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PENSION SECTION

"A KNOWLEDGE COMMUNITY FOR THE SOCIETY OF ACTUARIES"

Pension Section News

The Sins of Our Fathers

by Leslie John Lohmann

Practicing abroad has forced me to examine what it was I used to do before I left North America and, more often, why. When still working in North America, I had already wondered why plan sponsors were required to provide flyspeck benefits from retirement plans when they were, in fact, providing better benefits of the same kind and for the same risk through other, more efficient, employee benefit programs.

I wondered why a retirement plan was forced to provide benefits unrelated to need and/or appropriateness when an employee left employment prior to normal retirement. Why were poorly capitalized entities forced to provide insurance products—lifetime annuities—when risk theory analysis shows virtually a 100 percent chance of ultimate insolvency?

Why do actuaries, especially my Canadian colleagues, insist that the act of charging a loading that is not pooled with all other similarly underwritten loadings, protects the overall system from insolvency? Why do American actuaries, who believe that full funding of all termination benefits payable from retirement plans would protect the overall system, fail to notice that the reports showing funded status prepared in the United States are more than a year after the fact?

In both jurisdictions, why is externally funding a small benefit more important than providing appropriate and adequate benefits at all possible ages of termination of employment? Why is it that relatively large severance benefits, for the same employee, need neither accrued benefit-cost recognition nor external funding? Why do the proponents of financial economics fail to see that the future benefits promised by the retirement plan do not create a true liability of the employer? And, finally, why are deferred executive benefits not subject to ERISA permitted to be contractually guaranteed while benefits funded under the rules of ERISA are virtually prohibited from being so?

In Japan, I discovered preretirement benefits from retirement plans that made sense. Employees participating in private plans get a lump sum based on the length of time they work and their pay when they leave. Typically, if a plan provides an annuity, it is not a lifetime annuity, but an annuity exactly equal[1] to the lump sum originally promised.

A further enhancement adopted in Japan is the difference based on reason for leaving; voluntary leavers see their benefit reduced while involuntary (other than disciplinary) get a full lump sum benefit equal to what an older employee would get at full retirement age based on the same service and pay.

Women get the same cash benefits from private retirement plans as men, given the same pay and working history. Japan permits "Book Reserve" plans, plans that we in North America consider unfunded. In Japan, these plans represent legally enforceable promises by the employer to the employee; there is even a degree of priority protection in bankruptcy/insolvency of the employer for the benefits promised by these

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[1] This is not perfectly true as the interest rate is sometimes different than the market rate for a security of similar duration.

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phone: (847) 706-3500
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world wide web: http://www.soa.org

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fax: (860) 521-3742
e-mail: ajassantes@hhconsultants.com

SOA STAFF
Clay Baznik, Director of Publications
e-mail: cbaznik@soa.org

Emily Kessler, Staff Partner
e-mail: ekessler@soa.org

Sue Martz, Project Support Specialist
e-mail: smartz@soa.org

Joe Adduci, DTP Coordinator
e-mail: jadduci@soa.org

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Letter to the Editor

Projecting Social Security's Costs: Actuarial Science or Politics?

As I noted in prior Letters, the Intermediate Cost assumptions used by the Social Security trustees for making 75-year financial projections are unsatisfactory for two reasons: asset projections over the 10-year period 1992-2002 were grossly inaccurate, and asset projections to decennial years (e.g., 2030) were markedly diverse.[1] Is it possible politics caused the odd results, given the intersection in Washington of professionals and politicians, that the trustees are all presidential political appointees, and the enormous stakes involved? In addition, these trustees have the power to make the final actuarial decisions, such as on assumptions.

For your consideration, Figure 1 presents 75-year projection results from the trustees' annual reports, 1984-1998 (official Intermediate Cost basis). Does this deficit stream warrant our confidence sufficiently to declare Social Security to be in serious trouble, as many have done?

Figure 1

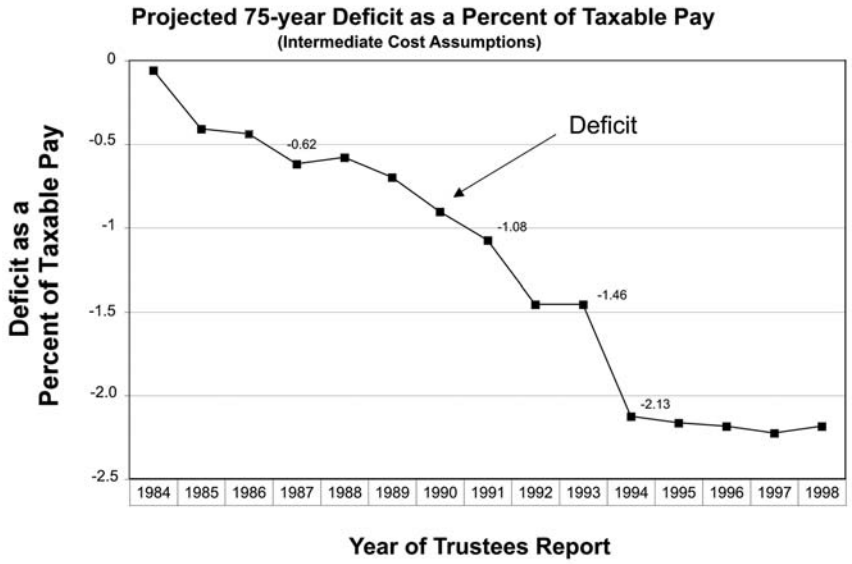

Figure 1 reveals persistently increasing deficits resulting from the trustees' changes in methods and assumptions. The range is from a surplus of 0.02 percent of taxable payroll in 1984 down to a 2.23 percent deficit in 1998. This deficit leap would call for a more than 15 percent increase in the payroll tax for each employer and worker, and it represents an increase in projected costs of over $100 billion a year and more than $10 trillion in benefits over the 75-year projection period.

In particular, there was the 0.67 percent increase reported in 1994, which raised the deficit from -1.46 percent to -2.13 percent, a 46 percent one year jump. The -2.13 percent is what the 1994 Social Security Advisory Council was faced with at its first meeting, and was a key reason for seven of the 13 members of the Council to call for some form of privatization to "protect" Social Security.

(continued on back cover)

[1] *Pension Section News*: March 2004, August 2005

Outgoing Chairperson's Corner

by Tonya B. Manning

As I end my three-year term as a member of the Pension Section Council, I step away not only with sadness in leaving such an energetic and devoted group, but also with excitement in anticipation of what is left for the group to accomplish.

This is truly a challenging time for pension actuaries. Evolving markets, corporate environments and regulations have taught us to be more nimble and to expect and be prepared for anything. We know that a one-year forecast is never far enough and it will always be wrong and that a one-size-fits-all approach to plan design is futile. During these changing times, the Pension Section Council recently went about transforming itself as well. As the SOA reorganized, the section councils were asked to redefine their goals, determining what they would be accountable for and restructure to make this happen. In this process of self-examination, the Pension Section Council gained a better grasp of its purpose and mission, and I personally left the process with a greater appreciation of the SOA's value, not only to members, but also to society.

As pension actuaries struggle to keep their profession in synch with the new economy and market, the SOA's offerings of research and continuing education become more valuable than ever. It is not so critical to be well versed in the current rules and regulations—they will be changing. Nor should we focus on today's demographics, for they are quickly evolving. We have to keep our eyes focused on the future and what tomorrow's population will look like. We need to understand the implications of mortality improvement, an ownership society and a social insurance program with an uncertain future.

Current initiatives and projects of the Pension Section Council are critical components in the SOA's forward-looking approach:

1. The Committee on Post-Retirement Needs and Risks continues to examine issues individuals face as they retire from the workforce and throughout their retirement years. Our changing retirement system, shrinking family size and longer life spans have increased the importance in understanding individuals' retirement risks. The committee's 2005 Retirement Risk Survey, the third in a series, is ready for publication. They have also worked with researchers to conduct retiree focus groups discussing how retirees manage financial resources.
2. The council has recently issued a call for papers regarding "Re-envisioning Work and Retirement in the 21st Century." As longevity increases, healthcare costs continue to rise and average savings rates decline, more and more workers will need to work past age 65. This brings forth the following questions:
   - How can workers sustain long careers while better managing risks?
   - Is there a workforce management program that is cost-effective, while at the same time supportive of more flexible work schedules?
   - How can society transform its notion of "cliff retirement?"

   Answering these questions will require us to go beyond simple changes in retirement plan design. We will need to rethink the underlying definition of both work and retirement.
3. The council sponsors a task force, along with the American Academy of Actuaries, focused on financial economics, with the goal of educating consultants about the principles of financial economics and its value as a new approach to pension finance. To help outline the basic concepts, they are publishing the *Actuary's Guide to Financial Economics Consulting*, which will be available soon.
4. Along with the Financial Economics Task Force, the Continuing Education Committee recently sponsored a seminar on "Enterprise Risk Management and Pension Finance" at the SOA's Annual Meeting in November. The seminar examined how a pension plan fits into capital structure and how its risks become enterprise risks.
5. The council has issued a request for proposal for a literature review on "Defined Benefit versus Defined Contribution: Inherent and Stakeholder Value" to better understand the true value of defined benefit and defined contribution plans and how their value varies by stakeholder.

To cumulate and better focus all these great efforts, the council has adopted "Re-envisioning Retirement for the 21st Century" as its strategic project for 2006. Look for much more on this topic in the coming year. All council members and committees will focus on this initiative from multiple angles, with each group charged with sponsoring projects that align with this vision.

Each of the above projects and initiatives will help broaden the knowledge and perspective of our profession and arm us with the information needed to thrive in our changing world. I challenge you to get involved with the council's activities, because each project's success depends on many hours of help from many volunteers. Our profession cannot survive if we simply sit at our desk and push paper out the door. We have to think of new methods, approaches and solutions to new problems. Please contact Emily Kessler, SOA retirement systems staff fellow, at *ekessler@soa.org*, or Anne Button, the new chair of the council, at *anbutton@deloitte.com*, to find out how you can be involved in shaping the future of our profession. ◆

Tonya B. Manning, FSA, FCA, MAAA, EA, is vice president with Aon Consulting in Winston-Salem, N.C. She can be reached at Tonya.Manning@aon.com

plans. North American executives have similar plans, but they are prohibited from being offered to the rank and file. The popular belief is that such plans are less secure some way than those plans subject to the funding rules of IRC 412.

Are they less secure? Even in America, I think not. Anecdotally, one can point out that few executives in the airline industry have lost retirement or severance benefits similar to the material losses of the rank and file. Is the ongoing arrangement of the Vice President of the United States with his former employer externally funded? Is it guaranteed by the PBGC? Is he worried? The simple reality in North America is this: the less "funded" promised retirement benefits are, the more likely it is they will be fully honored by the employer.

How did we get where we are in North America? Like integral calculus, we have been subject to the adding of minuscule bits that seemed insignificant at the time, but now have added up to a monster. We have a defined benefit system that fails its beneficiaries, its sponsors and the public. In addition to the accumulated changes, current law does not reflect current beliefs about the promises, as reflected in the accounting rules.

DB plans grew from providing a retirement gratuity to employees becoming too old to work any longer. Originally only for senior employees, the gratuity was often a continuation of a portion of final pay. Rank and file employees eventually grew into similar arrangements. Employers saw no reason and had no legal imperative to provide severance benefits (what we now call "vesting") as part of the retirement plan promise; the retirement benefit was only available to those employees who reached an age where the employer was willing to let them go with a benefit. It was not guaranteed; it was not part of the employment exchange. Actuaries got involved when it was realized that financing and cash flow could be problems. We helped our insurance companies develop products that financed and guaranteed the accrued annuity values of these future annuity benefits.

In order to finance the plan and guarantee the benefits, the employer was encouraged to buy annuities from insurers. Since these were insurance products, they required minimum cash surrender values (MCSV). The surrender values, due to the design of the products, were generally vested in each employee at termination of employment. Premiums paid, since they were costs of employment and were irrevocable[2], were deductible business expenses. The approach satisfied the culturally North American standard of fairness. The standard became law after the Equitable Assurance Society scandal in the early 1900s, the subsequent Armstrong Investigation in 1905 and the establishment of legally required nonforfeiture values.

These products introduced the concept of a termination benefit based on the present value of the promised future retirement benefit. Since the MCSV was relatively small and considered "fair," few ever questioned the rationale of keeping the same approach when trusts were introduced.

IRS rules solidified the approach. While other approaches were legal prior to ERISA, a tax deduction would only be available to companies that used essentially the insurance product approach; the future retirement benefit had to have minimum nonforfeitable values[3] after a certain period of employment. Payments to the trust had to be irrevocable until all accrued benefits were provided to the beneficiaries of the trust. Without tax deductibility, few retirement plans for rank and file employees would have been funded in advance.

Then, as now, the plan sponsor's only legal obligation was to make minimum contributions as they became due. A legally enforceable promise to pay what we now consider "deferred wages" was never made. The future benefit remained a gratuity. The promise of the retirement plan trust was legally severable from the plan sponsor's liabilities. ERISA codified the essence of these rules, while recognizing that the retirement benefit was (and still is) a gratuity.

Have employees benefited? Have actuaries protected participants? For one thing, ERISA pretty much prevented the benefits promised by retirement plans from becoming "pay for performance." Even severance plans are specifically defined as "welfare plans" avoiding any reference to pay for performance. On the other hand, the Financial Accounting Standards Board (FASB) insists that the plans be treated as though there is a contractual right (the "employment exchange") to the deferred pay represented in a pension plan (but not severance and continuation of pay plans).

Are we protecting annuity benefits in payment? As the recent experience with the airlines has shown, without the full faith of the promisor and priority of deferred pay in insolvency, external funding provides little in protecting even these most sacred benefits. Faithfulness, we have seen, disappears in bankruptcy/insolvency. We seem to be protecting some severance benefits derived from

[2] There were par and nonpar products that returned some premiums to the employer in excess of that necessary to provide legally required benefits.

[3] Unlike insurance products, the surrender values were permitted to vary according to actuarial basis used. This particular freedom began to be limited in the early '80s with the Retirement Equity Act.

retirement plans, but are they worth the effort? Compared to severance benefits available from retirement plans in Japan, those in North America are quite small. For simplicity, consider a plan that provides 1 percent of final pay[4] per year of service at age 65. Table 1 (to the right) shows lump sum values at various ages of termination with the service indicated.

At normal retirement age 65, this plan looks similar to a common design in Japan; a lump sum of one month of final pay times the number of years of service. But what happens when employees leave before normal retirement age? In Japan, the involuntarily departing employee would still get the same column as "Age 65." In Japan, except for distinguishing voluntary from involuntary departure, the value of the deferred pay changes only with the employee's value[5] at departure, not age at departure.

An employee in Japan who leaves voluntarily needs to take into account the diminished value of the various moneys to be received at departure. If the new opportunity is not worth the change, it needs to be reconsidered. Distinguishing voluntary from involuntary severance is a concept that needs adoption in North America.

When the severance is involuntary, the former employee needs an amount of money that suits the difficult situation, not a cash value of a deferred annuity payable at the normal retirement date. In Japan, this works; there is no retirement plan penalty for early departure or early retirement in an involuntary termination. And, since the normal form is lump sum, there is no additional penalty for being an employed female.

In North America, the amount the employer pays the employee for work already performed varies by age paid if it is paid from a retirement plan. It is a direct consequence of the application of minimum cash value theory to a non-insurance product and the inability to legally adopt the position demanded by the FASB, namely that the retirement plan represents a promise of deferred pay by the plan sponsor for performance of the employee—the "employment exchange."

While I don't think that retirement plans should be mandated, when an employer chooses to establish one, these lessons from Japan could atone for some of the sins of our fathers:

1. All pay based on past performance should have priority in insolvency.
2. Employers should promise and pay only lump sums.
3. Less than 100 percent vesting should occur only when an employee voluntarily leaves employment.
4. Benefits paid for departure prior to normal retirement date should be designed to meet the needs of the sponsor instead of being based on MCSV principles.

Table 1
Lump Sum Value Of Deferred Annuity
Expressed as a Number of Months of Final Pay

	Age				
Service	65	55	45	35	25
5	6.0698	3.1091	1.6885	0.9319	0.5160
10	12.1396	6.2183	3.3769	1.8638	
15	18.2094	9.3274	5.0654	2.7957	
20	24.2792	12.4366	6.7538		
25	30.3490	15.5457	8.4423		
30	36.4188	18.6548			
35	42.4886	21.7640			

Finally, I must mention the greatest sin one our fathers committed and we carry on: the sin of believing that, if the math works, it must be right.[6] Perfect math from a false premise produces bad results. There are three areas where this is having a grossly negative impact on actuarial work involving retirement plans:

1. The Canadian standard requiring a margin for adverse deviations uses the mathematics of pooling risk without requiring any actual pooling. The result is overcharging.
2. The ERISA standard of perfection in the actuarial valuation ignores the timing of the results. Late results are useless results. "Full" funding cannot be achieved with the turnaround now permitted.
3. The elaborate mathematics of financial economics is based on the appealing, but incorrect, premise that the plan sponsor promises deferred pay for employee performance.

Actuaries must atone for this last sin by moving toward relevance and timeliness, regardless of standards, laws and regulations permitting otherwise. ◆

*Leslie John Lohmann, FSA, MAAA, FCIA, EA, FCA, is president of Lohmann International Associates in Tokyo, Japan. He can be reached at LL*ohmann@Gol.com. *Leslie is a research member of the Institute of Actuaries of Japan.*

4 This is generally not permitted in North America, but a plan could be designed to look very much like this, despite using the required longer averaging periods.

5 An employee's value being directly related to pay.

6 Unfortunately, this sin is reflected in computer work where, if the computer produced the result, it must be right.

The Importance of Employer Plans—A Dialogue on a Key Issue

by Anna M. Rappaport

Retirement security in the United States comes from Social Security, employer-sponsored benefits, and personal assets including housing and individual savings. The retirement system today is faced with a lot of change, threat and uncertainty. This article deals with the question: How do employers add value by sponsoring plans? It is positioned to open up a dialogue among actuaries and include embedded questions that are italicized throughout this article.

First question: Should the SOA put together a research paper on this topic? You are encouraged to participate in this discussion by sending your comments to The *Pension Section News* Letters to the Editor. These can be sent in an e-mail addressed to Art Assantes, newsletter editor, at *ajassantes@hhconsultants.com*. Letters will be selectively published in the next edition of the *Pension Section News*.

The Proposition

Americans are much more likely to have a secure retirement when they have an employer-sponsored benefit and a longer-term job so that they have time to earn benefits. They are much more likely to save for retirement when they have access to employer-sponsored savings programs such as a 401(k) plan (or 403(b) plan for not-for-profit employers and 457 plan for some governmental employers.) This article provides an overview of the advantages of employer plans and of saving in an employer sponsored plan rather than an individual plan. It offers some data and encourages you, the reader, to contribute more data and ideas.

What an Employer-Sponsored Defined Benefit Plan Offers

An employer-sponsored defined benefit offers benefits, generally defined as monthly income for all who work longer enough to meeting vesting requirements. Private sector plans are generally non-contributory and public sector plans are generally contributory. These plans pool longevity and investment risk and provide much greater retirement security than the same amount contributed to a defined contribution plan. It has been estimated by some that you can achieve two to three times as much retirement benefit for a dollar contributed to a defined benefit plan when compared to a dollar contributed to a defined contribution plan.

Please join the dialogue and provide your estimate and information about why you support it.

These plans provide monthly income to the employee and spouse. By pooling longevity risk, it is not necessary to "oversave" in order to achieve a reasonable change that assets will not be outlived. These plans are ideal to provide adequate benefits to long service employees when an employer wishes to protect primarily those with long service. In most noncontributory plans, no decisions or action are needed until leaving the firm. The downside of this is that employees may not know much about the plans and may not identify much with them. However, today people are learning more about their benefits.

What an Employer-Sponsored Savings Plan Offers

An employer-sponsored defined contribution plan generally makes it easier to save and encourages savings. The employer provides for easy (sometimes automatic) enrollment and payroll deduction. The employee makes the decision to save once, and while it can be changed, savings continues unless a step is taken to change it. The employer program offers both education provided by the employer and those hired to provide education, but also in many cases, support and encouragement from peers.

Many employers make it very worthwhile for em-

ployees to save in their programs by matching contributions. A common match is 50 percent of the first 6 percent saved. Some employers match 100 percent of some employee savings. If the employer matches 50 percent, that means that for every $500 the employee saves, the employer will add $250.

Employers can often get a better deal for employees than they get by saving on their own. There are a number of areas of potential saving including low administrative charges, and access to mutual funds or investment options with a combination of strong professional management and low charges. Employers, by prescreening investment options, can also help increase the chance that employees will get a good return on their money.

Next area for member input: How would you compare expenses between typical employer plans and individual savings opportunity? Do you have data?

Lessons Learned and Implications for Employers Sponsoring Defined Contribution Plans

Recent research on what the public knows about retirement savings, as well as the teachings of behavioral finance, serve to reinforce for us the importance of employer plans. Managing retirement saving completely independently is a daunting task for many. Having the help of an employer makes it much more achievable. Left alone, many people will not save enough (or maybe not at all) for a secure retirement. An employer can help improve the chances of employees saving enough by adding matching contributions, providing strong default options in plans, encouraging maximum participation, and educating its workforce on retirement planning and investment considerations. Customized retirement planning information can be particularly helpful. Our experience tells us that:

- Many employees chose default options and stay in them for the entire time that they stay in their jobs.

  Next question for the dialogue: Do you have evidence about this, or comments about how we might get such evidence?

- Whenever there are matching contributions on employee savings, it is beneficial for employees to participate and they are much more likely to do so.
- Traditionally, defined contribution plans that offered choice were based on the idea that choice is good and the more, the better. In the last few years, behavioral finance has taught us that too much choice is confusing, and that no matter how attractive and informative the educational materials, many employees will not be engaged.
- Some employers have determined that the most effective way to ensure security is to create "autopilot" plans. These plans allow choice, but the default options provide for safe harbors resulting in significant amounts of savings, sometimes with annual increases, and offering a diversified portfolio. The employees who do not actively elect to join the plan are not left out as they would be under traditional plans.
- Payroll deduction is a very valuable feature of employer-sponsored defined contribution plans.
- Education is critically needed, even if there are segments of the working population that will not take it seriously.
- Employees often do not have a sufficient financial background to make appropriate investment decisions when given the choice. The employer, by selecting a limited number of options offers prescreening and fiduciary due diligence. In addition, the employer can offer education about investment mixes appropriate for different situations and/or personal advice.
- Employer defined contribution plans cannot make longevity risk go away, but many larger and well established companies offer a combination of a defined contribution and defined benefit plan. This combination serves as a portfolio that helps employees address longevity risk.
- Employees who seek to manage their own money in retirement will choose different spending patterns. While some will do fine, others may not use their assets in the best way. Some will spend too fast and need to cut back later and/or run out of assets. Others may spend too slowly, cutting back more than needed and missed out on some of what they can enjoy in retirement. Retirees who are afraid to use their assets may experience a greatly reduced standard of living. Employers can help employees understand the implications of different withdrawal strategies.

Some Evidence

Actual experience demonstrates that people are more likely to save in employer plans than in Individual Retirement Accounts. While IRA assets are a major component of the total retirement assets in the United States, much of that money came from rollovers. In 2001, contributions to traditional IRAs were $9.8 billion compared to rollovers coming in at $187.1 billion. In 2000, contributions were $10.0 billion compared to rollovers of $225.6 billion. Total assets at the end of 2003 were $2,730 billion.[1] Roth IRAs added another $102.0 billion at the end of 2003. At the end of 2004, $45.2

(continued on page 8)

[1] Table 5, *Investment Company Institute Perspective* Vol. 11, No. 1, February 2005: The Individual Retirement Account at Age 30.

million households, or 40.4 percent of U.S. households owned IRAs. The median balance for traditional IRAs was $24,000 and the mean was $76,000.[2] IRAs have been around for 30 years, and individuals have demonstrated that they are less likely to save on their own than with the support of an employer.

"The Vital Connection," a 1998 paper from the ERISA Industry Committee reinforces that employer plans work more effectively than IRAs, and that younger individuals are more likely to save in employer plans. Of the approximately 59 million households eligible to make deductible contributions to an IRA in 1992, only 6.6 percent (3.9 million) made such contributions. Even during the 1981-1986 period when all households could contribute to IRAs, the maximum number of tax returns claiming an IRA deduction was 16.2 million in 1985. By contrast, of the 105.8 million civilian non-agricultural workers in the United States in 1993, 25.2 million or 23.8 percent made contributions to employer sponsored 401(k) plans.[3]

An analysis of projected retirement status of workers aged 50 to 61 showed that households with a defined contribution plan are much more likely to have adequate retirement resources than those without such plans. Defined contribution participants include those with only defined contribution plans and those with a combination of defined contribution and defined benefit plans. Few individuals today have only defined benefit plans so this represents nearly the entire universe with employer-sponsored retirement benefits, and the result can be restated to indicate that households with employer -sponsored retirement benefits are much more likely to have adequate resources for retirement. This paper indicated that based on planned retirement age, 79 percent of those aged 50-61 are likely to be able to maintain preretirement living standards compared to 47 percent of those without such plans. At retirement age 65, the percentages increase to 88 percent and 50 percent.[4]

Next question for you: Can you provide more evidence and data to help explain the importance of employer plans?

Conclusions

Private sector pension plans and asset accumulation are a vital part of retirement security for most Americans. Experience has shown that few people have the discipline and knowledge to save successfully on their own without help and support. Employer-sponsored retirement plans that offer attractive savings options for those with substantial service in organizations are a big help. Plans that provide benefits automatically even if an employee takes no action provide the best level of protection, considering that many people do not have the motivation and knowledge to take action. This paper does not conclude that those with plans will have enough money. In fact, many with plans need to save more or accept a lower living standard in retirement. However, without plans, a very large number of people will be in poor financial condition in old age.

Next Steps in This Dialogue

These are some ideas to get a dialogue started. Please send in your responses to the italicized questions and any other related thoughts to the *Pension Section News*. The dialogue will continue in the next issue. Depending on your comments, the Pension Section may also decide to prepare a larger paper on this topic. ◆

Anna M. Rappaport, FSA, MAAA, EA, is proprietor of Anna Rappaport Consulting in Chicago, Ill. She is also chairperson for the SOA Committee on Post-Retirement Needs and Risks. She can be reached at anna@annarappaport. com.

2 Tables 7, 10 and 13, *Investment Company Institute Perspective* Vol. 11, No. 1, February 2005: "The Individual Retirement Account at Age 30."

3 *The Vital Connection*, page 12, ERISA Industry Committee, 1998.

4 Table 8, *Projected Retirement Adequacy for Workers Age 50 to 61: Changes between 1998 and 2001*, by Sherman Hanna, E. Thomas Garman and Rui Yao, June 2003, published on PSCA Web site.

Adjusting IRC 415 Limits for Prior Distributions

by David M. MacLennan

The proposed IRC 15 regulations issued last May contained guidance regarding how to adjust the benefit limits for prior distributions. This is commendable on the part of the IRS. How to adjust the IRC 415 limits for prior distributions has long been a source of confusion even for experienced pension actuaries. The best methodology is not immediately clear, and some methods have become common practice even if they can lead to inconsistent or unreasonable results.

Comments on the proposed regulations by major organizations and others (including comments submitted by this author) have pointed out how the regulations lead to unintended, unreasonable results. Although a praiseworthy attempt to assist taxpayers and give them some reliance, the proposed regulations are inconsistent with the Internal Revenue Code (the Code). Treasury regulations are intended to carry out the statutory enactment and should not be inconsistent with the Code. Most comments submitted to the IRS stopped short of making detailed alternate proposals. Others made suggestions not on the basis of detailed arguments, but rather were made on the basis of what seems reasonable and yet remains simple. Unfortunately, these reasonable but simple suggestions can still lead to unreasonable results that are inconsistent with the Code. This paper intends to show there is a mathematical solution to the problem, and that this solution is at its core fairly simple in concept—"fill and spill" and BERF = WERF, to be explained in this article, are the basic ideas.

§415 Limit adjustments versus Plan Benefit Adjustments.

One point should be made at the outset to avoid confusion. The adjustment of the §415 limits for prior distributions is a separate process from adjustment of a participant's plan benefit for prior distributions. Adjustment of the plan's benefit for prior distributions is governed by the applicable plan document provisions (in most documents detailed provisions are not present, so amendment of the plan or adoption of an administrative procedure to be followed is advisable if adjustment for a prior distribution is necessary).

§415 Compensation Limit Adjustments

Background

§415(b)(2)(B) states that benefits with respect to a participant shall not exceed "100% of the participant's average compensation for his high 3 years," payable in the form of a straight-life annuity (sometimes referred to as the "percentage limit" or "100% compensation limit"). In contrast to the "dollar" limitation under §415(b)(2)(A), a unique feature of the compensation limit is that it is not adjusted for age of commencement of benefits. Since the analysis for the dollar limit is more complex, it makes sense to begin with the compensation limit.

Retroactive Assignments Not Allowed

First it is worth noting that the §415 limits do not allow retroactive payments to prior limitation years when applying the limits. For example, a participant retiring at age 65 and whose benefit is governed by the compensation limit cannot claim commencement of benefits at age 60 and collect five catch-up payments. This would be true even if he had retired early at age 60 and collected a payment or payments and then returned to work at age 61. To allow otherwise would permit "playing" the rules and lead to unequal treatment of participants.

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Common Proposed Methods

There are several methods that one can propose to take into account prior distributions in applying the compensation limitation. Listed below are two of the most common methods:

1. **Straight actuarial adjustment.** Under this method, the prior distribution is brought forward with actuarial adjustment for elapsed time and then added to the current benefit (or, equivalently, reduces the limit to be applied). This is generally the method used in the proposed regulations.

2. **Annuitized layer adjustment.** Under this method, the prior distribution is converted to a life-only annuity, and the amount of this annuity is added to the current benefit (or, equivalently, reduces the limit to be applied). This method was suggested in some of the comments submitted to the IRS ("percentage used"). This method is appealing in that it seems to give the correct answer if the prior distributions were already in the form of an annuity (no conversion required). For example, suppose a participant has high three-year average compensation of $50,000/year. Suppose further the participant receives, commencing at age 55, a life-only annuity of $20,000/year. Suppose at age 60 he wishes to receive the maximum benefit possible under §415 in the form of a life annuity. Under this method, the maximum additional age 60 life-only benefit would be $50,000 less $20,000 or $30,000/year. This result seems to be reasonable for the life-only annuity form of benefit, since at no point in time has his benefit exceeded the $50,000/year limit. The question is, is this method correct in its application to lump sums and other forms of distribution?

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Common Proposed Methods Are Inconsistent with the Code

Actually, neither of the above methods is consistent with the age independent nature of the compensation limitation. To get at the correct answer, some heuristic techniques can be used to simplify the discussion. Let's suppose there is no interest and everyone expires at age 85 (in actuarial terms, i=0 and all q's are zero except q_{85}=1). These assumptions will allow us to easily convert any form of payment to another equivalent form.

Another heuristic technique is to test the method on a series of distributions we know satisfies the limitation—if the method is reasonable it should not disallow such a series of distributions.

Let's look first at the "straight actuarial adjustment" method (method 1). Suppose the participant in the earlier example elects a life-only annuity of $50,000 commencing at age 55. We know this series of payments satisfies the compensation limit. Now, any series of payments can arbitrarily be divided into past and future payments by reference to a particular point in time. At age 60, the participant has had five prior yearly payments of $50,000. If we apply method 1, these five prior payments will create an offset to the limit applied to future benefits payable commencing at age 60, so we know the method fails without doing any math. But let's do the math anyway, to make this clear. The five annuity payments prior to age 60 can be viewed individually as annual lump-sum payments that are actuarially equivalent to $250,000 at age 60 (remember, we have assumed no interest). The payments commencing at age 60 are in life-only annuity form, the "normal form" for the benefit limits, so they do not need to be converted. The $250,000 is actuarially equivalent to a life-only annuity of $250,000 / 25 years commencing at age 60, or $10,000/year. The 25 years in the denominator comes from the fact that everyone expires at age 85 under our actuarial assumptions (85 – 60 = 25 future years of payments). So, under this method, the maximum benefit payable at age 60 is $40,000/year ($50,000 – $10,000 = $40,000). This result is clearly incorrect, since we know in advance the $50,000 annuity payment stream satisfies the compensation limit and should hold up to the method.

Let's now apply the annuitized layer method (method 2) to our $50,000 annuity divided into past and future payments. The five annuity payments commencing at age 55 are actuarially equivalent to a single lump sum of $250,000 payable at age 55. This lump-sum is actuarially equivalent to a life annuity equal to $250,000/30 years, or $8,333/year (85 – 55 = 30 future years of payments). So, under this method, the maximum benefit payable at age 60 is $41,667/year ($50,000 – $8,333 = $41,667). Again, this result is clearly incorrect, since we know in advance the $50,000 annuity payment stream satisfies the compensation limit and should hold up to the method.

The Cascade Method, or "Fill and Spill"

The above discussion suggests the correct method: the "cascade method" adjustment. In this method, the actual prior distributions are converted to an equivalent series of annual "cascaded" payments. The amount of each annual cascaded payment in the series is the lesser of 1) the annual compensation limit, and 2) the actual prior distribution. In other words, the prior annual payments are converted to a stream of payments with any excess over the compensation limit "cascading" to a future year (as water flows down only, cascading to a prior year is not allowed to reflect the prohibition of retroactive payments). The compensation limit is violated if this process cannot be completed without at least one of the cascaded annual payments exceeding the compensation limit.

Let's now apply the cascade method to an example. Suppose again a $250,000 lump-sum payment at age 55, in addition to a life-only annuity of $50,000 commencing at age 60. The $250,000 lump-sum payment is actuarially equivalent to five annual payments of $50,000 at ages 55, 56, 57, 58 and 59. This is followed by $50,000 lifetime payments commencing at age 60. None of these equivalent annual payments exceed the annual compensation limit in any given year, so the compensation limit is satisfied.

Suppose the lump-sum paid to our hypothetical participant at age 55 is $300,000, followed by a lump-sum of $1,000,000 at age 60. Does this exceed the compensation limit? With our zero interest rate actuarial equivalence assumptions, the $300,000 lump sum is equivalent to six payments of $50,000 each beginning at age 55 and ending at age 60, and the $1,000,000 distribution at age 60 is equivalent to 20 $50,000 distributions commencing at age 61. These payments then do not exceed the compensation limit. Note that if the lump sum at age 60 was greater than $1,200,000, then the compensation limit would have been exceeded since a lump sum of greater than $1,200,000, along with the prior $300,000 distribution, could not have been annuitized over future years (85-61=24 years) without an annual payment exceeding the participant's $50,000 compensation limit.

Real-world application of the method with a nonzero interest rate and a real mortality table is straightforward actuarial work. Since the Code defines the compensation limit in the form of a life-only annuity, the conversion of the distributions that are to be tested for §415 compliance to cascaded payments should be expressed as life contingent payments as of the annuity starting date of the distributions. Unless, of course, the distributions are in the form of a life-only annuity or QJSA, in which case no conversion is needed as per the Code.

Post-Distribution Changes to Participant Data

What if a participant's highest three-year average compensation increases after the first distribution? Should the cascaded payments then parallel this increase by bumping up the cascade payment level at the same point in time as the increase? Probably the answer is no. More thought may be needed regarding this issue, but it does not seem reasonable to allow personal events after the distribution to affect the offset at a later date. Consider this example: Two identical participants receive lump-sum distributions from a plan. One participant terminates from service shortly thereafter and the other stays employed. The participant who stays employed receives regular compensation increases, so his compensation limit increases. The terminated participant then returns to work for the employer. At the time the terminated participant returns to work, his or her offset would be greater than the offset for the participant who stayed employed, even though they had *the same* prior distributions and were identical participants at that time. Because of examples like this, it probably is not appropriate to increase the level of cascaded payments for compensation increases after a distribution. Similar arguments would apply to increases in cascaded payments based on the prorating of the compensation limit over 10 years of service.

Conclusion

Because of the age-independent nature of the compensation limit, adjustments for prior distributions to the compensation limit must be done separately rather than combined with adjustments to the dollar limit. The proposed regulations mistakenly combine the two. Use of the "straight actuarial adjustment" method is "closer" to being correct with the dollar limit since it is more age dependent, but it is inconsistent with the code to apply that method to the compensation limit. The cascade method does generate a larger compensation limit than the method given in the proposed regulations, and lump-sum distributions yield smaller offsets to the compensation limit than annuity forms of payment. Since the compensation limit is not age-dependent, it makes sense that the earlier you commence distributions, the larger your lifetime benefit will be—immediate lump-sum distributions are the "earliest" type of distribution. This "use it or lose it" nature is a consequence of the age-independent aspect of the limit as prescribed in the Code.

§415 Dollar Limit Adjustments

Dollar Limit Has a Mix of Properties

As stated earlier, the dollar limit is more complex. It has properties of the compensation limit, in that EGTRRA allows for age independence (no reduction) between age 62 and 65. It has a straight actuarial adjustment aspect, prior to age 62 and after age 65. Cost-of-living-adjustments (COLA) also enter into the analysis. And the dollar limit has an early retirement factor adjustment aspect for pre-EGTRRA limitation years (pre-2002).

Pre-EGTRRA Statute Must Be Considered for pre-EGTRRA Distributions

Why should pre-EGTRRA enter into the analysis? §415 is satisfied with respect to each limitation year in which a distribution occurs. When adjusting a present day §415 benefit limit for prior distributions when the

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prior distributions occurred in a pre-EGTRRA limitation years, pre-EGTRRA rules must be observed in the analysis. Otherwise, the principle against retroactive payments mentioned earlier would be violated. This is similar to how satisfaction of the compensation limit cannot be demonstrated by assigning payments to prior years. Here is an example to make this clear. Suppose a participant has elected to receive two life-contingent installment distributions of $160,000 commencing at age 62 on Jan. 1, 2000 (consider these the prior distributions requiring adjustment to the §415 limit). This participant cannot then continue the $160,000 payments in a life annuity form commencing at age 64 on Jan. 1, 2002—even though EGTRRA allows $160,000 payments commencing at age 62 to 65—because EGTRRA does not apply to pre-2002 limitation years. Nor could a participant receive a lump sum at age 64 in 2002 in addition to a $160,000 annuity and claim it was a retroactive catch-up payment for age 62 and 63. The method used to adjust for prior distributions must reflect the historical limits since the first distribution.

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Cost of Living Adjustments

What about COLA? Should they be incorporated into the offset calculations? Similar to the pre-EGTRRA issue, one way to look at the COLA issue is from the standpoint of parity between lump sums and installment forms of payment. This is illustrated in one of the examples at the end of this paper. The conclusion is that if offsets for prior distributions are computed without reflecting limits in historical limitation years, offsets for lump sums will not be on par with offsets for actuarially equivalent installment payments. Because of this disparity, the best conclusion in the author's opinion is that COLAs and pre-EGTRRA limits must be reflected in the offset computations.

Special Conditions for Terminated Plans

However, for terminated plans, the answer is clearly different. COLAs should not be reflected in the offset calculation after a plan is terminated since established IRS guidance does not allow COLAs to be applied to benefits from terminated plans. Similarly, a terminated plan cannot be amended for statutory limit changes since the plan no longer exists, so the offset calculation from a terminated plan should not reflect statutory changes after the plan's termination. To prevent any misunderstanding, remember we are not talking about how the current plan benefit limit is determined, which is always based on the current COLA-adjusted limit and current statutory limit (as contained in the plan document). The conclusion that terminated plans should not reflect post-termination COLAs and law is only applied with respect to the prior distribution offset calculation.

Proration of §415 Dollar Limit Over 10 Years of Participation

Similar to the previous discussion on prorating service for the §415 compensation limit, additional years of participation after a distribution has occurred should not be reflected in the offset calculation for the §415 dollar limit. To do otherwise would lead to disparity in the offset for identical participants (one who terminated and one who continued in employment). In general, personal data changes after the distribution should not be reflected in the offset calculation.

The Basic Equation: BERF = WERF

Getting back now to the main focus of our effort: to solve the §415 dollar limit adjustment problem we need more mathematical analysis. Note that the early retirement factor problem is the general case: the no-reduction case is simply where the early retirement factor is equal to one, and the straight actuarial adjustment case is where the early retirement factors are based on actuarial equivalency factors. So we need to solve the early retirement factor problem to proceed. Once this is done, it should also support our cascade method analysis on the compensation limit.

Fortunately, the necessary math has already been published in the March 1991 issue of the *Pension Section News*, in a paper by William J. Sohn and John Atteridg. (Sohn and Atteridg's paper disclosed the basic formula and was also published by Lawrence Sher in the 1982 Transcript of the Enrolled Actuaries Meeting). This 1991 paper addressed the adjustment of plan benefits for prior distributions in annuity form. It did not specifically address the adjustment of §415 limits or the treatment of lump-sum distributions. However, the formula is applicable to our needs since the §415 limit can be thought of as the "benefit" to be adjusted, and the appropriate method for lump-sums is to convert them to "cascaded" annual payments.

Here is the needed formula:
Let
x = Age at annuity distribution commencement (early retirement)
y = Age at which annuity payments stop
z = Normal retirement age (let this be later than ages x and y)
B_z = Benefit commencing at age z
W_z = B_z adjusted for prior benefit payments between ages x and y
ERF_x and ERF_y = Early retirement factors for ages x and y

(Note: I have slightly modified Sohn and Atteridg's notation.)

Then:
$B_z \times ERF_x = W_z \times ERF_y$

The formula can (almost) be derived from simple inspection. The level of annuity payments at age x is equal to $B_z \times ERF_x$. But by considering the stream of forgone payments after age y, this quantity should also equal $W_z \times ERF_y$. The underlying assumption (the "should" part) of this equation is that we are forcing the early retirement factors to be on par with actuarial equivalence. If we don't do this, we get "unfair" results involving disparity between participants in a given plan (in our case the "plan" is the Internal Revenue Code).

BERF = WERF Yields Pure Actuarial Reduction as a Special Case

Note that if the early retirement factors involve no subsidy and are actuarial reductions, then $ERF_x = N_z/N_x$. After substituting this into the above equation,

$$B_z \times ERF_x = W_z \times ERF_y$$
$$W_z = B_z \times ERF_x / ERF_y$$
$$W_z = B_z \times N_y / N_x$$
$$W_z = B_z - B_z + B_z \times N_y / N_x$$
$$W_z = B_z - B_z \times (1 - N_y/N_x)$$
$$W_z = B_z - B_z \times (N_x - N_y)/N_x$$
$$W_z \times N_z / D_z = B_z \times N_z/D_z - (B_z \times N_z/N_x) \times (N_x - N_z)/D_z$$

This last equation gives us the expected result that when the early retirement factors involve pure actuarial reduction, then the lump-sum value of the benefit is reduced by the actuarial value of the benefits already paid.

BERF = WERF Yields Cascade Method as a Special Case

Earlier it was anticipated that the general formula would be consistent with the cascade method for the compensation limit. To test this, consider there is no early retirement reduction with the compensation limit. So in this case, ERF_x and ERF_y are both equal to one, for all x and y. This then implies $W_z = B_z$. In other words, the cascaded payments (the payments between ages x and y) can be of any duration (y can be any value between x and z) without effecting a reduction in the benefit, which is consistent with the cascade method for fully subsidized early retirement.

"z" Can Be Any Age

Note that z has been defined above as the normal retirement age, but as long as the early retirement factors are with respect to age z, more generally it is the age at which benefits commence for the "current" distribution as opposed to the "prior" distributions. Or, for our topic of inquiry, z is the annuity starting date (age) for the benefit, which when added to the prior distributions, is to be tested for §415 compliance.

Application of BERF = WERF

Explanation of how the BERF = WERF equation is applied to determine the §415 dollar limit adjustment is best put into the context of examples (see below).

What interest rate and mortality assumptions should be applied to prior distributions to determine the offset to a current distribution? There may be differing points of view on this issue. One option would be to use the prior plan's actuarial equivalence assumptions, including 417(e) assumptions if they governed the benefit calculation (as in the case of a lump-sum to a younger employee). Using the prior plan's actuarial equivalence assumptions may make the most sense, since it seems inappropriate that a participant's offset for 415 should vary based on the plan an employee is participating in (another argument that post-distribution events should not influence the offset). Put another way, since we are talking about statutory limits, the statutory limit should be determinable after the distribution, rather than it being determined possibly years later based on provisions of a plan he or she has yet to enter. In cases where the benefit calculation details or the prior plan document is not available, so that the prior actuarial assumptions are unknown, the final IRS regulations could allow the use of a safe-harbor set of assumptions.

Examples

Let's look at some examples of calculations. We will use the IAM 83 mortality table and 5 percent interest. Commutation factors based on annual payments are used since the Code refers to annual payments (annual payments yield larger lump-sums).

§415 Compensation Limit Examples

Example 1

- A participant at age 50 receives a $400,000 lump-sum distribution from a terminating DB plan of his employer.
- Ten years later at age 60 he retires and is eligible for a lump-sum distribution from a replacement cash-balance plan.
- His compensation is, and has always been, $35,000.
- He completed 10 years of service prior to age 50.

What is the offset, if any, to the §415 compensation limit at age 60 due to the prior distribution? Using commutation tables and simple algebra, we find that the $400,000 distribution at age 50 is equivalent to 16 life contingent annual payments of $35,000 from 50 to age 65, plus a smaller partial payment at age 66. Since this age 66 is greater than 60, we know that there must be an

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offset. The offset at age 60 as a lump sum is then \$400,000 x D_{50}/D_{60} – (\$35,000)(N_{50} – N_{60})/D_{60} = \$199,363, or the offset as a life annuity is \$199,363 x D_{60}/N_{60} = \$13,643/year. Note that the offset decreases with increasing age. After age 66 there will be no offset.

Example 2

- Same as Example 1, but the participant's compensation increases to \$40,000 at age 56.

There is no change to the answer in Example 1, based on the discussion that cascaded payments should not increase for personal changes after the prior distribution. (Moreover, the prior distribution came from a plan which terminated, so post-termination changes would not be reflected).

Example 3

- A participant attains normal retirement age (age 60) and receives a \$200,000 lump-sum distribution from a DB plan of his employer.
- He completed seven years of service as of age 60.
- At age 63 he receives a second distribution of \$50,000.
- At age 65 he retires and is eligible for a lump-sum distribution from the plan.
- His highest consecutive three-year average compensation is, and has always been, \$35,000.

What is the offset, if any, to the §415 compensation limit at age 65 due to the prior distribution? The cascade level for the first distribution at age 60 is \$35,000 x 7/10 = \$24,500, due to the prorating of the §415 compensation limit over 10 years of service. The second distribution has cascade level of \$35,000, but 7/10 of this is used up by the first distribution. So, we start out with one layer of \$24,500 at age 60, with a second layer starting at age 63 of \$10,500. We can see from the relative magnitude that both layers will exceed age 65. The offset at age 65 for the first distribution, as a lump sum, is then \$200,000 x D_{60}/D_{65} – (\$24,500)(N_{60} – N_{65})/D_{65} = \$117,625. The offset at age 65 for the 2nd distribution, as a lump sum, is \$50,000 x D_{63}/D_{65} – (\$10,500)(N_{63} – N_{65})/D_{65} = \$33,005. The total offset as a lump sum at age 65 is then \$117,625 + \$33,005 = \$150,630.

Note: Under a different possible example, if the first cascade layer expired and the second one had not, the second layer can use the full \$35,000 from that point forward. The first layer of \$24,500 must remain fixed under the rule that post-distribution personal changes are not reflected in the cascade levels.

§415 Dollar Limit Examples

Example 4

- In 2002, a participant age 62 receives a \$300,000 lump-sum distribution from a DB plan of his employer.
- The participant completed 10 years of participation prior to age 62.
- Three years later at age 65 he retires and is eligible for a lump-sum distribution from another plan of his employer.

What is the offset, if any, to the §415 dollar limit at age 65 due to the prior distribution? 2002 is a post-EGTRRA limitation year (assuming the plan was amended for EGTRRA in 2002), so early retirement reduction factors do not apply and we would apply cascade method techniques. The §415 dollar limit in 2002 and 2003 was \$160,000, and \$165,000 for 2004. These are the cascade levels for those years. Without doing any math, we can see that there will be no offset to the §415 dollar limit, since a \$300,000 lump-sum distribution cannot "fill and spill" these three cascade levels which total (arithmetically) \$485,000. If the reader is having trouble accepting the zero offset result, consider that a participant who elected an annuity and whose benefit was governed by the §415 dollar limit would clearly have no offset at age 65 even after having received larger payments than the example above. Sohn and Atteridg gave another supporting example of unacceptable results if an offset is applied with unreduced early retirement when a retired participant returns to work for one day, then retires again (like the i=0 simplification, these "boundary" conditions are useful to test an argument).

Example 5

This is the same as example 4, but let the distribution at age 62 equal \$900,000. What is the §415 dollar limit offset at age 65? The solution would follow methods similar to the §415 compensation limit examples, with the cascade levels equal to the dollar limits for 2002, 2003 and 2004. The "spillover" at the end of 2004 is the amount of the offset. If the offset at a later age is desired, it is simply the "spillover" with actuarial equivalent increase to a later date. Similarly, assuming no pre-EGTRRA years are involved, if the distribution occurred at an age earlier than 62, the first step is to bring forward the distribution with an actuarial equivalent increase to age 62, then apply the cascade method as usual.

Example 6

- Commencing in 1998, a participant at age 62 receives life contingent installment payments of \$104,000, \$104,000 and \$108,000 in 1998, 1999 and 2000 respectively.
- The participant completed 10 years of participation prior to age 62.

What is the offset, if any, to the §415 dollar limit at age 65 applicable in 2001 due to the prior distributions? The participant's Social Security retirement age is 65

(pre-EGTRRA). The pre-EGTRRA early retirement reduction at age 62 is therefore 20 percent. The distributions in the example were chosen such that they equal the dollar limit for that year reduced for early retirement. Applying BERF = WERF equation, we have y = z, so $ERF_x = 1$. Therefore $W = ERF_x \times B_{65}$ = 80% x [§415 Limit @ Age 65] = $140,000. In other words the offset is 20 percent. This was to be expected, since we have essentially created the exact conditions for an early retirement annuity at the §415 dollar limit.

Example 7

- Same conditions as in Example 6, but only a single distribution of $104,000 is received in 1998 with none in 1999 or 2000.

In general, if the cascaded payments do not "fill" the years for which pre-EGTRRA early retirement factors apply, the offset is computed by determining age y, then the early retirement reduction at ages x and y, and finally applying BERF = WERF. In this case, y=63 and ERF_x / ERF_y = 80% / [1-(2/3) x 20%] = 0.923077. The §415 dollar limit offset at age 65 in 2001 (end of 2000) is then [1-0.923077] x $130,000 = $10,000. The §415 dollar limit in 2001 is then $140,000 - $10,000 = $130,000.

Note that the [1-0.923077] factor was not applied to $135,000 (2000) or $140,000 (2001). This is because the BERF = WERF equation was derived assuming level payments. So, when a COLA is involved, the COLA "layer" portion should be treated as a separate limit to be adjusted under BERF = WERF. In the example above, a second COLA layer was not involved, since we only "filled" the first year where the $130,000 limit solely applied, and y=63. If, for example, the prior distribution was larger and y = 64.4, we would have had to apply BERF = WERF to $130,000, and again to the $5,000 COLA layer in year 2000, and the sum would be the offset.

Example 8

- In 2000, a participant age 62 receives a partial lump sum of distribution of $800,000.
- The participant completed 10 years of participation prior to age 62.

What is the offset to the §415 dollar limit at age 65? This example involves both the pre- and post-EGTRRA statute. When confronted with a transition from pre-EGTRRA to EGTRRA, the post-EGTRRA §415 dollar limit must be determined in accordance with Revenue Ruling 2001-51. There are conditions and exceptions, but this ruling generally allows the limitation for the 2002 or later year to be computed as if EGTRRA was in effect at the time of the annuity starting date. Echoing earlier discussions in this paper, this does not mean that retroactive payments are allowed—the increases are made on a prospective basis only.

The participant's Social Security retirement age is 66. The reduction in the §415 dollar limit at age 62 is therefore 25 percent. The first cascade level, for year 2000, is then $135,000 x 75% = $101,250. The second cascade level, for year 2001, is $140,000 x 75% = $105,000. For the EGTRRA year 2002, the cascade level is $160,000, per Rev Ruling 2001-51, since under EGTRRA there is no reduction for benefits commencing at age 62. The offset expressed as a lump sum is then $800,000 x D_{62}/D_{65} – $101,250 x D_{62}/D_{65} – $105,000 x D_{63}/D_{65} – $160,000 x D_{64}/D_{65} = $537,298. The offset is then $537,298 x D_{65}/N_{65} = $40,513. The §415 dollar limit at age 65 in 2003 is then $160,000 – $40,513 = $119,487.

Similar to earlier discussions, care must be taken to make sure the plan provisions are consistent with any given approach taken in the offset calculations. The cascade method utilizes "hypothetical" cascaded payments, but in the author's opinion these payments should be permissible under the plan. For example, a prior distribution from a plan terminated before EGTRRA cannot utilize EGTRRA in the offset computations—if this were the case in Example 8 the offset above would be larger, since the third cascade level would be smaller. Another example is whether the document or EGTRRA amendment allows the benefits in pay status to be subject to the EGTRRA limits.

Final Word

If this is purely a mathematical exercise, do we need regulations from the IRS, apart from the comfort factor that reliance gives, and apart from some of the finer practical details? Well, yes I believe so, at least for the pre-EGTRRA dollar limit where indexed early retirement factors are involved. The reason is the assumption inherent in the BERF = WERF equation, that early retirement factors should define actuarial equivalence for a plan. One can argue quite convincingly that it is the only reasonable approach that consistently leads to fair results, but this assumption makes it not a purely mathematical exercise. However, with respect to the compensation limit and post-EGTRRA dollar limit, in the author's opinion logic alone requires the basic approach outlined here. Because of this the current proposed §415 regulations on prior distributions should be withdrawn and re-proposed. Also, simplified methods such as "straight actuarial equivalent offset" or "percentage used" approaches cannot be adopted in the regulations, since the regulations must be consistent with the Code. ◆

David MacLennan, ASA, EA, is a self-employed actuary located in Portland, Ore. focusing mainly on small defined benefit plans. He can be reached at david@definedbenefit.com.

An Overview of Retiree Health Aging Curves

by Jeff Petertil

The July 2005 issue of the *North American Actuarial Journal (NAAJ)* published my paper entitled, "Aging Curves for Health Care Costs in Retirement." The paper was based on peer-reviewed research sponsored by the Health Section. Many actuaries involved with retiree health actuarial models will look to the article for numerical factors to reflect morbidity increases as retirees grow older. Such factors combine to form an aging curve and have become an essential part of long-term retiree health cost and utilization projections. Although health actuaries at larger benefits consulting firms have access to some substantial databases and may have analyzed those to develop their own aging factors, many other actuaries have been relying on anecdotal sources. Aging curves have gained a new significance with the Governmental Accounting Standards Board's accounting rules and with the actuarial equivalence provisions of the Medicare prescription drug law.

As the author, I want to offer a few precautionary principles, as well as relieve some of you of the burden of reading through the entire paper. While the goal of the paper is reflected in its title, the length of the paper reflects my conclusion that a number of complicated issues need discussion. Most of those issues had not been subject to published discussion recently, if ever. The paper was an opportunity to explore and document sources. It had become clear to me, in the research leading up to the paper, that the aging curve is quite dynamic. Actuaries will need to continue researching these issues. An immediate answer to the question became less important than structuring the framework of the question.

Although I suggested an "answer" in the paper, I also emphasized the variety of circumstances under which a different aging curve answer might be more appropriate. On page 40 of the July 2005 issue of the *NAAJ* is an aging curve, with a single age-to-age factor set out for each of the five-year age bands from age 50 to age 90. Flatter than a single geometric curve, this "representative" curve is made up of small geometric curves for each five-year band. The highest band is 4.2 percent from age to age; the lowest is 0.5 percent age to age at the oldest age band. This curve was derived from and representative of a 2002 survey of actuaries who work in the area of retiree health benefits. The basis of the curve is explained, but it is noted that, "a close fit to the survey answers … does not make the curve a good fit for any one particular situation. Indeed, it may not be a good fit to any situation …." Notwithstanding that last cautionary comment, I do believe the representative curve is an appropriate fit for many of the retiree health valuations of the next several years and maybe many years beyond. The actuary who uses that or any curve, however, is encouraged to read carefully the caveats in the paper and consider the circumstances of their use of any curve.

Some historical and personal background may help flesh out my concerns. When, 20-plus years ago, I was first asked to value a retiree health benefit plan, I was given no guidelines. The consulting firm where I worked had many pension specialists among its actuaries, all of whom were quite busy in the years after the passage of ERISA, whereas I was a health insurance actuary who seemed to have time on his hands. An actuary who understood the pension valuation system (I did not) would project the participant census over the lifetime of all those eligible. I was to determine an annual per capita cost that would be the starting point for an increasing annuity inflated over the retirees' lives, as well as review valuation results and write a report.

I knew enough, however, to know that the "inflation" would understate the increase in costs if it did not take into account the likelihood that these retirees, as they got older, would use more health care goods and services. Simply increasing the medical inflation factor by some amount for aging was suggested. That would not accurately model what was likely to happen, however, because the older participants were also more likely to die in any given year than the younger retirees. The valuation actuary understood my point and programmed features for the valuation system that included an "aging factor" to model the increase in morbidity with age. The only factors published, however, were for ages of active workers. The factor we used, 4 percent for each additional year of age, was used over the entire life span of the retirees.

Retiree health-care valuations became my bread and butter over the next few years and I talked with many more actuaries who were wrestling with the same problems. There was much anecdotal talk about what the correct "aging factors" were. Occasional internal studies were undertaken, leading to adjustments of the original factors, but nobody ever published anything. When the Health Section announced a few years back that it would like to invest in research and asked for proposals, I suggested aging factors as a suitable topic. The Health Section agreed to provide some funding for my research. The results were first discussed at an SOA meeting in 2002 and published on the Web site in late 2003. The full paper was published in the July 2005 issue of the *NAAJ*.

What is in the paper besides the representative aging curve referred to above? It validates the use of age factors and concludes that differences in age factor by medical service can be significant. Nursing home care seems most affected by age differences, dental and vision least affected. The answer to one of the questions that prompted me to take up the study was yes, – aging factors for most retiree health services seem to decrease with advancing age. For many categories of health care service, age factors begin to decline after age 70 and become insignificant by age 90. Beyond noting such findings, much of the paper reviews sources and offers shortcuts and considerations for those deciding which aging curves to use in their valuation work.

The paper moves from an introductory piece on aging factors and their use in retiree health valuations to a review of Medicare data, followed by a relatively lengthy look at the significance of the factors from a theoretical standpoint. This last section was included not only for the few people who still doubt the significance of aging on measurement of retiree health benefits, but also to outline ways that the significance might be quantified. This is important because the actuary needs to know what is significant in choosing between two or more possible sets of aging factors. One point not made in the paper is that all aging curves are theoretic, in the same way that all mortality curves formed from smoothed data found in raw mortality tables are theoretic. The actuary has a choice to make, a choice informed by professional judgment.

It turns out that there are many ways to measure significance. I wanted to acknowledge the different ways of measurement while advocating the most meaningful measure of significance. For a single life, I concluded that the best comparative measure was a multi-year accumulation, taking into account a mortality assumption, but not assumptions for trend or discounting. Illustrations in the paper used the female UP 94 mortality table throughout and three different age ranges, starting at ages 50, 65 and 80, with each range continuing to the end of life. Using that measure and that mortality table, the impact of using the representative aging curve was significant when the range began at the younger of the ages. At age 50, the increase was 82 percent above the accumulation that did not recognize aging, and at age 65 it was 29 percent. Only when the impact over the range starting at age 80, the oldest age, was measured, did the comparative use of the representative aging curve became relatively insignificant: a 4 percent increase. Using a different mortality table would have given different results, although it is unlikely to change the basic significance.

I identified, as variables, certain characteristics in a population that will magnify or mitigate the importance of correct aging factors. The paper addresses at some length those variables—for the current retiree population, the average age and age distribution; for the plan, the potential range of eligible ages. Regarding the age distribution within a set of retirees, there is discussion of how two different sets of retirees with the same average age and average cost would, under the same aging curve, have a different set of initial claim rates simply because they had different age distributions. Although counterintuitive for most of us, this is theoretically true. There is an exception for the rare aging curve that would be strictly linear. But actuaries using the more usual geometric curves that are better matches for claims experience (of Medicare, etc.), are cautioned against the use of only average cost and average age when applying the aging curve.

The paper also discusses the "warping" error related to the shortcut of placing a geometric aging curve such that it runs through a single age/cost point that is derived from averaging costs or rates over a range of ages. Most health actuaries know an error will result, but the paper's discussion may bring it to the attention of others and indicate when the error might or might not be significant.

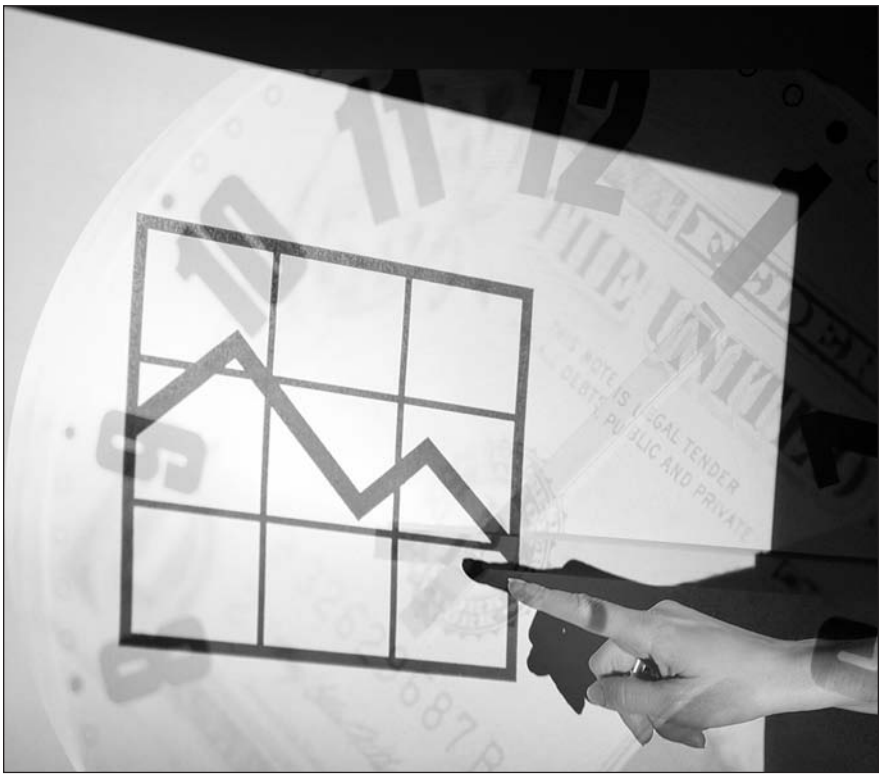
For actuaries who are unsure of their aging factors, the research provides some guidance as to particular numbers and areas for further attention. For instance, Sections 3 and 6 of the paper cover comparison techniques that can be helpful for an actuary trying to decide whether to change curves. The difference between using one curve and another can be estimated without running

(continued on back cover)

Turning the Tables

Mortality Tables Should Reflect Improving Mortality

by Emily K. Kessler



The Group Annuity Mortality table (GAM-83) is probably the most common table used by pension actuaries—75 percent of the plans in Watson Wyatt's "2003 Survey of Actuarial Assumptions and Funding" use GAM-83 for funding calculations. However, there are three more recently published tables that warrant consideration for use in pension valuations: UP-94, GAM-94 and RP-2000.

Which is the most appropriate table to use? Should actuaries be moving to these new tables, or does GAM-83 still represent a reasonable expectation for most plans? What are the consequences if plans don't use current mortality tables, and what options are open to actuaries?

The Tables

GAM-83. The GAM-83 table was constructed after a review of GAM-71 and insurer experience showed that GAM-71 was inadequate. When GAM-83 was developed, there wasn't sufficient credible data available to construct a new table, so the developers used the same annuitant mortality experience on which GAM-71 was based. This is mortality experience from 1964.

Researchers then reviewed U.S. population statistics to determine mortality improvements from 1966. They projected additional mortality improvements to 1983 based on 1966 trends, and added a 10 percent margin for conservatism (because experience can vary from insurer to insurer).

UP-94 & GAM-94. The UP-94 table is based on uninsured pensioner experience projected to 1994. It was developed by the Society of Actuaries to replace UP-84 after a study of 1985 mortality experience of 29 retirement systems found mortality rates were between 82 percent and 86 percent of those expected under UP-84.

Similarly, the GAM-94 table is based on group annuitant experience projected to 1994. This table was developed to replace GAM-83 after a study of 1986 annuitant experience showed steady declines in ratio of actual to expected (GAM-83) mortality, particularly for males.

During the development of the two tables, recent experience for uninsured pensioners was compared to recent experience for group annuitants and no significant mortality difference was detected. Researchers compared mortality rates at ages 66-95 for group annuitants, the Federal Civil Service Retirement System (CSRS), uninsured plans (24 private and one state) and the Railroad Retirement System.

Researchers found that the group annuitant and uninsured pensioner rates were quite similar (the Railroad Retirement System showed higher mortality rates). Thus, the same underlying data were used for both the GAM-94 and the UP-94 tables.

All rates were trended to 1994 based on CSRS experience and benefit weighted in construction of final tables. The final tables (UP-94 and GAM-94) were published with Projection Scale AA. Projection Scale AA was created for these tables and is based on a blend of the CSRS and *Actuarial Study No. 107* mortality reduction trends from 1977-93.

The only difference between the final UP-94 and the GAM-94 tables is that the GAM-94 table includes a 7 percent margin. GAM-94 was designed for insurance reserves, which need margins for deviations in blocks of business. For an insurance company, a 5 percent margin provides a 95 percent confidence level on 3,000-life block of business. The additional 2 percent margin was added to account for variations in white- and blue-collar, higher- and lower-income and geography. Also, according to the GAM-94 report, it was felt that an additional

margin was needed as tables are adopted by state insurance commissioners and aren't changed often thereafter.

RP-2000. The RP-2000 table is the only table based solely on retirement plan mortality experience. It was developed by the SOA specifically for current liability calculations. The Retirement Protection Act of 1994 (RPA 94) allowed the Secretary of Treasury to promulgate a new table for current liability purposes in 2000. The SOA conducted a study of uninsured pension plan mortality to ensure that the Treasury Department would have current information available when considering updating the table. As there was no current table based on uninsured pension data, (UP-94 was based partly on group annuity experience) a decision was made to conduct a separate study.

In the construction of the RP-2000 table, data were collected from private employers (those affected by current liability provisions) for plan years ending 1990 through 1994.

Rates were adjusted for mortality improvement from 1992 to 2000 using the data underlying Actuarial Study No. 110 and Federal CSRS data. The same scale AA that was published with the UP-94 and GAM-94 reports was published with the RP-2000 report. The committee felt that this scale was reasonably close to what was seen in Social Security trends and consistent with other groups. Although it felt minor adjustments could have been made, they weren't significant enough to justify a new scale.

How do these tables compare? Table 1 on page 20 shows the change in annuity values, deferred to age 65 (immediate if over age 65) for various ages.

There have been substantial improvements in male mortality since the publication of the GAM-83 table, particularly at the younger ages. Across the board, male annuity factors are higher under these new tables, except possibly at the very oldest ages.

Female mortality rates haven't decreased; they're slightly higher in the newer tables than in GAM-83. Partly, this is due to the 10 percent margin in GAM-83 (female mortality didn't improve as much as was expected). This also reflects that GAM-83 female mortality is based on relatively little actual experience.

What does this mean for the practicing actuary? Is the GAM-83 mortality table still a reasonable mortality table for use in valuation? When considering these questions, we must look to actuarial standards of practice for guidance.

Actuarial Standard of Practice No. 35 (ASOP 35)

ASOP 35 covers the *Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations*. The ASOP gives very clear, specific guidance on the selection of mortality tables, as well as other demographic assumptions. Here's what ASOP 35 says (this limited excerpt in no way is intended to be a substitute for reading the ASOP yourself; go to www.actuarialstandards.org to get a full text of the ASOP):

"In selecting specific assumptions (paragraph 3.3.4) 'The actuary should select each demographic assumption from the appropriate assumption universe. In all cases, the actuary should consider the materiality of each assumption selected and the consequences of experience deviating significantly from the selected assumption.'"

The ASOP goes on to list measurement-specific factors the actuary should consider, such as the purpose and nature of the measurement, any features of the plan design that influence the assumption, plan experience and known factors that may affect future experience. In particular, it notes that:

- Each material demographic assumption is to be evaluated for reasonableness (paragraph 3.3.5), that is, whether it's "expected to appropriately model the contingency being measured." It should not be "anticipated to produce significant cumulative actuarial gains and losses over the measurement period."
- Each demographic assumption must be individually reasonable (paragraph 3.4).
- When looking at the mortality assumption, the actuary should consider "the likelihood and extent of mortality improvement in the future."

Quiz: *True or False*

Most, if not all, of the *youngest* annuitants whose mortality experience underlies the GAM-83 table have already died. Answer: *True.*

GAM-83 is based on group annuitant experience from 1964-1968. The youngest annuitants in the experience bracket were age 66 in 1964; if they were alive today, they would be age 107. We don't know for certain, but most of these annuitants are probably dead.

Unfair question? Consider this: The youngest annuitants used to build the UP-94 and GAM-94 tables were 65 in 1985. They'd be 85 today. It's likely that half of those youngest annuitants are still alive.

(continued on page 20)

Table 1– Unprojected Mortality

	Monthly Annuity Due, 5% interest Deferred Annuity to age 65 for ages less than 65 Immediate Annuity for ages 65 and greater				Change in annuity value from GAM-83 value at the same age		
	GAM-83	UP-94	GAM-94	RP-2000	UP-94	GAM-94	RP-2000
Male							
35	2.23	2.32	2.39	2.43	4.0%	7.0%	8.6%
45	3.68	3.83	3.94	3.99	3.9%	6.8%	8.4%
55	6.23	6.41	6.58	6.65	2.8%	5.6%	6.7%
65	11.14	11.38	11.61	11.60	2.1%	4.2%	4.1%
75	7.93	8.24	8.48	8.22	3.9%	7.0%	3.7%
85	5.18	5.29	5.51	5.04	2.2%	6.4%	-2.7%
Female							
35	2.82	2.75	2.81	2.69	-2.5%	-0.4%	-4.8%
45	4.63	4.52	4.61	4.41	-2.4%	-0.4%	-4.7%
55	7.66	7.48	7.62	7.31	-2.5%	-0.6%	-4.6%
65	13.02	12.78	12.98	12.54	-1.9%	-0.3%	-3.7%
75	9.67	9.57	9.80	9.34	-1.1%	1.4%	-3.4%
85	6.45	6.19	6.42	6.10	-4.0%	-0.4%	-5.4%

We'll come back to mortality projection later. Let's go back to the question of whether GAM-83 is an appropriate mortality table, based on the guidance provided by the ASOP 35.

First, in no way is anyone saying that GAM-83 is never an appropriate table. There are certainly circumstances in which GAM-83 will be the best choice based on the appropriate assumption universe. And there are probably circumstances in which other older, less conservative tables (GA-71, UP-84) are still appropriate.

Can it be argued that GAM-83 is the appropriate table for most plans? Consider what we know, 20 years after the publication of GAM-83:

- Male mortality has improved significantly, particularly at the younger ages;
- Female mortality has not improved as much when compared to GAM-83 before the 10 percent load.

Absolute mortality rates have changed and they've improved (or not improved) differently for males and females; and, for each gender, differently by age. In other words, GAM-83 probably doesn't represent, for most populations, the correct level of mortality, and even if projected, probably won't reflect the right pattern of mortality. We shouldn't be surprised; GAM-83 is based on mortality experience from the 1960s projected to 1983, based on mortality improvement trends from the 1960s and 1970s, with the addition of a 10 percent margin.

We recognize that GAM-83 is prescribed for the current liability calculation. And ASOP 35 notes that, when an assumption is prescribed, the actuary is obligated to use it for the purpose for which it was prescribed (paragraphs 2.6, 3.8).

But the ASOP doesn't say that, because a particular assumption is prescribed in one calculation, it therefore becomes the most appropriate assumption for all the other calculations. And for good reason. Consider the following example, using the prescribed mortality for current liability and a completely hypothetical situation:

"The Secretary of the Treasury, under due consultation with those elected officials who are desperate to find ways to offset the cost of Medicare Part D, decides that the 'Bubonic Plague Mortality Table, based on Italian experience in the 16th century' is the prescribed table for current liability calculations."

Can you state, in your professional opinion, that this table is now a reasonable table to use for your actuarial accrued liability, FAS 87 accrued benefit obligations (ABO) / projected benefit obligations (PBO), and any other calculation for which it's not prescribed?

"The following year, the Secretary of the Treasury, in an amazing Sybil-like turn of events, and after consultation with the Pension Benefit Guaranty Council, decides that the current liability mortality table should now be the 'Liberal Arts Professor with-an-increase-in-age-65-life-expectancy-to-age-127- Mortality Table.'"

Are you now also going to state, in your professional opinion, that this table ought to be used for actuarial accrued liability, FAS 87 ABO/PBO and any other calculation for which it isn't prescribed?

This is an exaggerated example, but drawn to make a point: We use prescribed assumptions when they're prescribed, sometimes criticizing under our breath those who prescribed them. But just because they've been prescribed in one circumstance doesn't make them the best assumption in another. It doesn't mean they aren't; but it doesn't mean they are.

To Project or Not to Project?

It's not a question; it's part of your assumptions. Mortality table construction has changed over the past 20 years. When the GAM-83 tables were created, computing systems were limited. Tables were built with substantial margins to allow not only for variation in experience, but also because programming in a new table took significant effort—static or generational projections were rare.

However, the construction of recent tables has reflected updates in our systems and our abilities to create individual projections. The three most recent tables reflect only mortality improvements through their creation dates: 1994 for UP-94 and GAM-94, 2000 for RP-2000). This is because their creators *expected* users to make explicit assumptions about mortality improvement. So every time actuaries use one of these tables, they must make an explicit decision about whether and how to project mortality improvements beyond the table date. In other words, by not projecting the table, the actuary has made the explicit decision *not* to assume any future mortality improvements beyond the date of the table's creation.

In a report, "Choosing between UP-94 & GAR-94 (group annuity reserving)," that coincided with the publication of the UP-94 and GAM-94 tables, the actuaries responsible for their creation recommended using mortality trend projection with the UP-94 table because mortality has been continually improving and will probably continue to do so.

Similarly, in its issuance of the RP-2000 report, the committee that developed the table said that given the long history of mortality improvement, pension valuations should take mortality improvement trends into account, preferably by using a generational table but, if not, by a comparable static projection.

And finally, a recent SOA study shows the effects of not taking mortality improvement into account. The paper examined, theoretically, what would happen to a sample plan's funded status, contributions and FAS 87 expense (among other measures) given known mortality improvements and different actuarial assumptions, which tracked or lagged actual mortality improvements to varying degrees.

The study, by David F. Kays, found that for assets to accumulate to a relatively level percentage of their "ideal," (assets sufficient to cover actual mortality improvement) the mortality assumption ought to be updated periodically, and at least projected to the valuation date by the appropriate mortality improvement scales. Tables that were projected beyond the valuation date did a better job of approximating a generational table—the ideal projection point would likely vary by plan population. However, "consistently using tables that are not current will eventually accumulate assets less than ideal."

But as we've already seen, in some cases the new factors showed higher mortality than existing tables. Is there really a need to project specific improvements onto the tables?

Note that none of these most recent tables (UP-94, GAM-94 and RP-2000) would be considered to reflect current mortality experience, unless we haven't had any improvement in mortality between their creation date and today. We have some evidence that mortality has improved over the past 10 years. If the tables are simply brought up to date—from their creation dates in 1994 and 2000, respectively, to 2005—the ratio of the differences in annuity factors between GAM-83 and the projected tables comes much closer together for females, and widens even more for males. And if full generational improvements are reflected, then the mortality differences are much wider. Table 2 on page 22 shows selected rates with improvement.

(continued on page 22)

Table 2 - Projected Mortality

	Monthly Annuity Due, 5% interest Deferred Annuity to age 65 for ages less than 65 Immediate Annuity for ages 65 and greater				Change in annuity value from GAM-83 value at the same age		
Male	GAM-83	UP-94 @ 2005	RP2000 @ 2005	RP2000 Generational	UP-94 @ 2005	RP2000 @ 2005	RP2000 Generational
35	2.23	2.45	2.48	2.81	9.9%	11.1%	26.0%
45	3.68	4.04	4.08	4.48	9.6%	10.8%	21.6%
55	6.23	6.73	6.79	7.19	8.0%	8.9%	15.4%
65	11.14	11.79	11.78	12.09	5.8%	5.7%	8.5%
75	7.93	8.58	8.37	8.53	8.2%	5.6%	7.5%
85	5.18	5.46	5.12	5.16	5.4%	-1.2%	-0.4%
Female	GAM-83	UP-94 @ 2005	RP2000 @ 2005	RP2000 Generational	UP-94 @ 2005	RP2000 @ 2005	RP2000 Generational
35	2.82	2.81	2.72	2.89	-0.5%	-3.8%	2.4%
45	4.63	4.60	4.45	4.66	-0.6%	-3.8%	0.7%
55	7.66	7.60	7.37	7.59	-0.9%	-3.8%	-0.9%
65	13.02	12.95	12.62	12.82	-0.5%	-3.1%	-1.5%
75	9.67	9.77	9.44	9.56	1.1%	-2.4%	-1.1%
85	6.45	6.31	6.15	6.19	-2.1%	-4.5%	-4.0%

Table 3

Life Expectancy	**GAM-83**	**RP-2000**	**RP-2000 @ 2025**	**RP-2000 Generational**
Male born 1940	81.7	82.6	84.2	83.9
Male born 1960	81.7	82.6	84.2	85.4
Male born 1980	81.7	82.6	84.2	86.7

So what should actuaries consider when projecting mortality? The committee that oversaw the UP-94 and GAM-94 tables recognized that many factors influence decisions to project mortality: "the actual population expected to retire under the plan, the interaction of assumptions, the relevance of various assumptions given alternate plan designs and the significance of a particular assumption given the overall level of precision in the liability model." The decision to project mortality trends explicitly or implicitly should be based on the actuary's judgment of how future trends interact with the actuarial model of the benefit plan. Sometimes, "a static table that includes an appropriate degree of mortality projection may be most consistent with the plan benefit and actuarial model."

Does this mean you're always required to project mortality, and more critically, are you required to use generational mortality? Not necessarily. Each population is different. That's where your actuarial professional judgment comes in.

Food for Thought

Let's assume a pension plan with a normal retirement age of 65, unreduced early retirement at 62, and early retirement reduction factors of 5 percent per year before age 62. (The benefit paid at age 55 is 65 percent of the normal retirement benefit). The actuary currently uses 1983 GAM mortality, retirement rates of 5 percent per year before age 62; 50 percent at age 62; 5 percent at 63 and 64; and 100 percent at age 65. The weighted average retirement age is 61.8.

Consider three changes to mortality: to RP-2000, to RP-2000 projected to 2025 and to RP-2000 generational, for each of three sample participants, age 65 (born 1940), 45 (born 1960) and 25 (born 1980).

Do these assumptions seem reasonable? Let's consider what the change in mortality does to life expectancy (see Table 3 on page 22).

Our sample plan, as many other plans, was designed to help move the war generation out of the work force to make way for the baby boomers. It has provided subsidized early-retirement benefits for anyone wishing to leave the workforce before age 62—subsidies worth as much as 30 percent at age 55. Our actuarial assumptions reflect that prior generations have, and future generations probably will, continue to take this early retirement subsidy.

A man who expects to live to 82 may reasonably be expected to retire at 62, particularly when there are generations of workers ready to take his job. But is it reasonable to expect that someone born in 1980, who, with improved mortality would have a life expectancy of 87, to also retire at age 62? If improvements in life expectancy also bring improvements in health at older ages, might our disability rates at older ages (e.g., age 50 plus) also decrease?

When projecting mortality, all things must be considered in balance: If mortality improves, what will happen to disability rates? Will retirement ages increase as people work longer, either out of necessity or desire? It's not all that simple. You need to use your actuarial professional judgment.

This article is a slight abbreviation of the full text, which can be found at *www.contingencies.org*. ◆

Emily K. Kessler, FSA, is a retirement systems staff fellow at the Society of Actuaries in Schaumburg, Ill. She can be reached at ekessler@ soa.org.

Politics or Actuarial Science?

The period between 1984-1998 is politically significant. The year 1984 represents the start of a resourceful drive fostered by the Heritage Foundation and the Cato Institute, explicitly intended to build up a privatized system of individual investment accounts to replace Social Security. These groups knew the deficits could be manipulated actuarially, that the trustees had the power to do this, and the cooperation of the actuaries would be needed.

After an acute political embarrassment to the Reagan Administration following a brash attempt in the early 1980s to sharply cut early retirement benefits, including those already in payment status, it appears the decision was made to blacken Social Security's eye financially by gradually raising the deficit over a period of many years so as to attract little notice. The drive peaked in 1994 when the Social Security Advisory Council came into being, a prime topic being privatization.

In reading through the trustees' reports, I found no satisfactory explanation for the plunging deficit phenomenon. I also don't recall hearing the chief actuary or a deputy ever dispute blatant assertions that the system was going kaput, or any explanation that the projections were subject to too great an error to be relied on, or advise the public that a 2 percent deficit should not even be regarded as significant over 75 years.[2]

Finally, in the process of accommodating the trustees, the chief actuary has apparently violated two actuarial standards of practice published by the American Academy of Actuaries. My 1999analysis of the Gross Domestic Product (GDP) economic assumptions revealed a failure to take into account either substantial past or recent experience, thus giving the trustees carte blanche to set the level wherever desired. The average future GDP chosen by them was less than half of the long-term actual average (3.3 percent vs. 1.5 percent), and served to make Social Security future finances look dismal indeed.[2]

Secondly, the chief actuary has consistently failed to report as required in his actuarial certification at the end of the trustees' reports, the influence and input of the trustees. Readers can easily err in believing that the chief actuary has total professional control.

It is reasonable to conclude the trustees had the motive and the means and ran with the opportunity to worry the public about the financial health of Social Security. True trustees they are not. Unfortunately, the reputation of the actuarial profession is involved. ◆

David Langer, ASA, MAAA
Proprietor
David Langer, Inc.

David Langer, ASA, MAAA, is proprietor of David Langer, Inc. in New York, N.Y. He can be reached at dlanger@davidlanger.com.

[2] See my 1999 *Contingencies* article analysis on my Web site at *www.davidlanger.com*, "Social Securities Finances are in Fine Shape."

a valuation several times. Actuaries with a solid basis for their current aging factors will find the paper to be a reminder that there are other opinions, there are important variances by medical services, and there are dynamics driving changes in the relative values between ages. It might also encourage them to share their own findings through publication. For instance, there are now many actuaries interested in the aging curve for primary and secondary prescription drug coverage. Is this an appropriate area for practice section research?

In the larger world there are also implications. In the United States and other developed countries, the population is gradually but inevitably becoming older. A health cost aging curve such as those discussed in the paper implies that, due to the older average population, spending for medical goods and services will increase as a portion of national expenditure, crowding out other needs. This seems to have been the case in at least the last 30 years. While productivity gains in the economy have taken care of some needs, there is a significant portion of the population for whom medical care has become a substantial economic problem. Much of this is due to demand and supply variables that may be separate from the aging effect. Nonetheless, it is worth considering that if the aging curve is not static but sufficiently dynamic, there is a greater chance that the efforts at health care cost control—that many of us have been involved with—will be successful. ◆

Based on the research mentioned above, The SOA Health Section is sponsoring a webcast based on Jeff's research. The webcast is scheduled February 15, 2006, for complete details go to http://www.soa.org/ccm/content/?categoryID=33504.

Jeffrey P. Petertil, ASA, MAAA, FCA, is a consulting actuary in Oak Park, Ill. He can be reached at jpetertil@comcast.net.