

A PUBLIC POLICY PRACTICE NOTE

Selecting and Documenting Other Pension Assumptions

October 2009

American Academy of Actuaries
Pension Committee



AMERICAN ACADEMY *of* ACTUARIES

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Developed by the Pension Committee
of the American Academy of Actuaries



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The American Academy of Actuaries is a professional association with over 16,000 members, whose mission is to assist public policymakers by providing leadership, objective expertise, and actuarial advice on risk and financial security issues. The Academy also sets qualification, practice, and professionalism standards for actuaries in the United States.

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This practice note does not cover the selection and documentation of the investment return assumption or the mortality assumption. Those assumptions are covered in separate practice notes published by the Academy: [*Selecting and Documenting Investment Return Assumptions*](#) (May 2001) and [*Selecting and Documenting Mortality Assumptions for Pensions*](#) (October 2009)

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Introduction

This practice note is not a promulgation of the Actuarial Standards Board, is not an Actuarial Standard of Practice, is not binding upon any actuary and is not a definitive statement as to what constitutes generally accepted practice in the area under discussion. Events occurring subsequent to the publication of this practice note may make the practices in the practice note irrelevant or obsolete.

This practice note was prepared by the Pension Committee (“Committee”) of the American Academy of Actuaries. It provides information to actuaries on current and emerging practices in the selection and documentation of certain actuarial assumptions for measuring obligations of defined benefit pension plans. The intended users of this practice note are the members of the actuarial organizations governed by the Standards of Practice issued by the Actuarial Standards Board. Measurements of defined benefit pension plan obligations include calculations that assign plan costs to time periods, actuarial present value calculations, and estimates of the magnitude of future plan obligations. This practice note does not apply to individual benefit calculations or individual benefit statement estimates. The application of the information contained herein is intended to cover qualified and non-qualified plans, and governmental and non-governmental plans. This practice note may be used when setting or providing advice on funding, where permitted by law, and financial accounting assumptions.

The practice note is intended to assist actuaries by describing some approaches for selecting (including giving advice on selecting) and documenting these assumptions that the Committee believes could be employed to comply with Actuarial Standard of Practice No. 27, *Selection of Economic Assumptions for Measuring Pension Obligations* (“ASOP No. 27”) and Actuarial Standard of Practice No. 35, *Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations* (“ASOP No. 35”). Actuarial Standard of Practice No. 4, *Measuring Pension Obligations and Determining Pension Plan Costs or Contributions* (“ASOP No. 4”) ties together the guidance from these and certain other standards on measuring pension obligations. It also updates guidance provided in ASOP Nos. 27 and 35, on the actuary’s responsibility with regard to prescribed assumptions.^{1,2}

This practice note does not cover the selection and documentation of the investment return assumption or the mortality assumption. Those assumptions are covered in separate practice notes published by the Academy: [*Selecting and Documenting*](#)

¹ In the event of a conflict between the guidance provided in ASOP No. 4 and the guidance provided in ASOP Nos. 27 and 35, ASOP No. 4 governs.

² In 2008, the Actuarial Standards Board drafted proposed revisions to Actuarial Standard of Practice No. 41, *Actuarial Communications* (“ASOP No. 41”). Revisions to ASOP No. 41 could affect the actuary’s responsibility with regard to, among other things, required disclosures regarding assumptions and the actuary’s responsibility with regard to prescribed assumptions. This practice note does not take the review of ASOP No. 41 into account.

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[Investment Return Assumptions](#) (May 2001) and [Selecting and Documenting Mortality Assumptions for Pensions](#) (October 2009).

This practice note is intended to be illustrative and spur professional discussion on this topic. Other reasonable selection and documentation methodologies currently exist and new ones likely will evolve in the future. This practice note does not apply to the selection and documentation of assumptions for other types of benefit plans (e.g., postretirement health and welfare plans).

Portions of this practice note are based on the Mercer Consultant Resource Manual, *Selection of Actuarial Assumptions* (November 2001).

The Committee welcomes any suggested improvements for future updates of this practice note. Suggestions may be sent to the Pension Policy Analyst of the American Academy of Actuaries at 1850 M St. NW, Suite 300, Washington, DC 20036 or by email to PensionAnalyst@actuary.org.

I. Economic Assumptions

General Impact of ASOP No. 27³

The Actuarial Standards Board (ASB) originally adopted ASOP No. 27 in December 1996, following seven years of development including the release of three exposure drafts. The ASOP was revised in September 2007 to coordinate with the other standards providing guidance on key elements of measuring pension obligations. It provides that an actuary should use professional judgment to estimate possible future economic outcomes based on past experience and future expectations, and select assumptions based on that judgment. It outlines a general process an actuary should follow for selecting economic assumptions, including:

- Identify components, if any, of each assumption and evaluate relevant data;
- Develop a best-estimate range for each economic assumption required for the measurement, reflecting appropriate measurement-specific factors; and
- Further evaluate measurement-specific factors and select a specific point within the best-estimate range.

The “best-estimate range” is described as the narrowest range within which the actuary reasonably anticipates that the actual results, compounded over the measurement period, are more likely than not to fall.

Each individual assumption the actuary selects should satisfy the standard. However, the combined effect of all nonprescribed assumptions⁴ (including those not covered by this practice note) should be reasonable.

ASOP No. 27 applies not just when an actuary selects an assumption, but also when an actuary gives advice on selecting an assumption. In addition, ASOP No. 4 provides guidance on the actuary’s responsibility with regard to prescribed assumptions selected by a plan sponsor (such as employer-selected assumptions to comply with Statements of Financial Accounting Standards). ASOP Nos. 27 and 4 do not apply to mandated prescribed assumptions (e.g., (1) the yield curve required for funding single-employer, ERISA-covered pension plans, or (2) the required interest rate for determining Pension Benefit Guarantee Corporation (“PBGC”) variable rate premiums). Where a particular assumption is prescribed, ASOP No. 27 does not appear to authorize the actuary to select another assumption that would not satisfy the standard on its own in order to offset the effect of using the prescribed assumption. This appears to be true even when the actuary

³ In 2008, the Actuarial Standards Board began a comprehensive review of ASOP 27. This practice note does not take that review into account and portions of it may no longer be applicable or appropriate if and when ASOP 27 changes.

⁴ According to ASOP No. 27, section 2.6, a “prescribed assumption” is defined as a specific assumption that is mandated or that is selected from a specified range that is deemed to be acceptable by law, regulation or other binding authority.

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believes the prescribed assumption is unreasonable, unless the disclosure of deviation provisions of the standard are followed.

A forecast valuation may require the use of multiple sets of actuarial assumptions. In addition to a set of assumptions for each future valuation date in the forecast period, other set(s) of assumptions may be necessary to appropriately project current data to future valuation periods. For example, an assumption for short-term compensation increases may be selected to reasonably project current compensation of each active participant to the forecast valuation date. It may be different from the actuary's current and/or future best-estimate long-term compensation scale assumption (or the prescribed assumption, if applicable) used at the forecast valuation date.

More than one reasonable assumption may exist for measuring the same contingency. The actuary may select one, or may show the results using several reasonable assumptions to show the different effects of alternate assumptions.

As generally provided in ASOP No. 27, all economic assumptions selected by the actuary should be consistent with each other over the measurement period, unless the assumption, considered individually, is not material. Assumptions selected by the actuary need not be consistent with any prescribed assumptions.

The consistency requirement may be satisfied in part by using the same inflation component in each economic assumption selected. Consistency is not necessarily achieved by maintaining a constant difference between one assumption and another. A change in the inflation component of one assumption may indicate that the inflation component needs to be changed in some or all of the other assumptions. However, if an assumption changes due to a factor that is unique to that assumption, it may not be necessary to change the other assumptions.

Compensation Scale

Use of a compensation scale assumption is generally appropriate for all types of calculations involving active employees eligible for benefits that are based on future amounts of employees' compensation. In some cases a compensation scale may not be needed even in a plan with pay-related benefits. Examples include: (1) a funding valuation in which all plan participants currently earn more than the statutory limit on compensation and an assumption of future increases in the limit is not permitted, (2) a valuation for a plan in which all participants currently earn more than a fixed plan limitation on compensation, and (3) a valuation of the accrued benefits as of the valuation date. The actuary may choose an assumption based on the experience and expectations of the particular group of employees or of other plan sponsors in similar industries or locations.

The format of the assumption may be a single rate of increase for all employees, a scale that varies the increase with age and/or service, or a scale that varies by calendar, plan, or fiscal year. The use of a single rate or a rate that varies only by service may produce

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higher liabilities by overstating projected compensation for older employees who generally receive compensation increases that are lower percentages than younger employees. Separate scales may be appropriate for employees in different categories (e.g., union versus nonunion and salaried versus hourly), in different industries, job classifications, or geographic locations and on different components of compensation (e.g., bonus versus base).

The compensation scale may be developed by a building block approach with inflation, real wage growth, and merit scale components:

- *Inflation*: This component may be based on inflation expectations in the appropriate country applicable to the valuation. If multiple countries apply, then the actuary may consider separate inflation rates for plan participants in each country.
- *Real wage growth*: Factors influencing real wage growth include: real economic growth (typically stated as growth in real GDP per employed person, a result of productivity growth combined with various workforce parameters) and the share of total economic output expected to be devoted to wages.
- *Merit scale*: This item encompasses merit, promotional, and seniority-based increases. Such increases may be estimated from current data by comparing differences in compensation among employees in the current population. Comparing pay data grouped by age or service allows the actuary to identify past employer-specific influences due to these factors.

Historical data can also be used to calculate the past total compensation experience by comparing changes in compensation for individual employees, grouped by age and service, from one year to the next. The overall compensation scale assumption may be adjusted up or down to reflect varying expectations with regard to any of the above compensation elements.

If separate ranges of reasonable values are set for each separate component under the building block approach, it may not be appropriate to set the compensation scale assumption by simply combining the low endpoints and high endpoints of each range. This approach may produce an overly broad best-estimate range for the compensation scale assumption.

Employer-specific adjustments may be considered based on industry, region, or financial strength of the employer. However, it is generally not appropriate to assume that differences between the employer and the national economy continue indefinitely. Thus, the selection of a long-term compensation scale assumption should usually not be influenced by a short-term period of experience variation. Alternatively, a select and ultimate compensation scale may be developed to explicitly reflect both the expected short-term and long-term compensation patterns. In this regard, the purpose of the valuation may be a relevant consideration. For example, in a short-term projection of traditional unit credit normal cost, short-term expectations may be the most reasonable basis for the compensation scale selection.

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In plans covering only business owner(s) and a few other participants, the plan liability for the owner(s) may be significantly larger than the combined liabilities of the other participants. In such a case, it may be reasonable to base the entire plan's compensation scale on the expected compensation experience of the owner(s) if the impact on total plan liabilities of the difference in the compensation scale for the non-owner participants is relatively small. Alternatively, a separate compensation scale for the business owner(s) and the non-owner participants may be developed.

One element of testing the reasonableness of the total compensation scale assumption may be to compare it to historical data of year-over-year differences for individual employees by age and service. Another element of testing the reasonableness of the compensation scale assumption may be to compare the employer's overall expected payroll increase to the total projected payroll using the current population, adjusted for projected exits and new entrants, and the compensation scale assumption. Note that the compensation scale assumption usually exceeds the percentage increase in total payroll, unless the covered employee population is increasing significantly. This is because the merit component of the compensation scale assumption does not contribute to the increase in total payroll for the year for those employees exiting from the active population, and any new hires are generally lower-paid or less-senior.

Social Security

Increases in the Social Security Wage Base are usually based on inflation plus expected real wage increases for the national economy. Factors influencing real wage growth include: real economic growth (typically stated as growth in real GDP per employed person, a result of productivity growth combined with various workforce parameters) and the share of total economic output expected to be devoted to wages. There is no merit scale component. Therefore, the Social Security Wage Base assumption will typically be higher than the inflation assumption, but lower than the employer's overall compensation scale assumption.

Growth of Individual Account Balances

Plans with individual account balances, such as cash balance plans, may need an assumption for the future interest rate credited on the balances, unless there is a fixed percentage defined in the plan document. Plans with benefits otherwise dependent on individual account balances, such as floor-offset plans, may need an assumption for future investment earnings on the balances. See the discussion below on setting assumptions using a probability distribution or a stochastic analysis for floor-offset plans.

To develop the assumption for any future rate that is based on the yield of a fixed income investment (e.g., a 30-year Treasury), sources of data for setting the assumption may include current and historical yields for the investment. Other sources might also include current and historical yields on other fixed income securities and the relationship of those to the security in question. As with other assumptions, short- and long-term expectations

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may differ, so a select and ultimate approach may be appropriate. To develop the assumption for a return that varies with certain types of investments, the same procedures described in the practice note [*Selecting and Documenting Investment Return Assumptions*](#) may be used by assuming the entire portfolio consists of the applicable types of investments. More recent investment data than included in that practice note may be used (the Society of Actuaries' web site on investment statistics is one source for such data).

Variable Conversion Factors

Plans may need an assumption for the future interest rate used to convert account balances to annuities or to convert between different forms of annuities and for the future Internal Revenue Code §417(e) interest rate to compute minimum lump sum distributions. If the conversion rate is a fixed percentage defined in the plan document, then no assumption is needed and that fixed rate may be used in the calculations.

To develop the assumption for any future rate that is based on the yield of a fixed income investment (e.g., a 30-year Treasury), sources of data for setting the assumption may include current⁵ and historical yield rates for the investment. Sources of data might also include current and historical yields on other fixed income securities and the relationship of those to the security in question. As with other assumptions, short- and long-term expectations may differ, so a select and ultimate approach may be appropriate.

Cost-of-Living Adjustments (COLAs)

Plans may need an assumption for the future amount of COLAs applied to the benefits payable from the plan. Usually a plan bases the adjustment on the level of a specific cost-of-living index. In those cases, recent historical experience and future expectations of the changes in that particular index may be the most appropriate basis for setting the assumption. If an inflation component is part of any other economic assumptions used in the valuation, careful consideration may be given to whether those other assumptions are consistent with the cost-of-living adjustment assumption, particularly when different indices representing different segments of the economy are used for different assumptions.

Setting Assumptions for Floors, Ceilings, and Other Asymmetric Plan Provisions

For many common plan provisions, additional analysis may be appropriate when selecting some assumptions for a valuation in which variance in the assumption affects

⁵ In a valuation of a deferred lump sum option, under one approach an actuary might estimate an implicit future lump sum based on the forward rates implied by the current yield curve, without explicitly making an assumption about future interest rates. A fuller discussion of the potential uses and limitations of forward rates for valuing lump sum options is beyond the scope of this practice note. For more detail, and a discussion of approaches to valuing deferred lump sums, please refer to Valuation of Pension Obligations with Lump Sums, by Richard Q. Wendt in the December 2004 issue of The Pension Forum." <http://www.soa.org/library/newsletters/the-pension-forum/2004/december/pfn0412.pdf>.

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the plan benefits asymmetrically. Thus, approaches other than using the expected value might be considered if variance in one direction does not have approximately the same effect as the same variance in the other direction. In these cases, probability distributions, stochastic modeling or option-pricing techniques may be appropriate, either to value the benefits directly, or to develop an adjusted assumption that reflects the interaction of the asymmetric plan provision with the underlying economic phenomenon. Among others, cases where these techniques may be appropriate include:

- Valuing a floor-offset provision where the plan benefit is based on a comparison of a minimum defined benefit to a defined contribution account balance. For this type of provision, actuaries may also need to consider many additional issues that are beyond the scope of this practice note.
- Valuing a lump sum payment option based on the greater result of using both a fixed and variable rate. If, for example, the variable rate is expected to be less than the fixed rate, but may be higher than the fixed rate with a significant probability, alternatives might be considered to incorporate a value for the variable rate in excess of that obtained using only the fixed rate. A stochastic or probability analysis may be needed to assess the proportion of time and by what amount the variable rate calculation result is likely to fall above the fixed rate result.
- Valuing benefits that vary with a COLA that does not always vary by the same proportion of the change in the applicable index or is otherwise limited in certain ways. For example, special consideration is needed in valuing a benefit when (1) the benefit is increased by the lesser of the change in the applicable index or a fixed percentage, or (2) the benefit is increased by a certain percentage of the applicable index up to a certain amount and a different percentage of the index in excess of that certain amount. Additional considerations arise in situations where there is a cumulative or “catch-up” COLA (e.g., the lesser of CPI increases since retirement or 3 percent per year accumulated since retirement).
- Valuing cash balance plan provisions where the interest crediting rate is some interest rate or other economic index subject to a floor or ceiling.

To illustrate the approach to setting an assumption, consider the case of a plan that increases benefits in payment status each year by the amount that inflation for the prior year exceeds 3 percent. Suppose the actuary’s inflation assumption is 2.5 percent, but that expected yearly fluctuations in the level of general inflation are such that years when inflation exceeds 3 percent are expected to have a significant impact on the value of the benefit.

Based on stochastic modeling or other similar techniques, the actuary may determine that it is appropriate to assume that benefit payments will increase by an average of 0.5 percent annually. This does not imply that the overall inflation assumption should be considered to be increased to 3.5 percent (i.e., 3 percent plus 0.5 percent) instead of 2.5 percent. Rather, 0.5 percent is an additional valuation assumption (separate from, but affected by, the general inflation assumption) that the actuary has used to determine the value of expected future benefits payable under the plan.

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In this example, for purposes of assessing consistency among the economic assumptions, the applicable assumption is the general inflation assumption of 2.5 percent. In the disclosure of assumptions, the actuary may consider disclosing both the general inflation assumption (2.5 percent), and the assumption for the average long-term benefit increase expected to be granted under the plan (0.5 percent). The latter reflects the interaction of the general inflation assumption with the plan provisions.

A complete discussion of the techniques that may be used in these cases is beyond the scope of this practice note.

II. Demographic and Other Noneconomic Assumptions

General Impact of ASOP No. 35

The ASB originally adopted ASOP No. 35 in December 1999. The ASOP was revised in September 2007 to coordinate with the other standards providing guidance on key elements of measuring pension obligations. It provides that an “actuary should use professional judgment to estimate possible future outcomes based on past experience and future expectations, and select assumptions based upon application of that professional judgment.” It outlines a general process an actuary should follow for selecting a particular type of demographic assumption, including:

- Determine whether the use of the assumption is appropriate for the specific calculation;
- Consider the relevant assumption universe (e.g., published tables, plan experience, published studies, etc.) from which a specific assumption may be selected;
- Consider the assumption format (e.g., a table of rates or point estimate) appropriate to the specific situation and determine whether it is appropriate to use different assumptions for different segments of the covered population;
- Select the specific assumption from the relevant universe; and
- Evaluate the reasonableness of the selected assumption.

In general, an actuary need not follow this complete process at every measurement date for every assumption if, in the actuary’s professional judgment, previously selected assumptions continue to be reasonable. According to ASOP No. 35, a reasonable assumption is “one that is expected to appropriately model the contingency being measured and is not anticipated to produce significant cumulative actuarial gains and losses over the measurement period.” Each individual assumption selected by the actuary should satisfy the standard. However, the combined effect of all nonprescribed assumptions (including those not covered by this practice note) should be reasonable.

ASOP No. 35 applies not just when an actuary selects an assumption, but also when an actuary gives advice on selecting an assumption. In addition, ASOP No. 4 provides guidance on the actuary’s responsibility with regard to prescribed assumptions selected by a plan sponsor (such as employer-selected assumptions to comply with Statements of Financial Accounting Standards). ASOP Nos. 35 and 4 do not apply to mandated prescribed assumptions (such as the mortality assumption under Internal Revenue Code §430). Where a particular assumption is prescribed, ASOP No. 35 does not appear to authorize the actuary to select another assumption that would not satisfy the standard on its own in order to offset the effect of using the prescribed assumption. This appears to be true even when the actuary believes the prescribed assumption is unreasonable, unless the disclosure of deviation provisions of the standard are followed.

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A forecast valuation may require the use of multiple sets of actuarial assumptions. In addition to a set of assumptions for each future valuation date in the forecast period, other set(s) of assumptions may be necessary to appropriately project current data to future valuation periods. For example, a reasonable assumption for short-term expected retirements of current active participants during the period up to a future valuation date may be different than the actuary's current and/or future best-estimate long-term retirement age assumption (or the prescribed assumption, if applicable) used at the forecast valuation date.

More than one reasonable assumption may exist for measuring the same contingency. The actuary may select one, or may show the results using several reasonable assumptions to show the effect of the differences among the alternate assumptions.

As provided in ASOP No. 35, all demographic assumptions selected by the actuary should be consistent with each other over the measurement period, unless the assumption, considered individually, is not material. For example, if the employer's business is in decline and the actuary chooses to reflect that decline in the selection of the turnover assumption, then the selection of the retirement assumption should also reflect that decline. In addition, assumptions selected by the actuary need not be consistent with any prescribed assumptions, although if the differences are material, the actuary may want to consider additional disclosure or discussion of the differences.

Retirement

Use of a retirement assumption is generally appropriate for all types of calculations involving active employees or terminated employees who have not commenced receiving benefit payments. However, there are no published tables of retirement rates for different benefit eligibility provisions, especially taking into account different industry work conditions. So the actuary would generally choose an assumption based on the experience and expectations of the particular group of employees under the specific benefit eligibility provisions of the plan being valued and the industry work conditions.

The format of the assumption is generally a table of rates that vary by age. The table is applied when an employee is projected to have met the age and service requirements for retirement and/or commencement of benefit payments. Separate rates may be set for:

- The age at which benefit payments are expected to commence for active employees who terminate employment before retirement age,
- The age at which active employees are projected to retire directly from active employment and, for those employees, the age at which benefit payments are projected to commence. (The commencement age may be the same age or a later age than the age at exit from the active population.)
- The age at which benefit payments are expected to commence for previously terminated employees who have not yet elected to commence payments.

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Additionally, separate rates based on age and/or service may be applied to reflect special retirement eligibilities (e.g., “30 and out” and “rule of 80”). A point estimate of a single retirement age with 100 percent probability does not reflect differences in subsidized retirement benefits among various retirement ages, so it may not be appropriate in cases where these subsidized benefits exist or where plan changes to subsidized benefits are being measured.

The purpose of the valuation may also be a consideration in the selection of the assumption format. If the valuation is to project the amount and timing of benefit payments, using a table of rates that varies by the relevant factors affecting the expected timing of participants’ retirement may be critical to producing reasonable valuation results. However, if the valuation is to approximate a liability or future contribution level, it may not be as important to project the timing of benefit payments as long as the valuation produces a reasonable result for its purpose. If the valuation is being conducted to identify the cost of adding or changing a subsidized retirement benefit, consideration should be given, consistent with ASOP No. 35 Section 3.3.4(b), as to whether the retirement age assumption used to value the benefits after the change should be modified to reasonably reflect the change in expected retirement experience.

Depending on the purpose of the valuation, the use of a 100 percent probability of retirement at a single assumed retirement age rather than a series of retirement probabilities and ages may be reasonable if, for example, any of the following conditions is satisfied:

- Benefits payable at retirement ages other than the one assumed are not subsidized relative to the assumed retirement age and the funding period is not extended unreasonably. For example, a single, assumed retirement age that is approximately the average age at retirement, weighted by liability size, would likely satisfy this condition.
- Consistent with ASOP No. 35 Section 3.3.5(a), there is a reasonable expectation that the single, assumed retirement age will be selected by all or almost all of the plan members, weighted by liability size. For example, use of the owner’s expected retirement age in a two-person plan consisting of a long-service owner and a short-service administrative assistant would likely satisfy this condition.
- Actual plan experience indicates that a material number of retirements do not occur at other retirement ages. For example, a plan with benefits significantly more subsidized at one potential retirement age and nearly all plan participants are aware of that subsidy and actually retire at that age would likely satisfy this condition.

Several factors, some external to the pension plan, may influence an employee’s decision to retire at a particular age and may be considered when the actuary develops a retirement assumption. These factors include the pension plan design (including the level of benefits and payment options at early and late retirement ages), the design of the employer’s other benefit plans (including the eligibility age and amount of employer-subsidized retiree health and welfare benefits), and the design of other available benefits (e.g., the eligibility

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age and amount of Social Security and Medicare benefits). The actuary may find it reasonable to increase retirement rates at ages where subsidized benefits become available and reduce rates at ages immediately prior. Other employment-related factors may also affect retirement rates, such as physical requirements of the job and work environment and conditions.

In the short term, certain factors may influence the age when participants retire, such as recent significant gains or losses in the financial markets (e.g., through their impact on employees' savings balances) or the employer's financial condition. Consideration may also be given to whether it is more appropriate to assume employees retire sooner if the employer is experiencing significant financial hardship. However, in most cases it may not be appropriate to assume those short-term factors will affect the ages and rates of retirement over the long term. In these cases, the actuary may consider separate select and ultimate retirement assumptions.

For former employees who have not commenced payments, the existence of subsidized early retirement payments may make it more appropriate to use a retirement age assumption earlier than normal retirement age. Even if early retirement benefits are actuarially equivalent, it may be more appropriate to use a table of retirement rates rather than a point estimate for certain types of calculations (e.g., for a projection of plan benefit payments by year).

One approach to testing the retirement assumption against evolving experience compares the expected number of retirements by age and service categories to the actual number experienced in a year. Calculating the liability gain or loss by source is another reasonable approach. The results for one year may not be indicative of a need to update the assumption, but a consistent trend over a number of years may indicate the need for a change. The analysis may be adjusted for any unusual events, such as an early retirement window, during the study period. If most employees have not reached retirement age, it may not be possible to collect sufficient experience data to compare to the assumption until more time has passed. Retirement experience of similar companies (if available) may be useful when an employer's own experience is insufficient.

Termination of Employment

Use of a termination of employment assumption is generally appropriate for most types of calculations involving active employees. In certain cases of small employee populations, it may be reasonable not to use a termination of employment assumption. In certain other cases, the use of a turnover assumption that presumably reflects only non-vested turnover (or the use of no turnover assumption at all) may be reasonable if, for example, either of the following conditions is satisfied:

- Consistent with ASOP No. 35 Section 3.3.1 (last paragraph), the use of a termination of employment assumption for vested employees would not affect the results of the calculation (e.g., in the calculation of the present value of accrued benefits for a vested active employee if the values of the benefits payable for

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- future terminations and other types of decrements are all actuarially equivalent or in the calculation of projected annual benefit payments if the date payments commence is the same for terminations and other types of decrements); or
- Consistent with ASOP No. 35 Section 3.3.5(a), the small size of the pension plan population does not justify the use of a turnover assumption for longer-service members.

Published tables may provide a useful starting point for setting a termination of employment assumption. The 2003 Society of Actuaries Pension Plan Turnover Study⁶ was developed from pension plan experience data for the period 1995 to 2000. Another recent table is the “V-Table” by Roger Vaughn, which was published in The Proceedings of the Conference of Consulting Actuaries (1992, pages 525-535) and The Pension Forum (August 1992, pages 1-20). An older, now lesser used, set of tables is the Crocker, Sarason and Straight Tables (the “T-Tables”), which were published in The Actuary’s Pension Handbook in the 1950’s. The T-Tables provide a set of eleven age-based tables with varying levels of termination rates. They show a faster decline in termination rates as employees age compared to the tables based on more recent experience.

When plan-specific experience is not credible or available, actuaries may consider using the 2003 SOA Study or the V-Table instead of the T-Tables. When plan-specific experience is expected to be similar in level and pattern, use of any of these published tables, with appropriate adjustments, may be considered. Employment patterns may change over time, so the actuary may consider whether the patterns of termination underlying these tables may be expected to be reasonable for the current workforce. For valuations of existing plans or groups based on an older published table, the actuary may periodically review the plan experience to determine if the termination patterns underlying the table are reasonably consistent with actual past and expected future plan experience.

For larger plan populations, past plan experience may provide a credible starting point for selecting a termination of employment assumption. However, unusual events (e.g., layoffs or plant closings) or trends may be factored out of the experience if they are not expected to apply in future years.

Since termination rates generally vary by an employee’s length of service, the format of the assumption is usually a table of rates that vary by age and service of the employees. The format often includes a select period with higher termination rates for the first few years of service in combination with an ultimate table that varies only by age. The select rates may or may not vary by age depending on what is determined to be reasonable. Alternatively, a table of rates that varies only by age may be used. The use of an age-based, aggregate turnover assumption rather than one that is select and ultimate based on service (or age and service) may be reasonable if, for example, any of the following conditions is satisfied:

⁶ <http://www.soa.org/ccm/content/research-publications/research-projects/2003-soa-pension/>

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- There is insufficient data to justify the select period because the pension plan population is small; or
- Credible pension plan experience demonstrates that the use of a select period is not justified or, consistent with ASOP No. 35 Section 3.10.1, is immaterial; or
- The pension plan has been closed to new entrants for a number of years so that a select period is not necessary.

If short-service employees account for a significant portion of the overall termination experience, but an insignificant portion of the overall liability, their termination experience might be weighted less in the selection of an appropriate age-based table to avoid understating the overall liability of the plan.

Various situation-specific factors may be considered in selecting the appropriate assumption from the relevant assumption universe. Some factors may indicate a need to adjust the termination rates or use different rates for different groups of employees (e.g., union versus nonunion, male versus female). Among the employment-related factors that may affect termination rates are industry, occupation, unionization, employment policies and practices, work environment and conditions, employer's financial condition, availability of alternative employment, and location. Among the plan-related factors that may affect termination rates are vesting requirements, early retirement benefits and eligibility, disability benefits and eligibility, and availability of a lump sum payment.

As one test of the termination table against evolving experience, the actuary may first compute the probability of an employee continuing in service from a sample of age and/or service durations through retirement or a specified age. Then the actuary would compare these results with the age/service distribution of the current population to see if the assumption is plausible. For example, if the termination rates show that the probability of remaining in service from age 30 to age 60 is 5 percent, but the current population distribution includes a proportionately large group of active employees in their late fifties or early sixties with 30 or more years of service, the actuary may consider adjusting the assumed termination rates. This approach may only be reasonable if termination patterns have been historically consistent and, considering expected future hiring patterns, are not expected to differ materially in the future.

The termination of employment assumption may also be tested against evolving experience by comparing the expected number of terminations by age and service categories to the actual number experienced in a year. Calculating the liability gain or loss by source is another reasonable approach. The results for one year may not be indicative of a need to update the assumption, but a consistent trend over a number of years may indicate the need for a change. It may be appropriate to consider the experience over the course of a business cycle. The analysis may be adjusted for any unusual events during the study period, such as a layoff.

Disability Incidence and Recovery

For plans with a significant disability benefit, the actuary may determine that it is appropriate to use a disability incidence assumption. A separate mortality table for disabled employees may also be appropriate; see the practice note [Selecting and Documenting Mortality Assumptions](#) for further discussion of disabled employee mortality. If, for example, the plan requires continued disability monitoring and if the plan's definition of disability is not very restrictive, an assumption for rates of recovery may also be appropriate. If no special benefits are paid on disability or if the disability experience is not readily predictable (e.g., if the plan population is small), the actuary may determine it is appropriate not to use a separate disability assumption but rather to reflect any expected disabilities in the termination of employment and retirement assumptions.

Published incidence of disability tables are available, such as the Social Security Administration's *Death and Disability Life Table for Insured Workers* (Actuarial Note no. 2005.6), *Disability Insurance Program Worker Experience* (Actuarial Study No. 114), and *Trends in the Social Security and Supplemental Security Income Disability Programs* (Actuarial Study No. 118). Statistics for the Social Security and Railroad Retirement Systems are also available. The Society of Actuaries and the Conference of Consulting Actuaries have also published statistics on disability, such as *Incidence of Disability for U.S. Government Employees: 1988-1993* (SOA *Pension Section News*, April 1998).

Disability benefit eligibility definitions among plans may differ significantly, making it relatively easy for an individual with a certain condition to qualify for benefits in one plan while an individual with the same condition may find it difficult to qualify in another plan. Thus, when considering using a published table it may be necessary to consider the difference in eligibility definition underlying the source of the data in the published table versus the eligibility definition of the particular plan to be valued. When the plan population is sufficiently large, and the employer is able to provide reliable data regarding disabled participants, the disability assumptions may be based on the experience of the employee group. The format of the disability incidence assumption is usually a table of rates by age and possibly gender.

Various factors may be considered in developing a disability assumption for a specific case. More hazardous occupations and occupations with higher physical job demands may have higher rates of disability. The plan's definition of disability (e.g., inability to work at one's own occupation versus any occupation; eligibility for Social Security disability) may significantly affect the incidence and recovery rates. The level of disability benefits available may also have an impact (e.g., if benefits are small, employees may not file for disability; if benefits are large, employees may be more likely to apply for them and those already disabled may be less inclined to return to work). The amount and availability of benefits outside the pension plan, such as from Social Security or an employer's long-term disability plan, may affect the expected disability experience of the plan to be valued.

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One means of testing the disability assumption against evolving experience compares the actual number of disabilities to the expected, including grouping of ages and gender as appropriate for the available plan experience.

Optional Form of Benefit

In some pension plans, certain payment options that employees may elect are subsidized relative to the other available options. For employees with benefits that are limited by the Internal Revenue Code §415 limit, the qualified joint and survivor annuity may be subsidized since the §415 limit need not be reduced to the actuarial equivalent of the life annuity. If any of those subsidies are material, it may be appropriate to use an assumption that reflects how many employees are expected to select each of the various optional forms of payment.

The assumption that every participant will elect retirement under a certain, single form of payment may be reasonable in some cases, for example:

- If, consistent with ASOP No. 35 Sections 3.3.3(a) and 3.5.5(c), no optional form of payment is materially subsidized relative to the other available options (including the QJSA supplement for benefits at the §415 limit); or
- If, consistent with ASOP No. 35 Section 3.3.1(e), any subsidized option is available only to a small group of participants such that the impact of ignoring the subsidy is immaterial.

Even if all payment forms are actuarially equivalent, it may be more appropriate to use an optional form of benefit assumption rather than assume all employees elect the same payment form for certain types of calculations (e.g., for a projection of plan benefit payments by year) unless the assumption is not expected to materially affect the results of the calculations.

The actuarial profession has conducted no large-scale experience studies to develop tables of optional form of benefit election rates. Some of the available data, however, has been studied by research organizations and academics to analyze behavior such as the percentage of plan participants who elect lump sums under various types of plans, or the election of joint-and-survivor forms to provide spousal protection. The study of postretirement risk and its management is a burgeoning field, among both actuaries and other retirement professionals, and relevant studies of benefit election behavior could continue to become available.

The format of the assumption is generally a set of two or more rates for individual payment options or for groups of payment options totaling 100 percent. Separate rates may be set for (1) active employees expected to terminate from employment before retirement age, (2) active employees projected to retire directly from active employment, and (3) previously terminated employees who have not yet elected to commence payments.

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The actuary's assumption might have been developed with consideration of the benefit forms and commencement dates available under the plan, the degree to which each payment form is subsidized, and the historical and expected experience of elections under the plan. The actuary may also find it useful to look to the experience of other plans with similarly subsidized payment options. Consideration may also be given to changes made to the list of available options under the plan and changes in the factors used to determine the amount of the payments (e.g., changes in the required interest rate and mortality table to value lump sum benefits).

One means of testing the optional form of benefit assumption against evolving experience compares the expected percentage elected to the actual percentage elected by payment form.

Administrative Expenses

When administrative expenses paid from plan assets are material, it is appropriate to use an administrative expenses assumption. These expenses do not include benefit payments or lump sums paid to plan participants and their beneficiaries. As specified in ASOP No. 35, the expenses considered include investment advisory, investment management, insurance advisory, accounting, auditing, actuarial, plan administration, legal, and trustee services as well as PBGC premiums.

The actuary may choose an assumption based on the experience and expectations of the particular plan and type(s) of expenses. The format of the assumption may be a specified dollar amount, a specified percentage of plan assets, a percentage of benefit obligation or normal cost, or some combination of these. In the case of expenses related to the investment of plan assets, the format may be a specific (and explicitly disclosed) reduction in the investment return assumption.

The actuary may look to prior years' expense levels and plan sponsor expectations of future expenses in setting the administrative expenses assumption. Adjustments may be necessary to reflect past or future extraordinary expenses and changes in levels of service or in the plan sponsor's policy regarding which expenses are payable from the plan. Investment-related expenses may correlate with asset levels and plan administration expenses may correlate with number of plan participants. PBGC variable premiums for underfunded plans may change significantly from year to year, so frequent adjustment to the assumption may be appropriate. It also may be appropriate for the actuary to review the assumption each year to make these adjustments and to reflect changes in the cost of the various services.

Household Composition

Although it is not common, some plans may provide certain benefits that vary with the composition of the employee's family. For example, annuity death benefits may be payable to surviving children under a specified age. If the level of those benefits is

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material, it may be appropriate to use an assumption regarding the composition of the employee's household.

The actuary may choose an assumption based on the experience and expectations of the particular employee group or, in a small employer plan, of the key employee(s) expected to receive most of the applicable benefit. The format of the assumption may include an expected number of family members of each relevant type and an average age for each type.

Marriage, Divorce, Remarriage, and Age Difference

Many plans offer certain benefits to the spouse after the death of the employee. For these plans it may be appropriate to use assumptions regarding marriage, divorce, and remarriage. Generally, the actuary may set the assumption based on the past and expected future experience of the specific employee group or on the experience of similar groups. The format of the assumptions is usually a single amount for the percentage married of the entire employee group or a different percentage by gender and/or age. A fixed age difference between the employee and spouse or the husband and the wife is generally also assumed. In most cases, benefits in pay status are not affected by divorce or remarriage, so separate assumptions for divorce and remarriage may not be relevant. However, in cases where they are, a separate assumption may be used if the impact would be material.

Open Group

Actuaries providing accounting or funding valuations for private sector plans generally do not use assumptions to reflect future entrants to the plan. However, where such assumptions are permitted (for projections or modeling, for example, or for valuations in the public sector), assumptions regarding the number and characteristics of the new entrant population may be appropriate, depending on the purpose of the valuation. The assumptions may be based on the expectations of the employer (e.g., maintaining workforce size, expanding it, or contracting it) or, if past hiring practices are expected to continue, on the number and characteristics of recent new hires. The format of the assumptions is generally a number of new entrants per year broken down by other characteristics (e.g., age and compensation) relevant to benefit eligibility and/or benefit amount under the plan. In selecting the assumptions, consideration may be given to the expected overall growth of the employee population (i.e., is the population expected to increase, decrease, or remain stable over time) given the characteristics of the current workforce.

Hours of Service

For plans that base benefit accruals or employer contributions on hours of service worked by employees (or other units of production), it may be appropriate to use an "hours of service," "benefit accrual" and/or "contribution income" assumption. Such assumptions are usually developed from recent plan or industry experience and plan sponsor expectations for anticipated industry activity.

Transfers and Return to Employment

For plans that allow transfers between categories of employment, assumptions as to the timing, frequency, and demographic characteristics of such transfers may sometimes be appropriate, if expected to materially affect the results of the valuation. Consideration may be given to both the frequency and direction of the transfer. For example, experience may show that employees transfer from hourly to salaried status with some frequency, but rarely transfer back from salaried to hourly status.

For plans where re-hires of former employees have been or are expected to be significant, assumptions as to the timing, frequency, and demographic characteristics of such re-hires may sometimes be appropriate.

Unpredictable Contingent Event Benefits

Consideration may be given to whether an assumption should be made to reflect the probability of payment of a benefit that is contingent on an event that is not reasonably and reliably predictable. An example of such a benefit is a plan provision for payments to plan participants who would be actively employed at a plant in the event of a permanent shutdown beyond the payments that would otherwise be made under the plan at their termination of employment or retirement. Whether an assumption should be made and how such an assumption would reasonably be determined are the judgment of the actuary based on the specific provisions of the plan, the condition of the plan sponsor, and the purpose of the calculations. The relevant considerations and implications can be complex and are beyond the scope of this practice note.

III. Disclosure and Documentation

Required disclosures about the assumptions in pension actuarial communications are described in ASOP Nos. 4, 27, 35, and 41, and generally include the following:

- Specific information about each material assumption that was used in the measurement so that another actuary reading the communication has sufficient information to make an assessment about the level and pattern of the rates and the reasonableness of the work;
- Discussion of any material changes in assumptions from the previous measurement, including a description of the changes and their general effects, in words or numerically, if appropriate;
- Discussion of any significant events that have happened since the date of the measurement that would have materially changed any of the assumptions, including the likely effect;
- Identification of any prescribed assumptions, including their sources;
- Identification of any prescribed assumptions selected by a plan sponsor that significantly conflict with what the actuary judges to be reasonable for the purpose of the measurement (note that for this purpose, a reasonable assumption is not limited to what the actuary would have selected as his/her best estimate);
- Identification of any prescribed assumptions selected by a plan sponsor that the actuary is unable to evaluate for reasonableness; and
- Discussion of any deviation from the procedures in an applicable ASOP, including the nature, rationale, and effect of the deviation.

For some purposes, the actuary might also disclose other information. For example, to provide information needed by an auditor, the actuary might disclose the source of and support for the selection of the assumptions (e.g., “based on the plan’s experience from 2005-2008”).

The actuarial assumptions used should be reviewed at the time of each actuarial valuation in accordance with ASOP No. 35, Section 3.9.

A complete assumption study is not required at the time of each valuation. However, many actuaries conduct and document an analysis of actual plan experience versus the assumptions used in the current or most recent prior valuations every three to five years. Alternatively, some assumptions may be reviewed more frequently, but less rigorously, with a more thorough analysis conducted if the results of the basic analysis indicate that the experience may be deviating from the assumption.

For large employer plans, the analysis of actual experience may cover those assumptions (typically, the retirement, termination and compensation scale assumptions) for which a significant amount of new, credible experience can be obtained. In addition to the assumptions examined for recent past experience, all assumptions may be examined with respect to changes, if any, in reasonable expectations of future experience or with respect to actual experience collected over a longer period of time. For small employer plans

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where credible experience cannot be obtained, a comparison of the assumptions to past experience may not be useful.

Special events (e.g., pension plan changes, retiree health plan changes, human resource policy changes, plan spin-offs or mergers) may trigger a need for an additional review and documentation of the selection of actuarial assumptions. The actuary may consider whether the occurrence of the event could significantly alter the future experience of the plan and whether any assumption changes are warranted to better reflect that future experience.

The actuary may also want to document the assumption selection in internal workpapers. This documentation may describe the assumptions selected for the valuation, the process used to review the assumptions, the results of any experience or gain/loss analysis, the impact of any special events, the impact of any assumption changes, and the basis for the selection of the assumptions used in the valuation.