Asset Smoothing" – National Association of State Retirement Administrators, August 2009 (with A Milligan), Savannah

"The Importance of Lifetime Income to Retirees" – Stars & Stripes National Public Employees' Retirement Fund Summit, April 2009, Miami

"Financial Economics" – 65th Annual Southern Conference on Teacher Retirement, April 2009 (with K Brainard, T Cavanaugh), Hilton Head SC

"Consensus Hopefuls: Actuaries, Accountants and Public Pensions" – Public Funds Summit, March 2009 (with C Chittendon, D Owens), Huntington Beach CA

"Executive Roundtable: Case Studies in Weathering Economic Turmoil" – Public Funds Summit, March 2009 (with C Collins, I Lowenberg, B Jacksha), Huntington Beach CA

"Defined Benefit versus Defined Contribution Plans" - Police, Fire & Public Pensions Forum, March 2009 (with J Sopranuk, M Fuller, J White), Huntington Beach CA

"Asset Allocation Tutorial: Proactively Manage Your Fund's Overall Pension Framework to Avoid Unnecessary Exposures" – Public Funds Board Forum, December, 2008 (with R Masih, J Davis, B Rubin), San Francisco

"Understanding and Responding to the Changing Pension Plan Environment" - International Foundation of Employee Benefit Plans, November 2008 (with C Franklin), San Antonio

"A Better Bang for the Buck – The Economic Efficiencies of Defined Benefit Plans" - International Foundation of Employee Benefit Plans, November 2008 (with B Almeida), San Antonio

"Optimizing Your Retirement Program: Are Your Employees Financially Prepared for Retirement?" – Western Pension & Benefit Conference, November 2008, Denver

"The Mark to Market Push" Guns and Hoses, September 2008, Huntington Beach CA

"Economic Efficiencies of Defined Benefit Plans" - National Association of State Retirement Administrators, August 2008 (with B Almeida), Snowbird UT

"Cost Savings of Public Pensions" - National Conference of State Legislators Legislative Summit, July 2008 (with B Almeida, P Macht, P Robertson), New Orleans

"Actuarial Roles and Relationships" - Pennsylvania Association of Public Employee Retirement System Annual Conference, June 2008 (with J McMillin, A Randzin), Harrisburg

"Actuarial Issues" - IMN Mountain Public Employee Retirement System Forum, April 2008 (with R Harris), Denver

"The Movement Toward Defined Contribution Plans, An Analysis of Reasons, Issues and Outcomes" – 64th Annual Southern Conference on Teacher Retirement, April 2008 (with J Forman), Oklahoma City

"Intermediate Public Employee Retirement Administration" - Government Finance Officers Association, April 2008 (with H Pohl, C Walker), Reno

"The Defined Benefit and Defined Contribution Experience ... Any Regrets?" - Stars & Stripes National Public Employees' Retirement Fund Summit, April 2008 (with L Johnson), Key West

"Liability Driven Investing for Public Plans ..Yes or No?" - Stars & Stripes National Public Employees' Retirement Fund Summit, April 2008 (with S McShea), Key West

"Financial Disclosure of Public Employee Retirement Systems" - Enrolled Actuaries Meeting, April 2008 (with L Johansen), Washington DC

"How Public Entities are Dealing with GASB 43 and 45" - Enrolled Actuaries Meeting, April 2008 (with S Chan, T Vicente), Washington DC

"The Move Toward Public Sector Defined Contribution Plans from Defined Benefit Plans" - State and Local Government Benefits Association Annual Conference, March 2008, San Diego

"Pension Risk Management" - State and Local Government Benefits Association Annual Conference, March 2008 (with J Miller), San Diego

"Actuarial Roles and Relationships" - IMN Public Funds Summit, March 2008 (with G Bland, J Davis, S Hutt), Huntington Beach CA

"The Funding Conundrum -- What Can Be Done?" - Ohio Forum on Public Retirement, January 2008, Columbus

"Exploring Your Fund's Relationship with the Actuary to Increase your Funded Status" Public Funds Board Forum, December 2007 (with L Johnson, R Reed), San Francisco

"Treasurers Roundtable: Policy, Governance and More" Great Plains Public Employees Retirement System Forum, November 2007 (with M Fitzgerald, S Steelman, K Schmidt), Kansas City

"An Analysis of Defined Contribution (DC) Plans" Great Plains Public Employees Retirement System Forum, November 2007 (with J Forman, B Bryant, J Walker), Kansas City

"Helping Public Employees Prepare For Health Care Needs During Retirement" - National Conference of Public Employee Retirement Systems Retiree Health Care Symposium, October 2007 (with R Crane, P Yakaboski), Chicago

"Working with the Actuary: Successful Fundamental Training for Trustees and Staff" Guns and Hoses, September 2007 (with I Summer), Huntington Beach, CA

"Actuary 101 -- Trustee Education on Pension Actuarial Principles" Missouri Association of Public Employee Retirement Systems, July 2007

"Other Post Employment Benefits (OPEB): Sorting Out Fact from Fiction and Getting Started" Government Finance Officers Association 101st Annual Conference, June 2007 (with C Walker, N Turnipseed), Anaheim

"LDI: A Paradigm Shift for Public Pension Funds?" Liability Driven Investing Summit, March 2007 (with C Chittendon, P Morin), Las Vegas

"It's Getting Closer! Everything You Wanted to Know about OPEB but were Afraid to Ask" American Institute of Certified Public Accountants National Government Accounting and Auditing Update, September 2006 (with R Samra), Denver

"Accounting Issues – Managing the Impact of GASB-OPEB" National Association of Public Pension Attorneys Legal Education Conference, June 2006, New York

"Future of Public Pension Plans: Short-term Problems or Structural Failures?" 62nd Annual Southern Conference on Teacher Retirement, April 2006, Little Rock

"Financial Economics and Public Pensions", Enrolled Actuaries Meeting, March 2006, Washington DC

"Defined Contribution Plans in the Public Sector" Conference of Consulting Actuaries Annual Meeting, October 2005, Asheville NC

"Reducing Contribution Volatility" National Council on Teacher Retirement 83rd Annual Meeting, October 2005, Tampa

"Actuarial Basics 1, and Actuarial Basics 2", Public Pension Financial Forum Professional Development Conference, October 2005, Denver

"Retirement Issues Facing the Baby Boomers" Texas Society of Certified Public Accountants Government Accounting Conference, September 2005 (with A Fuelberg, R Jung), Austin

"Contribution Rate Stabilization Methods" National Council on Teacher Retirement Deputy Directors Meeting, May 2005, Denver

"GASB 43 and 45 – New OPEB Reporting Standards for Governments and Plans" Utah Government Finance Officers Association, April 2005, St. George

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"The Push for Defined Contribution Plans" Oklahoma Public Fund Trustee Education Conference, September 2004, Stillwater

"How the World has Changed Regarding the Actuarial Status of Funds" National Council on Teacher Retirement Deputy Directors Meeting, May 2004, San Francisco

"Current Issues in Retirement Plans", Western Pension and Benefit Conference Annual Meeting, cosponsored by American Society of Pension Professionals and Actuaries, July 2003 (with J Holland), Denver

"Flexible Retirement Security: Helping Retirees get the Most From Your Retirement Programs by Coordinating DC and DB Plans", Western Pension and Benefit Conference Denver Winter Meeting, February 2003

"New Developments in DB/DC Plans", National Council on Teacher Retirement 80th Annual Convention, October 2002 (with J Reneau, A Winkle), Anchorage

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"Retirement Strategy: Designs that Serve the Long and Short Term Needs of Your Workforce" The Conference Board Employee Benefits Conference, April 2001, New York

"Potpourri of Executive Compensation and Benefits – Compensation Committee Case Study" Enrolled Actuaries Meeting, March 2001 (with J Reda, M Rosenbaum, M Schwartz), Washington DC

"Public Employee Retirement Systems Workshop", Enrolled Actuaries Meeting, March 2000 (with R North), Washington DC

"Introduction to Executive Compensation and Benefits", Enrolled Actuaries Meeting, March 2000 (with M Schwartz), Washington DC

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"Challenge of Managing Retiree Medical Liabilities", International Society of Certified Employee Benefit Specialists, October 1994 (with T Boldt), Denver

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"Pensions Overview - Pension Types, Administration, Funding" Colorado Government Finance Officers Association, November 1992, Grand Junction

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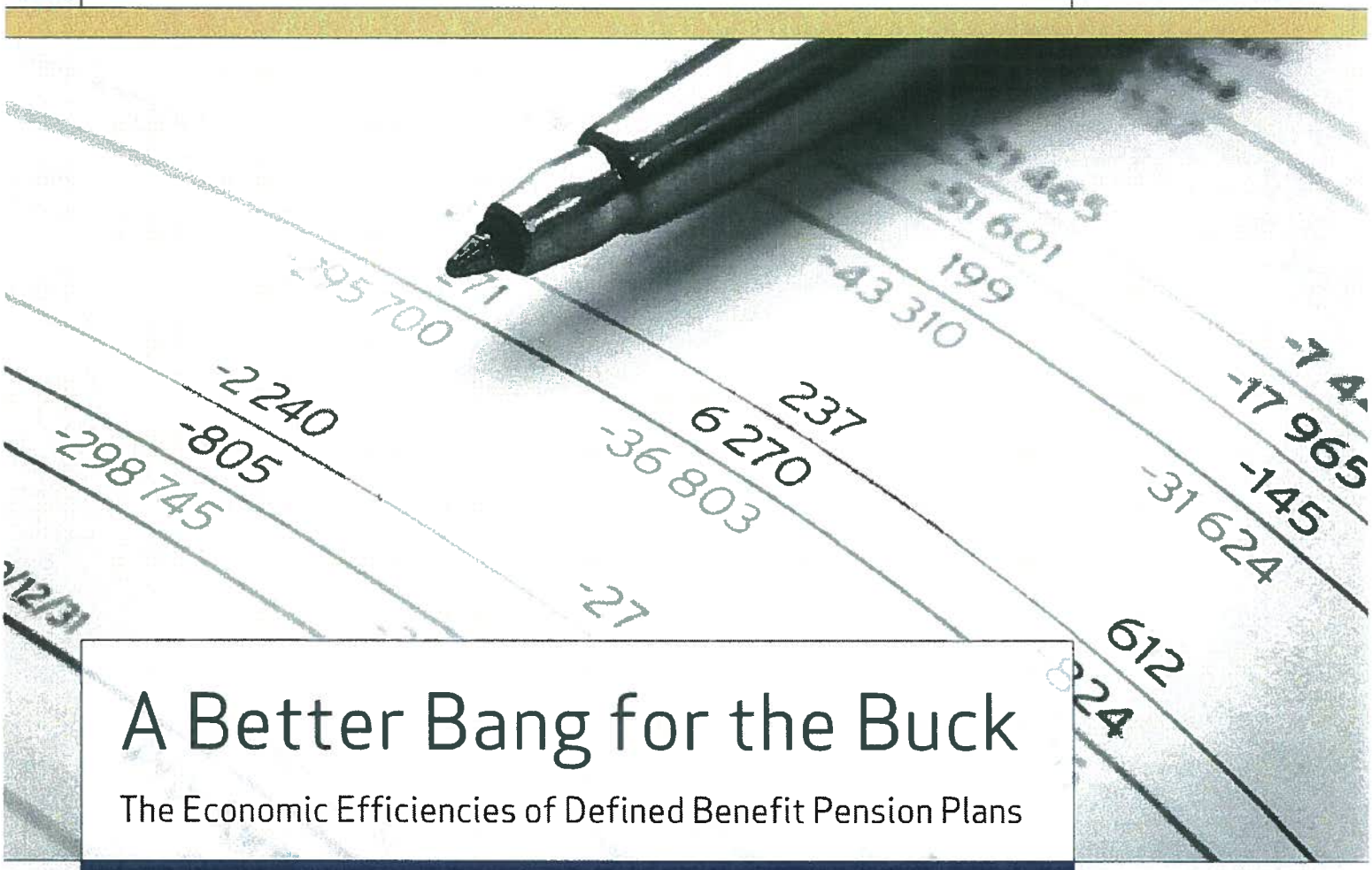

A Better Bang for the Buck

The Economic Efficiencies of Defined Benefit Pension Plans

by Beth Almeida and William B. Fornia, FSA

August 2008

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INTRODUCTION

Worries about retirement security abound. Families fear that they won't have enough to support an adequate retirement income as home values and financial markets plummet. Dwindling profit margins have employers looking to cut costs. And governments are concerned about delivering on the promises that they have made to their citizens and to their employees as tax revenues shrink amid a weakening economy.

In this environment, some have proposed replacing traditional defined benefit (DB) pensions with 401(k)-type defined contribution (DC) retirement savings plans in an effort to save money. But decision makers would be wise to look before they leap. To deliver the same level of retirement benefits, a DB plan can do the job at almost half the cost of a DC plan. Hence, DB plans should remain an integral part of retirement income security in an increasingly uncertain world because they offer employers and employees a better bang for the buck.

The value of traditional DB pensions to employees is generally recognized: they provide a secure, predictable retirement income that cannot be outlived. But less well known is the value of a DB pension to an employer. Due to their group nature, DB plans possess "built-in" savings, which make them highly efficient retirement income vehicles, capable of delivering retirement benefits at a low cost to the employer and employee. These savings derive from three principal sources.

First, DB plans better manage longevity risk, or the chance of running out of money in retirement. By pooling the longevity risks of large numbers of individuals, DB plans avoid the "oversaving" dilemma – that is, saving more than people need on average to avoid running out of cash – that is inherent in DC plans. Consequently, DB plans are able to do more with less.

Second, because DB plans, unlike the individuals in them, do not age, they are able to take advantage of the enhanced investment returns that come from a balanced portfolio throughout an individual's lifetime.

Third, DB plans, which are professionally managed, achieve greater investment returns as compared with DC plans that are made up of individual accounts. A retirement system that achieves higher investment returns can deliver any given level of benefit at a lower cost.

Because of these three factors, we find that a DB pension plan can offer the same retirement benefit at close to half the cost of a DC retirement savings plan. **Specifically, our analysis indicates that the cost to deliver the same level of retirement income to a group of employees is 46% lower in a DB plan than it is in a DC plan.** This is an important factor for policy makers to consider, especially with respect to public sector workforces, where tax dollars are an important source of funds for retirement benefits. DB plans are a more efficient use of taxpayer funds when offering retirement benefits to state and local government employees.

More specifically, this study finds that …

- Longevity risk pooling in a DB plan saves 15%,
- Maintenance of a balanced portfolio diversification in a DB plan saves 5%, and
- A DB plan's superior investment returns save 26%

… as compared with a typical DC plan.

TWO APPROACHES TO RETIREMENT: DB AND DC PLANS

Employers who offer retirement benefits can consider two basic approaches: a traditional defined benefit (DB) pension plan and a defined contribution (DC) retirement savings plan.[1] Each type of plan has certain distinguishing characteristics that influence their cost to employers and employees.[2]

How DB plans work

While employers have a good degree of flexibility in designing the features of a DB plan, there are some features all DB plans share.

DB plans are designed to provide employees with a predictable monthly benefit in retirement. The amount of the monthly pension is typically a function of the number of years an employee devotes to the job and the worker's pay – usually at the end of their career.[3] For example, the plan might provide a benefit in the amount of 1.5% of final average pay for each year worked. Thus, a worker whose final average salary was $50,000, and who had devoted 30 years to the job, would earn a monthly benefit of $1,875 ($22,500 per year), a sum that would "replace" 45% of his final average salary after he stops working. This plan design is attractive to employees because of the security it provides. Employees know in advance of making the decision to retire that they will have a steady, predictable income that will enable them to maintain a stable portion of their pre-retirement standard of living.

Benefits in DB plans are pre-funded. That is, employers (and, in the public sector, employees) make contributions to a common pension trust fund over the course of a worker's career. These funds are invested by professional asset managers whose activities are overseen by trustees and other fiduciaries. The earnings that build up in the fund, along with the dollars initially contributed, pay for the lifetime benefits a worker receives when he retires.

How DC plans work

DC plans function very differently than DB plans.

First, there is no implicit or explicit guarantee of retirement income in a DC plan. Rather, employers (and usually employees) contribute to the plan over the course of a worker's career. Whether the funds in the account will ultimately be sufficient to meet retirement income needs will depend on a number of factors, such as the level of employer and employee contributions to the plan, the investment returns earned on assets, whether loans are taken or funds are withdrawn prior to retirement, and the individual's lifespan.

DC plans are typically "participant directed," meaning that each individual employee can decide how much to save, how to invest the funds in the account, how to modify these investments over time, and at retirement, how to withdraw the funds.

While DC plan assets are also held in a pension trust, that trust is comprised of a large number of individual accounts. DC plans are typically "participant directed," meaning that each individual employee can decide how much to save, how to invest the funds in the account, how to modify these investments over time, and at retirement, how to withdraw the funds. Retirement experts typically advise individuals in DC plans to change their investment patterns over their lifecycle.

In other words, at younger ages, because retirement is a long way off, workers should allocate more funds to stocks, which have higher expected returns, but also higher risks. As one gets closer to retirement, experts suggest moving money away from stocks and into safer, but lower returning assets like bonds. This is to guard against a large drop in retirement savings on the eve of retirement, or in one's retirement years.

This high degree of participant direction makes DC plans very flexible in accommodating individuals' desires, decisions, and control. Employees, however, do not always follow the best expert advice when it comes to saving and investing for retirement.[4] Too many workers fail to contribute sufficient amounts to the plans, and individuals' lack of expertise in making investment decisions can subject individual accounts to extremely unbalanced portfolios with too little or too much invested in one particular asset, such as stocks, bonds, or cash. For example, one study found that more than half of all DC plan participants had either no funds invested in stocks—which exposes them to very low investment returns—or had almost all their assets allocated to stocks, making for a much more volatile portfolio.[5]

Another important difference between DC and DB plans becomes apparent at retirement. Unlike in DB plans, where workers are entitled to receive regular, monthly pension payments, in DC plans it is typically left to the retiree to decide how to spend one's retirement savings. Research suggests that many individuals struggle with this task, either drawing down funds too quickly and running out of money, or holding on to funds too tightly and enjoying a lower standard of living as a result.[6] In theory, employers that offer DC plans could provide annuity payout options, but in practice they rarely do.[7]

BOTH DB *AND* DC PLANS ARE IMPORTANT TO RETIREMENT SECURITY

Because individuals do not have perfect knowledge as to whether they will remain in a given job (and therefore in a given DB plan) until retirement, taking advantage of the opportunity to save in a supplemental DC plan can provide employees with useful diversification of retirement income sources.

DC plans are also flexible vehicles that can accommodate individual retirement income needs that can vary. For example, two otherwise identical workers might have different family situations, health needs, or simply different preferences and expectations about their retirement income needs. DC plans give workers the opportunity to save for retirement in a manner that reflects their individual situations.

This is why most retirement experts liken the ideal design of retirement income sources to a "three-legged stool," consisting of Social Security, a DB plan, and a supplemental DC savings plan. Indeed, researchers have found that workers who have access to all three sources of retirement income are in the best position to achieve a secure retirement.[8]

However, to the extent that retirement benefits for private sector employees constitute a cost to employers, and since benefits for public employees are supported by taxpayer contributions, designing retirement benefits in a fiscally responsible fashion is an important public policy goal. To that end, it is important for policymakers to recognize that the features that make DB plans highly attractive to employees – a predictable monthly retirement benefit, low fees and professional management of retirement assets – also provide significant savings for employers and taxpayers.

DB PLANS ARE MORE COST EFFECTIVE

The cost of either a DB or DC plan depends primarily, but not only, on the generosity of the benefits that it provides. Economists have found that DB plans are typically more generous than DC plans, and obviously, more generous benefits are more expensive.[9]

However, for any given level of benefit, a DB plan will cost less than a DC plan.[10] This makes DB plans, in the language of economists, *more efficient* since they stretch taxpayer, employer or employee dollars further in achieving any given level of retirement income.

This makes DB plans, in the language of economists, more efficient since they stretch taxpayer, employer or employee dollars further in achieving any given level of retirement income.

There are three primary reasons behind DB plans' cost advantage.

- First, because DB plans pool the longevity risks of large numbers of individuals, they avoid the "over-saving" dilemma inherent in DC plans. DB plans need only accumulate enough funds to provide benefits for the average life expectancy of the group. In contrast, individuals will need to set aside enough funds to last for the "maximum" life expectancy if they want to avoid the risk of running out of money in retirement. Since the maximum life expectancy can be substantially greater than the average life expectancy, a DC plan will have to set aside a lot more money than a DB plan to achieve the same level of monthly retirement income.
- Second, because DB plans do not age, unlike the individuals in them, they are able to take advantage of the enhanced investment returns that come from a balanced portfolio over long periods of time. For instance, ongoing DB plans generally include individuals with a range of ages. As older workers retire, younger workers enter the plan. As a result, the average age of the group in a mature DB plan does not change much. This means DB plans can ride out bear markets and take advantage of the buying opportunities that they present without having to worry about converting all of their money into cash for benefits in the near future. By contrast, individuals in DC plans must gradually shift to a more conservative asset allocation as they age, in order to protect against financial market shocks later in life. This process can sacrifice investment returns because people may have to sell assets when they are worth too little due to market fluctuations coinciding with retirement timing. Moreover, they are not able to take advantage of higher expected returns associated with a balanced portfolio.
- Third, DB plans achieve greater investment returns as compared with DC plans based on individual accounts. Superior returns can be attributed partly to lower fees that stem from economies of scale. Also, because of professional management of assets, DB plans achieve superior investment performance as compared to the average individual investor.

METHODOLOGY

We compare the relative costs of DB and DC plans by constructing a model that first calculates the cost of achieving a target retirement benefit in a typical DB plan. We express this cost as a level percent of payroll over a career. We then calculate the cost of providing the same retirement benefit under a DC plan. Additional details on our methodology can be found in the Technical Appendix to this report.

Our model is based on a group of 1,000 newly-hired employees. For the purposes of simplicity, we give all individuals a common set of features. All newly hired employees are female teachers aged 30 on the starting date of their employment. They work for three years and then take a two-year break from their careers to have and raise children. They return to work at age 35 and continue working until age 62. Thus, the length of the career is 30 years. By their final year of work, their salary has reached $50,000, having grown by about 4% percent each year.

Next, we define a target retirement benefit that, combined with Social Security benefits, will allow our 1,000 teachers to achieve generally accepted standards of retirement income adequacy. The plan provides a benefit in retirement equal to $26,684 per year or $2,224 per month. A cost of living adjustment is provided to ensure the benefit maintains its purchasing power during retirement. Thus, each teacher will receive a benefit equal to 53% of her final year's salary that adjusts with inflation, which we estimate at 2.8% per year. With this benefit and Social Security benefits, each teacher can expect to receive roughly 83% of her pre-retirement income – a level of retirement income that can be considered adequate, but not extravagant.

We define certain parameters for life expectancy and investment returns. Then, on the basis of all these inputs, we calculate the contribution that will be required to fund our target retirement benefit through the DB plan over the course of a career. We do the same for the DC plan.

WHAT IS AN "ADEQUATE" RETIREMENT BENEFIT?

Experts generally believe that in order for a retiree to maintain the same standard of living enjoyed during working years, income from all sources (Social Security, DB pensions, DC savings plans, etc.) should replace roughly 70 to 90 percent of pre-retirement income. Because some expenses (commuting costs, payroll taxes, etc.) disappear after retirement, it may be possible to maintain one's pre-retirement standard of living, even with a replacement ratio (that is, the ratio of retirement income to pre-retirement income) of less than 100%.

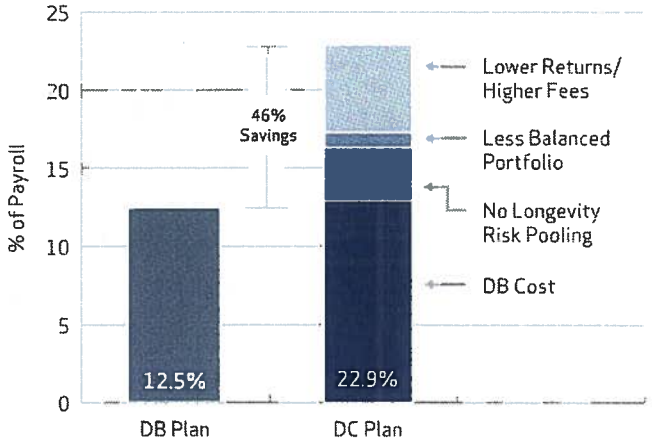
For example, Aon Consulting and Georgia State University estimate that a single retiree with a pre-retirement income of $50,000 would need to achieve a replacement ratio of 80% in order to maintain pre-retirement living standards.[11] Other analysts have recommended that workers seek to achieve an even higher replacement ratio. Human resources consulting firm Hewitt Associates predicts that employees will actually need *more* money in retirement than during their working years, and suggests a target replacement ratio of 125% to cover retiree healthcare and other expenses.[12] In our discussion, we target a replacement rate of 83% of pre-retirement income for both the DB and the DC plan.

DB PLANS ARE MORE COST EFFECTIVE BECAUSE OF LONGEVITY RISK POOLING, PORTFOLIO DIVERSIFICATION, AND SUPERIOR RETURNS

We find that the cost to fund the target retirement benefit under the DB plan comes to 12.5% of payroll each year. By comparison, we find that the cost to provide the same target retirement benefit under the DC plan is 22.9% of payroll each year. In other words, the DB plan can provide the same benefit at a cost that is 46% lower than the DC plan, as shown in Figure 1.

The DB cost advantage stems from differences in how benefits are paid out in each type of plan, how investment allocations shift in DC plans as individuals age, and how actual investment returns in DC plans compare with those in DB plans.

Figure 1:
Cost of DB and DC Plan as % of Payroll

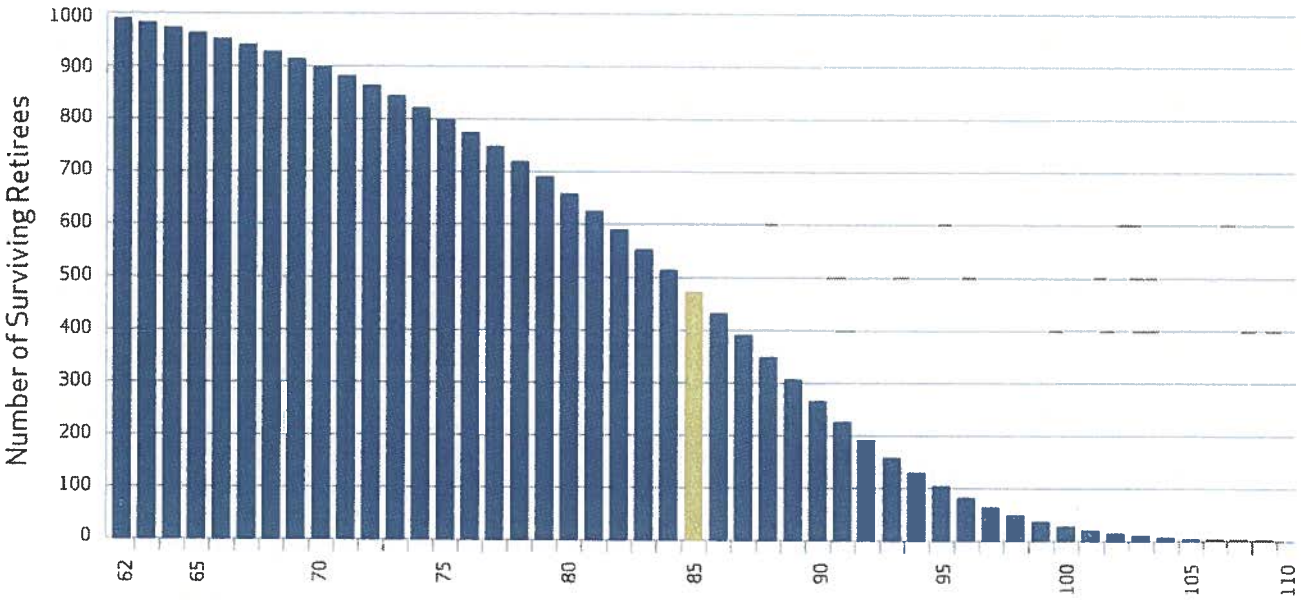


Longevity Risk Pooling

Longevity risk describes the uncertainty an individual faces with respect to their exact lifespan. While actuaries can tell us that, on average, our pool of female teachers who retire at age 62 will live to be 85, they can also predict that some will live only a short time, and some will live to be over 100. Figure 2 illustrates the longevity patterns among our 1,000 teachers. With each passing year, fewer retirees are still living. Age 85 corresponds to the year when roughly half of retirees are still alive.

In a DB plan, the normal form of benefit is a lifetime annuity, that is, a series of monthly payments that lasts until death. A DB plan with a large number of participants can plan for the fact that some individuals will live longer lives and others will live shorter lives. Thus, a DB plan needs only to ensure that it has enough assets set aside to pay for the *average* life expectancy of all individuals in the plan, or in this case, to age 85. Based on our target benefit level, the DB plan needs to have accumulated approximately $355,000 for each participant in the plan by the time they turn 62. This amount will ensure that every individual in the plan will receive a regular, inflation-adjusted monthly pension payment that lasts as long as they do. The contribution required to fund this benefit, smoothed over a career, comes to 12.5% of payroll.

Figure 2: **Longevity of 1,000 Retired Female Teachers**



WHAT ABOUT MONEY FOR A SURVIVING SPOUSE?

Our analysis did not explicitly analyze the effect of providing income to a retiree's surviving spouse. But the method of providing for spouse benefits would be similar under either the DB or DC approach. Under a DB plan, a retiree has the option of electing a reduced monthly benefit in exchange for a portion of the benefit continuing on to her surviving spouse if there is one. Virtually all pension plans offer at least a "50% Joint and Survivor" option and a "100% Joint and Survivor" option. For example, in our model, the retired teacher could have three payment options:

- $2,224 per month for as long as she lives, with no surviving spouse benefit, or
- $2,046 per month for as long as she lives, with half ($1,043) continuing to her surviving husband for as long as he lives, or
- $1,882 per month for as long as either the retiree or her husband lives

These three options are roughly "actuarially equivalent," meaning that for a large group following the actuarially assumed mortality and investment return patterns, the plan costs are neutral with respect to the option chosen.

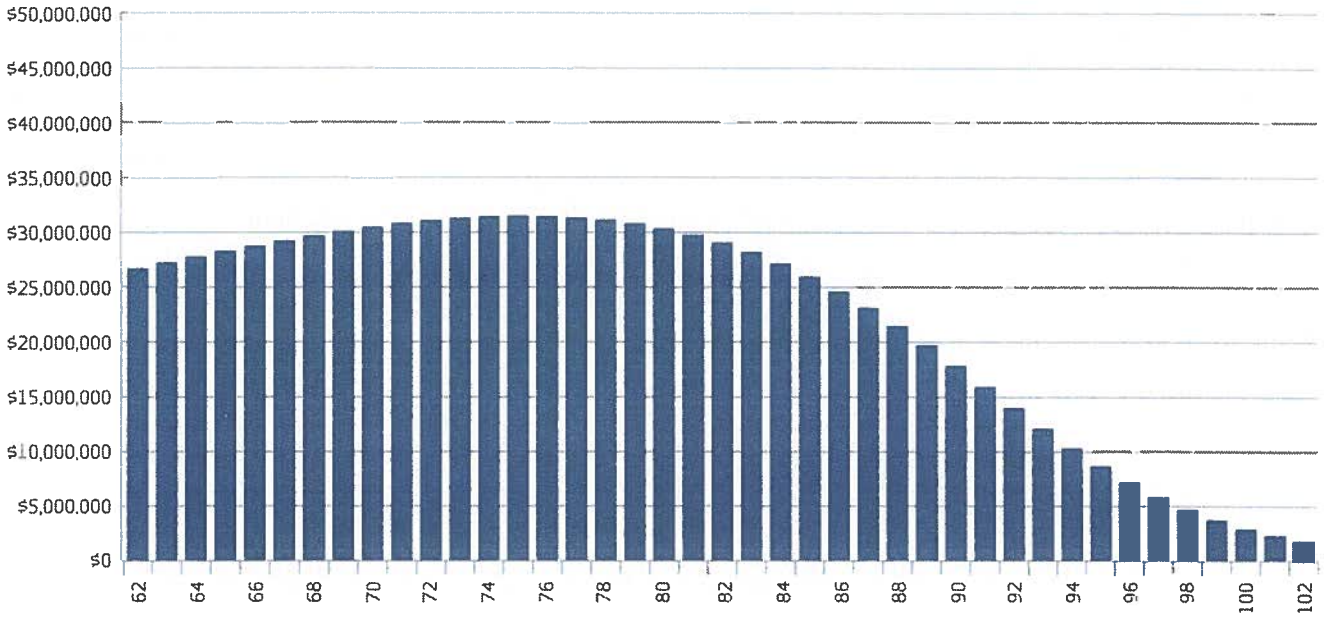
Under a DC plan, if this retiree wanted to provide her husband with retirement income should he outlive her, she would reduce the amount of her monthly withdrawals to enable him to be more likely to have residual assets available for him upon her death. If the retired couple were to make calculations as to how much to reduce their benefit, they would make calculations identical to those made by the plan to determine the actuarially equivalent benefit.

In other words, the desire of providing survivor income can be met through either a DB or DC plan.

We could have modeled our analysis based on a married retiree seeking survivor income protection, but adding this complexity would not have made a material difference in our analysis. This is because while it is difficult for a retiree to predict how long she will live, it is also difficult for a couple to predict how long they each will live.

Total annual payments out of the DB plan will have a hump-shaped pattern as seen in Figure 3. The amount of benefits paid out will increase for a number of years, because the effect of inflation adjustments is greater than the effect of individuals gradually dying off. At age 77, the impact of retiree deaths overtakes the effect of the cost of living adjustments and payments decline with each passing year. In the DB plan, every retiree recieves a steady inflation-adjusted monthly income that lasts until her death.

Figure 3: **Total Payments under the Defined Benefit Plan**

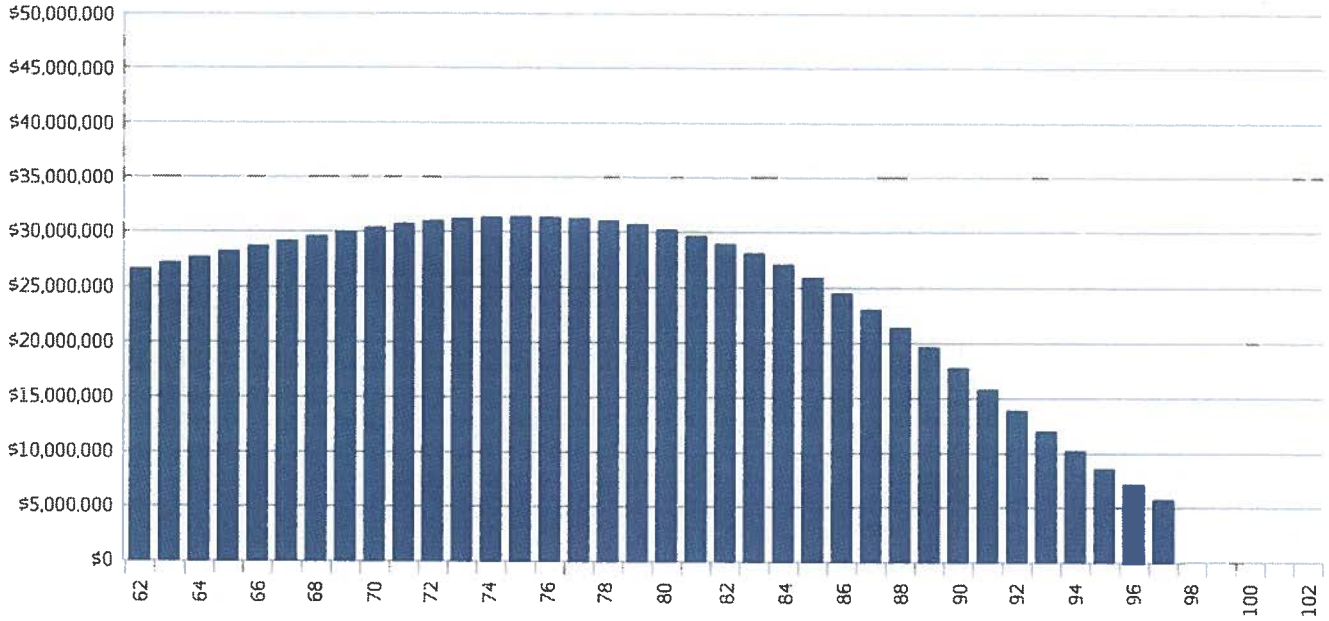


Next, we contrast this situation with that in a DC plan. Because DC plans rarely offer annuity options, individuals must self-insure longevity risks. This can be an expensive proposition. Because an individual in a DC plan does not know exactly how long she will live, she will probably not be satisfied with socking away an amount sufficient to last for the *average* life span, for if she lives past age 85, she will have depleted her retirement savings. For this reason, an individual will probably want to be sure that she has enough money saved to last for the *maximum* life span (or something close to it).

We define the "maximum life expectancy" for purposes of this analysis as 97 years old. It corresponds to the age beyond which only 10% of individuals survive, and therefore it is not a "true" measure of maximum life expectancy.[13] In fact, our mortality table indicates that one lucky individual out of the 1,000 will celebrate her 110th birthday. This simplifying assumption is intended to be more realistic (that most individuals will be satisfied with a 90% chance of not outliving their money, rather than a 100% chance), but it will also tend to understate the cost of the DC plan. Figure 4 illustrates the payout pattern under the DC plan, where individuals withdraw funds on an equivalent basis to the DB plan until age 97 – that is, in a series of regular, inflation adjusted payments. After age 97, there are no more withdrawals, even though 100 (10% of our initial pool of 1,000) teachers are still living. The money has simply run out.

Thus, our simplifying assumption of using a 90th percentile life expectancy of 97, rather than the true maximum life expectancy, will reduce the cost of providing the target benefit under the DC plan, but will also mean that individuals with exceptionally long lives will experience a reduced standard of living, compared to what they would experience under a DB plan. Thus, in our example, the DC plan ends up actually delivering less in total retirement benefits than the DB plan.

Figure 4: **Total Benefit Payments under the DC Plan Based on Life Expectancy of 97**



Of course, those 10% of individuals who do survive beyond age 97 would want to avoid the possibility of having their retirement income reduced to zero. It is likely that individuals will respond to a long life by gradually reducing their withdrawals from the plan to avoid running out of money. Thus, we assume that once an individual reaches age 90, she begins to reduce the size of annual withdrawals from the plan. This changes the withdrawal pattern to avoid the steep drop off in payments at age 97, as shown in Figure 5. However, it should be noted that those with very long lives will see their standard of living reduced significantly.

It is important to acknowledge that if a retiree dies before exhausting all of her retirement savings, the money in the account does not simply evaporate. Rather, it will pass to her estate. Benefits that were intended to be pension benefits become death benefits paid to heirs instead. This is the "over-saving" dilemma that is inherent in DC plans. As Figure 6 illustrates, the aggregate amount of money transferred to estates is substantial – totaling 24% of all assets accumulated in the plan.

While some individual heirs will benefit from these inter-generational transfers of wealth, they are not economically efficient from a taxpayer or employer perspective. Because heirs did not provide services that the employer/taxpayer benefited from, providing additional benefits to heirs is economically inefficient. Moreover, these additional "death benefits" are not tied in any direct way to an individual employee's productivity during her working years, rather their value is a function of living a shorter life.

DB plans avoid this problem entirely. By pooling longevity risks, DB plans can not only ensure that all participants in the plan will have enough money to last a lifetime, they can accomplish this goal with less money than would be required in a DC plan. Because DB plans need to fund only the *average* life expectancy of the group, rather than the *maximum* life expectancy for all individuals in the plan, less money needs to be accumulated in the pension fund. Remember that the DB plan needed to accumulate about $355,000 for each participant in the plan by the time they turn 62 in order to fund the target level of benefit. Due to the "over-saving" dilemma, DC plans must accumulate at least $455,000 per participant, or $100,000 more, in order to minimize the likelihood of running out of funds. In order to accumulate those additional amounts, contributions to the plan would climb to 16.0% of pay, from 12.5% under the DB plan.

Figure 5: **Total Benefit Payments under the DC Plan Based on Adjusted Life Expectancy**

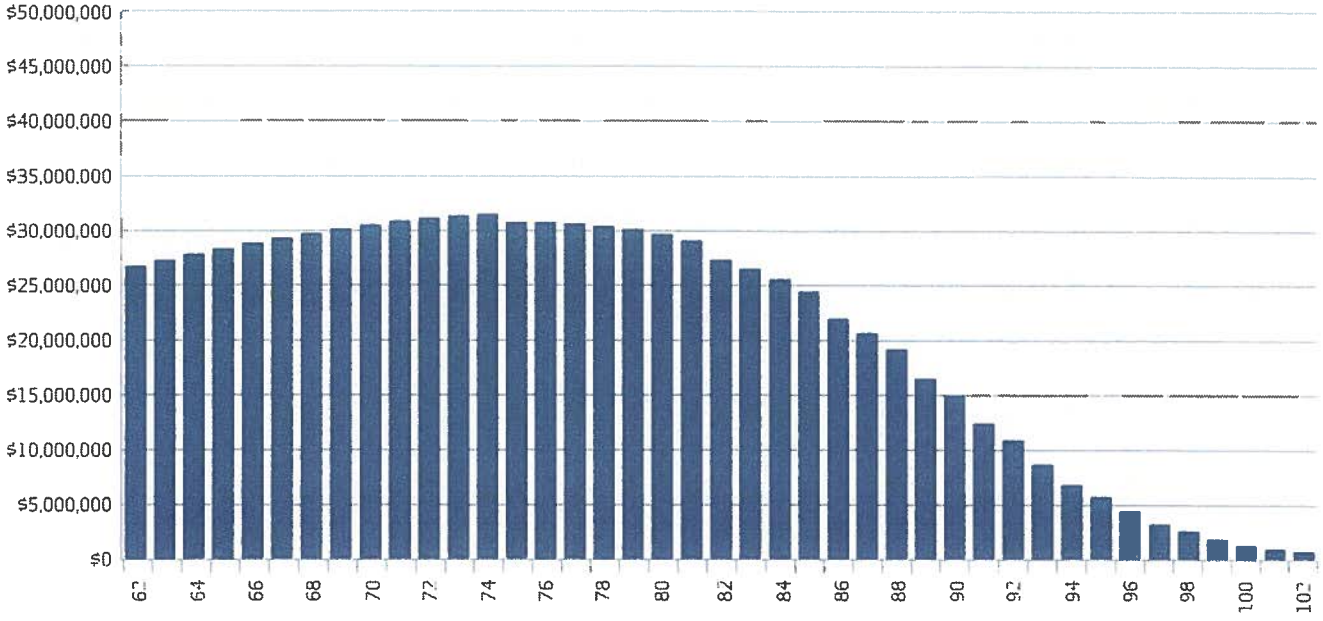
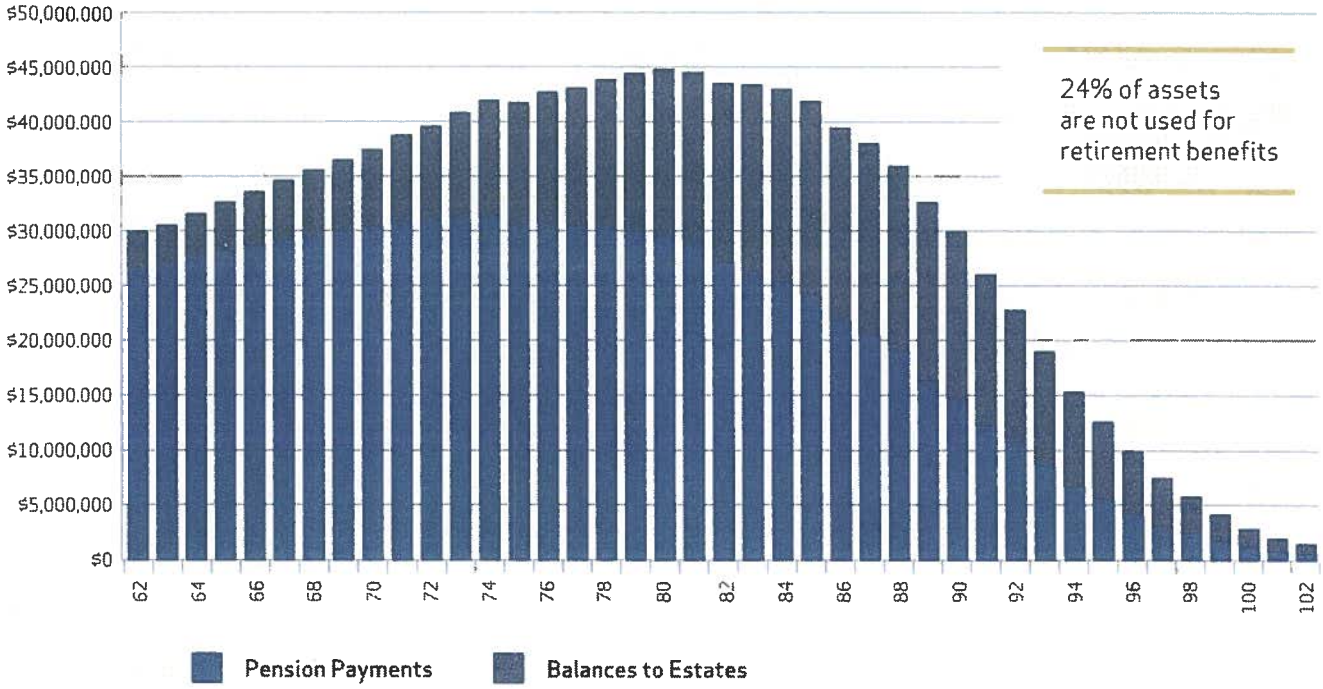


Figure 6: **Total Benefit + Estate Payments under the DC Plan**



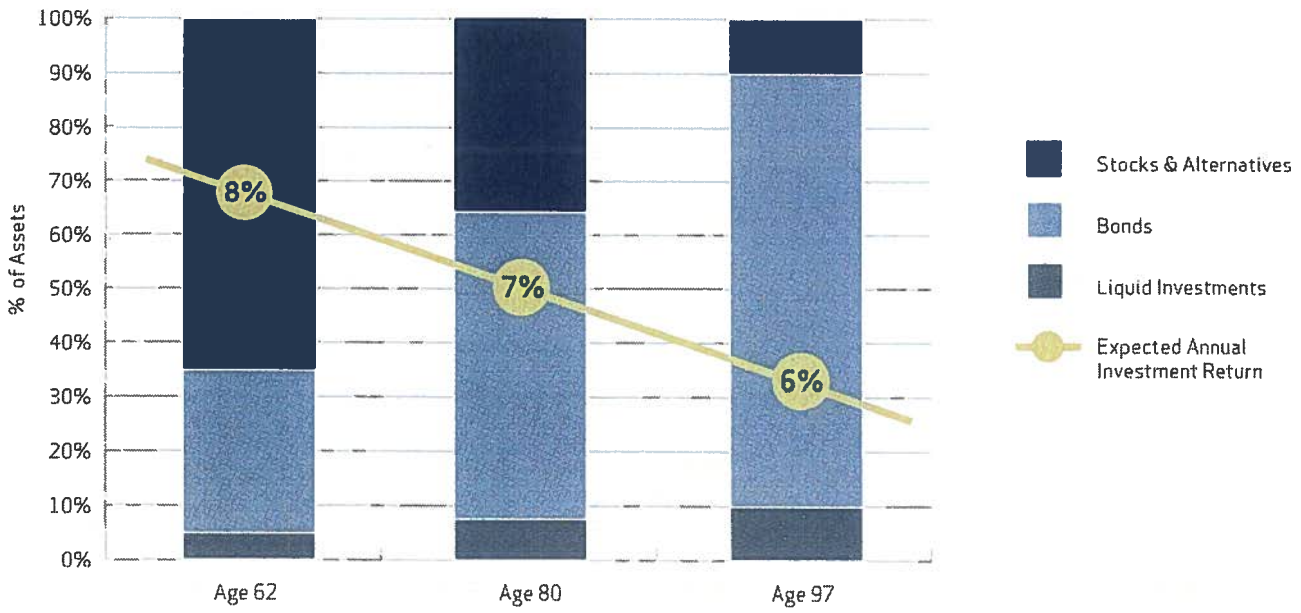
Maintenance of Portfolio Diversification

A retirement system that achieves higher investment returns can deliver a given level of benefit at a lower cost. All else equal, the greater the level of investment earnings, the lower contributions to the plan will need to be.[14] Prior research substantiates DB plans' significant advantage in investment returns, as compared with DC plans.

Part of the reason why DB plans tend to achieve higher investment returns as compared with DC plans is that they are long-lived. That is, unlike individuals, who have a finite career and a finite lifespan, a DB pension fund endures across generations; thus a DB plan, unlike the individuals in it, can maintain a well-diversified portfolio over time. In DC plans, individuals' sensitivity to the risk of financial market shocks increases as they age. The consequences of a sharp stock market downturn on retirement assets when one is in their 20s are minor, compared to when one is on the eve of retirement. For this reason, individuals are advised to gradually shift away from higher risk/higher return assets as they approach retirement. While this shift offers insurance against the downside risk of a bear market, it also sacrifices expected return since more money will be held in cash or similar assets that offer low rates of return in exchange for more security. A reduction in expected investment returns will require greater contributions to be made to the plan in order to achieve the same target benefit.

In our model, the well-diversified DB plan is expected to achieve investment returns of 8% per year, net of fees. In the DC plan, individuals gradually shift out of higher risk/higher return assets in favor of lower-risk/lower return assets. This results in a sacrifice of expected annual return of 2% by age 97, as shown in Figure 7.

Figure 7: **As Portfolio Allocation Shifts, Expected Return in DC Plan Falls**



We find that the shift in portfolio allocation has a modest, but nonetheless, significant effect on cost. Specifically, we find that the per-retiree amount that must be accumulated in the DC plan by retirement age now climbs to about $485,000. By comparison, the DB plan requires about $355,000. The contributions required to fund the target benefit level now climb to 17.0% of payroll (compared to 12.5% of payroll under the DB plan).

Another important reason why DB plans achieve higher investment returns than DC plans is that assets are pooled and professionally managed.

Superior Returns

Another important reason why DB plans achieve higher investment returns than DC plans is that assets are pooled and professionally managed. Expenses paid out of plan assets to cover the costs of administration and asset management reduce the amount of money available to provide benefits. As a result, a plan that can reduce these costs will require fewer contributions. By pooling assets, large DB plans are able to drive down asset management and other fees. For example, researchers at Boston College find that asset management fees average just 25 basis points for public sector DB plans.[15] By comparison, asset management fees for private sector 401(k) plans range from 60 to 170 basis points.[16] Thus, private DC plans suffer from a 35 to 145 basis point cost disadvantage, as compared with public DB plans.[17] On their face, these differentials may appear small, but over a long period of time, they compound to have a significant impact. To illustrate, over 40 years, a 100 basis point difference in fees compounds to a 24% reduction in the value of assets available to pay for retirement benefits.[18]

Administrative costs are largely driven by scale. Thus, a similarly-sized DB plan and DC plan can have opportunities to negotiate minimized administrative expenses. A DC plan involves costs that do not exist in a DB plan, such as the costs of individual recordkeeping, individual transactions, and investment education to help employees make good decisions. However, DB plans, unlike DC plans, bear the administrative costs of making regular monthly payments after retirement.

But fees are only part of the story – differences in the way retirement assets are managed in DB and DC plans play a substantial role. As previously discussed, investment decisions in DB plans are made by professional investment managers, whose activities are overseen by trustees and other fiduciaries. Research has found that DB plans have broadly diversified portfolios and managers who follow a long-term investment strategy.[19] We also know that individuals in DC plans, despite their best efforts, often fall short when it comes to making good investment decisions. Thus, it should not be surprising that researchers find a large and persistent gap when comparing investment returns in DB and DC plans. Munnell and Sunden put the difference in annual return at 80 basis points.[20] A 2007 report from the global benchmarking firm, CEM, Inc., concluded that between 1998 and 2005, DB plans showed annual returns 180 basis points higher than DC plans, largely due to differences in asset mix.[21] And Watson Wyatt found that, between 1995 and 2006, DB plans outperformed DC plans by 109 basis points, on average. Among large plans, the DB advantage was even greater – at 121 basis points. [22]

In our model, we use conservative estimates of the differences in DB and DC plan costs and expected returns. We model a 100 basis point (1%) net disadvantage for the DC plan annual investment returns as compared with DB plan returns. While this is slightly higher than the estimate of Munnell and Sunden,[23] it is lower than the more recent estimates of Flynn and Lum,[24] and Watson Wyatt.[25] This 100 basis point differential persists into the retirement years and magnifies the effects of the shift in asset allocation discussed previously. However, our model separates these effects to avoid double-counting. We do not isolate the impact of expenses and fees from the impact of superior investment management skill.

We find that a 1% per year disadvantage in DC plan investment returns compounds over time to create a significant cost disadvantage. In particular, we find that the amount which must be set aside for each individual at retirement age now climbs to about $550,000 (compared to the roughly $355,000 required in the DB plan). The level of contributions to the plan climbs again, this time to 22.9% of payroll (compared to 12.5% under the DB plan).

"BUT I THOUGHT DC PLANS WERE CHEAPER?" UNTANGLING BENEFIT GENEROSITY AND ECONOMIC EFFICIENCY

GM Will Freeze Salaried Pensions, Shift to 401(k)s
"...move will save the struggling automaker $420 million in 2007."
USA Today - April 10, 2007

IBM Adds Its Name to the List of Firms Freezing Pensions
"...cut worldwide retirement-related expenses by $450 million to $500 million this year."
The Washington Post - January 6, 2006

Verizon to Halt Pension Outlay for Managers
"...company hopes to save about $3 billion over the next decade".
The New York Times - December 6, 2005

Headlines like these have, understandably but unfortunately, led to a good deal of confusion about the relative costs and economic efficiencies of DB plans versus DC plans. While many employers have cited the financial burden of DB plans as their main reason for shifting from a DB to a DC plan, it is important to separate the question of benefit generosity from the question of the economic efficiency of a retirement plan.[26]

A review of the economic literature helps in this regard. Researchers have found that when employers move out of DB and into DC plans, they almost always cut the average employee benefit in the process.[27] Ghilarducci and Sun find, for instance, that between 1981 and 1998 the average employer pension contribution declined from $2,140 to $1,404 per employee, while the share of pension contributions attributed to DC plans increased from 23% to 68% in that time period.[28] Also, a UK study found that the average contribution per employee is 15-18% under a DB system, but only 9% under a DC system.[29] Thus, when employers simultaneously reduce their contributions along with the move from DB to DC, they will undoubtedly save money. Yet this does not mean that DC plans are inherently cheaper than DB plans; it simply means that employers are reducing employee benefits, while also changing the benefit design. Shifting costs from one party (the employer who reduces contributions) to another (employees who receive less in retirement) does not reduce costs overall. As the *The Economist* succinctly put it, "Whatever the arguments about the merits of the new wave of [DC] schemes, if you put less money in, you will get less money out."[30]

Whether an employer chooses a DB plan, a DC plan, or both, it has to decide how generous the benefits should be. But, as our analysis demonstrates, the economic efficiencies built into DB plans mean that such systems can provide the same benefit at a much lower cost, as compared with a DC plan.

SUMMARY OF RESULTS: DB PLANS REDUCE COSTS BY ALMOST HALF

Taken together, the economies that stem from investment pooling and longevity risk pooling can result in significant cost savings to employees and employers (or in the case of the public sector, taxpayers). In our model, required contributions are 46% lower in the DB plan as compared with the DC plan.

Our analysis clearly demonstrates that DB plans are far more cost-effective than DC plans. We find that to achieve roughly the same target retirement benefit that will replace 53% of final salary, the DB plan will require contributions equal to 12.5% of payroll, whereas the DC plan will require contributions to be almost twice as high – 22.9% of payroll.

We find that due to the effects of longevity risk pooling, maintenance of portfolio diversification, and greater investment returns over the lifecycle, a DB plan can provide the same level of retirement benefits at almost half the cost of a DC plan.

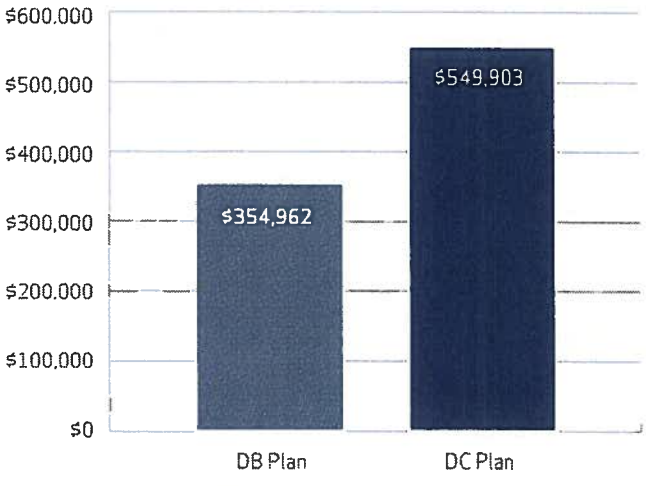
Figure 8: **Tallying DB Plan Cost Savings**

1. Longevity risk pooling saves	15%
2. Maintenance of portfolio diversification saves	5%
3. Superior investment returns save	26%
All-in costs savings in DB plan	**46%**

The longevity risk pooling that occurs in the DB plan accounts for 15% of the incremental cost savings. DB plans' ability to maintain a more diversified portfolio drives another 5% cost savings, and their superior investments returns across the lifecycle generate an additional 26% reduction cost.

Our results also indicate that DB plans can do more with less. That is, they can ensure that all individuals in the plan (even those with very long lives) are able to enjoy an adequate retirement benefit that lasts a lifetime, at the same time that they require less money to be contributed to a retirement plan and fewer assets to accumulate in the plan. We calculated the amount of money that would be required to be set aside for each retiree in each type of plan, to provide a modest retirement benefit of about $2,200 per month. As shown in Figure 9, at retirement age, the DB plan requires only about $355,000 to be set aside for each individual, whereas the DC plan requires almost $550,000. The difference – nearly $195,000 for each and every employee – illustrates that the efficiencies embedded in DB plans can yield large dollar savings for employers, employees and taxpayers.[31]

Figure 9:
Per Employee Amount Required at Age 62 DB Plan vs. DC Plan



CONCLUSION

Our findings indicate that DB plans provide a better bang for the buck when it comes to providing retirement income. We find that a DB plan can provide the same level of retirement income at almost half the cost of a DC plan. Hence, DB plans should remain a centerpiece of retirement income policy and practice, especially in light of current fiscal and economic constraints.

We find that the biggest drivers of the cost advantages in DB plans are longevity pooling and enhanced investment returns that derive from reduced expenses and professional management of assets. The sacrifice of investment returns that results from life-cycle driven shifts in portfolio allocation in DC plans had a smaller, but still significant, effect. The sources of cost savings in DB plans reflect, at a very basic level, the differences in how DB and DC plans operate. Group-based DB plans provide lifetime benefits and feature pooled, cost-efficient, professionally managed assets: these features drive significant cost savings that benefit employers, employees, and taxpayers.

When considering our results, it is important to keep in mind that in our effort to construct an "apples to apples" comparison, we made a number of simplifying assumptions that actually reflected more favorably on DC plans. For instance, we did not model any asset leakage from the DC plan before retirement, through loans or early withdrawals nor any terminations of employment under either plan. We also assumed that individuals followed a sensible "goldilocks-like" withdrawal pattern in retirement – not too fast, not too slow, but just right. We used conservative estimates of the difference in actual investment returns between DB and DC plans. And, we used a 90th percentile life expectancy to project required accumulations in the DC plan, rather than "full" life expectancies. Thus, if anything, our analysis likely underestimates the cost of providing benefits in a DC plan and thereby understates the cost advantages of DB plans.

Due to the built-in economic efficiencies of DB plans, employers and policy makers should continue to carefully evaluate claims that "DC plans will save money." As discussed, benefit generosity is a separate question from the economic efficiency of a retirement plan. While either type of plan can offer more or less generous benefits, DB plans have a clear cost advantage for any given level of retirement benefit. Considering the magnitude of the DB cost advantage, the consequences of a decision to switch to a DC plan could be dramatic for employees, employers, and taxpayers.

While either type of plan can offer more or less generous benefits, DB plans have a clear cost advantage for any given level of retirement benefit. Considering the magnitude of the DB cost advantage, the consequences of a decision to switch to a DC plan could be dramatic for employees, employers, and taxpayers.

Finally, policymakers should consider proposals that can strengthen existing DB plans and promote the adoption of new ones. When viewed against the backdrop of workers' increasing insecurities about their retirement prospects and the economic and fiscal challenges facing employers and taxpayers, now more than ever, policy makers ought to focus their attention and energy on this important goal. The very features that make DB plans attractive to employees drive cost savings for employers and taxpayers. In this way, DB plans represent a rare "win-win" approach to achieving economic security in retirement that should be recognized and replicated.

TECHNICAL APPENDIX: CALCULATING THE COST SAVINGS EMBEDDED IN DB PLANS

We calculate the cost, expressed as a level percent of payroll over a career, of achieving a target benefit in a typical DB plan and compare that with the cost of providing the same target benefit in a typical DC plan.

We begin by constructing a cohort of 1,000 newly-hired employees. For the purposes of simplicity, we give this cohort a common set of features. All newly hired employees are age 30 on the starting date of their employment and they are all female teachers. They work for three years and then take a two-year break from their careers to have and raise children. They return to work at age 35 and continue working until age 62. Thus, the length of the career is 30 years. By their final year of work, their salary has reached $50,000, having grown by 4.05% percent each year.

Modeling DB Plan Benefits and Costs

The DB plan provides a benefit in retirement equal to 1.85% of final average salary for each year worked. This represents the median benefit among DB plans covering public employees who are also covered by Social Security.[32] Final average salary is calculated on the basis of the final three years of one's career, which in this case is $48,079. Thus, the initial benefit in the DB plan is $26,684 per year or $2,224 per month.

The DB plan provides a cost of living adjustment that ensures the benefit maintains its purchasing power during retirement. Inflation is projected at 2.8% per year. Thus, each individual in our cohort will receive a benefit equal to 53% of her final year's salary that adjusts with inflation. This DB plan (in combination with Social Security) would allow an employee to meet generally accepted standards of retirement income adequacy, or roughly 83% of pre-retirement income.

DB plans typically offer married participants the ability to receive joint-and-survivor annuity benefits, whereby when the retiree dies, her spouse can continue to receive a monthly benefit that will last the spouse's lifetime. But the retiree pays the cost of this survivor's benefit. That is, the monthly benefit that would be payable on a single-life basis will be reduced by an actuarially determined factor to account for the fact that payments may continue if the retiree dies before her spouse. Therefore, for simplicity, we model all benefit payouts on a single-life basis (and do the same for the DC plan), using the RP-2000 Healthy Female Annuitants mortality table.

In order to model the contributions that are required to fund these benefits, we start by establishing expected investment returns. The DB plan is expected to achieve nominal investment returns of 8.01% per year, net of fees. We calculate a weighted average return, based on assumptions about asset allocation and returns for each asset class.

The DB plan follows a typical asset allocation of 2% in cash/liquid assets, 15% in treasuries/agency debt, 13% in corporate bonds, and 70% in equities and alternative assets. Our expected investment returns for each asset class are based on the projections prepared by the Office of the Actuary of the Social Security Administration to support analysis of the impact of private accounts by the President's Commission to Strengthen Social Security. The Commission's report described these assumptions as "conservative," noting that these assumptions are "much lower than that used in many academic and policy studies."[33] We expect cash/liquid investments to earn a nominal 2.8% per year, treasuries and agency debt to earn 5.8%, corporate bonds to earn 6.3%, and stocks and alternatives to earn 9.3%. Asset management fees of 0.25% are deducted from these returns, reflecting the average for DB plans in the public sector.[34]

Figure 10	% of Assets	Expected Annual Investment Return
Cash/Liquid Investments	2%	2.8%
Treasuries and Agency Debt	15%	5.8%
Corporate Bonds	13%	6.3%
Stocks and Alternatives	70%	9.3%
Less Asset Management Fees		-0.25%
Overall Portfolio		**8.0%**

On the basis of these inputs, we calculate the contribution that will be required to fund this benefit through the DB plan over the course of a career, and express this as a level percent of payroll. We find that the cost to fund the target retirement benefit, smoothed over a career, comes to 12.5% of payroll. Contributions could be made entirely by the employer, or, in the public sector, they may be split between the employer and employee.

Modeling DC Plan Benefits and Costs

Modeling the cost of the target retirement benefit in the DC plan requires some adjustments based on what we know about how DC plans differ from DB plans.

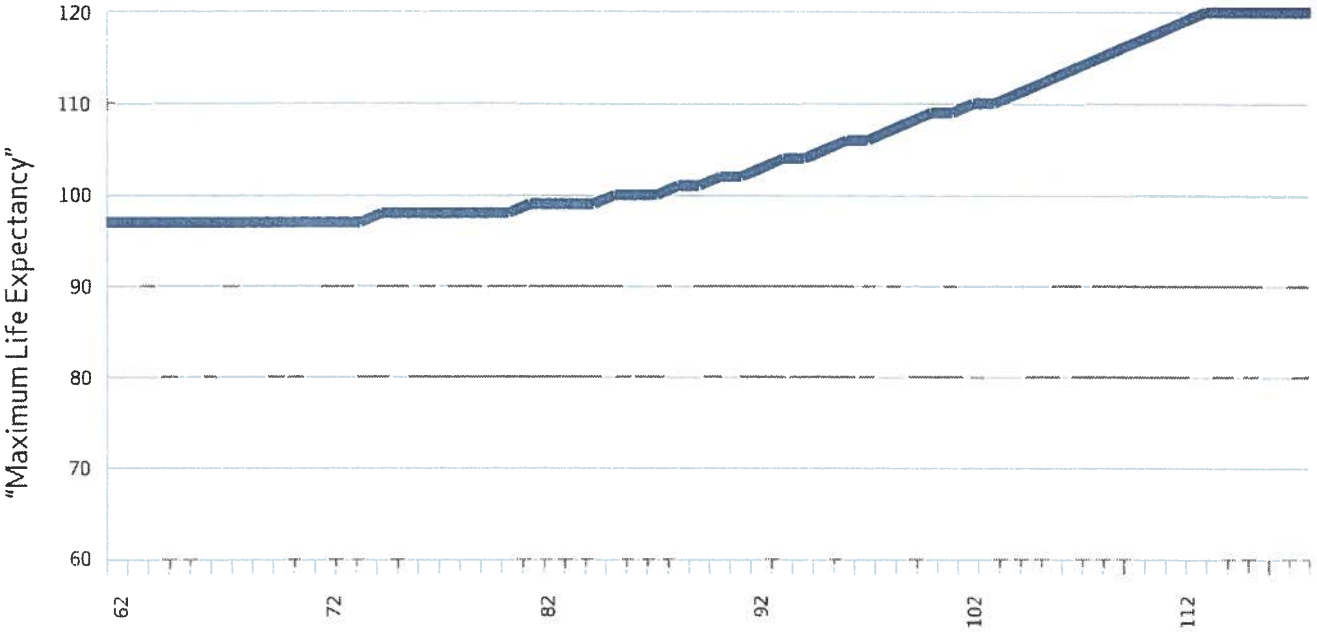
First, because employees are not provided with an annuity benefit at retirement under the DC plan, we determine the size of the lump sum amount that an individual would need to accumulate by their retirement date in order to fund a retirement benefit equivalent to that provided by the DB plan (including inflation adjustments) for a period of 35 years, or to age 97. This represents our estimate of the "maximum life expectancy." It corresponds to the age beyond which only 10% of individuals survive, and therefore is not a "true" measure of maximum life expectancy. In fact, our mortality table indicates that one individual out of 1,000 will survive to 110. This simplifying assumption is intended to be more realistic (that most individuals will be satisfied with a 90% chance of not outliving their money, rather than a 100% chance). Using a 90th percentile life expectancy of 97, rather than the true maximum life expectancy will reduce the cost of providing the target benefit under the DC plan, but will also mean that individuals with exceptionally long lives will experience a reduced standard of living, compared to what they would experience under a DB plan.

Of course, those 10% of individuals who do survive beyond age 97 would see their standard of living drop quite dramatically once their DC accounts were depleted. In reality, individuals would be likely to respond to a long life by gradually reducing their withdrawals from the plan to avoid the possibility of having their retirement income reduced to zero. For this reason, we assume that once an individual reaches age 90, she reduces annual withdrawals from the plan. We assume that the individual monitors her "maximum life expectancy" each year, and whenever it increases by a year, she adjusts her withdrawals accordingly. Figure 11 illustrates this process.

To model the impact of the shift to a more conservative portfolio allocation, starting at age 62, we have individuals begin to shift their portfolio allocation to gradually reduce the share held in equities and increase the holdings of cash and liquid investments, treasuries and agency debt, and corporate bonds. At age 62, the portfolio holds 65% of assets in equities; by age 72 it holds 49%; by age 82, it holds 33%; by age 92, it holds 16%; and so on. This drives the expected return on the baseline portfolio down from 8% per year to 6% per year in nominal terms.

The investment/withdrawal strategy we model is not the result of an optimization rule, rather it follows ad hoc rules. The investment strategy is modeled as a "glide path," along which the retiree gradually reduces her exposure to equities. Withdrawals are designed to mimic DB plan payouts, at least in the early years of retirement, declining in later years. Work by William Sharpe and colleagues suggests that an optimal approach would integrate investment and withdrawal

Figure 11: "Maximum Life Expectancy" increases as one gets older



strategies. Specifically, they find that a constant withdrawal rate must be paired with a riskless investment strategy in order to be optimal for an individual.[35] However, a post-retirement asset allocation entirely concentrated in risk-free assets would dramatically drive up the cost of the DC plan. Thus our model's ad hoc investment and withdrawal strategies would tend to understate the cost advantage of DB plans.

We use conservative estimates of the differences in DB and DC plan costs and expected returns. We assume that a large, sophisticated employer will seek to use whatever economies of scale are available to negotiate fees down on both types of plans. To capture the effect of lower DC plan returns over a lifetime, due to fee differentials and superior investment decisions, we model a 100 basis point disadvantage in net return as compared with DB plan returns. While this is slightly higher than the estimates of Munnell and Sunden,[36] it is lower than the more recent estimates of Flynn and Lum[37] and Watson Wyatt.[38] Thus, we assume individuals achieve a 7% nominal rate of return during their working years. This 100 basis point differential persists into the retirement years. So the return disadvantage compounds on top of the shift in portfolio allocation. (We calculate the impact of each effect separately to avoid double counting.) As a result, the expected return on the portfolio gradually declines from 7% per year to 5% in nominal terms.

On the basis of these inputs, we calculate the contribution that will be required to fund this benefit through the DC plan over the course of a career, and express this as a level percent of payroll. We find that the cost to fund the target retirement benefit, smoothed over a career, comes to 22.9% of payroll in the DC plan.

Future extensions of our model might incorporate additional differences between DB and DC plans. For example, one could analyze the impact of "leakage" of assets from DC plans through loans or early withdrawals, two features which are rare in DB plans. Pre-retirement death and disability benefits, which are a common feature of DB plans, but not DC plans, could be considered as well. Finally, the model could be extended to capture cyclical and idiosyncratic variances in investment returns. That is, one could analyze the effects of ups and downs in financial markets and the impact that these have on investment returns and costs in both DB and DC plans over a career. Also, the fact that in DC plans some individuals will have "better luck" with investing than others means that individuals' retirement prospects will exhibit a wider dispersion than what is predicted by our model.

ENDNOTES

1 The most common type of DC plan in the private sector is the 401(k) plan. Public sector employees often save for retirement in 403(b) plans or through 457 plans. These nomenclatures reflect the sections of the Federal tax code that spells out the rules governing these plans.

2 Both types of plans also share some common features. For instance, they both are employment-based plans that make preparing for retirement easier than if employees had to tackle the job completely on their own. Both DB and DC plans benefit from tax incentives designed to encourage retirement preparedness. And both types of plans are governed by laws designed to protect employees and their benefits.

3 The benefit factor could also be a function of a worker's earnings over their entire career (a so-called "career average plan.") Or, the factor could be a flat dollar amount: for example, the plan will pay a monthly benefit equal to $50 per year of service, so that a 30 year employee would have a benefit of $1,500 per month. "Flat dollar" plans are primarily seen among blue-collar workers in the private sector.

4 Benartzi, S. & R.H. Thaler. 2007. "Heuristics and Biases in Retirement Savings Behavior." *Journal of Economic Perspectives.* Vol. 21 No. 3. 81-104. Mitchell, O. and S. Utkus. 2004. *Pension Design and Structure: New Lessons from Behavioral Finance.* New York: Oxford University Press. Munnell, A. H. and A. Sunden. 2004. *Coming Up Short: The Challenge of 401(k) Plans.* Washington, DC: Brookings Institution Press.

5 Holden, S. and J. VanDerhei. 2001a. "401(k) Plan Asset Allocation, Account Balances, and Loan Activity in 2000." *EBRI Issue Brief* 239. Washington, DC: Employee Benefit Research Institute.

6 Copeland, C. 2007. "How Are New Retirees Doing Financially in Retirement?" *EBRI Issue Brief.* No. 302. Washington DC: Employee Benefit Research Institute. Love, D., P.A. Smith and L. McNair. 2007. "Do Households Have Enough Wealth for Retirement?" *Finance and Economics Discussion Series.* 2007-17. Federal Reserve Board, Washington DC.

7 Perun, P. 2007. "Putting Annuities Back into Savings Plans." In Ghilarducci and Weller, eds. *Employee Pensions: Policies, Problems, and Possibilities.* Champaign IL: Labor and Employment Relations Association.

8 Munnell, A. H., M. Soto, A. Webb, F. Golub-Sass, and D. Muldoon. 2008. "Health care costs drive up the National Retirement Risk Index." Center for Retirement Research Issue in Brief, No. 8-3. Boston College. Munnell, A.H., A. Webb and F. Golub-Sass. 2007 "Is there Really a Retirement Savings Crisis? An NRRI Analysis." Center for Retirement Research Issue in Brief, No. 7-11. Boston College. Love, D. et al., op. cit.

9 Ghilarducci, T., & W. Sun. 2006. How defined contribution plans and 401(k)s affect employer pension costs. *Journal of Pension Economics and Finance, 5(2),* 175-96. Blake, D. 2000. Does it matter what type of pension scheme you have? *The Economic Journal, 110(461), F46-F81.*

10 Fuerst, D. & A. Rappaport. 2004. "Defined Benefit Plans: Still a Good Idea?" *AARP Global Report on Aging.* Washington DC: AARP International. at http://www.aarpinternational.org/gra_sub/gra_sub_show.htm?doc_id=562911

11 Palmer, B., R. DeStefano, M. Schachet, J. Paciero, and C. Bone. 2008. *2008 Replacement Ratio Study.* Chicago, IL: Aon Consulting.

12 Hewitt Associates. 2008. *Total Retirement Income at Large Companies: The Real Deal.* Chicago, IL: Hewitt Associates.

13 Authors' calculations based on RP-2000 Healthy Female Annuitants mortality rates. Society of Actuaries. "Table 4-6: Female RP-2000 Rates." *RP-2000 Mortality Tables.* at http://www.soa.org/files/pdf/rp00_mortalitytables.pdf.

14 Another factor is particularly important in the discussion of investment – the degree to which contributions and investment earnings remain in the plan until retirement. This is generally not an issue in DB plans, but is a concern in most DC plans, where employees can borrow from their retirement account or take money out before retirement age (with the attendant tax penalties). This problem of "leakage" from DC plans has been well-documented and is receiving more attention by researchers and policy-makers. (See Weller, C., and J. Wenger. 2008. "Robbing Tomorrow to Pay for Today: Economically Squeezed Families are Turning to their 401(k)s to Make Ends Meet." CAP Economic Policy Report. Washington, DC: Center for American Progress.)

15 One basis point is equal to 0.01%. Thus 25 basis points is equal to one-quarter of one percent, or 0.25%.

16 Munnell, A.H. & M. Soto. 2007. "State and Local Pension Plans are Different from Private Plans." Center for Retirement Research State and Local Pensions, No. 1. Boston College.

17 This large fee gap may be attributable to several factors. One is plan size. Since most public pension plans tend to be very large compared to many private sector DC plans, their lower fees may be attributable to scale economies. Another factor may be differences in asset mix, which analysts find to be a key driver of asset management fees. However, here the direction of the effect is not entirely predictable. Although DB plans invest in less expensive index funds more often than DC plans, they also are

more likely to invest in assets that involve higher expenses (but also higher returns), such as real estate, private equity, or hedge funds. (Flynn, C. 2008. Author's correspondence.)

18 Weller, C., and S. Jenkins. 2007. "Building 401(k) Wealth One Percent at a Time: Fees Chip Away at People's Retirement Nest Eggs." CAP Economic Policy Report. Washington, DC: Center for American Progress.

19 Weller, C. and J. Wenger. 2008. "Prudent Investors: The Asset Allocation of Public Pension Plans." Unpublished manuscript. University of Massachusetts Boston.

20 Munnell, A.H. and A. Sunden, op. cit. 2007.

21 Flynn, C. & H. Lum. 2007. "DC Plans Underperformed DB Funds." Toronto, ON: CEM Benchmarking, Inc.

22 Watson Wyatt. 2008. "Defined benefit vs. 401(k) plans: Investment returns for 2003-2006." *Watson Wyatt Insider*, 18(5).

23 Munnell, A.H. and A. Sunden, op. cit. 2007.

24 Flynn, C. and H. Lum, op. cit.

25 Watson Wyatt, op. cit.

26 Clark, R.L., & A.A. McDermed. 1990. *The Choice of Pension Plans in a Changing Regulatory Environment.* Washington, DC: AEI Press. Kruse, D.L. 1995. "Pension substitution in the 1980s: Why the shift toward defined contribution pension plans?" *Industrial Relations, 34(2),* 218–41.

27 *The Economist.* 2008. Falling short: The trouble with pensions. *The Economist,* June 12, 2008.

28 Ghilarducci, T. and W. Sun, op. cit.

29 Blake, D. op. cit.

30 *The Economist*, op. cit.

31 There is an additional consideration for taxpayers we do not explore. Qualified retirement plans involve a significant amount of foregone revenue to federal and state treasuries, because taxes on contributions and investment earnings are deferred. To illustrate, the exclusion of DB and DC plan contributions and income from Federal tax involved a loss of $108.6 billion in revenue in 2007. By comparison, the mortgage interest tax deduction cost $73.7 billion. (See Joint Committee on Taxation. 2007. *Estimates of Federal Tax Expenditures for Fiscal Years 2007-2011.* Washington, DC: US GPO. September 24.) Since our analysis demonstrates that DC plans require more assets to be accumulated to deliver the same amount of retirement benefits, it is likely that the implicit tax subsidy to deliver $1 in retirement benefits through a DC plan exceeds that provided to deliver $1 in benefits through a DB plan. Valuing this impact is beyond the scope of this report, however, and analysis this issue must be left for future research.

32 Brainard, K. 2007. *Public Fund Survey Summary of Findings for FY 2006.* Georgetown, Texas: NASRA.

33 President's Commission to Strengthen Social Security. 2001. "Strengthening Social Security and Creating Personal Wealth for All Americans: Report of the President's Commission." Washington, DC.

34 Munnell A.H. and M. Soto, op. cit.

35 Sharpe, W.F., J.S. Scott, and J.G. Watson. 2007. "Efficient Retirement Financial Strategies." *Pension Research Council Working Paper PRC WP2007-19.* Philadelphia, PA: The Wharton School, University of Pennsylvania.

36 Munnell, A.H. and A. Sunden, op. cit.

37 Flynn, C. and H. Lum, op. cit.

38 Watson Wyatt, op. cit.

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