ACTUARIAL STANDARDS BOARD

● **EXPOSURE DRAFT** ●

Actuarial Standard of Practice No. 27

Selection of Assumptions for Measuring Pension Obligations

Comment Deadline: June 15, 2023

Developed by the Pension Committee of the Actuarial Standards Board

Approved for Exposure by the Actuarial Standards Board December 2022

TABLE OF CONTENTS

APPENDIX

December 2022

TO: Members of Actuarial Organizations Governed by the Standards of Practice of the Actuarial Standards Board and Other Persons Interested in the Selection of Assumptions for Measuring Pension Obligations

FROM: Actuarial Standards Board (ASB)

SUBJ: Proposed Revision of Actuarial Standard of Practice (ASOP) No. 27 and repeal of ASOP No. 35

This document contains the exposure draft of a proposed revision of ASOP No. 27, now titled *Selection of Assumptions for Measuring Pension Obligations*. Please review this exposure draft and give the ASB the benefit of your comments and suggestions. Each written comment letter or email received by the comment deadline will receive consideration by the drafting committee and the ASB.

The ASB appreciates comments and suggestions on all areas of this proposed standard. The ASB requests comments be provided using the Comments Template that can be found here and submitted electronically to **comments@actuary.org**. Include the phrase "ASOP No. 27 COMMENTS" in the subject line of your message. Also, please indicate in the template whether your comments are being submitted on your own behalf or on behalf of a company.

The ASB posts all signed comments received on its website to encourage transparency and dialogue. Comments received after the deadline may not be considered. Anonymous comments will not be considered by the ASB nor posted on the website. Comments will be posted in the order that they are received. The ASB disclaims any responsibility for the content of the comments, which are solely the responsibility of those who submit them.

For more information on the exposure process, please see the ASB Procedures Manual.

Deadline for receipt of comments: **June 15, 2023**

History of the Standard

The ASB provides guidance for measuring pension and retiree group benefit obligations through the series of ASOPs listed below.

1. ASOP No. 4, *Measuring Pension Obligations and Determining Pension Plan Costs or Contributions*;

2. ASOP No. 6, *Measuring Retiree Group Benefits Obligations and Determining Retiree Group Benefits Program Periodic Costs or Actuarially Determined Contributions*;

3. ASOP No. 27, *Selection of Economic Assumptions for Measuring Pension Obligations*;

4. ASOP No. 35, *Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations*;

5. ASOP No. 44, *Selection and Use of Asset Valuation Methods for Pension Valuations*; and

6. ASOP No. 51, *Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions*.

ASOP No. 27 was first adopted in December 1996 to expand upon the guidance on assumptions in ASOP No. 4, in response to the passage of rules and regulations that made it clear that more detailed guidance was needed. ASOP No. 35 was first adopted in December 1999 as the next step in expanding the guidance on assumptions in ASOP No. 4.

In September 2007, ASOP Nos. 27 and 35 were revised to resolve a conflict with the revision of ASOP No. 4 in the treatment of prescribed assumptions selected by the plan sponsor.

In September 2010, ASOP No. 35 was revised to provide additional guidance on the selection and disclosure of assumptions for future mortality improvement.

In September 2013, ASOP No. 27 was revised to incorporate financial economic concepts, to change the criteria for a reasonable assumption away from the best-estimate range, to require disclosure of rationale for assumptions selected, and to distinguish between assumptions prescribed by law and assumptions prescribed by another party. In September 2014, ASOP No. 35 was revised to accomplish the same objectives.

In June 2020, ASOP Nos. 27 and 35 were both revised to expand the scope, provide additional guidance on the combined effect of assumptions, provide guidance on assessing assumptions not selected by the actuary, and to modify the required disclosure of rationale for assumptions selected.

Throughout the past few revisions, the ASB has adopted identical language in ASOP Nos. 27 and 35 where practical and improved the similarity of layout and structure to simplify the overall guidance. The final step in this simplification is to combine the two current pension assumption ASOP Nos. 27 and 35 into one. When the proposed revision to ASOP No. 27 is adopted as the single assumption standard for pensions, ASOP No. 35 will be repealed. The ASB generally attempted to avoid changing the current guidance in both ASOPs except when the two standards took different approaches to the assumption selection framework.

Notable Changes from the Existing Standards

Notable changes made to the existing standards are summarized below. Additional changes were made to improve readability, clarity, or consistency.

1. In general, references to “economic assumptions” or “demographic assumptions” were changed to “assumptions” throughout the standard. Similarly, discussions about

economic assumptions or demographic assumptions were generally changed to refer to all actuarial assumptions throughout.

2. The definitions in sections 2.4, Merit Adjustments, and section 2.7, Productivity Growth, were deemed unnecessary and were deleted. The guidance referring to these terms is unchanged. Some definitions from ASOP No. 35 were not incorporated into ASOP No. 27 including sections 2.1, Assumption Format; and section 2.2, Assumption Universe. The guidance from ASOP No. 35 on these definitions was incorporated into this standard as appropriate.

3. Section 3.3, General Selection Process, has been moved to section 3.2 and renamed Assumption Selection Process. In addition, this section was modified to incorporate certain guidance from ASOP No. 35 from section 3.2, Demographic Assumption Selection Process, as appropriate.

4. The assumption universe concept in ASOP No. 35 was deemed unnecessary and was deleted in this draft.

5. Section 3.4, Relevant Data, was renumbered 3.4.1, renamed Relevant Information, and updated to incorporate certain guidance from ASOP No. 35, section 3.2.2, Consider the Relevant Assumption Universe, and section 3.2.4, Select the Specific Assumption, as appropriate.

6. Section 3.4.4, Format, was added to incorporate certain guidance from ASOP No. 35, section 3.2.3, Consider Assumption Formats.

7. Section 3.5.6, Other Sources of Economic Data and Analyses, was deleted.

8. Sections 3.10, Selecting a Retirement Assumption; 3.11, Selecting a Termination Assumption; 3.12, Selecting a Mortality Assumption; 3.13, Selecting a Mortality Improvement Assumption; 3.14, Selecting Disability and Disability Recovery Assumptions; 3.15, Selecting Election of Optional Form of Benefit Assumptions; and 3.16, Expenses Paid from Plan Assets, were added to incorporate certain guidance from subsections of ASOP No. 35, section 3.4, Specific Considerations.

9. Section 3.11, Selecting Other Economic Assumptions (now Selecting Other Assumptions), was moved to section 3.17 and modified to incorporate certain guidance from ASOP No. 35, section 3.5, Other Demographic Assumptions.

10. Sections 3.22, Reliance on Others for Data, Projections, and Supporting Analysis; 3.23, Reliance on Another Actuary; and 3.24, Reliance on Expertise of Others, was added to align with standard ASB guidance.

11. Section 3.25, Documentation was modified to align with standard ASB guidance.

Request for Comments

The ASB appreciates comments and suggestions on all areas of this proposed standard submitted through the Comments Template. Rationale and recommended wording for any suggested changes would be helpful.

In addition, the ASB would like to draw the readers' attention to the following questions:

1. The consolidation of ASOP Nos. 27 and 35 is not intended to substantively change the guidance. Has the conversion achieved this goal? If not, please explain or provide examples.

2. Will the deletion of guidance about the assumption universe affect practice? If so, please explain or provide examples.

The ASB voted in December 2022 to approve this exposure draft.

Pension Committee of the ASB

David T. Kausch, Chairperson

Benjamin Ablin
Michael S. Clark
Sarah E. Dam
Mark T. Dungan
Julie M. Ferguson
Howard A. Freidin
Stephen T. McElhaney
Keith L. Nichols
Matthew M. Smith

Actuarial Standards Board

Darrell D. Knapp, Chairperson

Elizabeth K. Brill
Robert M. Damler
Kevin M. Dyke
Laura A. Hanson
David E. Neve
Christopher F. Noble
Judy K. Stromback
Patrick B. Woods

The Actuarial Standards Board (ASB) sets standards for appropriate actuarial practice in the United States through the development and promulgation of Actuarial Standards of Practice (ASOPs). These ASOPs describe the procedures an actuary should follow when performing actuarial services and identify what the actuary should disclose when communicating the results of those services.

PROPOSED REVISION OF ACTUARIAL STANDARD OF PRACTICE NO. 27

SELECTION OF ASSUMPTIONS FOR MEASURING PENSION OBLIGATIONS

STANDARD OF PRACTICE

Section 1. Purpose, Scope, Cross References, and Effective Date

1.1 Purpose—This actuarial standard of practice (ASOP or standard) provides guidance to actuaries when performing actuarial services that involve selecting assumptions, including giving advice on selecting assumptions, for measuring defined benefit pension plan obligations.

1.2 Scope—This standard applies to actuaries when performing actuarial services that include selecting assumptions used in the actuary's measurement of defined benefit pension plan obligations, other than obligations of social insurance programs that are within the scope of ASOP No. 32, *Social Insurance*, unless ASOP No. 32 explicitly calls for application of this standard. Measurements of defined benefit pension plan obligations include calculations such as funding valuations or other assignment of plan costs to time periods, liability measurements or other actuarial present value calculations, and cash flow projections or other estimates of the magnitude of future plan obligations. Measurements of pension obligations do not generally include individual benefit calculations, individual benefit statement estimates, or nondiscrimination testing.

Throughout this standard, any reference to selecting assumptions also includes giving advice on selecting assumptions. For example, the actuary may provide advice on selecting assumptions under US GAAP or Governmental Accounting Standards even though another party is ultimately responsible for selecting these assumptions. This standard applies to actuaries rendering advice in such situations, within the constraints imposed by the relevant accounting standards.

This standard only applies to the extent of the actuary's responsibilities. The actuary's responsibilities may extend to measuring obligations for a defined benefit pension plan or may be limited to giving advice on selecting specific assumptions.

As discussed in ASOP No. 41, *Actuarial Communications*, an assumption may be selected by the actuary or selected by another party. Nothing in this standard is intended to require the actuary to select an assumption that has otherwise been selected by another party. When an assumption is not selected by the actuary, the guidance in section 3.20 and section 4 concerning assessment and disclosure, respectively, applies.

If the actuary determines that the guidance in this standard conflicts with ASOP Nos. 4 or 6, ASOP Nos. 4 or 6 will govern.

If a conflict exists between this standard and applicable law (statutes, regulations, and other legally binding authority), the actuary should comply with applicable law. If the actuary departs from the guidance set forth in this standard in order to comply with applicable law or for any other reason the actuary deems appropriate, the actuary should refer to section 4.

1.3 Cross References—When this standard refers to the provisions of other documents, the reference includes the referenced documents as they may be amended or restated in the future, and any successor to them, by whatever name called. If any amended or restated document differs materially from the originally referenced document, the actuary should consider the guidance in this standard to the extent it is applicable and appropriate.

1.4 Effective Date—This standard is effective for any actuarial report issued on or after four months after adoption of this standard.

Section 2. Definitions

The terms below are defined for use in this standard and appear in bold throughout the ASOP.

2.1 Inflation—General economic **inflation**, defined as price changes over the whole of the economy.

2.2 Measurement Date—The date as of which the values of the pension obligations and, if applicable, assets are determined.

2.3 Measurement Period—The period subsequent to the **measurement date** during which a particular assumption will apply in a given measurement.

2.4 Prescribed Assumption or Method Set by Another Party—A specific assumption or method that is selected by another party, to the extent that law, regulation, or accounting standards give the other party responsibility for selecting such an assumption or method. For this purpose, an assumption or method selected by a governmental entity for a plan that such governmental entity or a political subdivision of that entity directly or indirectly sponsors is a **prescribed assumption or method set by another party**.

2.5 Prescribed Assumption or Method Set by Law—A specific assumption or method that is mandated or that is selected from a specified range or set of assumptions or methods that is deemed to be acceptable by applicable law. For this purpose, an assumption or method selected by a governmental entity for a plan that such governmental entity or a political subdivision of that entity directly or indirectly sponsors is not a **prescribed assumption or method set by law**.

Section 3. Analysis of Issues and Recommended Practices

3.1 Overview—Pension obligation values incorporate assumptions about pension payment commencement, duration, and amount. Pension obligation values also require discount rates to convert future expected payments into present values. In order to measure a pension obligation, the actuary will typically need to select or assess assumptions underlying the obligation.

3.2 Assumption Selection Process—The actuary should follow the process below for selecting assumptions. The actuary should follow the guidance in section 3.19 when considering the retention of assumptions that were previously selected by the actuary.

a. identify the types of assumptions used in the measurement (section 3.3);

b. take into account other general considerations, when applicable (section 3.4); and

c. select a reasonable assumption (section 3.5).

After completing these steps for each assumption, the actuary should review the set of assumptions for consistency (section 3.18) and make appropriate adjustments if necessary.

3.3 Identification of Types of Assumptions Used in the Measurement—The actuary should identify the types of assumptions to use for a specific measurement. In doing so, the actuary should take into account the following:

a. the purpose of the measurement;

b. the plan provisions or benefits and factors that will affect the timing and value of any potential benefit payments;

c. the characteristics of the obligation to be measured (such as **measurement period**, pattern of plan payments over time, open or closed group, significance, and volatility);

d. the contingencies that give rise to benefits or result in loss of benefits; and

e. the characteristics of the covered group.

The types of assumptions used to measure pension obligations may include the following:

1. **inflation**;

2. investment return;

3. discount rate;

4. compensation increase;

5. retirement;

6. termination of employment;

7. mortality and mortality improvement;

8. disability and disability recovery;

9. election of optional form of benefit;

10. expenses paid from plan assets; and

11. other assumptions such as Social Security; cost-of-living adjustments; rate of payroll growth; growth of individual account balances; variable conversion factors; household composition; marriage, divorce, and remarriage; open group; hours of service; transfers and return to employment; and missing or incomplete census data.

Not every contingency requires a separate assumption. For example, for a plan that is expected to provide benefits of equal value to employees who voluntarily terminate employment or become disabled, retire, or die, the actuary may use an assumption that reflects some or all of the above contingencies in combination rather than selecting a separate assumption for each.

3.4 General Considerations—The following are general considerations for the actuary when selecting assumptions.

3.4.1 Relevant Information—The actuary should review relevant recent and long-term historical data and evaluate its appropriateness for use in setting assumptions. The actuary should take into account the possibility that some historical data may not be appropriate for use in developing assumptions for future periods due to changes in the underlying environment.

Sources of information relevant to assumptions may include the following:

a. experience studies or published tables based on experience under uninsured plans and annuity contracts, or based on any other populations considered representative of the group at hand;

b. relevant plan or plan sponsor experience, which may include analyses of gains or losses by source;

c. studies or reports of the effects of plan design, specific events (for example, shutdown), economic conditions, or sponsor characteristics on the assumption under consideration;

d. studies or reports of general trends relevant to the type of assumption in question (for example, mortality improvement in the United States); and

e. relevant information from the plan sponsor or other sources about future expectations (for example, capital market expectations, economic conditions of the area or industry, availability of alternative employment, or the human resources practices of the employer).

Experience of the covered group or other groups with similar characteristics may be useful in forming a judgment about future expectations. However, the actuary should not give undue weight to experience that is not sufficiently credible. For example, in small plans or recently formed plan sponsors, industry or national data may provide a more appropriate basis for developing assumptions. The actuary should refer to ASOP No. 25, *Credibility Procedures*, for additional guidance.

In addition, the actuary should not give undue weight to experience that may not be relevant to future expectations. For example, if recent rates of termination and retirement were largely attributable to a one-time workforce reduction, it may be unreasonable to assume that such rates will continue over the **measurement period**.

Although the actuary may incorporate relevant information from the plan sponsor and other sources, the selection of or advice on assumptions should reflect the actuary's professional judgment.

3.4.2 Adverse Deviation or Plan Provisions That Are Difficult to Measure—Depending on the purpose of the measurement, the actuary may determine that it is appropriate to adjust the assumptions to provide for adverse deviation or reflect plan provisions that are difficult to measure.

3.4.3 Materiality—The actuary should take into account the balance between refined assumptions and materiality. The actuary is not required to use a particular type of assumption or to select a more refined assumption when in the actuary's professional judgment such use or selection is not expected to produce materially different results. In some instances, materiality may depend on the purpose and nature of the measurement. For example, a cash flow projection may require more refined assumptions than a liability measure.

The actuary may take into account the balance between refined assumptions that have increased potential to model anticipated plan experience and the cost of using refined assumptions.

3.4.4 Format—The actuary should take into account the degree to which a parameter (such as gender, age, service, or calendar year) is anticipated to affect experience. In many situations it is appropriate for the assumption format to include assumptions for different segments of the covered population. For example, it may be appropriate to have different mortality or turnover tables for salaried and hourly employees.

3.4.5 Rounding—Taking into account the purpose of the measurement, significance, and the cost of using refined assumptions, the actuary may determine that it is appropriate to apply a rounding technique to the selected assumption. In such cases, the rounding technique should be unbiased.

3.4.6 Changes in Circumstances—The actuary should select assumptions that reflect the actuary's knowledge as of the **measurement date**. If the actuary learns of an event occurring after the **measurement date** (for example, plan termination, death of the principal owner, or collective bargaining agreement ratification) that would have changed the actuary's selection of an assumption, the actuary may reflect this change as of the **measurement date**, if appropriate for the purpose of the measurement.

3.5 Selecting a Reasonable Assumption—The actuary should use professional judgment to select reasonable assumptions. For this purpose, an assumption is reasonable if it satisfies the following criteria:

a. it is appropriate for the purpose of the measurement;

b. it reflects current and historical data that is relevant to selecting the assumption for the **measurement date**, to the extent such relevant data is reasonably available;

c. it reflects the actuary's estimate of future experience, the actuary's observation of the estimates inherent in market data (if any), or a combination thereof; and

d. it is expected to have no significant bias (i.e., it is not significantly optimistic or pessimistic), except when provisions for adverse deviation or plan provisions that are difficult to measure are included (as discussed in section 3.4.2) or when alternative assumptions are used for the assessment of risk, in accordance with ASOP No. 51, *Assessment and Disclosure of Risk Associated with Measuring Pension Obligations and Determining Pension Plan Contributions*.

3.5.1 Reasonable Assumption Based on Future Experience or Market Data—The actuary should develop a reasonable assumption based on the actuary's estimate of future experience, the actuary's observation of the estimates inherent in market data, or a combination thereof. Examples of how the actuary may observe estimates inherent in market data include the following:

a. comparing yields on **inflation**-indexed bonds to yields on equivalent non-**inflation**-indexed bonds as a part of estimating the market's expectation of future **inflation**;

b. comparing yields on bonds of different credit quality to determine market credit spreads;

c. observing yields on U.S. Treasury debt of various maturities to determine a yield curve free of credit risk; and

d. examining annuity prices to estimate the market price to settle pension obligations.

The items listed above, as well as other market observations or prices, include estimates of future experience as well as other considerations. For example, the difference in yields between **inflation**-linked and non-**inflation**-linked bonds may include premiums for liquidity and future **inflation** risk in addition to an estimate of future **inflation**. The actuary may want to adjust estimates based on observations to reflect the various risk premiums and other factors (such as supply and demand for tradable bond or debt securities) that might be reflected in market pricing.

3.5.2 Range of Reasonable Assumptions—The actuary may conclude that several different assumptions satisfy the criteria to be reasonable for a given measurement. Different actuaries will apply different professional judgment and may choose different reasonable assumptions. As a result, a range of reasonable assumptions may develop, both for an individual actuary and across actuarial practice.

3.5.3 Combined Effect of Assumptions—The actuary should select assumptions such that the combined effect of the assumptions selected by the actuary is expected to have no significant bias (i.e., it is not significantly optimistic or pessimistic) except when provisions for adverse deviation or plan provisions that are difficult to measure are included (as discussed in section 3.4.2), or when alternative assumptions are used for the assessment of risk, in accordance with ASOP No. 51.

For example, the actuary may have decided not to make any assumption with regard to four different types of future events, each of which alone is immaterial. However, the effect of omitting assumptions for all four types of future events may be a material understatement or overstatement of the measurement results. In these circumstances, the assumptions should be revised.

3.6 Selecting an Inflation Assumption—When selecting an **inflation** assumption as an independent assumption or as an explicit component of other economic assumptions, the actuary should take into account the following:

3.6.1 Data—The actuary should evaluate appropriate **inflation** data. These data may include consumer price indices, the implicit price deflator, forecasts of **inflation**,

yields on government securities of various maturities, and yields on nominal and **inflation**-indexed debt.

3.6.2 Select and Ultimate Inflation Rates—The actuary may assume select and ultimate **inflation** rates in lieu of a single **inflation** rate. Select and ultimate **inflation** rates vary by period from the **measurement date** (for example, **inflation** of x% for the first 5 years following the **measurement date** and y% thereafter).

3.7 Selecting an Investment Return Assumption—When selecting an investment return assumption, the actuary should reflect the anticipated returns on the plan's current assets and, if appropriate for the measurement, anticipated returns on the plan's future assets. The actuary may take into account various factors including, but not limited to, the time value of money; **inflation** and **inflation** risk; illiquidity; credit risk; macroeconomic conditions; and growth in earnings, dividends, and rents. In developing a reasonable assumption for these factors and in combining the factors to develop the investment return assumption, the actuary may take into account a broad range of data and other inputs, including the judgment of investment professionals.

3.7.1 Data—The actuary should evaluate appropriate investment data. These data may include the following:

a. current yields to maturity of fixed income securities such as government securities and corporate bonds;

b. forecasts of **inflation**, GDP growth, and total returns for each asset class; and

c. historical and current investment data including, but not limited to, real and nominal returns, the **inflation** and **inflation** risk components implicit in the yield of **inflation**-protected securities, dividend yields, earnings yields, and real estate capitalization rates.

The actuary may also take into account historical and current statistical data showing standard deviations, correlations, and other statistical measures related to historical or future expected returns of each asset class and to **inflation**. The actuary may use stochastic simulation models or other analyses to develop expected investment returns from this statistical data.

3.7.2 Components of the Investment Return Assumption—When the actuary is developing an investment return assumption by combining two or more components or factors, the actuary should confirm that the combination of these components or factors is logically consistent.

3.7.3 Measurement-Specific Considerations—The actuary should take into account factors specific to each measurement in selecting an investment return assumption. Such factors may include the following:

a. Investment Policy—The plan's investment policy may include the following: (i) the current allocation of the plan's assets; (ii) types of securities eligible to be held (diversification, marketability, social investing philosophy, etc.); (iii) a stationary or dynamic target allocation of plan assets among different classes of securities; and (iv) permissible ranges for each asset class within which the investment manager is authorized to make investment decisions. If the actuary takes into account the investment policy in selecting an investment return assumption, the actuary should consider reflecting whether the current investment policy is expected to change during the **measurement period**.

b. Effect of Reinvestment—Two reinvestment risks are associated with traditional, fixed income securities: (i) reinvestment of interest and normal maturity values not immediately required to pay plan benefits, and (ii) reinvestment of the entire proceeds of a security that has been called by the issuer.

c. Investment Volatility—Plans investing heavily in those asset classes characterized by high variability of returns may be required to liquidate those assets at depressed values to meet benefit obligations. Other investment risks may also be present, such as default risk or the risk of bankruptcy of the issuer.

d. Investment Manager Performance—Anticipating superior (or inferior) investment manager performance may be unduly optimistic (or pessimistic). The actuary should not assume that superior or inferior returns will be achieved, net of investment expenses, from an active investment management strategy compared to a passive investment management strategy unless the actuary believes, based on relevant supporting data, that such superior or inferior returns represent a reasonable expectation over the **measurement period**.

e. Expenses Paid from Plan Assets—Investment and other administrative expenses may be paid from plan assets. To the extent such expenses are not otherwise recognized, the actuary should reduce the investment return assumption to reflect these expenses (see section 3.16).

f. Cash Flow Timing—The timing of expected contributions and benefit payments may affect the plan's liquidity needs and investment opportunities.

g. Benefit Volatility—Benefit volatility may be a primary factor for small plans with unpredictable benefit payment patterns. It may also be an important factor for a plan of any size that provides highly subsidized early retirement benefits, lump-sum benefits, or supplemental benefits triggered

by corporate restructuring or financial distress. In such plans, the untimely liquidation of securities at depressed values may be required to meet benefit obligations.

h. Expected Plan Termination—In some situations, the actuary may expect the plan to be terminated at a determinable date. For example, the actuary may expect a plan to terminate when the owner retires, or a frozen plan to terminate when assets are sufficient to provide all accumulated plan benefits. In these situations, the actuary may select an investment return assumption that reflects a shortened **measurement period** that ends at the expected termination date.

i. Tax Status of the Funding Vehicle—If the plan's assets are not kept in a tax-exempt fund, income taxes may reduce the plan's investment return. Taxes may be reflected by an explicit reduction in the total investment return assumption or by a separately identified assumption.

j. Forward-Looking Expected Investment Returns—In some instances, the actuary will collect or develop forward-looking expected investment returns by asset class or for the entire portfolio. The actuary should take appropriate steps to determine the time horizon, the price **inflation**, and the expenses reflected in the expected returns. In addition, the actuary should take steps to determine the type of forward-looking expected returns (i.e., forward-looking expected geometric returns or forward-looking expected arithmetic returns) and that they are used appropriately.

3.7.4 Multiple Investment Return Rates—The actuary may assume multiple investment return rates in lieu of a single investment return rate. Multiple investment return rates may include the following:

a. Select and Ultimate Investment Return Rates—Assumed investment return rates vary by period from the **measurement date** (for example, returns of x% for the first 10 years following the **measurement date** and y% thereafter). When assuming select and ultimate investment return rates, the actuary should consider reflecting the relationships among **inflation**, interest rates, and market appreciation or depreciation.

b. Benefit Payments Covered by Designated Current or Projected Assets—The actuary may assume one investment return rate for benefit payments covered by designated current or projected plan assets on the **measurement date** and a different investment return rate for the balance of the benefit payments and assets.

3.8 Selecting a Discount Rate—A discount rate may be a single rate or a series of rates, such as a yield curve. The actuary should take into account the purpose of the measurement as

a primary factor in selecting a discount rate. Measurement purposes may include the following:

a. Contribution Budgeting—An actuary evaluating the sufficiency of a plan's contribution policy may choose among several discount rates. The actuary may use a discount rate that reflects the anticipated investment return from the pension fund. Alternatively, the actuary may use a discount rate appropriate for defeasance, settlement, or market-consistent measurements.

b. Defeasance or Settlement—An actuary measuring a plan's present value of benefits on a defeasance or settlement basis may use a discount rate implicit in annuity prices or other defeasance or settlement options.

c. Market-Consistent Measurements—An actuary making a market-consistent measurement may use a discount rate implicit in the price at which benefits that are expected to be paid in the future would trade in an open market between a knowledgeable seller and a knowledgeable buyer. In some instances, that discount rate may be approximated by market yields for a hypothetical bond portfolio whose cash flows reasonably match the pattern of benefits expected to be paid in the future. The type and quality of bonds in the hypothetical portfolio may depend on the particular type of market-consistent measurement.

The present value of expected future pension payments may be calculated from the perspective of different parties, recognizing that different parties may have different measurement purposes. For example, the present value of expected future payments could be calculated from the perspective of an outside creditor or the entity responsible for funding the plan. The outside creditor may desire a discount rate consistent with other measurements of importance to the creditor even though those other measurements may have little or no importance to the entity funding the plan.

3.9 Selecting a Compensation Increase Assumption—Compensation is a factor in determining participants' benefits in many pension plans. Also, some actuarial cost methods take into account the present value of future compensation. Generally, a participant's compensation will increase over the long term in accordance with **inflation**, productivity growth (i.e., the change in the real value of goods or services per unit of work), and merit adjustments (i.e., changes attributable to personal performance, promotion, seniority, or other individual factors). The assumption used to measure the anticipated year-to-year change in compensation is referred to as the compensation increase assumption. In certain circumstances, such as a temporary reduction or freeze in compensation, the compensation increase assumption may be negative or zero.

3.9.1 Data—The actuary should evaluate available compensation data. Compensation data may include the following:

a. the plan sponsor's current compensation practice and any anticipated changes in this practice;

b. current compensation distributions by age or service;

c. historical compensation increases and practices of the plan sponsor and other plan sponsors in the same industry or geographic area; and

d. historical national wage increases and productivity growth.

3.9.2 Measurement-Specific Considerations—The actuary should take into account factors specific to each measurement in selecting a specific compensation increase assumption. Such factors may include the following:

a. Compensation Practice—The plan sponsor's current compensation practice and any contemplated changes may affect the compensation increase assumption, at least in the short term. For example, if pension benefits are a function of base compensation and the plan sponsor is changing its compensation practice to put greater emphasis on incentive compensation, future growth in base compensation may differ from historical patterns.

b. Competitive Factors—The level and pattern of future compensation changes may be affected by competitive factors, including competition for employees both within the plan sponsor's industry and within the geographical areas in which the plan sponsor operates, and global price competition. Unless the **measurement period** is short, the actuary should not give undue weight to short-term patterns.

c. Collective Bargaining—The collective bargaining process impacts the level and pattern of compensation changes. However, it may not be appropriate to assume that future contracts will provide the same level of compensation changes as the current or recent contracts.

d. Compensation Volatility—If certain elements of compensation, such as bonuses and overtime, tend to vary significantly from year to year, or if aberrations exist in recent compensation amounts, then the actuary should take volatility into account. In some circumstances, this may be accomplished by adjusting the base amount from which future compensation elements are projected (for example, the projected bonuses might be based on an adjusted average of bonuses over the last 3 years). In some other circumstances, an actuary may use an additional assumption regarding an expected increase in pay in the final year of service.

e. Expected Plan Freeze or Termination—In some situations, as stated in section 3.7.3(h), the actuary may expect the plan to be frozen or terminated at a determinable date. In these situations, the compensation increase assumption may reflect a shortened **measurement period** that ends at the expected termination date.

3.9.3 Multiple Compensation Increase Assumptions—The actuary may use multiple compensation increase assumptions in lieu of a single compensation increase assumption. Examples of multiple compensation increase assumptions include the following:

a. Select and Ultimate Assumptions—Assumed compensation increases vary by period from the **measurement date** (for example, x% increases for the first 5 years following the **measurement date**, and y% thereafter) or by age or service.

b. Separate Assumptions for Different Employee Groups—Different compensation increases are assumed for two or more employee groups that are expected to receive different levels or patterns of compensation increases.

c. Separate Assumptions for Different Compensation Elements—Different compensation increases are assumed for two or more compensation elements that are expected to change at different rates (for example, x% bonus increases and y% increases in other compensation elements).

3.10 Selecting a Retirement Assumption—When selecting a retirement assumption, the actuary should take into account factors such as the following:

a. employer-specific or job-related factors such as occupation, employment practices, work environment, unionization, hazardous conditions, and location of employment;

b. the plan design, where specific incentives may influence when participants retire. For example, the introduction of an early retirement subsidy could influence the plan's incidence of retirement. Under these circumstances, in order to measure the incremental cost associated with this change, the assumptions for the proposed plan provision may differ from the assumptions for the current provision;

c. the design of, and date of anticipated payment from, social insurance programs (for example, Social Security or Medicare) or other non-employer-sponsored benefit programs (for example, health insurance exchange plan); and

d. the availability of other employer-sponsored postretirement benefit programs (for example, postretirement health coverage or savings plan).

3.11 Selecting a Termination Assumption—When selecting a termination assumption, the actuary should take into account factors such as the following:

a. employer-specific or job-related factors such as occupation, employment practices, work environment, unionization, hazardous conditions, and location of employment; and

b. plan provisions, such as early retirement benefits, vesting schedule, or payout options.

3.12 Selecting a Mortality Assumption—When selecting a mortality assumption, the actuary should take into account factors such as the following:

a. the characteristics of employees and retirees (for example, it may be reasonable to select different assumptions for pre and post retirement);

b. the size of the covered population (for example, for some small plans, a reasonable model for mortality may be to assume no mortality before retirement);

c. the characteristics of disabled lives, which may depend on the plan's definition of disability and how it is administered; and

d. the characteristics of different participant subgroups and beneficiaries.

The actuary should consider using actual participant mortality data, to the extent fully or partially credible, or published and generally available mortality tables. If the actuary selects a mortality assumption that is based on mortality tables that substantially predate more recently published relevant and generally available mortality tables, the actuary should disclose the rationale for the use of such tables instead of a more recently published table, in accordance with section 4.1.2.

3.13 Selecting a Mortality Improvement Assumption—The actuary should reflect the effect of mortality improvement (which may be positive, negative, or zero) both before and after the **measurement date**. With regard to mortality improvement, the actuary should do the following:

a. adjust mortality rates to reflect an assumption as to mortality improvement before the **measurement date**. For example, if the actuary starts with a published mortality table, the mortality rates may need to be adjusted to reflect mortality improvement from the effective date of the table to the **measurement date**. Such an adjustment is not necessary if, in the actuary's professional judgment, the published mortality table reflects expected mortality rates as of the **measurement date**. This assumption should be disclosed in accordance with section 4.1.1, even if the actuary concludes that such an adjustment is not necessary; and

b. include an assumption as to expected mortality improvement after the **measurement date**. This assumption should be disclosed in accordance with section 4.1.1, even if the actuary concludes that an assumption of zero future improvement is reasonable as described in section 3.5. Note that the existence of

uncertainty about the occurrence or magnitude of future mortality improvement does not by itself mean that an assumption of zero future improvement is a reasonable assumption.

3.14 Selecting Disability and Disability Recovery Assumptions—When selecting disability and disability recovery assumptions, the actuary should take into account factors such as the following:

a. the plan's definition of disability (for example, whether the person with a disability must be eligible for Social Security disability benefits); and

b. the potential for recovery. For example, if the plan requires continued disability monitoring and if the plan's definition of disability is not highly restrictive, an assumption for rates of recovery may be appropriate. Alternatively, the probability of recovery may be reflected by assuming a lower incidence of disability than the actuary might otherwise assume.

3.15 Selecting Election of Optional Form of Benefit Assumptions—When selecting election of optional form of benefit assumptions, the actuary should take into account factors such as the following:

a. the optional forms of benefit and benefit commencement dates available under the plan being valued;

b. the historical or expected experience of elections under the plan being valued and similar plans; and

c. the degree to which particular optional forms of benefit may be subsidized.

3.16 Expenses Paid from Plan Assets—The actuary should take into account expenses paid from plan assets such as investment advisory, investment management, or insurance advisory services; premiums paid to the Pension Benefit Guaranty Corporation (PBGC); accounting and auditing services; actuarial services; plan administration services; legal services; and trustee services. Formats for these assumptions may include a dollar amount, a specific percentage of assets, a reduction in the investment return assumption, a percentage of benefit obligation or normal cost, or a combination thereof.

3.17 Selecting Other Assumptions—Other assumptions may be required for measuring pension obligations. When measuring pension obligations, the actuary should consider selecting assumptions such as the following:

3.17.1 Social Security—Social Security benefits are based on an individual's covered earnings, the OASDI contribution and benefit base, and changes in the cost of living. Changes in the OASDI contribution and benefit base are determined from changes in national average wages, which reflect the change in national productivity and **inflation**.

3.17.2 Cost-of-Living Adjustments—Plan benefits or limits affecting plan benefits, including the Internal Revenue Code (IRC) section 401(a)(17) compensation limit and section 415(b) maximum annuity, may be automatically adjusted for **inflation** or assumed to be adjusted for **inflation** in some manner (for example, through regular plan amendments). However, for some purposes (such as qualified pension plan minimum required contribution calculations), the actuary may be precluded by applicable laws or regulations from anticipating future plan amendments or future cost-of-living adjustments in certain IRC limits.

3.17.3 Rate of Payroll Growth—As a result of terminations and new participants, total payroll generally grows at a different rate than does a participant's salary or the average of all current participants combined. As such, when a payroll growth assumption is needed, the actuary should use an assumption that is consistent with but typically not identical to the compensation increase assumption. One approach to setting the payroll growth assumption may be to reduce the compensation increase assumption by the effect of any assumed merit adjustments. The actuary should apply professional judgment in determining whether, given the purpose of the measurement, the payroll growth assumption should be based on a closed or open group and, if the latter, whether the size of that group should be expected to increase, decrease, or remain constant.

3.17.4 Growth of Individual Account Balances—Certain plan benefits have components directly related to the accumulation of real or hypothetical individual account balances (for example, floor-offset arrangements and cash balance plans).

3.17.5 Variable Conversion Factors—Measuring certain pension plan obligations may require converting from one payment form to another, such as converting a projected individual account balance to an annuity, converting an annuity to a lump sum, or converting from one annuity form to a different annuity form. The conversion factors may be variable (for example, recalculated each year based on a stated mortality table and interest rate equal to the yield on 30-year Treasury bonds).

3.17.6 Household Composition—Household composition may affect the payment of benefits, the number of benefits, or other assumptions. For example, some plans provide annuity death benefits to surviving children under a stated age. In that case, an assumption as to the number and ages of the potential beneficiaries may be needed.

3.17.7 Marriage, Divorce, and Remarriage—Marriage, divorce, or remarriage may affect the payment of benefits, the amount or type of benefits, or the continuation of benefit payments. An assumption regarding beneficiary ages may also be necessary.

3.17.8 Open Group—Certain assumptions, such as the number and characteristics of new entrants, are applicable in open-group measurements.

3.17.9 Hours of Service—Assumptions for hours of service are generally plan- or industry-specific. Separate assumptions may also be needed for such purposes as benefit accrual and total employer plan contributions.

3.17.10 Transfers and Return to Employment—The assumptions for transfers or return to employment are generally plan- or industry-specific. Transfers and return to employment may be one-time events or may be continual if employees are required or permitted to move among groups that are covered by the same or different plans.

3.17.11 Missing or Incomplete Census Data—Census data provided may be incomplete due to missing elements such as birth dates or hire dates. If the actuary has determined, in accordance with ASOP No. 23, *Data Quality*, that the overall data are of sufficient quality to complete the assignment, the actuary should select assumptions for the missing data elements. Data actually supplied may be relevant in making such assumptions. For example, it may be appropriate to assume a missing birth date is equal to the average birth date for other participants who have complete data and who have the same service credits as the participant whose date of birth is missing.

3.18 Consistency among Assumptions Selected by the Actuary for a Particular Measurement—With respect to a particular measurement, the actuary should select assumptions that are consistent with the other assumptions selected by the actuary, unless an assumption considered individually is not material (see section 3.4.3). For example, if an employer's business is in decline and the effect of that decline is reflected in the turnover assumption, it may be appropriate to reflect a change in the retirement assumption, and it may also be appropriate to reflect a change in the compensation increase assumption.

In addition, the actuary should evaluate the assumptions for consistency with assumptions used for measurements of different benefit plans covering the same covered group, if that information is available to the actuary. To the extent the actuary determines that inconsistencies exist, the actuary should determine whether those inconsistencies are reasonable and make adjustments if appropriate.

A number of factors may interact with one another and may be components of other assumptions, such as **inflation**, economic growth, and risk premiums. In some circumstances, consistency may be achieved by using the same **inflation**, economic growth, and other relevant components in each of the assumptions selected by the actuary.

Consistency is not necessarily achieved by maintaining a constant difference between one economic assumption and another. For each **measurement date**, the actuary should reassess the individual assumptions selected by the actuary and the relationships among them, and make appropriate adjustments.

The actuary is not required to select assumptions that are consistent with assumptions not selected by the actuary.

3.19 Reviewing Assumptions Previously Selected by the Actuary—At each **measurement date**, the actuary should determine whether the assumptions selected by the actuary for a previous **measurement date** continue to be reasonable. In making this determination, the actuary should take into account changes in relevant factors known to the actuary that may affect future experience. The actuary should also review recent gain and loss analyses, if any. In addition, the actuary should consider whether an experience study should be performed; however, the actuary is not required to perform an experience study. For each previously selected assumption that the actuary determines is no longer reasonable, the actuary should select a reasonable new assumption.

3.20 Assessing Assumptions Not Selected by the Actuary—At each **measurement date**, the actuary should assess the reasonableness of each assumption that the actuary has not selected (other than **prescribed assumptions or methods set by law** or assumptions disclosed in accordance with section 4.2[b]), using the guidance set forth in this standard to the extent practicable.

3.21 Phase-In of Changes in Assumptions—If an assumption is being phased in over a period that includes multiple **measurement dates**, the actuary should determine the reasonableness of the assumption and its consistency with other assumptions as of the **measurement date** at which it is applied, without regard to changes to the assumption planned for future **measurement dates**. If the actuary determines that an assumption is not reasonable as of the **measurement date** at which it is applied, the actuary should select a reasonable new assumption.

3.22 Reliance on Others for Data, Projections, and Supporting Analysis—The actuary may rely on data, projections, and supporting analysis supplied by others. When practicable, the actuary should review the data, projections, and supporting analysis for reasonableness and consistency. For further guidance, the actuary should refer to ASOP No. 23, *Data Quality*, ASOP No. 41, *Actuarial Communications*, and ASOP No. 56, *Modeling*.

3.23 Reliance on Another Actuary—The actuary may rely on another actuary who has selected assumptions or given advice on the selection of assumptions. However, the relying actuary should be reasonably satisfied that the other actuary is qualified to select the assumptions and the assumptions were selected in accordance with this ASOP and other applicable ASOPs.

3.24 Reliance on Expertise of Others—An actuary may rely on the expertise of others (including actuaries not performing actuarial services) in the fields of knowledge used in the selection of the assumption. In determining the appropriate level of such reliance, the actuary should take into account the following:

a. whether the individual or individuals upon whom the actuary is relying has expertise in the applicable field;

b. the extent to which the assumption has been reviewed or opined on by others with expertise in the applicable field, including any commonly known significant differences of opinion among others with expertise concerning aspects of the assumption that could be material to the actuary's use of the assumption; and

c. whether there are industry or regulatory standards that apply to the assumption.

3.25 Documentation—The actuary should consider preparing and retaining documentation to support compliance with the requirements of section 3 and the disclosure requirements of section 4. If preparing documentation, the actuary should consider preparing such documentation in a form such that another actuary qualified in the same practice area could assess the reasonableness of the actuary's work. The amount, form, and detail of such documentation should be based on the professional judgment of the actuary and may vary with the complexity and purpose of the actuarial services. In addition, the actuary should refer to ASOP No. 41 for guidance related to the retention of file material other than that which is to be disclosed under section 4.

Section 4. Communications and Disclosures

4.1 Required Disclosures in an Actuarial Report—When issuing an actuarial report within the scope of this standard, the actuary should refer to ASOP Nos. 23, 25, 41, and 51. In addition, the actuary should disclose the following in such actuarial reports:

4.1.1 Assumptions Used—The actuary should describe each significant assumption used in the measurement and, to the extent known, whether the assumption represents an estimate of future experience, an observation of the estimates inherent in market data, or a combination thereof. The actuary should also include a disclosure of any explicit adjustment made in accordance with section 3.4.2 for adverse deviation or plan provisions that are difficult to measure. Sufficient detail should be shown to permit another qualified actuary to assess the level and pattern of each assumption (for example, by supplying the name of a published decrement table or by showing turnover rates at every fifth age for an unpublished age-based table).

The disclosure of the mortality assumption should contain sufficient detail to permit another qualified actuary to understand any adjustment to reflect mortality improvement from the effective date of the table to the **measurement date** and the provision made for future mortality improvement. If the actuary assumes zero mortality improvement after the **measurement date**, the actuary should state that no provision was made for future mortality improvement.

Depending on a particular measurement's circumstances, the actuary may disclose information about specific interrelationships among the assumptions (for example,

investment return: x% per year, net of investment expenses and including **inflation** at y%).

4.1.2 Rationale for Assumptions—For each assumption that has a significant effect on the measurement and that the actuary has selected, the actuary should disclose the information and analysis used to support the actuary's determination that the assumption is reasonable.

For each assumption that has a significant effect on the measurement and that the actuary has not selected (other than **prescribed assumptions or methods set by law** or assumptions disclosed in accordance with section 4.2[a] or [b]), the actuary should disclose the information and analysis used to support the actuary's determination that the assumption does not significantly conflict with what, in the actuary's professional judgment, is reasonable for the purpose of the measurement.

The disclosures should be based on the assumptions as of the **measurement date** at which they are applied without regard to changes to the assumptions planned for future **measurement dates**. These disclosures may be brief but should be pertinent to the plan's circumstances. For example, the actuary may disclose any specific approaches used, sources of external advice, and how past experience and future expectations were considered in determining the assumption to be reasonable. If applicable, the actuary should disclose the time period of relevant plan or plan sponsor experience that was last analyzed, including the date of any study used in the selection process.

Additionally, if the disclosure relates to a mortality assumption that is based on mortality tables that substantially predate more recently published relevant and generally available mortality tables, the actuary should disclose the rationale for the use of such tables instead of a more recently published table.

4.1.3 Changes in Assumptions—The actuary should disclose any changes in the significant assumptions from those previously used for the same type of measurement. The general effects of the changes should be disclosed in words or by numerical data, as appropriate. For each assumption that is neither a **prescribed assumption or method set by another party** nor a **prescribed assumption or method set by law**, the actuary should include an explanation of the information and analysis that led to the change.

The disclosure may be brief but should be pertinent to the plan's circumstances. The disclosure may reference any actuarial experience or other study performed, including the date of the study.

4.1.4 Changes in Circumstances—The actuary should refer to ASOP No. 41 for communication and disclosure requirements regarding changes in circumstances known to the actuary that occur after the **measurement date** and that would affect economic assumptions selected as of the **measurement date**.

4.2 Disclosure about Assumptions Not Selected by the Actuary—The actuary's report should state the source of any assumption that the actuary has not selected.

With respect to assumptions that the actuary has not selected, other than **prescribed assumptions or methods set by law**, the actuary's report should identify the following, if applicable:

a. any such assumption that significantly conflicts with what, in the actuary's professional judgment, is reasonable for the purpose of the measurement (section 3.20); or

b. any such assumption that the actuary is unable to assess for reasonableness for the purpose of the measurement (section 3.20).

4.3 Additional Disclosures—The actuary should also include the following, as applicable, in an actuarial report:

a. the disclosure in ASOP No. 41, if the actuary states reliance on other sources and thereby disclaims responsibility for any material assumption or method set by a party other than the actuary; and

b. the disclosure in ASOP No. 41, if, in the actuary's professional judgment, the actuary has otherwise deviated materially from the guidance of this ASOP.

4.4 Confidential Information—Nothing in this ASOP is intended to require the actuary to disclose confidential information.

Appendix

Background and Current Practices

Note: This appendix is provided for informational purposes and is not part of the standard of practice.

Background

Assumptions have a significant effect on any pension obligation measurement. Small changes of 25 or 50 basis points in economic assumptions can change the measurement by several percentage points or more. Assumptions such as compensation increases or cash balance crediting rates are often used to determine projected benefit streams for valuation purposes. Demographic assumptions such as termination, retirement, and mortality (including assumed improvement) are often used to determine the timing and length of projected benefit streams. The discount rate assumption, arguably the most critical economic assumption in determining a pension obligation, is used to determine the discounted present value of all benefit streams that are part of such obligation measurement.

Historically, actuaries have used various practices for selecting economic assumptions. For example, some actuaries have looked to surveys of economic assumptions used by other actuaries, some have relied on detailed research by experts, some have used highly sophisticated projection techniques, and many actuaries have used a combination of these.

The first decade of the 21st century contained a significant amount of debate inside and outside the actuarial profession regarding the measurement of pension obligations. Much of the debate centered on the economic assumptions actuaries use to measure these obligations. The decade also saw the emergence of a financial economic viewpoint on pension obligations. Applying financial economic theory to the measurement of pension obligations has been controversial and has produced a significant amount of debate in the actuarial profession, which ultimately lead to some revisions to actuarial standards of practice.

Historically, actuaries have relied on plan-specific experience studies, where available and credible, for selecting demographic assumptions. Published tables are also available for the actuary to consider when plan-specific experiences studies are unavailable or when they lack sufficient credibility.

Current Practices

The actuary's discretion over certain assumptions has been curtailed in many situations. In the private single employer plan arena, the IRS, PBGC, and FASB have promulgated rulings that have limited or effectively removed an actuary's judgment regarding the discount rate used for current-year funding or accounting. For these same measurements, the actuary may also have no discretion over the selection of an assumed mortality table. Actuaries can still set other economic assumptions, such as compensation increases, inflation, or fixed income yields or other demographic assumptions such as termination, retirement, and disability.

For plans other than private single-employer plans (for example, church plans, multiemployer plans, public plans), the discount rate for current-year funding requirements may be prescribed by other entities but most demographic assumptions are not. Funding valuations for these types of plans often use a discount rate related to the expected return on plan assets. In practice, this discount rate (return on asset) assumption may be set by a legislative body, plan sponsor, a governing board of trustees, or the actuary. The actuary may advise the plan sponsor about the selection of the discount rate.

As in the single-employer situation, the actuary may have discretion over other economic assumptions used to measure obligations for plans other than private single-employer plans. Alternatively, the actuary may be in an advisory position, helping the legislative body, plan sponsor, or governing board of trustees select the assumptions.

The focus on solvency in the private single-employer plan arena has come along with prescribed economic assumptions that are linked to capital market indices. Actuaries practicing in this area are becoming accustomed to changing assumptions frequently. In nonprescribed situations, practice is still dependent upon the individual actuary. Many actuaries change assumptions infrequently, while other actuaries reevaluate the assumptions as of each measurement date and change assumptions more frequently. In the public plan arena, many entities perform assumption reviews every few years, and these reviews may or may not lead to assumption adjustments.

In preparing calculations for purposes other than current-year plan valuations, actuaries often use economic assumptions that are different from those used for the current-year valuation.

The following list of references is a representative sample of available sources of data, analyses, and published tables that may be useful when selecting assumptions. It is not intended to be an exhaustive list.

1. General Comprehensive Sources for Economic Assumptions

    a. Kellison, Stephen G. *The Theory of Interest*. 3rd ed. Colorado Springs, CO: McGraw-Hill, 2008.

    b. *Stocks, Bonds, Bills, and Inflation (SBBI)*. Chicago, IL: Ibbotson Associates. Annual Yearbook, market results 1926 through previous year.

2. Recent Economic Data, Various Indexes, and Some Historical Economic Data

    a. U.S. Bureau of the Census. *Statistical Abstract of the United States*. https://www.census.gov/library/publications/time-series/statistical_abstracts.html

    b. U.S. Department of Labor, Bureau of Labor Statistics. *Consumer Price Index*. http://www.bls.gov/cpi/

c. U.S. Federal Reserve Weekly Statistical Release H.15. Interest rate information for selected Treasury securities. http://www.federalreserve.gov/releases/h15/

d. U.S. House of Representatives, Committee on Ways and Means. *Green Book: Background Material and Data on Programs within the Jurisdiction of the Committee*. http://greenbook-waysandmeans.house.gov/

e. U.S. Social Security Administration. *Social Security Bulletin*. http://www.ssa.gov/policy/docs/ssb/

3. Economic Forecasts

a. Congressional Budget Office. *Budget and Economic Data*. https://www.cbo.gov/data/budget-economic-data

4. Published Demographic and Other Tables

a. Society of Actuaries. *Mortality and Other Rate Tables (MORT)*. https://mort.soa.org/