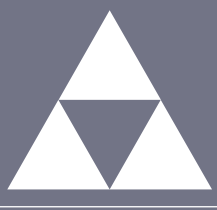
A PUBLIC POLICY SPECIAL REPORT

Actuarial Soundness

May 2012

American Academy of Actuaries
Actuarial Soundness Task Force



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Developed by the Actuarial Soundness Task Force
of the American Academy of Actuaries

2012 Actuarial Soundness Task Force

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INTRODUCTION

The terms “actuarially sound” and “actuarial soundness” have appeared in actuarial literature since the early 1900s. They appear in historical, active, and proposed state and federal statutes and regulations. In these statutes and regulations, the terms have been applied to rates, reserves, funding levels, and solvency. They have been applied to for-profit entities and governmental programs.

Discussions among several committees and groups of the American Academy of Actuaries prompted questions regarding the use of terms such as actuarially sound and actuarial soundness. This paper catalogs the use of these and similar terms, providing examples where the terms are defined and where they are not. This paper is not an exhaustive search of every use and definition related to actuarial soundness. This paper is not meant to produce a single definition or to provide a direction for the use of these terms. It is meant to give general background and to assist in possible future efforts to provide actuaries and the public with specific direction on the use of these terms. The concept of actuarial soundness is becoming more visible in public discourse, particularly in the context of existing federally funded programs like the National Flood Insurance Program. As a result, a robust examination of this issue by the actuarial community may be helpful.

In addition to searching the actuarial literature, the task force reviewed the Actuarial Standards of Practice (ASOPs), National Association of Insurance Commissioners (NAIC) model laws and regulations, and selected state statutes and regulations for each of the four actuarial practice areas: health, life, pension, and property/casualty. This approach produced different results by practice area.

Sections 2–5 of the issue brief provide an overview of the historical definitions and use of the terms as well as some of the issues that arise for each of the four actuarial practice areas. Additional documents specific to a particular practice area also are referenced where relevant.

We begin our discussion with a dictionary definition of the word “sound”:

“Based on truth or valid reasoning; accurate, reliable, judicious, sensible; agreeing with established views or beliefs; showing good judgment or sense.”[1]

1. HEALTH

Health actuaries long have utilized some form of the term actuarially sound in conducting their actuarial work or in describing a statutory or regulatory requirement. In this section, we look first to the NAIC model laws, in which we found one use of the term actuarially sound. We then identify instances in which the term actuarially sound is used in a health-

[1] http://www.yourdictionary.com/sound (last visited on March 9, 2012).

related ASOP. Our final subsection includes several practice notes that utilize the term often.

NAIC MODEL LAWS

One model law related to health issues uses the term actuarially sound.

Small Employer Health Insurance Availability Model Act (Prospective Reinsurance With Or Without An Opt-Out)

In Section 6. Restrictions Relating to Premium Rates, this model law states:

> (1) Each small employer carrier shall maintain at its principal place of business a complete and detailed description of its rating practices and renewal underwriting practices, including information and documentation that demonstrate that its rating methods and practices are based upon commonly accepted actuarial assumptions and are in accordance with sound actuarial principles.
> (2) Each small employer carrier shall file with the commissioner annually on or before March 15, an actuarial certification certifying that the carrier is in compliance with the Act and that the rating methods of the small employer carrier are **actuarially sound**. Such certification shall be in a form and manner, and shall contain such information, as specified by the commissioner. A copy of the certification shall be retained by the small employer carrier at its principal place of business. (emphasis added)

ACTUARIAL STANDARDS OF PRACTICE (ASOPs)

ASOPs identify what the actuary should consider, document, and disclose when rendering actuarial work in the United States. In the ASOPs, there is only one place in which actuarial soundness is defined—ASOP No. 26, *Compliance with Statutory and Regulatory Requirements for the Actuarial Certification of Small Employer Health Benefit Plans.* ASOP No. 26 states:

> **Actuarial Soundness**—Small employer health benefit plan premium rates are **actuarially sound** if, for business in the state for which the certification is being prepared and for the period covered by the certification, projected premiums in the aggregate, including expected reinsurance cash flows, governmental risk adjustment cash flows, and investment income, are adequate to provide for all expected costs, including health benefits, health benefit settlement expenses, marketing and administrative expenses, and the cost of capital. (emphasis added)

The published comments on the exposure draft of ASOP No. 26 from 1995 state that the issue of whether and how to describe actuarial soundness of small group premium rates was a significant portion of the work performed by the committee that drafted the ASOP. That committee noted that "many of the applicable laws … require the actuary to address *actuarial soundness*," so the committee found it appropriate to address the issue. Note, however, that the definition of actuarial soundness in ASOP No. 26, like all of the definitions in all of the standards, is specific to that standard and does not purport to

provide a definition of actuarial soundness or actuarially sound for all areas and types of actuarial practice or in any other context.

PRACTICE NOTES

Practice notes are published by the American Academy of Actuaries and describe various methods actuaries may use to follow the guidance provided by ASOPs or legal or regulatory requirements. Practice notes, however, are not in themselves guidance, do not purport to codify generally accepted practice and are not binding on actuaries or any other parties. A number of health practice notes use terms related to actuarially sound or actuarial soundness.

Actuarial Certification of Restrictions Relating to Premium Rates in the Small Group Market (Dec. 2009)

This practice note uses the term actuarial soundness in answering a number of questions. Consider the following examples:

> Q2. What is an actuary certifying to when a statement of compliance with small group legislative and regulatory requirements is made?
>
> > The repealed NAIC Model Act, Premium Rates and Renewability of Coverage for Health Insurance Sold to Small Groups (Premium Rates Model Act), defines an actuarial certification in Section 2(A) as a "written statement that a small employer carrier is in compliance with section 4 (Restrictions Relating to Premium Rates) of this act, based on a review of methods, actuarial assumptions, and appropriate records." Furthermore, the NAIC Model Act, Small Employer Health Insurance Availability Model Act (Small Employer Model Act), defines an actuarial certification similarly in Section 3(A). Both of these NAIC Model Acts require that the certification be done annually and that the rating methods of the carrier be **actuarially sound**. (emphasis added)
> >
> > When the actuary certifies compliance, it generally means that the actuary has conducted appropriate tests and reviews and has determined that the carrier complies with the state's definition of compliance. Using the NAIC Model Act as a guide to preparing opinions on compliance, the actuary may review the following:
> >
> > 1. Classes of business (defined in Q10) have been established in accordance with applicable laws.
> > 2. Index rates (defined in Q6) have been calculated as required by law.
> > 3. Premium rates (defined in Q9) for groups within a class do not vary from the index rate for that class by more than is allowed by the law, taking into account any differences in case characteristics

(also defined in Q5), except for groups where transition period allowances are applicable and permitted by law.
4. The index rate for any class does not exceed the index rate for any other class by more than is allowed by law.
5. Rate increases from the prior rating period do not exceed the percentage increases allowed by law.
6. Rating restrictions associated with permitted case characteristics have been met and only allowable case characteristics have been used in adjusting the rates for compliance testing.
7. Rates have been calculated in compliance with applicable laws, and in compliance with any regulations established by the commissioner to implement the law.
8. Differences in rates for plan design are reasonable, reflect objective design differences, and do not include differences in the nature of groups assumed to elect a plan, to the extent permitted by law.
9. Rating methods and practices are in accordance with sound actuarial principles, to the extent permitted by law.

Note that the above text refers to laws and regulations in effect in 2012, but the Affordable Care Act (ACA) and the health care exchanges that will be created as a result of the ACA will result in significant changes to the small group health insurance market beginning in 2014.

Q17. What tests are performed to demonstrate compliance?

The actuary usually performs the tests necessary to prove and document compliance with the applicable small employer laws and regulations for which the certification is being made and, if required, to determine that the rating methods are **actuarially sound**. The level of testing required generally will vary with both the specific certification requirements of the particular state and the complexity of the rating practices employed by the small employer carrier. For example, for a carrier that uses a pure community rating approach, a thorough review of rating and underwriting practices may constitute a sufficient level of testing. On the other hand, group specific calculations may be required of a carrier that incorporates all allowable rating parameters in its rating structure. (emphasis added)

Generally, tests are performed that demonstrate that the underwriting methods and premium rates charged are established according to the following:

1. The rates are based on generally accepted actuarial methods and in accordance with sound actuarial principles, to the extent permitted by law;

2. Rates are calculated using allowed case characteristic factors, with the range of these factors within the limits allowed by law;
3. Rates do not use any prohibited separate policy fees or charges, similarly, they do not include any prohibited rebates, refunds, or discounts;
4. The index rate for any class of business does not exceed the index rate for another class by the prescribed percentage;
5. The premium rates for small employers with similar case characteristics within a class of business do not vary from the index rate of that class by more than the prescribed percentage; and
6. The percentage increase in renewal premium rates has not exceeded the sum of the following:
    a. the percentage change in the new business premium rate measured from the first day of the prior rating period to the first day of the new rating period;
    b. an adjustment, not to exceed a prescribed annual percentage (e.g., 15 percent) adjusted prorata for periods of less than one year, due to the claims experience, health status, or duration of coverage of the employees or dependents of the small employer; and
    c. any adjustment due to a change in coverage or changes in the case characteristics of the small employer, as determined from the carrier's rate manual for the class of business.

The actuary typically will wish to determine if the state has put forth testing procedures that must be followed or if specific policy data must accompany the certification. In the absence of prescribed testing procedures, the actuary usually will wish to be satisfied that the tests performed are sufficient to support the certification.

The complexity of the testing method called for generally depends upon the rating practices employed by the carrier. One approach that is generally appropriate for most small employer carriers is to base the testing on the rate manual that must be maintained for each class of business.

The requirement to test that the rating practices are based on generally accepted actuarial methods and are in accordance with sound actuarial principles can often be satisfied with a review of the various rating factors included in the rate manual. The actuary typically confirms that only allowable and permitted case characteristics are being used, that the factors associated with these case characteristics are within the limits allowed by law, and that such factors are uniformly applied. If not involved with the development of such factors, the actuary generally reviews the reasonableness of the range of values being used. A familiarity with the underwriting and renewability rules of the carrier and a review of

> the supporting data or actual experience on which the rates or most recent rate changes are based are also usually desirable to support the actuary's opinion.

Q23. What testing should be done if the actuary is required to attest to the rates being **actuarially sound**? (emphasis added)

> Some states require the actuary to attest to the soundness of the rates charged. This should be relatively straight forward if the actuary attesting is the same actuary who derived the rates. In that case, the methods and assumptions used would be known. But if the actuary signing the certification is required to certify to the soundness of the rates when he/she did not participate in their determination, a review of the pricing methods and assumptions and plan experience may be in order. Rates should be such that they are not inadequate or excessive, and premiums should be reasonable in relationship to the benefits covered. If the actuary relies on the certification made as part of a recent rate filing, that fact should be disclosed.

Actuarial Certification of Rates for Medicaid Managed Care Programs (Aug. 2005)

This practice note was developed by the Academy's Medicaid Rate Certification Work Group in the course of its review of the CMS regulations that require certification of the actuarial soundness of Medicaid managed care premium rates.

The work group was asked to:

- Review the CMS regulations that require certification of the actuarial soundness of Medicaid managed care premium rates;
- Determine the extent to which the Academy has addressed the term actuarial soundness in any public statements; and
- Make a recommendation to the Academy's Health Practice Council regarding the best way to proceed on this issue. The work group's recommendation was to publish a practice note. The Health Practice Council approved this recommendation and directed the work group to proceed with the drafting of the practice note.

The federal requirements, as stated in 42 CFR Section 438.6(c), are as follows:

> (2) Basic requirements.
>
> > (i) All payments under risk contracts and all risk sharing mechanisms in contracts must be **actuarially sound**. (emphasis added)

> (ii) The contract must specify the payment rates and any risk sharing mechanisms, and the actuarial basis for computation of those rates and mechanisms.
>
> (3) Requirements for **actuarially sound** rates. In setting **actuarially sound** capitation rates, the State must apply the following elements, or explain why they are not applicable (emphasis added):
>
> (i) Base utilization and cost data that are derived from the Medicaid population, or if not, are adjusted to make them comparable to the Medicaid population.
>
> (ii) Adjustments are made to smooth data and adjustments to account for such factors as medical trend inflation, incomplete data, MCO [managed care organization], PIHP [prepaid inpatient health plan], or PAHP [prepaid ambulatory health plan] administration, and utilization
>
> (iii) Rate cells are specific to the enrolled population, by—
>
> (A) Eligibility category;
>
> (B) Age;
>
> (C) Gender;
>
> (D) Locality/region; and
>
> (E) Risk adjustments based on diagnosis or health status (if used).
>
> (iv) Other payment mechanisms and utilization and cost assumptions that are appropriate for individuals with chronic illness, disability, ongoing health care needs, or catastrophic claims, using risk adjustment, risk sharing, or other appropriate cost neutral methods.

Section 438.6(c)(1)(i) defines actuarially sound capitation rates as capitation rates that:

> (A) Have been developed in accordance with generally accepted actuarial principles and practices;
>
> (B) Are appropriate for the populations to be covered and the services to be furnished under the contract; and
>
> (C) Have been certified as meeting the requirements of this paragraph (c), by actuaries who meet the qualification standards established by the American Academy of Actuaries and follow the practice standards established by the Actuarial Standards Board.

Section 438.6(c)(5) also specifies what is not actuarially sound under special contract provisions. (See Sections III and IV of this practice note for additional information.) For example:

> ii. If risk corridor arrangements result in payments that exceed the approved capitation rates, these excess payments will not be considered **actuarially sound** to the extent that they result in total payments that exceed the amount Medicaid would have paid, on a fee-for-service basis, for the State plan services actually furnished to enrolled individuals, plus an amount for MCO, PIHP, or PAHP administrative costs directly related to the provision of these services (emphasis added).
>
> iii. Contracts with incentive arrangements may not provide for payment in excess of 105 percent of the approved capitation payments attributable to the enrollees or services covered by the incentive arrangement, since such total payments will not be considered to be **actuarially sound** (emphasis added).

Section 438.6(c) requirements for actuarial soundness thus are a combination of two types of requirements. The first is the broad requirement of being developed in accordance with generally accepted actuarial practices and principles. The second is the potentially more restrictive requirement that CMS may impose on fiscal arrangements. This practice note concentrates on issues concerning the former. For issues concerning the latter, it is acknowledged that CMS or the states may impose additional restrictions, and this practice note, therefore, addresses only the potential areas of conflict between these requirements and generally accepted actuarial principles and practices.

For the purposes of the practice note, the work group developed the following proposed definition of actuarial soundness to apply to Medicaid managed care rates developed on behalf of a state for submission to CMS (based on the description in ASOP No. 26, discussed earlier):

> **Actuarial Soundness**—Medicaid benefit plan premium rates are "**actuarially sound**" if, for business in the state for which the certification is being prepared and for the period covered by the certification, projected premiums, including expected reinsurance and governmental stop-loss cash flows, governmental risk adjustment cash flows, and investment income, provide for all reasonable, appropriate and attainable costs, including health benefits, health benefit settlement expenses, marketing and administrative expenses, any state-mandated assessments and taxes, and the cost of capital. (emphasis added)

This definition is only applicable for the purposes of this practice note and is not guidance. It is not applicable to any actuarial practice other than suggested use for actuarial certification of rates for Medicaid managed care programs and does not have the binding authority such as may be found in a definition found in an ASOP.

There are some differences between the proposed definition above and the language in ASOP No. 26. "Governmental stop-loss" is included in the practice note description of actuarial soundness in recognition of noninsured stop-loss programs funded by states to cover certain costs in excess of specified amounts, or for certain types of services, or for treatment of certain medical conditions.

The words "reasonable, appropriate, and attainable" clarify that the costs of the Medicaid benefit plan do not normally encompass the level of all possible costs that any managed care organization (MCO) might incur, but only such costs that are reasonable, appropriate, and attainable for the Medicaid program. In addition, all expected costs directly related to the Medicaid benefit plan normally would be included.

An actuary may be asked to assist an MCO by providing an opinion as to whether the rates bid by the MCO or offered by a state are actuarially sound for that particular MCO. The analysis forming the basis of such an opinion usually would include expected costs specific to that MCO. This is a separate and distinct analysis compared to the analysis performed by the actuary who, on behalf of a state, forms an opinion concerning the actuarial soundness of rates to be offered to MCOs and for submission to CMS.

The paragraph above uses the words "actuarially sound" in the context of a particular MCO. There is no federal regulatory requirement that rates be actuarially sound for a particular MCO. Some states, however, may require MCOs that make rate bids or that accept offered rates to provide the state with an opinion as to the actuarial soundness (or an opinion addressing acceptability without using the term actuarial soundness) of the rates for that particular MCO. An MCO reasonably could decide to accept rates for a particular year, knowing that it expects an underwriting loss in that year. Such a decision may be a reasonable business decision, given that the MCO is entering a new market or expects underwriting gains to emerge in future periods.

As a final note, the term actuarial soundness does not appear in the literature regarding health insurance financial reporting in either U.S. Generally Accepted Accounting Principles (GAAP) or International Accounting Standards Board (IASB) insurance contracts literature.

2. LIFE

The use of the term "actuarial soundness" historically has not been used often in the life insurance practice area. Life insurance reserves and policy minimum nonforfeiture value assumptions have utilized prescribed assumptions that were accepted by regulators. With the advent in the 1990s of asset adequacy analysis, and continuing through today's principle-based reserves and capital development, there may be additional development of the concept and usage of actuarial soundness in the life insurance arena.

Since codification in 2001, life insurance statutory accounting, including reserve development, has been centralized in the NAIC process of developing assumptions and

methodologies.[2] A review of the *NAIC Life and Health Valuation Law Manual* yields only a few uses of the term actuarially sound, related to variable life investments and accelerated life insurance benefits (terminal illness). In addition, the asset adequacy statement of actuarial opinion requires language stating that the reserves are in accordance with sound actuarial principles. These references do not contain language defining actuarially sound.

For example, the Variable Life Insurance Model Regulation—Section 4.C.3 under Mandatory Policy Benefit and Design Requirements states: "The insurer shall demonstrate that the reflection of investment experience in the variable life insurance policy is actuarially sound."

Another reference to actuarially sound can be found in the Accelerated Benefits Model Regulation. Section 10.A.1 states: "The insurer may require a premium charge or cost of insurance charge for the accelerated benefit. This charge shall be based on sound actuarial principles." Section 10.A.2 and 10.A.3 each state: "The interest rate or interest rate methodology used in the calculation shall be based on sound actuarial principles and disclosed in the contract or actuarial memorandum."

Actuarial Guideline XXVII—Accelerated benefits—Section II.B states: "No additional reserves need be held as long as the actuary is convinced that the method used to discount the death benefit reflects sound actuarial principles."

Section 8 of the Actuarial Opinion and Memorandum Regulation, Statement of Actuarial Opinion Based On an Asset Adequacy Analysis, contains the following requirement:

> In my opinion the reserves and related actuarial values concerning the statement items identified above:
>
> (a) Are computed in accordance with presently accepted actuarial standards consistently applied and are fairly stated, in accordance with sound actuarial principles;

INDIVIDUAL STATE REGULATION

New York State Regulation 126, Regulations Governing an Actuarial Opinion and Memorandum, Section 95.8, The Statement of Actuarial Opinion Based On an Asset Adequacy Analysis, Section 6, states:

> The opinion paragraph shall include a statement such as the following:
>
> "In my opinion the reserves and related actuarial values concerning the statement items identified above:
>
> (i) Are computed in accordance with those presently accepted actuarial standards of practice which specifically relate to the

[2] Neither the U.S. GAAP nor IASB insurance contracts literature apply the term actuarial soundness to life insurance.

opinion required under section 95.8 of New York Insurance Department Regulation 126 to the extent not inconsistent therewith and in accordance with the requirements of such regulation, and which are consistently applied and are fairly stated, in accordance with sound actuarial principles;"

3. PENSION

With the exception of its use in the context of governmental plans, the term actuarial soundness does not have a significant presence in pension programs. It is not mentioned at all in the funding rules for tax-qualified pension plans under the Employee Retirement Income Security Act (ERISA), promulgated by the Internal Revenue Service (IRS), nor does the term appear in the accounting literature for nongovernmental organizations for which the Financial Accounting Standards Board (FASB) or the IASB is responsible. All those standards require that valuations be based on best-estimate assumptions, which are widely interpreted as being central, expected-value assumptions without adjustment for or discussion of degree of risk.

Statutory accounting principles for pension plan accounting promulgated by the NAIC generally follow U.S. GAAP and similarly do not mention actuarial soundness.

Actuarial soundness similarly does not appear in any of the ASOPs applicable to the pension area, nor is it included in any Academy practice note in the pension area.

The 2010 Social Security Trustees Report[3] does not refer to actuarial soundness *per se*, although the chief actuary's certification notes that "the techniques and methodology used herein to evaluate the financial and actuarial status of the Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds are based upon sound principles of actuarial practice and are generally accepted within the actuarial profession."

In the academic literature, there is a 1953 paper, *Pension Plans—the Concept of Actuarial Soundness*,[4] in which the author attempts to provide a definition related to the present value of accrued benefits on plan termination. This article was written well before the development of ERISA and current accounting standards, however, and is neither part of the actuarial exam syllabus nor considered particularly relevant to current actuarial practice.

Actuarial soundness does appear with regularity in one particular segment of pension practice: pension plans sponsored by state and local governments, referred to here as

[3] http://www.ssa.gov/OACT/TR/2010/tr2010.pdf (last visited on Jan. 23, 2012).
[4] *Pension Plans—The Concept of Actuarial Soundness*, Dorrance C. Bronson (FSA), *Journal of the American Association of University Teachers of Insurance*, Vol. 20, No. 1, Proceedings of the 17th Annual Meeting (March 1953), pp. 36-47.

governmental plans. These plans generally are controlled by state laws and the Governmental Accounting Standards Board (GASB).

Under the relevant governmental accounting standards, the term appears generally in reference to the funding of a plan, usually in the context of the broad notion of having a rational pattern of funding that is anticipated to accumulate sufficient assets in a plan to make pension payments when they come due—a period that can extend many years into the future and long after an employee ceases working. The following citations are instructive in this regard. It should be noted that GASB 27, the relevant standard for pension plans, is in the process of being substantially revised. As of August 2011, GASB has published an invitation to comment (2009), a preliminary views document (2010), and an exposure draft of a proposed standard (2011). GASB is expected to publish a final revised accounting standard in 2012. How many of the existing concepts will survive the standard setting process is uncertain.

- "[T]he measurement of the employer's pension expenditures/expense for an accounting period is similar to the employer's required contributions for that period, in accordance with an established and **actuarially sound** funding policy" (GASB 27, Paragraph 1, Objective) (emphasis added)
- "Many respondents, however, including actuaries, general and financial administrators of plans and employer entities, and auditors, pointed out that some of the parameters for measuring pension expenditures/expense would defeat the Board's objective because they were incompatible with **actuarially sound** practices commonly used in determining funding requirements or were inappropriate for governmental plans for other reasons." (GASB 27, Basis for Conclusions, Paragraph 78) (emphasis added)
- "In order to enhance stability in the employer's contribution rates and simplify the calculations, many plans use practices that are acceptable under recognized funding methodologies but would be precluded for accounting under the parameters of the 1990 ED. Stability of contribution rates is a common funding objective for governmental plans and frequently is required by statute. For example, the statute or policy may prohibit increases in benefits unless they can be funded without a significant increase in the contribution rates and without jeopardizing the **actuarial soundness** of the plan." (GASB 27, Basis for Conclusions, Paragraph 80). (emphasis added)
- "Some respondents to the 1990 ED thought that the existing accounting maximum of 40 years [to amortize changes in unfunded liability, due to plan changes or actuarial gains and losses] had worked well for many years and should be retained. Some respondents also questioned the appropriateness of any reduction in amortization periods and the resulting increase in required contributions, when many plans are well funded, funding excesses are not uncommon, and many employers are having difficulty balancing their budgets without curtailing services. However, the maximum period most frequently recommended in the responses was 30 years. Several reasons were given for recommending that period, including, for example, it is a reasonable approximation of total service life for many employee groups and is consistent with an entry age approach to

cost allocation, it is acceptable from a sound funding perspective, and it is frequently used in practice as a maximum period." (GASB 27, Basis for Conclusions, Paragraph 108).

- "The Board notes that both a closed and an open approach are acceptable under recognized actuarial funding methodologies. The approach selected depends on many factors and should be appropriate to the circumstances of the plan, participating employers, and their operating environments. Either approach can produce satisfactory results from a sound funding perspective." (GASB 27, Basis for Conclusions, Paragraph 115).
- "When the funding methodology is soundly conceived and appropriately applied, the results are monitored through frequent valuations and appropriate adjustments are made, and the employer pays the required contributions, the plan will progress to full funding, whether the amortization approach is open or closed." (GASB 27, Basis for Conclusions, Paragraph 116).
- "A large majority of governmental plans use the level percent method, combined, most typically, with the entry age actuarial cost method. The level percent method reflects traditional principles of sound funding which require a level contribution design—that is, a design whereby future citizens are not expected to contribute more than present citizens. That concept is sometimes referred to as intergenerational equity in the burden on taxpayers. The concept is implemented by establishing a contribution rate which, expressed as a percentage of active member payroll, is expected to remain level over time. The contribution rate includes normal cost and an amount, computed as a level percentage of projected covered payroll, that is designed to amortize an unfunded actuarial liability over a specific period of future years. Although inflation is likely to cause the absolute dollar amount of contributions to increase over time, contributions expressed in dollars adjusted for inflation (real dollars) are expected to be constant. Therefore, the burden on citizens does not increase relative to the payroll on which pension contributions are based." (GASB 27, Basis for Conclusions, Paragraph 124).

INDIVIDUAL STATE REGULATION

At the legislative level, many states also mention actuarial soundness in the context of the funding of their pension plans. In many of these cases, the references presume that the concept is widely understood and generally accepted, without further elaboration. In some cases (such as California), the legislature puts the onus on the independent actuary to certify the actuarial soundness of the funding requirement. The following excerpts from selected state laws highlight some of the attempts to refine, define, or elaborate on the term. An exhaustive search and commentary on individual states' use of the term actuarially sound is outside the scope of this document. Instead, we selected several states to review the usage of the term as it relates to state pension laws and regulations. The selected states represent those with which members of the task force are most familiar.

Perhaps the most detailed of the samples reviewed is the *Guidelines for Actuarial Soundness* proposed by the Texas Pension Review Board for its May 2, 2011, Actuarial Committee Meeting:

> 1. The funding of a pension plan should reflect all plan obligations and assets.
>
> 2. The allocation of the normal cost portion of the contributions should be level or declining as a percent of payroll over all generations of taxpayers, and should be calculated under applicable actuarial standards.
>
> 3. Funding of the unfunded actuarial accrued liability should be level or declining as a percent of payroll over the amortization period.
>
> 4. Funding should be adequate to amortize the unfunded actuarial accrued liability over a period not to exceed 40 years, with 15-25 years being a more preferable target. Benefit increases should not be adopted if all plan changes being considered cause a material increase in the amortization period and if the resulting amortization period exceeds 25 years.
>
> 5. The choice of assumptions should be reasonable, and should comply with applicable actuarial standards.

These guidelines appear to establish objective criteria that would allow the Texas pension board to assess the state of its plans and the recommended funding pattern and do not specifically involve the services of an actuary. Other legislated definitions of actuarial soundness provide less detail and, in some cases, require or imply the participation of an actuary in making a determination. For example:

RCW 41.26.710 [pertains to retirement systems in the state of Washington]

> (14) "**Actuarially sound**" means the plan is sufficiently funded to meet its projected liabilities and to defray the reasonable expenses of its operation based upon commonly accepted, sound actuarial principles. (emphasis added)

RCW 41.44.020 [pertains to city employees' retirement systems in Washington]

> The purpose of this chapter is to provide for an **actuarially sound** system for the payment of annuities and other benefits to officers and employees and to beneficiaries of officers and employees of cities and towns thereby enabling such employees to provide for themselves and their dependents in case of old age, disability and death, and effecting economy and efficiency in the public service by furnishing an orderly means whereby such employees who have become aged or otherwise incapacitated may, without hardship or prejudice, be retired from active service. (emphasis added)

RCW 41.16.060 [pertains to tax levy for firefighters' pension fund in Washington]

> … if a report by a qualified actuary on the condition of the fund establishes that the whole or any part of said dollar rate is not necessary to maintain the **actuarial**

> **soundness** of the fund, the levy of said twenty-two and one-half cents per thousand dollars of assessed value may be omitted … (emphasis added)

New York State Retirement Law and Social Security, 316-b(2)

> … the actuarial value of assets shall be calculated using the five year smoothing method that was used for the fiscal year commencing April first, nineteen hundred eighty-seven which method has been determined to be **actuarially sound**. (emphasis added)

Iowa, CH 1077 Sec. 117[5]

> Sec. 117. Judicial Retirement System — Legislative Intent—Notification—Report

1. It is the intent of the general assembly that once the judicial retirement system attains fully funded status based upon the benefits provided for judges through July 1, 2001, the employer and employee contribution rates established to fund the judicial retirement system should be adjusted to reflect the ratio of employer and employee contribution rates required under the Iowa public employees' retirement system.

> 2. … In conducting the study, the state court administrator shall consider, and make recommendations concerning, the appropriateness of funding the judicial retirement system by establishing employer and employee contribution rates which shall maintain the **actuarial soundness** of the system and which shall reflect the intent of the general assembly as contemplated in subsection 1. (emphasis added)

Connecticut, Chapter 66, State Employees Retirement Act

> **Sec. 5-156a. Funding of retirement system on actuarial reserve basis.** (a) The state employees retirement system shall be funded on an actuarial reserve basis…. the amount necessary on the basis of an actuarial determination to gradually establish and subsequently maintain the retirement fund on such determined actuarial reserve basis, and make such other recommendations with regard to such fund and its administration as the commission deems appropriate.
>
> (b) The Retirement Commission shall determine on an actuarial basis (1) a normal rate of contribution which the state shall be required to make into the retirement fund in order to meet the actuarial cost of current service and (2) the unfunded past service liability. For the first sixteen years, the funding program for the actuarial reserve basis shall consist of the following percentages of the sum of normal cost and the amount required for a forty-year amortization of unfunded liabilities …:

[5] Iowa Acts 2000 (78 G.A.) Ch. 1077, § 117.

> … provided said state payments shall not be reduced or diverted to any purpose other than the payment into the retirement fund until the foregoing schedule of payments has been completed and said fund is determined to be **actuarially sound**. (emphasis added)

California Government Codes, Section 31454.1

> (c) The intent of the Legislature, in enacting this section, is to insure the solvency and **actuarial soundness** of the retirement systems governed by this chapter by preserving the independent nature of the actuarial evaluation process. (emphasis added)

4. PROPERTY/CASUALTY

As is the case with the actuarial practice areas addressed in prior sections, property/casualty practice long has used some form of the term actuarially sound to direct actuarial work or to describe a statutory or regulatory requirement. In this section, we look first to the actuarial literature as the oldest source of the term for property/casualty actuarial work. We then examine Statements of Principles adopted by the Casualty Actuarial Society (CAS) before moving on to selected state regulations and NAIC model laws. We close the section with a review of several catastrophe insurance programs.

The term actuarial soundness does not appear in literature for property/casualty insurance financial reporting in either U.S. GAAP or IASB insurance contracts literature.

ACTUARIAL LITERATURE REVIEW

The term "actuarially sound" occurs in the first volume of the *Proceedings of the Casualty Actuarial Society* ("the Proceedings") published in 1914. An extensive search through the proceedings and the CAS journal *Variance* reveals many instances of the terms actuarially sound and actuarial soundness. The Appendix contains selected sections in which these terms appear. Some sections have been reproduced more extensively due to their general importance and the light they shed on discussions within the CAS.

A concise definition of the term actuarially sound in the CAS literature could not be found. For example, in the Proceedings Volume XLI, from 1955, Nathaniel Gaines writes, "In general, **actuarial soundness** implies an orderly arrangement for financing obligations under a benefit program. Precise formulations of what constitutes actuarial soundness have been adequately developed elsewhere, so that there is no need for further discussion here." (emphasis added) Mr. Gaines did not provide further details on where that development could be found. One might argue that the entire library of actuarial literature provides an ever-growing definition, culminating in the discussions provided in the CAS Statements of Principles for ratemaking and reserving, which are discussed below.

In another example from the Proceedings, Volume LXVII, from 1980, James MacGinnitie writes, "The problem, of course, is in the elusive nature of the concept of **actuarial soundness**. How do you determine whether an actuary's analysis or recommendation is sound?" (emphasis added) He identifies "a false dichotomy between **actuarial soundness** and business judgment." (emphasis added) He then concludes, "If it's **actuarially sound**, then it should be good business judgment; and it clearly is poor business judgment to implement something that is actuarially unsound." (emphasis added)

The synopsis found in the appendix illustrates the applicability of the concept of actuarial soundness within the actuarial community. It provides a brief history of the relevant casualty actuarial discussions, some of which contain profound and timeless advice.

STATEMENTS OF PRINCIPLES

Unlike the Health actuarial practice example, the Actuarial Standards of Practice applicable to property/casualty practice do not directly define the term actuarially sound or actuarial soundness. Several of the ASOPs refer to "sound actuarial practices" or "soundly thought out analysis" (see, for example, ASOP No. 12, *Risk Classification (for All Practice Areas)* or ASOP No. 17, *Expert Testimony by Actuaries*.) The CAS published two Statements of Principles, however, that address the concept of actuarially sound.

Statement of Principles Regarding Property and Casualty Ratemaking[6]

The CAS Board of Directors adopted the Statement of Principles Regarding Property and Casualty Ratemaking in May 1988. The statement puts forth four principles that provide a foundation for the development of actuarial procedures and standards of practice. Section II, Principles, states that ratemaking produces cost estimates that are actuarially sound if the estimation is based on the first three principles, which provide that a rate is the expected value of all future costs associated with an individual risk transfer. This particular definition of an actuarially sound cost estimate is used in several states' regulations, including Washington, as noted below.

Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves[7]

The CAS board of directors also adopted the Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves in May 1988. In this statement, an actuarially sound loss (or loss adjustment expense) reserve is defined as a provision based on estimates derived from reasonable assumptions and appropriate actuarial methods for the unpaid amount required to settle all claims and associated claims expenses.

[6] http://www.casact.org/standards/princip/sppcrate.pdf (last visited on January 24, 2012)
[7] http://www.casact.org/standards/princip/sppcloss.pdf (last visited on January 25, 2012)

INDIVIDUAL STATE REGULATION

An exhaustive search and commentary on individual states' use of the term actuarially sound is outside the scope of this document. Instead, we selected several states to review the usage of the term as it relates to property/casualty insurance. The selected states represent those in which members of the task force that prepared this document live.

Washington

Like many other states that adopted the All-Industry Bills[8] in the late 1940s, Washington state's rate standard requires that rates for property and casualty insurance "not be excessive, inadequate, or unfairly discriminatory" (RCW 48.19.020). In 1990, the Washington Office of the Insurance Commissioner looked to the CAS' statement of principles to clarify the meaning of that statutory standard. Using Principle 4 and the concept of rates as expected costs, Washington adopted a regulation that states:

> A rate is reasonable and not excessive, inadequate, or unfairly discriminatory if it is an **actuarially sound** estimate of the expected value of all future costs associated with an individual risk transfer. Such costs include claims, claim settlement expenses, operational and administrative expenses, and the cost of capital." (WAC 284-24-065(1)) (emphasis added)

This regulation provides a framework under which rate regulation in Washington could move beyond just allowing the traditional 5 percent underwriting profit provision.

In 2008, when the Washington State Legislature enacted title insurance reform, wording nearly identical to that of WAC 284-24-065(1) was incorporated into the legislation (RCW 48.29.143) as the basis for a future prior approval system for the regulation of title insurance rates.

Ohio

Ohio's laws regarding property/casualty insurance rates echo the language of the All-Industry Bills referenced above, stating: "Rates shall not be excessive, inadequate, or unfairly discriminatory" (Ohio Revised Code [ORC] Sections 3935.03[B] and 3937.02[D]). Neither of these sections of the Ohio law links this requirement with actuarial soundness, which possibly is because these laws predate the CAS Statement of Principles. In practice, the wording of the CAS Principle of Ratemaking is used to link the statutory requirements to actuarially sound rates.

[8] Prompted by the passage of McCarran-Ferguson, in the 1940s, the NAIC sponsored the creation of an "all-industry" committee comprised of 19 insurance trade organizations. In 1946, the NAIC collaborated with the all-industry committee to develop the so-called All-Industry Bills, which were adopted by the NAIC as model regulations designed to guide states in regulating insurance in accordance with McCarran-Ferguson. The All-Industry Bills required that rates be "reasonable and adequate," that they not "unfairly discriminate," and that past and future loss experience, as well as a reasonable underwriting profit, be considered. See Lemaire, Jean, *Automobile Insurance: Actuarial Models* (1985).

Ohio has an exclusive workers' compensation fund,[9] which is managed by the Administrator and Board of the Ohio Bureau of Workers' Compensation. The requirements for setting rates are provided in ORC Section 4123.34:

> The administrator … shall fix and maintain, with the advice and consent of the board, for each class of occupation or industry, the lowest possible rates of premium consistent with the maintenance of a solvent state insurance fund and the creation and maintenance of a reasonable surplus…
>
> (B) … and the administrator shall adopt rules, with the advice and consent of the board, governing rate revisions, the object of which shall be to make an equitable distribution of losses among the several classes of occupation or industry…
>
> (C) The administrator may apply that form of rating system that the administrator finds is best calculated to merit rate or individually rate the risk more equitably, predicated upon the basis of its individual industrial accident and occupational disease experience, and may encourage and stimulate accident prevention. The administrator shall develop fixed and equitable rules controlling the rating system, which rules shall conserve to each risk the basic principles of workers' compensation insurance.

The term "not excessive" arguably can be seen here as "the lowest possible rates"; "not inadequate" as "consistent with the maintenance of a solvent state insurance fund"; and "not unfairly discriminatory" as "to make an equitable distribution of losses" and "rate the risk more equitably." While not using the word "actuarial," the "… rules shall conserve to each risk the basic principles of workers' compensation insurance."

California

In California, the term "actuarially sound" most often is applied in the context of rates and premiums. For example, the California Automobile Assigned Risk Plan (CAARP) provides the following:

> Premium charges for the plan shall not be excessive, inadequate, nor unfairly discriminatory, and shall be **actuarially sound** so as to result in no subsidy of the plan. In no event shall the commissioner be required to approve a plan rate that includes a provision for operating profits greater than zero dollars. The commissioner shall not be required to allow a contingency provision with respect to a plan rate if the commissioner takes final action on an application for a rate change within 180 days from the date the application is submitted to the commissioner by the plan's advisory committee.[10] (emphasis added)

[9] In an "exclusive" workers' compensation fund, the state develops its own rates and experience using in-house actuaries or actuarial firms. See http://www.aascif.org/public/1.1.3_types.htm (last visited on January 25, 2012).

[10] California Insurance Code (CIC) Section 11624 (e)

The Fair Access to Insurance Requirements (FAIR) Plan contains similar language and provides additional instruction for rates and premiums as follows:

> Rates for the FAIR Plan shall not be excessive, inadequate, or unfairly discriminatory, and shall be **actuarially sound** so that premiums are adequate to cover expected losses, expenses and taxes, and shall reflect investment income of the plan. If the plan returns premiums to members annually, the rates shall not include any component relating to surplus enhancements.[11] (emphasis added)

For the voluntary market, California adopted a prior approval system in 1988; the statute governing the system states that "no rate shall be approved or remain in effect which is excessive, inadequate or unfairly discriminatory."[12] The term "actuarially sound" does not appear in the statute, but it is used in the regulations that the commissioner adopted in 2008 to implement the statute. Unlike the CAARP and the FAIR Plan, however, the term is not applied to rates or premiums; it rather is applied to the components or process of ratemaking. California Code of Regulations (CCR) Section 2642.8 defines a criterion of most actuarially sound as follows:

> The "most **actuarially sound**" choice is the most appropriate choice within the range of permissible **actuarially sound** choices, considering both the relative likelihood of all choices within the range and the context in which the choice will be employed. (emphasis added)

This criterion is applied to several component selections of the ratemaking process, such as loss development factors, credibility standards, and trend periods.

NAIC MODEL LAWS

NAIC model laws relating to property/casualty insurance contain relatively few references to the concept of actuarial soundness. In a drafting note, the *Model Risk Retention Act* suggests that "an analysis of actuarial soundness of rates charged" could be useful to a regulator in determining the financial condition of a risk retention group. The *Improper Termination Practices Model Act* refers to "sound underwriting and actuarial principles" in its section on unfair discrimination. When an insurer terminates a policy because of the insured's age or disability, or because of the geographic location or age of the insured risk, the action must be "the result of the application of sound underwriting and actuarial principles related to actual or reasonably anticipated loss experience."

CATASTROPHE INSURANCE PROGRAMS

State and national catastrophe insurance programs present additional points of discussion regarding what constitutes actuarially sound cost estimates or rates. Rates may be, by design, subsidized. The programs are generally not designed to generate a profit, and

[11] CIC Section 10100.2 (a)(1)
[12] CIC Section 1861.05 (a)

large losses may be funded by alternative mechanisms. A review of several of these programs highlights additional uses of the term actuarially sound.

National Flood Insurance Program (NFIP)

The National Flood Insurance Program was established in 1968 to identify flood-prone areas, make flood insurance available to property owners living in communities that joined the program, encourage mitigation, and reduce federal expenditures for disaster assistance.

In a 2001 report, the Government Accountability Office defines an actuarially sound program as one in which overall revenues from insurance premiums are sufficient to cover expected losses from claims and the program's expenses. The report offers the following conclusion:

> The program is not **actuarially sound** … Because the program does not collect sufficient premium income to build reserves to meet the long-term future expected flood losses, including catastrophe losses, it is inevitable that losses from claims and the program's expenses will exceed the funds available to the program in some years and, cumulatively, over time.[13] (emphasis added)

In explaining the lack of actuarial soundness of the NFIP, two conditions are identified as contributing factors. The report addresses individual risk transfer, noting that the program is not actuarially sound by design because Congress authorized the availability of subsidized insurance rates for policies covering certain structures to encourage communities to join the program. As of 2000, approximately 30 percent of the policies in force were subsidized, resulting in an estimated $500 million shortfall.[14] The other contributing factor is that the annual target for the program's overall premium is at least the amount of losses and expenses in an average historical year. At the time of the report, this value was estimated using the average annual losses experienced under the program since 1978 and thus did not include consideration of the potential for catastrophic flood losses.

With regard to the first condition, the program fails to meet the definition of actuarial soundness as laid out in the CAS Statement of Principles for Ratemaking because the rates for some risks do not provide for the expected future costs of those classes of insured losses. With regard to the second condition, the estimation process for determining average annual losses does not consider a sufficiently large range of catastrophic loss potential.

When the NFIP experiences losses in excess of its capital and reserves, it borrows from the U.S. Treasury, as it did following losses from Hurricane Katrina in 2005.

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[13] Flood Insurance, Information on the Financial Condition of the National Flood Insurance Program, U. S. General Accounting Office, July 19, 2001, Page 3. Available at http://www.gao.gov/new.items/d01992t.pdf (last visited on January 26, 2012).
[14] Ibid., Page 7

California Earthquake Authority (CEA)

In California, all insurers that sell residential property insurance must offer to sell a policy that covers the peril of earthquake. Following the 1994 Northridge earthquake, and in the context of a severely restricted homeowners' insurance market, the California legislature in 1996 established the CEA as a publicly managed, largely privately funded entity. Companies that sell residential property insurance in California can choose to offer their own privately funded earthquake insurance product or they can become a participating insurance company of the CEA. Only participating insurance companies can offer CEA earthquake insurance policies.

The CEA enabling statutes require that the rates established by the authority be actuarially sound so as not to be excessive, inadequate, or unfairly discriminatory.[15] This statement echoes the CAS statement of principles. The statutes contain the term actuarially sound in two additional sections. A minimum retrofit discount of 5 percent is required for homes meeting specified conditions. A larger discount or credit may be applied, provided that it is determined to be actuarially sound.[16] This requirement, again, is consistent with the statement of principles as it recognizes the costs of the individual risk transfer (in this case, the estimated costs associated with a retrofitted home versus one that is not).

As a final note, the CEA enabling statutes provide for the establishment of a mitigation fund, which is funded by a portion of the CEA's investment income. CIC 10089.37 states:

> The board shall set aside in each calendar year an amount equal to 5 percent of investment income accruing on the authority's invested funds, or five million dollars ($5,000,000), whichever is less, if deemed **actuarially sound** by a consulting actuary employed or hired by the authority, to be maintained as a subaccount in the California Earthquake Authority Fund. The authority shall use those funds to fund the establishment and operation of an Earthquake Loss Mitigation Fund. In the event a set-aside of mitigation-related funds may impair the **actuarial soundness** of the authority, the board may delay the implementation of this section. Any delay shall be reported to the Legislature and the commissioner and reported publicly.

In this section, actuarial soundness is used as a measure of the solvency of the program.

Florida Citizens Property Insurance Corporation

Florida Citizens was established in 2002 as a not-for-profit, tax-exempt government corporation to provide state-backed insurance coverage, including wind damage coverage, for homeowners who cannot get coverage in the private market.

[15] CIC 10089.40 (a)
[16] CIC 10089.40 (d)

Florida Citizens rates initially were required to be noncompetitive with the voluntary market, using a formula dependent on the highest rate offered in the voluntary market for specific areas. After several legislative changes in the ensuing years, in 2009, Florida enacted House Bill 1495, which requires Florida Citizens to implement rate increases until the implementation of actuarially sound rates. Beginning on Jan. 1, 2010, the rate increases were limited to 10 percent for any single policy issued, excluding coverage changes and surcharges. The limitation is to be removed once actuarially sound rates are implemented. The term actuarially sound is not specifically defined in the legislation; within it, however, conditions are provided, including the following:

- After the public hurricane loss-projection model … has been found to be accurate and reliable by the Florida Commission on Hurricane Loss Projection Methodology, that model shall serve as the minimum benchmark for determining the windstorm portion of the corporation's rates.
- The rates are generally subject to Florida statutes for rate standards (Section 627.062) which contain the standard prohibition against rates that are excessive, inadequate, or unfairly discriminatory as well its own listing of considerations, which are to be made in accordance with generally accepted and reasonable actuarial techniques, including:
    - Investment income
    - The cost of reinsurance
    - Past and prospective expenses

ASOPs recognize that actuaries might reasonably differ in their preferred methods and choices of assumptions and might reasonably reach differing opinions, even when faced with the same facts. Two actuaries could apply a particular ASOP, both using reasonable methods and assumptions, and reach appropriate results that could be substantially different. In the context of ratemaking for insurance companies, for example, disputes over whether a rate is an actuarially sound cost estimate tend to arise due to differences in opinion over the methods used to estimate future costs; the inclusion, exclusion, or limitation of certain costs; and how the rates are distributed to the individual classes of insureds. This result should not be a surprise given that ratemaking is a prospective exercise.

In the context of ratemaking and the actuarial soundness of catastrophe programs, evaluations of what constitutes an actuarially sound rate and/or program often are focused on the estimation of losses and/or the cost of financing large losses. For example, the prospective estimation of catastrophic losses might utilize a complex computer model rather than long-term historical averages. As another example, the NFIP has been considered by many as actuarially unsound because, in addition to the issues noted above, there is no provision in the rates for the cost of capital. As noted above, NFIP losses above its capital or reserve levels are funded by borrowing from the U.S. Treasury and are intended to be repaid over time by policyholder premiums. While not all publicly based catastrophe programs rely on outside sources of funding (e.g., taxpayer dollars or assessing a broader policy base), when they do, additional examination is needed to evaluate actuarial soundness. Instructions in the enabling legislation are necessary to

address the level of funding that is expected from premium income and the level that is intended to come from non-premium sources.

5. CONCLUSION

Terms such as actuarially sound or actuarial soundness appear in each of the actuarial practice areas discussed above. In some instances, the term is specifically defined. ASOP No. 26, *Compliance with Statutory and Regulatory Requirements for the Actuarial Certification of Small Employer Health Benefit Plans*, defines actuarially sound small employer health benefit plan premiums. The CAS statement of principles provides a description of an actuarially sound rate and a list of considerations that are not inconsistent with ASOP No. 26. The definitions, descriptions, and discussions surrounding actuarially sound generally are consistent across practice areas when applied in similar circumstances.

While the term is defined specifically in some circumstances, it more often is used as a general term, assumed to be understood to mean reasonable and consistent with generally accepted actuarial principles and practices. In applying the term as a description of actuarial work, it becomes incumbent upon the actuary to provide the support and documentation necessary to show users that the work has been done with skill and care by a qualified practitioner.

APPENDIX

Use of the terms actuarially sound and actuarial soundness in CAS literature (in the excerpts below, emphasis added):

Proceedings Vol. I, 1914-15, p. 196., reviews of publications dealing with workmens' compensation, review of *Three Years under the New Jersey Workmen's Compensation Law,* Report of an Investigation by the American Association for Labor Legislation, New York. 1915. "Neither the report nor the Commission suggests that the interests of beneficiaries in fatal cases require that commutation should be based upon tables of mortality and remarriage as well as upon compound interest, in order to be actuarially sound."

Proceedings Vol. II, 1915-16, p. 371., papers presented at the May 1916 meeting, "Valuation of Pension Funds, with Special Reference to the Work of the New York City Pension Commission." "Practically all of the 228 cities in the United States with more than 25,000 inhabitants have pension systems of some kind. The eighteen cities with a population of over 300,000 pension their firemen, policemen and teachers; and seven of these cities have additional funds for other branches of the municipal service. The majority of these cities, like the City of New York, have failed to exhibit forethought in providing for the actuarial soundness of their system. The time is approaching when either faith cannot be kept with their employees or the cities themselves will be overburdened by a financial strain for which they have not made adequate preparation. The size of the New York system and the longer period of its establishment have resulted in a more imperative need for reorganization than elsewhere. The fact that New York is a pioneer in this field gives peculiar value to the results of its experience."

Proceedings Vol. III, 1916-17, p. 286., reviews of books and publications, review of *Report of Illinois Pension Laws Commission,* Chicago, Illinois, December 1916. "Some conclusions to be drawn from the brief survey of pensions systems in effect in foreign countries are 'that the systems vary from those operating loosely without much regard for the probable future cost, to those kept actuarially sound on the theory that a class of persons of given age and service should be accumulating a sufficient fund to pay their own pensions; that the age of retirement is generally 65 years; that the amount of the pension is rarely based on final salary but is generally a per cent. of average salary multiplied by years of service."

Proceedings Vol. IV, 1917-18, p. 173, discussion of papers read at previous meetings, "Revision of Workmen's Compensation Rates," by Harwood E. Ryan, discussion by Ralph H. Blanchard. "The recognition of the principle by the actuarial committee and the adoption of a resolution calling for further actuarial and statistical study are forward steps. They are evidence of a growing purpose [sic] to begin preparation for further rate revision sufficiently in advance to preclude the familiar explanation that changes proposed in the interest of actuarially sound rate-making were admirable but that practical necessity and a lack of time prevented their adoption."

Proceedings Vol. XVIII, 1931-32, p. 260, papers presented May 20, 1932, “Criticisms and Answers,” by Gustav F. Michelbacher.

I. Actuarial science has been practiced in the field of casualty insurance for less than twenty-five years. In this comparatively brief period, actuaries have labored valiantly to overcome all manner of difficulties. They have made progress; but, speaking frankly, their accomplishments are not to be compared with those achieved in the field of life insurance, where such problems as rate-making and the establishment of reserves have been reduced to definite formulae which have universal sanction.

This failure to produce unequivocal results has irked some executives, who have expressed their exasperation in no uncertain terms. In fact, a feeling seems to exist in certain quarters that the business would be infinitely better off today if actuaries had not invaded it with their clumsy attempts to master problems which might have been solved more satisfactorily by persons endowed with "common sense" rather than a penchant for "the scientific method.

VI. What attitude should the casualty actuary maintain under the conditions which now confront him? The following suggestions are offered for what they may be worth.

So far as possible, he should maintain an open mind and be willing to consider any and all suggestions, for many years will elapse before we develop a rating structure that will stand the test of time and, in the interim, every new idea is entitled to its day in court. At the same time, he should constantly strive to perfect his methods and render his materials and equipment more efficient.

He should develop a broad interest in all phenomena that even remotely affect the business of casualty insurance, for it is not improbable that the clue to important factors affecting rates will be found in statistical facts outside the usual “experience” which today provides exclusively the materials for rate-making. Particularly should he seek to comprehend and cater to the requirements of supervising officials, agents and policyholders, for a rate that is timely, intelligible and justifiable, as well as actuarially sound, is an achievement to be devoutly desired.

He should be willing to accept responsibility for his results and should seek to attain greater accuracy in measuring the hazards of individual risks.

His platform may well be that of a scientist like Sir James Jeans, who says in “The Universe Around Us:”

> "Science advances ... by providing a succession of approximations to the truth each more accurate than the last, but each capable of endless degrees of higher accuracy ... Guessing has gone out of fashion in science; it was at best a poor substitute for knowledge, and modern science, eschewing guessing severely, confines itself, except on rare occasions, to ascertained facts and the inferences which, so far as can be seen, follow unequivocably [sic] from them."
>
> Thus equipped with a purpose, supplemented by adequate machinery and a proper mental attitude, I venture to prophesy that the casualty actuary will one day place the problem of ratemaking upon a basis which will be beyond criticism.

Proceedings Vol. XX, 1933-34, p. 150, discussion of papers read at previous meetings, "Is the Ratemaking Plan the Chief Trouble with Compensation Insurance?", by Winfield W. Greene, discussion by Clarence W. Hobbs: "The rating system is not perfect. As it stands today, it is the result of a continuous line of experimentation. An endeavor has been made to preserve a foundation of actuarial soundness, and to plug up the leaks as rapidly as possible."

Proceedings Vol. XXIII, 1936-37, p. 92, address delivered at the dinner of the CAS, "Reshaping the Body Politic," by Clarence W. Hobbs: "Yet I conceive that few actuaries and statisticians worthy of the name fail to grasp some distinct vision of the vibrant and complicated life of the polity into the several parts of which run the lines of underwriting, or fail to catch some reflection of the vast sea of human suffering and death whence emerge their loss statistics. More than one, too has heard the rude and brutal comment, 'To hell with actuarial soundness: Give me something I can sell!'"

Proceedings Vol. XXIV, 1937-38, p. 134, discussion of papers read at previous meetings, "Some Aspects Of Retrospective And Supplementary Rating Plans," by J. J. Magrath, discussion by S. Bruce Black: "Considering the immediate self-interest of insurance carriers, any form of cost-plus insurance has considerable appeal if, the plan is actuarially sound, and if the carriers are protected against shifting from "retrospective" to "prospective" rating or visa [sic] versa. There is no competitive advantage to any kind of insurance organization, in sound cost-plus insurance."

Proceedings Vol. XXVI, 1939-40, p. 200, discussion of papers read at previous meetings, "State Monopoly of Compensation Insurance, Laboratory Test of Government in Business, Part II, Analysis of The Recent Actuarial Audit of The Ohio State Insurance Fund," by Winfield W. Greene, discussion by Richard Fondiller: "I have only a scientific interest in the issues drawn between Mr. Greene and the proponents of monopolistic state funds and have prepared this discussion of his paper solely with a view to establishing that my analyses and valuations of the Ohio State Fund were actuarially sound.

Proceedings Vol. XXVIII, 1941-42, p. 222, reviews of publications, *Economics of Social Security*, by Seymour Edwin Harris, review by Otto C. Richter: "In the chapter entitled *Theory of Reserves* an attempt is made to define such concepts as actuarial soundness and the reserve system of financing. Unfortunately, the definitions given do not help much to dispel the confusion which frequently surrounded the use of these terms in the recent reserve controversy."

Proceedings Vol. XXX, 1943, p. 102. obituary for John Melvin Laird, 1885–1942: "Although for many years his duties had been of an executive nature, he never ceased to be guided by his actuarial training. He exacted from his actuarial associates rigid standards of performance, but in a friendly and kindly manner that made them eager to live up to those which he set. While never a theorist, he yet insisted that a business decision must be actuarially sound, but without ever losing sight of the fact that the decision had to fit into the day-by-day problems of Company management. He approached business problems with the same logic, clarity and conciseness that characterized his professional papers. He will be missed by the older members of the Society."

Proceedings Vol. XXXIV, 1947, p. 15, papers presented, "Interstate and Overall Rating Plans," by Seymour E. Smith: "It is believed by the proponents of Retrospective Rating—Plan D that the plan is actuarially sound and will represent a desirable step forward in the rating of sizeable casualty risks. The plan has been so designed as to provide ample safeguards and safety margins so that the integrity of the workmen's compensation rating procedure will in no way be endangered by the combination for rating purposes of workmen's compensation and other third party liability lines."

Proceedings Vol. XLI, 1955, p. 207, papers presented, "Actuarial Aspects of Unemployment Insurance," by Nathaniel Gaines: "In general, actuarial soundness implies an orderly arrangement for financing obligations under a benefit program. Precise formulations of what constitutes actuarial soundness have been adequately developed elsewhere, so that there is no need for further discussion here."

Proceedings Vol. XLV, 1958, p. 220, papers presented, "The Canadian Merit Rating Plan for Individual Automobile Risks," by Herbert E. Wittick: "To summarize, the Canadian experience indicates that merit rating of individual automobile risks is not only desirable, but practical. It is actuarially sound and is popular with the great segment of the insuring public who have few, if any, claims. The system keeps rates lower on good business and provides higher rates for the less satisfactory driver. The practical problems are not too difficult and the cost of making the system work is not excessive. A rating plan that does all these things is undoubtedly worthwhile, and represents a real advance over a plan which ignores the claim record of individual risks. In Canada, automobile underwriters generally would not wish to operate without the merit rating plan."

Proceedings Vol. XLV, 1958, p. 255, seminar reports, *Current Rate Regulatory Problems*, summation by James B. Donovan: "It was suggested that precise

uniformity of opinion among actuaries can never be ascertained; after all, this is an inexact science and we do not expect that a dollars-and-cents formula can be produced as the only actuarially sound answer to many of these complex problems. Nevertheless, to the maximum extent possible, without in any manner interfering with the individual's own sincere opinion, it would be in the best interests of the profession that efforts be made to minimize this kind of contest. Whether the actuary is with the Insurance Department or whether he is with a company, the opinion that he does give should be recognized by all as one that can be accepted as sound and intellectually honest and, to the maximum extent possible, does not present the type of conflict which would be to the detriment of the whole profession. In last analysis, such an endeavor can be an extremely important factor in eliminating many of these industry-Government disputes and in others could be determinative. To the extent that this goal could be accomplished, without curtailing in any way the intellectual freedom of each individual actuary, it would make not only for the solution of rate regulatory problems but also can only lead to further recognition of the high standards that this society has set for the profession of the actuary."

Proceedings Vol. XLV, 1958, p. 260-02, seminar reports, *Standards of Processional Conduct for Actuaries,* summation by Winfield W. Greene: "Now my thinking at that time was that the subject 'A Code Of Ethics For Actuaries' implied that there should be such a Code. At that particular stage, which was only a few weeks ago, I wasn't convinced that there should be such an animal … Another point that was brought out in our round table discussion was that the more definitely the actuary is regarded as a member of a profession, the more able he is to choose and maintain the actuarially sound position. As somebody said, he should really take the Hippocratic Oath. For example, take the actuary who is employed by a company. His boss wants him to take a certain position. He feels that his actuarial conscience forbids him to do so. The more he is regarded as a member of a profession which is not only just a group of wizards but a group of men dedicated to very high standards of conduct, the better that fellow's chances are of telling his boss 'Uh,-Uh,' and still keeping his job. To summarize, I now feel that the objects of our society should be re-stated, that there should be machinery for handling these questions of professional conduct, and that the adoption of a set of guides to professional conduct would be a good thing. The need for such guides has lately been intensified, and this subject merits the utmost serious and conscientious consideration of the society."

Proceedings Vol. XLVI, 1959, p. 228-32, papers presented, *OASDI Cost Estimates and Valuations,* by Robert J. Myers:

"Understandably, the question of the actuarial soundness of the system has provoked much discussion (and confusion, too) over the years. There is not agreement among actuaries as to whether the term "actuarial soundness" can be applied to a national compulsory system with virtually universal coverage.

At one extreme, a plan may be said to be 'actuarially sound' if the existing fund is at least as large as the value of all accrued benefit rights. This basis is, of course, satisfied by legal reserve life insurance companies but not by many

private pension plans that have assumed considerable liabilities for prior service. Some actuaries define an 'actuarially sound' private pension plan as one 'where the employer is well informed as to the future cost potential and arranges for meeting those costs through a trust or insured fund on a scientific, orderly program of funding under which, should the plan terminate at any time, the then pensioners would be secure in their pensions and the then active employees would find an equity in the fund assets reasonably commensurate with their accrued pensions for service from the plan's inception up to the date of termination of plan.'[17] This definition permits a long period before all the past-service credits are fully funded.

Other actuaries have a less stringent definition of an actuarially sound system: 'One which sets forth a plan of benefits and contributions to provide these benefits, so related that the amount of the present and contingent liabilities of the plan as actuarially computed as of any date will at least be balanced by the amount of the present and contingent assets of the plan actuarially computed as of the same date.'[18]

How do these concepts apply to OASDI? The first definition means that it is not actuarially sound, but rather that it is indeterminate from this standpoint; the second definition would say that it is actuarially sound. My personal view is that the second definition can be used and that it is the intent and understanding of Congress that the program has been developed, and should continue, on this basis. Even though it is generally agreed by actuaries that the first and more restrictive definition of actuarial soundness does not apply to OASDI, it may be of interest to compute certain quantities pertinent to it.

Such calculation can readily be made, and this has been done on an approximate basis, even though it is recognized that the resulting figures can be misunderstood and misused. One concept of measuring the actuarial condition of a pension plan is to develop the 'deficit for present members.' Under this concept, as of the end of 1958, based on the intermediate-cost estimate at 3% interest, the following situation existed for the OASDI program:

Item	Amount (billions)
1. Present Value of Future Benefits and Expenses	$544
2. Present Value of Future Contributions	232
3. Existing Trust Fund	23
4. Net Balance, (2) + (3) - (1)	-289

Under this concept there was thus an actuarial deficit of almost $300 billion (some 12½ times the amount of the existing trust fund), which, it should be realized, is only of theoretical interest and not of true significance under a long-range social insurance program.

[17] Dorrance C. Bronson, "Pension Plans-The Concept, of Actuarial Soundness" Proceedings of Panel Meeting, "What is Actuarial Soundness in a Pension Plan," sponsored jointly by the American Statistical Association, American Economic Association, American Association of University Teachers of Insurance, and Industrial Relations Research Association, Chicago, Dec. 29, 1952.
[18] George B. Buck, "Actuarial Soundness in Trusteed and Governmental Retirement Plans," ibid.

Still another concept of actuarial soundness applicable to private pension plans may be considered in respect to the OASDI system, namely, the present value of all benefits in current payment status. In a sense, this corresponds to the terminal funding concept of private pension plans. At the beginning of 1959, after the benefit increases provided in the 1958 Amendments had become effective, benefits in current payment status were running at the rate of $760 million a month. These had a present value of about $75 billion, somewhat more than 3 times the then-existing trust fund. But it should be kept in mind that this relationship has no direct bearing on the actuarial soundness of the program, although it is an interesting summary measure of the obligations incurred and does facilitate comparisons with other systems.

Although in some quarters there has been considerable criticism of the fact that every two years since 1950 legislative action has liberalized the OASDI system, there is one important point that should be kept in mind. Each time there has been legislative activity, the Congress—particularly, the important, controlling legislative committees concerned—has very carefully considered the cost aspects of all proposed liberalizations. Any changes made have been carefully financed according to the best actuarial cost estimates available. Thus, Congress has attempted to keep the system on a self-supporting basis by keeping benefit costs very closely in balance with contribution income. The Committees have always been anxious to be able to say that the program is 'actuarially sound.' In my opinion, this is true under the second, less restrictive definition of 'actuarial soundness,' which is fully satisfied by the self-supporting basis of the system. Certainly, the program can be said to have staunch financial safeguards as long as Congress continues to be cost-conscious, as it has been in the past, and to finance benefit liberalizations adequately."

Proceedings Vol. XLVII, 1960, p. 179, discussion of papers read at previous meetings, *OASDI Cost Estimates and Valuations*, by Robert J. Myers, discussion by W. Rulon Williamson: "The two illustrative 'projections' are set down by Mr. Myers with explanations that show their frailty. One cannot know exactly what the course of evolving history may be. The low and high illustrations are to some extent determined by 'ideology' of full employment, the need to check wage inflation, and other political gambits. Marx and Keynes have been well-examined lately. It seems to me that the range used is too narrow in considering 'the possible'—so that the two prospects might be called *low* low and *low* high. But when the mean of the two 'projects' is set down, as not any more dependable than the two boundaries of the low low and the low high, and then is quoted as making this highly suspect system 'actuarially sound,' 'reassurance' has replaced the 'need for verification.'"

Proceedings Vol. XLVII, 1960, p. 195, discussion of papers read at previous meetings, *The Compensation Experience Rating Plan—A Current View*, by Dunbar R. Uhthoff, discussion by R. M. Marshall: "To the actuarial mind the idea of a credibility greater than unity is unacceptable; it corresponds to the absurdity that the probability of an event happening is greater than certainty. To be actuarially sound the Plan should be corrected so that neither the primary nor the excess credibility can be greater than unity, regardless of whether or not the actual credibility figure may be readily determined."

Proceedings, Vol. XLVIII, 1961, p. 54-55,presidential address by William Leslie Jr.: "The word 'chaos' or its equivalent is being used over and over again to describe one or more problems today facing the insurance industry. Responsible executives with several decades of experience behind them are reporting that today's conditions represent the need to solve problems the like of which they have not seen previously in their careers.

There seem many aspects to this report of chaotic conditions. We hear it in discussions of the problems of independent companies viz a viz rating bureaus. A year ago bureaus were alleged to be blocking progress which was sought to be brought to the public by companies operating independently of the bureaus and this year we hear that the bureau companies are 'walking arm and arm through the marketplace' leaving a trail of trouble behind; competitively that is.

We hear of this chaos being talked of in the broader concept of competition in which there is sincere and open puzzlement as to whether homeowners rates, private passenger automobile rates, surplus lines rates and package policy rates, for example, have not by now departed from the realm of actuarial soundness and represent instead full evidence of a serious rate war.

Proceedings, Vol. XLVIII, 1961, p. 186, Footnote 1: Simon, LeRoy J., *Myths and Mysteries Concerning the Actuarial Soundness of Merit Rating*, paper presented to the Casualty Actuaries of Philadelphia, Sept. 7, 1960

Proceedings, Vol. XLIX, 1962, p. 97, discussion of papers read at previous meetings, *Experience Rating Reassessed,* by Robert A. Bailey, discussion by Lewis H. Roberts: "An important point is raised by the author to the effect that the parameters of an experience rating plan should be derived from experience. The need for doing so in connection with small risk experience rating, or merit rating, has long been recognized. This may have been because under merit rating plans a small number of classes can be set up to correspond to the several debit and credit groups established under such plans. For other experience rating, however, it would be no less appropriate to tabulate experience by the amount of the modification, and there is no real obstacle to arranging for this to be done. Such a study would provide a valuable check on the actuarial soundness of plans in current use, although it would not guarantee that they are the most efficient of possible plans."

Proceedings, Vol. L, 1963, p. 44, panel discussion during the May 1963 meeting, "An Analysis of the Adequacy of the Various Factors and Rating Values Used in Retrospective Rating," Chairman, Stephen S. Makgill; panel members Stephen Makgill, James Brannigan, Donald Trudeau, James Boyle: "When the risk's expected losses have been determined, the ratio of these losses to the loss provisions in the minimum and maximum premium are used to obtain the insurance charge percentages directly from Table M. These percentages are, of course, in terms of expected losses and must be converted to premium terms for use in the basic premium. In both the automatic Premium Adjustment Rating Plan and the Premium

Adjustment Plan for Boiler and Machinery risks the tables for the determination of the insurance charge are not labeled Table M as such but the underlying basic data is the same and the use of separate tables for these plans is merely one of mechanical convenience. In the various tabular retrospective rating plans the calculation of the insurance charge has been made in advance and is built into the tabular basic premium ratios. In the various formula type plans the appropriate insurance charge must be calculated on each individual risk. In view of the wide flexibility in the plans, this calculation is somewhat complicated if a high degree of actuarial soundness is to be maintained and as a general rule these calculations are made in the home office of the various carriers and then are checked as to accuracy by the appropriate rating organization."

Proceedings, Vol. LI, 1964, p. 37, previously presented papers, *Some Fundamentals of Insurance Statistics,* by Harry M. Sarason, discussion by Charles C. Hewitt, Jr.: "The science of statistics is based on similarities and on differences. Similarities lead to classes. Differences lead to sub-classes, to frequency distributions and to individuals—unique individuals, persons. Insurance statistics is in the class of human statistics and in the sub-class of business statistics. Insurance statistics of various kinds have their own distinct characteristics; each statistical study has its individual characteristics. One important characteristic of insurance statistics is change; who knows what tomorrow holds, except change? A sudden change like October 1929, or a mathematically smooth change? The application of insurance statistics to insurance operations involves the vital operations of an insurance business; sales, profit making, and the ability to provide the benefits which have been promised. So important are our statistics and our profession that actuaries, quite as a matter of course, appear before and are a part of boards of directors and governmental committees—so important, that the words 'actuarially sound' have been used as part of the presidential vocabulary. Actuaries and other insurance statisticians belong to that class of individuals, purveyors of truth, of whom King Solomon wrote in The Book of Proverbs; 'Seest thou a man diligent in his business? He shall stand before kings.'"

Proceedings, Vol. LIII, 1966, p. 307, papers presented, *Underwriting Profit in Fire Bureau Rates,* by Laurence H. Longley-Cook: "To justify the use of combined stock and mutual fire insurance loss experience, or as is sometimes suggested experience including independents and direct writers as well, three fallacious arguments are frequently put forward, and these must be reviewed briefly. The first is usually referred to as the 'broadest possible base' and the second, less frequently used, I will call 'a house is a house.' The third argument is that combined stock and mutual experience is used for workmen's compensation insurance which, it is generally admitted, is rated on actuarially sound methods.