Actuarial Funding Policies and Practices for Public Pension Plans

Second Edition
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Conference of Consulting Actuaries
Public Plans Community

Contents

Process and Acknowledgements

The Public Plans Community of the Conference of Consulting Actuaries (CCA PPC) published the first edition of this "white paper" on Actuarial Funding Policies and Practices for Public Pension Plans in October 2014. For this second edition, a committee began working on an update to the original paper in 2022, released an exposure draft in May 2024, and after reflecting comments on the exposure draft, the second edition of the paper was approved by the Steering Committee of the Public Plans Community on July 31, 2024.

This white paper is not an actuarial standard of practice issued by the Actuarial Standards Board nor is it guidance on compliance with actuarial standards. Actuaries are not required to follow the practices developed in the white paper, and while the CCA Board approved the release of the paper, the opinions expressed in the paper do not necessarily reflect the views of the CCA, the CCA's members, or any employers of CCA members, and should not be construed as being endorsed by any of those parties.

The first edition of the white paper was based on funding policy discussions among the members of the Conference of Consulting Actuaries Public Plans Community (CCA PPC) and reflected the majority opinions of the CCA PPC members in 2014. Those discussions relied heavily upon and generally concurred with the funding policy white paper prepared by the California Actuarial Advisory Panel (CAAP) and the level cost allocation model developed therein. The CCA PPC white paper built directly on the CAAP document and in 2015 the CAAP changed its guidance to refer to the CCA PPC white paper.

The CCA PPC represents a broad cross section of public-sector actuaries with extensive experience providing valuation and consulting services to public plans, and it is that experience that provides the knowledge base for this paper. The first edition of the white paper was based on over two years of extensive and detailed funding policy discussions among the members of the CCA PPC. While there were naturally disagreements and compromises during those discussions, the first edition reflected the resulting majority opinions of the CCA PPC as developed through those discussions.

The white paper has remained a valuable reference for public plan actuaries since its publication. Nevertheless, with updates to Actuarial Standards of Practice and nearly a decade of experience applying the guidance from the white paper, the Steering Committee of the CCA PPC determined it was time to update the guidance to reflect these changes as well as emerging practices. The intent of the changes in the second edition is to preserve and enhance the ongoing relevance and credibility of the white paper. The Steering Committee of the CCA PPC believes the second edition reflects a substantial consensus among current actuaries who provide valuation and consulting services to public pension plans.

The following members of the CCA PPC developed the second edition of the white paper.

Process and Acknowledgments

Introduction

This CCA PPC "white paper" provides guidance to actuaries, policymakers, and other interested parties on the development of actuarial funding policies[1] for public pension plans. It develops a principles-based empirically grounded Level Cost Allocation Model (LCAM) to be used as a basis for funding policies of public pension plans throughout the US. We believe that the funding policies developed herein could serve as a "reasonable actuarially determined contribution" under Actuarial Standard of Practice No. 4 and could be disclosed as the plan's actuarially determined contribution under GASB 67 and 68.

The distinguishing feature of this approach is that it begins with stated policy objectives and then develops specific policy guidance consistent with those objectives. One of the main results is that an effective funding policy often represents a balancing of policy objectives. Another is that adherence to the policy objectives may lead to a narrower range of acceptable practices than is sometimes found in current practice.

The reader is strongly encouraged to focus not only on the specific practice guidance but also on the detailed discussions and rationales that lead to that guidance. Also note that while this discussion is comprehensive it is not all-inclusive. In addition, there may be other "level cost allocation models" that are appropriate in some circumstances.

Scope

This white paper is intended to support and inform the development, review, and discussion of funding policies for public pension plans throughout the United States. Our hope is that the principles and policies presented herein may provide an actuarial basis for the development of funding practices and that legislative, regulatory, and other industry groups may build these concepts into their guidance.

This white paper develops actuarial funding policies for traditional defined benefit public pension plans that are open to new members and pre-funded using an actuarially determined contribution. It does not address policy issues where a member's benefits are not funded during the member's working career, e.g., plans receiving "pay-as-you-go" funding or "terminal" funding. It does not address closed or frozen plans, and it may not fully address issues specific to variable benefits or gainsharing provisions. Finally, it does not address the funding of OPEB plans. In all of these cases, we believe the General Policy Objectives presented here are applicable. However, application of those policy objectives may result in different specific funding policies based on plan design, legal status, and other features distinctive to the specific plans. We encourage those involved in the valuation and funding of these plans to consider the applicability of the General Policy Objectives and how those objectives may result in the same or different practice guidance than is developed here.

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[1] As used in this paper, an "actuarial funding policy" has the same meaning as a "Contribution Allocation Procedure" as defined in the Actuarial Standards of Practice (ASOPs).

Introduction

Some pension plans have contribution rates that are set on a fixed basis, rather than being regularly reset to a specific, actuarially determined rate or amount. While such plans are required to develop a reasonable actuarially determined contribution, this white paper does not address procedures for evaluating a comparison between the fixed rate and the reasonable actuarially determined contribution, or other practices to determine when and how the fixed rate should be changed.

Note that while the selection of actuarial assumptions is an essential part of actuarial policy for a public sector pension plan, the selection of actuarial assumptions is outside the scope of this discussion. Another important consideration in determining a plan's funding requirements is the plan's investment policy and related investment portfolio risks. While actuarial assumptions, plan investments and even benefit design are all elements that affect funding requirements, they are beyond the scope of this paper.

Finally, this white paper is not intended to address the measurement of liabilities for purposes other than funding, e.g., settlement, employer withdrawal, or the Low-Default-Risk Obligation Measure under ASOP 4.

Level Cost Allocation Model (LCAM)

As developed here the LCAM is a "level cost" actuarial methodology, which is consistent with well-established actuarial practice. Here a level cost actuarial methodology is characterized by economic assumptions based on the long term expected experience of the plan. Further, a "level cost" actuarial methodology allocates the cost associated with each year of an employee's active service as a level percentage of compensation. [2] The LCAM is a principles-based mathematical model of pension cost. The model policy elements are developed in a logical sequence based on stated General Policy Objectives, and in a manner consistent with primary factors that affect the cost of the pension obligation.

The particular model that we develop is based on a combination of policy objectives and policy elements that has been tested over many years and, we believe, is well understood and broadly applicable. However, there are other models and policy objectives that practitioners may use that are internally consistent and may be as appropriate in some circumstances as the model that is developed herein, and it is not our intention to discourage consideration of such other policies. Furthermore, there are situations where the policy parameters developed herein may require additional analysis to establish the appropriate parameters for each such situation. It is up to the actuary to apply professional judgment to the particulars of the situation and recommend the most appropriate policies for that situation, including considerations of materiality.

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[2] In contrast, a "market-consistent" actuarial methodology uses economic assumptions based on observations of current market interest rates, and costs are allocated based on the (non-level) changes in the present value of an employee's accrued benefit.

Introduction

Our approach begins with identifying the policy objectives of such a funding policy, and then evaluating the structure and parameters for each of the policy elements in a manner consistent with those objectives, as well as with current and emerging actuarial science and governing Actuarial Standards of Practice.

This white paper is intended as advice to actuaries and retirement boards[3] in the setting of funding policy. While the analysis is somewhat restrictive in the categorization of practices, this guidance is not intended to supplant or replace the applicable Actuarial Standards of Practice (ASOPs). Like all opinions of the CCA PPC, this guidance is nonbinding and advisory only. Furthermore, it is not intended as a basis for litigation, and should not be referenced in a litigation context.

Categories

Given the wide range of actuarial funding policies currently in practice in the U.S., this paper acknowledges that plan sponsors and retirement boards may require some level of policy flexibility to reflect both their specific policy objectives and their individual circumstances. To accommodate that need for reasonable flexibility and yet also provide substantive guidance, this paper evaluates various policy element structures and parameters or ranges according to the following categories:

- **LCAM Model practices**. Practices viewed as most consistent with the General Policy Objectives and the Level Cost Allocation Model as developed here based on those policy objectives.

   LCAM Model practices are not intended to be interpreted as synonymous with "best practices." In particular, given their circumstances retirement boards may find that other practices, particularly those categorized as Acceptable or Acceptable with Conditions, are both appropriate and reasonably consistent with the policy objectives stated herein.

- **Acceptable practices.** Practices that are well established and generally viewed as consistent with the General Policy Objectives but not necessarily fully consistent with the LCAM as developed here.

   Acceptable practices typically do not require additional analysis to demonstrate their consistency with the General Policy Objectives.

- **Acceptable practices, with conditions.** Practices that may be acceptable in some circumstances, based on additional analysis to show consistency with the General Policy Objectives or to address risks or concerns associated with the practices.

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[3] Here "retirement boards" is meant to refer generally to whatever governing bodies have authority to set funding policy for public sector plans.

Introduction

- **Non-recommended practices.** Practices that appear to reflect General Policy Objectives that are different from those on which the LCAM is based.

  Systems adopting such practices should address the policy concerns identified herein.

- **Unacceptable practices.** Practices that are inconsistent with the General Policy Objectives and may not be consistent with Actuarial Standards of Practice.

These categories are best understood in the context of the different elements that comprise an actuarial funding policy and the various alternatives for each of those policy elements. They are intended to assist in the evaluation of specific policy elements and parameters relative to the General Policy Objectives stated herein and are developed separately for each of the three principal policy elements discussed in this white paper (cost methods, asset smoothing methods and amortization methods). They are not intended as a grading or scoring mechanism for a system's overall actuarial funding policy.

In practice, Systems should carefully consider how the different policy elements interact in determining whether the General Policy Objectives are satisfied. While each policy element evaluated in isolation may achieve a desired balance between competing objectives, in combination the elements may not achieve the desired balance.

This evaluation of policy elements and parameters was developed in relation to the LCAM and its General Policy Objectives, based on experience with the many independent public plans sponsored by states, counties, cities, and other local public employers in the US, and is intended to have general applicability to such plans. However, for some plans, special circumstances or situations may apply. The specific applicability of the results developed here should be evaluated by their governing boards based on the advice of their actuaries.

Transition Policies

To avoid undue disruption to a sponsor's budget, it may not be feasible to adopt policies consistent with this white paper without some sort of transition from current policies. For example, a plan using longer than model amortization periods could adopt model periods for future unfunded liabilities while continuing the current (declining) periods for the current unfunded liabilities. Such transition policies should be developed with the advice of the actuary in a manner consistent with the principles developed herein. We have included some discussion of transition policies appropriate to each of the principal policy elements.

General Policy Objectives

The following are objectives that apply generally to all elements of an actuarially based funding policy. Objectives specific to each principal policy element are identified in the discussion section for that policy element.

1. **Contribution Sufficiency.** The principal goal of a funding policy is to pre-fund the benefits so that future contributions together with current plan assets and future investment returns should be sufficient to provide for all benefits expected to be paid to members and their beneficiaries when due.

    a. Contribution sufficiency means that contributions should include the cost of current service plus a series of amortization payments or credits to fully fund or recognize any unfunded or overfunded past service costs (note that the latter is often described as "Surplus").

2. **Demographic Matching.** The funding policy should seek a reasonable allocation of the cost of benefits and the associated funding to the years of service. This includes the goal that annual contributions should maintain a reasonably close relationship to both the expected cost of each year of service and to deviations from that expected cost.

    a. This policy objective promotes intergenerational equity which seeks to have each generation of taxpayers incur the cost of benefits for the employees who provide services to those taxpayers, rather than deferring those costs to future taxpayers.

    b. Demographic matching is closely linked with volatility management (policy objective 3) as these two aspects of inter-period equity (IPE) will tend to move a funding policy in opposite directions. Thus, the combined effect of policy objectives 2 and 3 is to seek an appropriate balance between demographic matching and volatility management.

3. **Volatility Management.** The funding policy should seek to manage and control future contribution volatility to the extent reasonably possible, consistent with other policy goals.

    a. This policy objective promotes period-to-period equity, which seeks to have the cost incurred by taxpayers in any period compare equitably to the costs for the periods just before and after.

General Policy Objectives

    b.   Volatility management is closely linked with demographic matching (policy objective 2) as these two aspects of IPE will tend to move a funding policy in opposite directions. Thus, the combined effect of policy objectives 2 and 3 is to seek an appropriate balance between demographic matching and volatility management.

    c.   Volatility management (and the appropriate balance between demographic matching and volatility management) depends on the presumed ongoing status of the public sector plan and its sponsors. The level of volatility management appropriate for a funding policy may be lower for plans where the ongoing status of the plan and its sponsors cannot be presumed, e.g., plans that are closed to new entrants or plans where the funding sources of the plan sponsors are projected to decline.

4.   **Transparency and Accountability.** The funding policy should support the general public policy goals of transparency and accountability. While these terms can be difficult to define in general, here their meaning includes that each element of the funding policy should be clear both as to its intent and effect, and that each should allow an assessment of whether, how, and when the plan sponsor is expected to meet the funding requirements of the plan.

    a.   This policy objective will generally favor policies that allow a clear identification and understanding of the distinct role of each funding policy element in managing both the expected cost of current service and any unexpected variations in those costs, as measured by any unfunded or overfunded past service costs.

    b.   Transparency and accountability can enhance the credibility and objectivity of the cost calculations, which is also supportive of policy objective 5.

5.   **Sound Governance.** The funding policy should take into consideration the nature of public sector pension plans and their governance. These governance issues include (1) agency risk issues associated with the desire of interested parties (agents) to influence the contribution calculations in directions viewed as consistent with their particular interests, and (2) the need for a sustained budgeting commitment from plan sponsors.

    a.   This policy objective seeks to enhance a retirement board's ability to resist and defend against efforts to influence the determination of plan costs in a manner or direction inconsistent with the other policy objectives.

General Policy Objectives

      b.   Sound governance favors policies based on a cost model for funding where the parameters are set in reference to factors that affect costs rather than the particular cost results. This separation between the selection of model parameters and the resulting costs enhances the objectivity of the cost results and, consequently, any attempt to influence those results must address the objective parameters rather than the cost result itself.

      c.   Agency risk may arise if, for example, plan sponsors are more aware of and responsive to the interests of current versus future taxpayers, and thus there may be incentives to defer contributions to future periods. This could be countered by avoiding policy changes that selectively reduce current contributions.

      d.   For plans with an ongoing service cost for active members, this policy objective also seeks to avoid encumbering for other uses the budgetary resources necessary to support that ongoing service cost. This introduces an asymmetry between funding policies for unfunded liabilities versus Surpluses, which is discussed in the policy development for Surplus amortization.

Once crafted, a funding policy incorporating these five objectives can be remarkably durable and care should be taken when updating or changing the policy.

Note that the model funding policies developed in this paper are substantially driven by these General Policy Objectives. In some situations, other plan features or policies (e.g., investment policy, reserving requirements, and plan maturity) may also be a consideration in setting a funding policy. Such considerations are not addressed in this paper.

Principal Elements of an Actuarial Funding Policy

The type of comprehensive actuarial funding policy developed here is made up of three components:

1. An actuarial cost method, which allocates the total Present Value of Future Benefits (PVFB) to each year (Normal Cost) including all past years (Actuarial Accrued Liability or AAL).

2. An asset smoothing method, which reduces the effect of short-term market volatility while still tracking the overall movement of the market value of plan assets.

3. An amortization policy, which determines the length of time and the structure of the increase or decrease in contributions required to systematically (1) fund any Unfunded Actuarial Accrued Liability or UAAL, or (2) recognize any Surplus, i.e., any assets in excess of the AAL.

An actuarial funding policy can also include some form of "output smoothing" in addition to both asset smoothing and UAAL/Surplus amortization. Two types of this form of output smoothing policies were evaluated for this development:

1. Phase-in of certain extraordinary changes in contribution rates, e.g., phasing-in the effect of assumption changes element over a three-year period.

2. Contribution "collar" where contribution rate changes are limited to a specified amount or percentage from year to year.

It is also possible to use output smoothing techniques as an alternative to asset smoothing, rather than in addition to asset smoothing. That approach is outside the scope of this discussion.

Actuarial Cost Method

The Actuarial Cost Method allocates the total Present Value of Future Benefits (PVFB) to each year (Normal Cost) including the accumulated value of all past years (Actuarial Accrued Liability[4] or AAL).

Specific policy objectives and considerations

1.   Each participant's benefit should be funded under a reasonable allocation method by the expected retirement date(s), assuming all assumptions are met.

2.   Pay-related benefit costs should reflect anticipated pay through the time of anticipated decrement.

3.   The cost allocated to each year of service (generally known as the Normal Cost or service cost) for each active member should be reasonably related to the expected cost of that member's benefit.

4.   The member's Normal Cost should emerge as a level percentage of member compensation[5].

5.   No gains or losses should occur if all assumptions are met, except for:

    a.   Investment gains and losses deferred under an asset smoothing method consistent with these model practices, or

    b.   Contribution gains or losses due to a routine lag between the actuarial valuation date and the date that any new contribution rates are implemented, or

    c.   Contribution gains or losses due to the phase-in of a contribution decrease or increase.

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[4] Here "liability" indicates that this is a measure of the accrued (normal) cost while "actuarial" distinguishes this from other possible measures of liability: legal, accounting, etc.
[5] This objective applies most clearly to benefits (for example, most public pension benefits) that are determined and budgeted for as a percentage of individual and aggregate salary, respectively. For benefits that are not pay related it may be appropriate to modify this objective and the resulting policies accordingly.

Actuarial Cost Method

6.   The cost method should allow for a comparison between plan assets and the AAL.

The discussion below references multiple actuarial cost methods. These cost methods are described in greater detail in the Appendix.

Discussion

1.   Level Cost Allocation Models for retirement benefits begin with construction of a series or array of Normal Costs that, if funded each year, under certain stability conditions will be sufficient to fund all projected benefits for current active members. The following considerations serve to specify the cost model developed here.

   a.   The usual stability conditions are that the current benefit structures and actuarial assumptions have always been in effect, the benefit structures will remain in effect, and future experience will match the actuarial assumptions. Special considerations apply if in the past the benefit structure has been modified for current active members by changing the benefits for members with service after some fixed date.

   b.   Consistent with Cost Method policy objective 3 and with General Policy Objective 4 (Transparency and Accountability) the LCAM Normal Cost for each member is based on the benefit structure for that member. This means that a separate Normal Cost array is developed for each tier of benefits within a plan. This argues against Ultimate Entry Age, where Normal Cost is based on an open tier of benefits even for members not in that open tier.

   c.   Consistent with Cost Method policy objective 4, the LCAM Normal Cost for pay-related benefits is developed as a level percentage of pay for each member, so that the Normal Cost rate for each member (as a percentage of pay) is designed to be the same for all years of service. This provides for a more stable Normal Cost rate for the benefit tier in case of changing active member demographics. This argues against Projected Unit Credit.

   d.   Also consistent with Cost Method policy objective 4, the LCAM Normal Cost for all types of benefits incurred at all ages is developed as a level percentage of the member's career compensation. This argues against Funding to Decrement Entry Age, where each type and incidence of benefit is funded to each age at decrement.

Actuarial Cost Method

e. Consistent with Cost Method policy objective 6, the LCAM Normal Cost is developed independent of plan assets, and the AAL (and so also the UAAL) is based on the Normal Costs developed for past years. This argues against Aggregate and Frozen Initial Liability (FIL).

  i. The Aggregate and FIL methods should be considered as fundamentally different approaches to the determination and funding of variations from Normal Cost.

  ii. Plans using these methods should also measure and disclose costs and liabilities under the Entry Age method, which will generally be the same as or similar to the amounts reported under current accounting standards.

f. Under a less common variation of the Entry Age method (an "Aggregated" Entry Age method), the Normal Cost and AAL are first determined for each member in a tier of benefits under the usual Entry Age method. However, the actual Normal Cost for the tier is then determined as the Normal Cost rate for the tier applied to the total salary for the tier, where the Normal Cost rate for the tier of benefits is determined as the Present Value of Future Normal Costs for all active members in the tier, divided by the Present Value of Future Salaries for all members in the tier.

  i. This variation introduces an inconsistency between the Normal Cost that is funded and the Normal Cost on which the AAL is based.

  ii. This inconsistency can be shown to produce small but systematic gains or losses, generally losses.

2. Consistent with all the above, the LCAM Normal Cost rate would change only when the projected benefits for the tier change either in amounts or in present value.

a. The Normal Cost rate (both in total and by member) will vary from valuation to valuation due to demographic experience and assumption changes.

b. The Normal Cost rate will not change when an individual member reaches an age or service where, under the consistent benefit structure for the member's tier, the member's benefit eligibility or accrual rate changes. This is because that event was anticipated in the projected benefits for the

Actuarial Cost Method

tier, so that the projected benefits are substantially unaffected by such predictable changes in eligibility or benefit accrual.

c. Similarly, the Normal Cost rate for a member should be unaffected by the closing of the member's tier and the creation of a new tier for future members, as discussed under item 1.b above.

d. However, if the benefit structure of a continuing, open tier is changed for members with service after some fixed date, then the Normal Cost rate should change to reflect the previously unanticipated change in projected benefits for members in the tier[6]. This calls for an extension or variation of the Entry Age method in order to value this type of benefit change.

  i. There are two methods in practice to adjust the Normal Cost rate for this type of plan change. While a detailed analysis of these two variations is beyond the scope of this discussion, our summary conclusions are:

    1. The "Replacement Life" Entry Age method would base the Normal Cost on the new benefit structure as though it had always been in place, thereby producing a consistent Normal Cost rate for all members at the same entry age in the tier. This has the advantages of a change in Normal Cost (both individual and total) more consistent with what would be expected for a change in future benefit accruals, a stable future Normal Cost rate for the tier and a relatively smaller (compared to the alternative) change in AAL. Its disadvantages are that it may be more complicated to explain and to implement.

    2. The "Averaged" Entry Age method would base each member's Normal Cost on the composite projected benefit for that member, thereby producing a different Normal Cost rate for different members at the same entry age in the tier, based generally on their service at the time of the change in benefit structure. The advantages and disadvantages are essentially the reverse of those for Replacement Life Entry Age. The change in Normal Cost is less than what would be

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[6] For many public sector pension plans current members have a legally protected right to future benefit accruals under their current benefit formula, so reducing future benefit accruals may not be permitted.

expected for a change in future benefit accruals, the future Normal Cost rate for the tier will be non-level (as it eventually reaches the same rate as under the replacement life variation) and there is a relatively larger (compared to the alternative) change in AAL. Its advantages are that it may be less complicated to explain and to implement (where the latter may depend on the valuation software used).

3. While categorized as unacceptable for funding, the Normal Cost under the Ultimate Entry Age method mentioned above may nonetheless provide useful information when a new open tier is adopted for future hires. The combined Normal Cost rate for the open and closed tiers (as determined under the LCAM Entry Age method) will change over time as members of the closed tier are replaced by members in the new tier. This will result in an increasing or decreasing combined Normal Cost rate (depending on whether the new tier has higher or lower benefits), consistent with the transition of the workforce over time to the new tier. However, the Ultimate Entry Age method Normal Cost for the combined tiers will reflect the expected long term Normal Cost for the entire workforce (unlike the LCAM Normal Cost which reflects only the recent hires in the new tier). For that reason, Normal Cost under Ultimate Entry Age may be useful for projecting longer-term Normal Costs or for evaluating a fixed contribution rate.

Practices

Based on the above discussion, and consistent with the policy objectives, actuarial cost methods and parameters are categorized as follows:

LCAM Model Practices

- Entry Age cost method with level percentage of pay Normal Cost.

  o Normal Costs are level even if benefit accrual or eligibility changes with age or service.

  o All types and incidences of benefits are funded over a single measure of expected future service.

  o The Normal Cost for a tier of benefits is the sum of the individually determined Normal Costs for all members in that tier.

  o Exception: for plans with benefits unrelated to compensation the Entry Age method with level dollar Normal Cost may be more appropriate.

Actuarial Cost Method

- For multiple tiers:

  o Normal Cost is based on each member's benefit.

- For benefit formula or structure changes within a tier (generally after a fixed date):

  o Normal Cost is based on current benefit structure (Replacement Life Entry Age method[7]).

Acceptable Practices

- Funding to Decrement Entry Age method, where each type and incidence of benefit is funded to each age at decrement.

  o This method may be appropriate for some plan designs or for plans closed to new entrants[8].

- For benefit formula or structure changes within a tier (generally after a fixed date):

  o Normal Cost is based on each member's composite projected benefit (Averaged Entry Age method[9]).

Acceptable Practices, With Conditions

- Aggregate cost method: Plans using the Aggregate method should disclose costs and liabilities determined under the Entry Age method.

  o Calculate Normal Cost and UAAL under Entry Age method.

  o Determine single amortization period for the Entry Age UAAL that, combined with the Entry Age Normal Cost, is equivalent to Aggregate method Normal Cost.

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[7] Note that this is not the method used in GASB Statements 67 and 68. The GASB method is categorized as an Acceptable Practice.

[8] For example, a Plan that provides very valuable early career-benefits (such as heavily subsidized early retirement or disability benefits) may prefer to have the higher early-career Normal Costs associated with the Funding to Decrement Entry Age method.

[9] Note that this is the version of the Entry Age method required for financial reporting under GASB Statements 67 and 68 for plans with benefit formula or structure changes within a tier.

Actuarial Cost Method

  - o   Monitor contribution volatility for consistency with General Policy Objective 3 (Volatility Management).

- Frozen Initial Liability (FIL) cost method: This method should disclose costs and liabilities under the Entry Age method.

  - o   Calculate Normal Cost and UAAL under Entry Age method.

  - o   Deduct the FIL amortization bases from the Entry Age UAAL.

  - o   Determine single amortization period for the remaining Entry Age UAAL that, combined with the Entry Age Normal Cost, is equivalent to FIL method Normal Cost.

  - o   Monitor contribution volatility for consistency with General Policy Objective 3 (Volatility Management).

- Projected Unit Credit cost method (or Traditional Unit Credit when benefit is not pay related).

- Entry Age method variation (Aggregated Entry Age method) where the Normal Cost for a tier of benefits is determined as the Normal Cost rate for the tier applied to the total salary for the tier, and where the Normal Cost rate for the tier of benefits is determined as the Present Value of Future Normal Costs for all active members in the tier, divided by the Present Value of Future Salaries for all members in the tier.

Non-Recommended Practices

- Aggregate or Frozen Initial Liability methods without the disclosures of costs and liabilities determined under the Entry Age method discussed above.

Unacceptable Practices

- Normal Cost based on open tier of benefits even for members not in that open tier (Ultimate Entry Age method).

  - o   Ultimate Entry Age Normal Cost may be useful to illustrate the longer-term Normal Cost for combined tiers or to evaluate fixed contribution rates.

- Traditional (non-Projected) Unit Credit cost method for plans with pay-related benefits as the primary benefit.

Actuarial Cost Method

- Note that while this white paper does not address policy issues related to pay-as-you-go funding or terminal funding, such practices would be unacceptable if the policy intent is to fund the members' benefits during the members' working careers.

Asset Smoothing Method

An asset smoothing method reduces the effect of short-term market volatility while still tracking the overall movement of the market value of plan assets.

Specific policy objectives and considerations

1. The funding policy should specify all components of an asset smoothing method:

    a. Amount of return subject to deferred recognition (smoothing).

    b. The smoothing period or periods.

    c. The range constraints on smoothed value (market value corridor), if any.

    d. The method of recognizing deferred amounts: fixed or rolling smoothing periods.

2. The asset smoothing method should be unbiased relative to market.

    a. The same smoothing period should be used for gains and for losses.

    b. Any market value corridor should be symmetrical around market value.

3. The asset smoothing method should not be selectively reset at market value only when market value is greater than actuarial value.

    a. Bases may be combined but solely to reduce future, non-level recognition of relatively small net unrecognized past gains and losses (i.e., when the smoothed and market values are already relatively close together).

4. The asset smoothing method should be unbiased relative to sources of investment return.

    a. Deferrals should be based on total return gain or loss relative to assumed earnings rate.

5. The asset smoothing method should incorporate the ASOP 44 concepts of:

    a. Likely to return to market in a reasonable period and likely to stay within a reasonable range of market, or

    b. Sufficiently short period to return to market or sufficiently narrow range around market.

Asset Smoothing Method

6. The policy parameters should reflect empirical experience from historical market volatility.

7. The asset smoothing method should support the policy goal of demographic matching (the intergenerational aspect of interperiod equity) described in General Policy Objective 2 (Demographic Matching). This leads to a preference for smoothing methods that provide for full recognition of deferred gains and losses in the UAAL by some date certain.

   a. Note that this objective is also consistent with the accountability and transparency goals described in General Policy Objective 4 (Transparency and Accountability).

8. The asset smoothing method should help manage the transitions from periods of low cost to periods of high cost (or vice versa) following extraordinary market losses or gains.

Discussion

1. In practice, most asset smoothing methods use fixed, separate smoothing periods for each year's investment experience. Methods using a single, rolling smoothing period are discussed in item 7 below.

2. Longer smoothing periods generally reduce contribution volatility. A discussion of smoothing periods could include the following considerations:

   a. To the extent that smoothing periods are considered as being tied to economic or market cycles, those cycles may be believed to be longer or shorter than in past years.

   b. If markets become more volatile, then longer smoothing periods would be needed to maintain former levels of contribution stability.

   c. Better funded plans, more mature plans and higher benefit plans (i.e., plans with a higher "asset volatility ratio" (i.e., the ratio of assets to payroll) have inherently more volatile contribution rates, so may justify longer smoothing periods.

   d. Sponsors may be more sensitive to contribution volatility.

3. However, ASOP 44 implies that longer smoothing periods call for narrower market value corridors.

Asset Smoothing Method

a. In effect, the corridor imposes a demographic matching style constraint on the use of longer smoothing periods which would otherwise obtain greater volatility management.

4. The model interpretation is that five-year smoothing is "sufficiently short" under ASOP 44.

   a. This reflects long and consistent industry practice for balancing the period needed to smooth volatility with the need to recognize changes in asset levels.

   b. This interpretation implies that five-year smoothing with no market value corridor is ASOP 44 compliant.

   c. It still may be useful to have a market value corridor as part of the asset smoothing policy.

   d. This avoids having to introduce the corridor structure in reaction to some future discussion of longer smoothing periods.

   e. Note that five years is also the period required by GASB Statement 68.

5. Consider the impact of smoothing periods and market value corridors after large market downturn (such as occurred in 2008).

   a. The smoothing method manages the transition from periods of lower cost to periods of higher cost.

      i. The level of those higher costs is determined primarily by size of the market loss and UAAL amortization period, not the asset smoothing policy.

   b. The smoothing period determines the length of the transition period.

   c. The market value corridor determines the cost pattern during the transition.

      i. A wide corridor or no corridor produces a straight-line transition.

      ii. "Hitting the corridor" accelerates the cost increases or decreases in early years of transition.

         A. In effect the corridor inhibits the smoothing method after years of large losses (or gains).

Asset Smoothing Method

      iii.   There are various possible policy justifications for such an accelerated transition.

          A.   Market timing: get more contributions in while the market is down.

          B.   Cash flow management: low market values may impair plan liquidity.

          C.   Employer solvency: if the employer eventually is going to default on making contributions, then get as much contribution income as possible before that happens.

          D.   Employer preference: employers may prefer to have the higher costs in their rates as soon as possible.

      iv.   Following significant market declines, these justifications have generally not been found to be compelling.

          A.   The normal lag in implementing new contributions rates defeats iii. A and B.

          B.   Employers are presumed solvent and if not, accelerating contributions would make things worse.

          C.   Many employers clearly preferred more time to absorb the contribution increases.

      v.   Absent these considerations, experience during significant market declines argues for permitting a wide corridor with a five-year smoothing period, based on the fact that five-year smoothing produced actuarial value to market value ratios that exceeded 140%.

6.   With fixed, separate smoothing periods, tail volatility due to alternating periods of market gains and losses can be controlled by limited active management of the separate deferral amounts.

     a.   One such adjustment involves combining the separate deferral amounts when the net deferral amount is relatively small (i.e., the smoothed and market values are very close together) but the recognition pattern of that net deferral is markedly non-level.

Asset Smoothing Method

     i.   The net deferral amount is unchanged as of the date of the adjustment.

     ii.   The period over which the net deferral amount is fully recognized is unchanged as of the date of the adjustment.

b.   Other uses of active management of the deferral amounts may add complexity to the application of the policy and may reduce transparency.

c.   Restarts of fixed, separate smoothing periods should not be used:

     i.   Too frequently, as this would produce a de facto rolling smoothing period, or

     ii.   Too selectively, as restarting smoothing at market value only when market value is greater than smoothed value would violate General Policy Objective 5 (Sound Governance) since it would selectively change the policy only when the effect is to reduce contributions.

7.   A single rolling smoothing period avoids "tail volatility" where contributions are volatile not only when gains and losses first occur but also when (under a layered approach) each year's gain or loss is fully recognized.

a.   Rolling smoothing is consistent with General Policy Objective 3 (Volatility Management) but substantially extends the recognition period for deferred investment gains and losses.

     i.   This will extend the time when the actuarial value of assets is consistently above or below the market value of assets.

     ii.   That argues for narrower corridors than are appropriate for fixed (layered) smoothing periods.

b.   In effect, rolling smoothing recognizes a fixed percentage of deferred investment gains and losses each year.

     i.   For example, 5-year rolling amortization recognizes 20% of the deferred amount.

     ii.   Corridors should be based on this deferral recognition percentage.

c.   Rolling smoothing periods should be accompanied with an appropriate corridor, as discussed in ASOP 44.

Asset Smoothing Method

Practices

Based on the above discussion, and consistent with the policy objectives, asset smoothing methods and parameters are categorized as follows:

LCAM Model Practices

- Deferrals based on total return gain/loss relative to assumed earnings rate.

- Deferrals recognized in smoothed value over fixed smoothing periods not less than 3 years.

- Maximum market value corridors for fixed, separate smoothing periods of:

    o 5 or fewer years with a 50%/150% corridor.

    o 6 or 7 years with a 60%/140% corridor.

- Combine smoothing periods or restart smoothing only to manage tail volatility.

    o Appropriate when the net deferral amount is relatively small (i.e., the actuarial and market values are very close together).

        ▪ The net deferral amount is unchanged as of the date of the adjustment.

        ▪ The period over which the net deferral amount is fully recognized is unchanged as of the date of the adjustment.

    o Avoid using frequent restart of smoothing to achieve de facto rolling smoothing.

    o Avoid restarting smoothing only to accelerate recognition of deferred gains, i.e., only when market value is greater than actuarial value.

- Additional analysis, such as solvency projections, is likely to be appropriate for closed plans.

Acceptable Practices

- Maximum market value corridors for fixed, separate smoothing periods of:

    o 8 to 10 years with a 70%/130% corridor.

Asset Smoothing Method

- 4- or 5-year fixed, separate smoothing periods with no corridor

- Rolling smoothing periods of 3 or 4 years with the following maximum market value corridors for various smoothing periods:

    o 3-year rolling smoothing means 33% recognition, with a 33% corridor.

    o 4-year rolling smoothing means 25% recognition, with a 25% corridor.

Acceptable Practices, with Conditions

- Maximum market value corridors for fixed, separate smoothing periods of:

    o 11 to 15 years with a 80%/120% corridor.

- 3-year (or shorter) smoothing with no corridor (including use of market value of assets without smoothing).

    o Using market value may be appropriate if volatility is managed through other methods.

- Rolling smoothing period of 5 years with a 20% corridor.

    o Perform additional analysis including projections of when the actuarial value is expected to return to within some narrow range of market value.

Non-Recommended Practices

- Longer than 5-year fixed, separate smoothing periods with no corridor.

- 15 years or shorter fixed, separate smoothing periods with corridors wider than shown above.

- Rolling smoothing periods between 5 and 10 years.

- Rolling smoothing with no corridor.

Unacceptable Practices

- Fixed, separate smoothing periods longer than 15 years.

- Rolling smoothing periods longer than 10 years.

Amortization Method

An amortization policy determines the length of time and the structure of the increase or decrease in contributions required to systematically (1) fund any Unfunded Actuarial Accrued Liability or UAAL, or (2) recognize any Surplus, i.e., any assets in excess of the AAL.

The specific policy objectives, discussion, and practices in this paper apply to ongoing plans that are open to new members. Other plans may require different or additional considerations that are beyond the scope of this paper.

Specific policy objectives and considerations

1.   Variations in contribution requirements from simply funding the Normal Cost will generally arise from gains or losses, method or assumption changes or benefit changes and will emerge as a UAAL or Surplus. As discussed in the General Policy Objectives, such variations should be funded over periods consistent with an appropriate balance between the General Policy Objectives 2 (Demographic Matching) and 3 (Volatility Management).

2.   The cost for changes in the UAAL should emerge as a level or declining percentage of members' compensation. Examples include:

   a.   Level percent of compensation.

   b.   Level in real terms (increases with inflation).

   c.   Level dollar amounts.

3.   The amortization policy should reflect explicit consideration of the following different sources of change in UAAL, even if the resulting policy treats different changes in the same way:

   a.   Experience gains and losses.

   b.   Changes in assumptions and methods.

   c.   Benefit or plan changes.

4.   The amortization policy should reflect explicit consideration of the level and duration of negative amortization, if any.

Amortization Method

    a.   This consideration should not necessarily preclude some negative amortization that may occur under an amortization policy that is otherwise consistent with the policy objectives.

    b.   Amortization periods developed in consideration of negative amortization (along with other policy goals) may be relevant for level dollar amortization (where negative amortization does not occur).

    c.   The amortization payments for each amortization base should:

        i.   Fully amortize the amortization base within a reasonable time period, or

        ii.   Reduce the outstanding balance by a reasonable amount each year.

    d.   The total of all amortization payments for all amortization bases should:

        i.   Fully amortize the UAAL within a reasonable time period, or

        ii.   Reduce the UAAL by a reasonable amount within a sufficiently short period.

5.   Consistent with General Policy Objective 1 (Contribution Sufficiency), the sum of the outstanding balances of all amortization bases should equal the total UAAL.

6.   The amortization policy should support the General Policy Objective 4 (Transparency and Accountability). This leads to a preference for:

    a.   Amortization policies that reflect a history of the sources and treatment of UAAL.

    b.   Amortization policies that provide for a full amortization date for UAAL.

        i.   Note that this objective is also consistent with the demographic matching aspect of General Policy Objective 2 (Demographic Matching).

7.   The amortization of Surplus requires special consideration, consistent with General Policy Objective 5 (Sound Governance).

Amortization Method

Discussion

1. The policy objectives lead to a general preference for level or declining percentage of pay amortization.

    a. The Normal Cost under the LCAM Model Actuarial Cost Method is expressed as a level percentage of pay.

    b. UAAL is different from Normal Cost as it represents the cost allocated to past service and not covered by existing assets rather than the cost allocated to future service. UAAL payments may be viewed as service on public debt or as a cost associated with the promised benefits. Debt service payments are often level dollar amounts, while benefit costs are typically funded as a percentage of payroll.

2. The amortization payment increase rate should consider a balance of General Policy Objectives 2 (Demographic Matching) and 3 (Volatility Management).

    a. Historically, amortization policies have focused on level percent of pay payment amounts or level dollar payment amounts. Note that level dollar payments are effectively a 0% amortization payment increase rate.

    b. To be consistent with a policy intent to have costs emerge as a level percent of payroll, the amortization payment increase rate would be based on the payroll growth assumption.

    c. No level dollar amortization is exactly equivalent to a level percent of pay amortization in terms of the pattern and total amount of payments, even if the amortization period is the same. However, even though the patterns and amounts differ, the amortization periods are set using the same General Policy Objectives, which would lead to the same amortization periods as used for percent of pay amortization. See the discussion below regarding amortization periods.

    d. Level dollar amortization pays off more of the unfunded liability in earlier years and less in later years than level percent of pay with the same amortization period. For the same amortization periods, level dollar amortization produces more initial contribution volatility. Furthermore, there is no negative amortization with level dollar amortization.

    e. Plan and/or sponsor circumstances may lead to a preference for a level dollar method. Examples include:

Amortization Method

i. Level dollar provides an extra measure of conservatism relative to percent of pay amortization in the event of future payroll growth lower than assumed.

ii. Level dollar may be appropriate for sponsors and plans that are particularly averse to future cost increases, e.g., utilities setting rates for current rate payers.

iii. Level dollar may be particularly appropriate if the plan is closed to new entrants or provides benefits that are not related to pay.

f. The amortization payment increase rate may be based on another economic assumption (e.g., inflation, expected sponsor revenue growth, etc.) or on modifying an existing assumption (e.g., payroll growth minus a margin).

g. Alternatively, the amortization payment increase rate could be set as a fixed percentage. For example, a plan amendment increasing benefits may be agreed to be paid over average future service but with a predetermined and budgeted increase in amortization payments.

h. Regardless of the basis, the amortization payment increase rate should not be greater than the expected payroll growth for a stable employee population (i.e., the expected increase in average pay) to be consistent with General Policy Objectives 2 (Demographic Matching), 3 (Volatility Management), and 5 (Sound Governance).

3. The policy objectives lead to a general preference for multiple, fixed period amortization bases[10].

a. Fixed period amortization is clearly better than rolling amortization for accountability, since the UAAL is funded as of a date certain.

b. Single base, fixed period amortization is not a stable policy since the resulting contribution volatility will conflict with General Policy Objective 3 (Volatility Management) as the remaining period gets shorter. When this volatility occurs, sponsors may need to change their policy to avoid the volatility.

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[10] The terms "amortization base" and "amortization layer" are interchangeable, but this paper will use "amortization base" throughout.

Amortization Method

c. Using multiple amortization bases is more transparent since it tracks the UAAL by source. However, such layered amortization bases are more complicated and can require additional policy actions to achieve stable contribution rates (including active management of the bases).

d. The discussion of periods in the following points will assume multiple, fixed period amortization bases and then revisit the use of rolling periods to manage volatility.

4. For gains and losses, balancing General Policy Objective 2 (Demographic Matching), and General Policy Objective 3 (Volatility Management), leads to an ideal amortization period range of 15 to 20 years.

   a. Historical experience suggests that short amortization periods, such as less than 15 years, provide too little volatility management as described in General Policy Objective 3, especially for gains.

      i. Short amortization of gains has led to partial contribution holidays (contributions less than Normal Cost) and even full contribution holidays (no contribution required) in the past. This is inconsistent with General Policy Objective 5 (Sound Governance), in that it led to insufficient budgeting for ongoing pension costs and to pressure for benefit increases.

      ii. Plan maturity may be a consideration when addressing volatility management and appropriate amortization periods. Mature plans may experience more volatility, indicating a need for longer amortization periods to manage that volatility. However, any consideration of longer amortization periods should also take into account General Policy Objective 1 (Contribution Sufficiency).

   b. Amortization periods longer than 20 years may conflict with General Policy Objective 2 (Demographic Matching); in particular, the intergenerational aspect of interperiod equity.

      i. The period may be substantially longer than average future service for actives and so be inconsistent with General Policy Objective 2 (Demographic Matching) in that funding will be longer than the member's remaining years of service.

      ii. The period may be substantially longer than average life expectancy for retirees such that benefit payments effectively could

Amortization Method

be paid from plan assets before gains and losses related to those benefit payments are entirely funded. Funding that extends beyond when all benefit payments are due violates General Policy Objective 1 (Contribution Sufficiency).

c. Longer amortization periods may also entail negative amortization. If, when, and for how long negative amortization persists is a function of the amortization period and actuarial assumptions (generally, discount rate and amortization growth assumptions).

    i. Negative amortization is an indicator of insufficient demographic matching based on economic rather than demographic considerations. If negative amortization remains for too long, principal payments may be deferred to future generations, diminishing the relationship between the expected cost of each year of service and variations around that expected cost.

    ii. If negative amortization is considered necessary to achieve sufficient Volatility Management (General Policy Objective 3), then

        1. Each amortization base should be fully amortized within a reasonable period, and

        2. The total UAAL should be reduced by a reasonable amount within a sufficiently short period.

    iii. As discussed later in this section, negative amortization is a much greater concern when using open or rolling amortization periods.

d. Two case studies illustrate the consequences of focusing on only one of General Policy Objectives 2 (Demographic Matching) or 3 (Volatility Management).

    i. GASB Statement No. 68 focuses exclusively on demographic matching for determining recognition periods for pension expense. The resulting short recognition periods can produce extremely volatile pension expense amounts. (This is cited for illustration only, as the GASB statements govern financial reporting and not funding).

Amortization Method

       ii.   A former funding policy employed by CalPERS focused on Volatility Management[11], which resulted in exceptionally long periods for gain and loss amortizations (as well as for asset smoothing).

5. While the amortization period for assumption and method changes could be the same as the period used for gains and losses, a case can be made for a longer amortization period.

    a. An assumption change represents a capitalization of future gains or losses, which would have otherwise been amortized beginning on each successive valuation as they would have occurred. A capitalization of all future gains and losses associated with that assumption change may therefore justifiably have a longer amortization period than a single gain or loss in any one year.

    b. A similar argument for longer periods could be made for changing cost method to one more consistent with the LCAM (such as from Projected Unit Credit to Entry Age). In these cases, a longer amortization period allows for greater volatility management while advancing General Policy Objective 5 (Sound Governance).

    c. For the initial liability of a new plan or for a plan transitioning from pay-as-you-go to prefunded, a longer amortization period may be justified to achieve a sustained budgeting commitment, consistent with General Policy Objective 5 (Sound Governance).

    d. However, very long amortization periods may entail substantial (arguably too much) negative amortization which violates General Policy Objective 2 (Demographic Matching). See item 3.c above for more details on negative amortization.

6. For plan amendments that increase liabilities, General Policy Objective 2 (Demographic Matching) is the key objective in setting the amortization policy since the impact on liabilities is the result of a deliberate decision to change benefits.

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[11] CalPERS conducted a stochastic study to develop a funding policy that would reduce the volatility of the contribution rate, subject to specified parameters. Based on this study, CalPERS adopted a single, 30-year layer of gain and loss amortization and 15-year rolling asset smoothing.

Amortization Method

a. For actives, consistent with General Policy Objective 2 (Demographic Matching) costs should be spread over a period no longer than their expected **remaining future service** of the affected group.

    i. Any negative amortization is inconsistent with General Policy Objectives 2 (Demographic Matching) and 5 (Sound Governance). See item 3.c above for more details on negative amortization.

    ii. Could use up to 15 years as an approximation of remaining future service that also avoids negative amortization.

    iii. Depending on the circumstances of the amendment, the amortization period may be set to the expected remaining future service of all active employees.

b. For inactives, with respect to changes that are long-term or permanent (e.g., implementing automatic COLA), consistent with General Policy Objective 1 (Contribution Sufficiency) costs should be spread over a period no longer than retiree life expectancy.

    i. For retiree benefit increases, the amortization period should control for negative cash flow where additional amortization payments are less than additional benefit payments.

    ii. Could use 10 years as an approximation for retiree life expectancy that also helps control for negative cash flow.

c. For inactives, with respect to changes that are one-time or short term (e.g., one time "13th check" or other lump sum payments), costs should be paid in full at time of amendment (i.e., no amortization) or a short amortization period (e.g., no more than five years).

    i. Amortization may not be appropriate as any amortization would result in negative cash flows.

    ii. Short periods allow some negative cash flow but still fully fund the improvements rapidly to allow for a balance of General Policy Objectives 2 (Demographic Matching) and 5 (Sound Governance).

Amortization Method

      d.   For Early Retirement Incentive Programs costs should be spread over a period corresponding to the period of economic savings to the employer, typically no more than five years[12].

7.   Plan amendments that reduce liabilities require separate considerations to avoid taking credit for the reduction over periods shorter than the remaining amortization of the original liabilities.

      a.   Reductions in liability due to such benefit reductions should not be amortized more rapidly than the pre-existing unfunded liabilities, for example, as measured by the average or the longest current amortization period.

      b.   Benefit "restorations"[13] should similarly be amortized on a basis consistent with the pre-existing unfunded liabilities or with the "credit" amortization base established when the benefits were reduced.

8.   For Surplus, similar to gains, historical experience suggests that short amortization periods for Surplus can lead to partial or full contribution holidays (contributions less than Normal Cost, or even zero).

      a.   The principal risk of a contribution holiday is that budgetary resources may be permanently reallocated to other policy initiatives. This reallocation creates possible agency risk in that, if pension contributions later need to increase, plan sponsors may be unable or unwilling to restore the previous budget allocation for pension contributions. This is inconsistent with General Policy Objective 5 (Sound Governance), and historically has led to insufficient budgeting for ongoing pension costs and to pressure for benefit increases.

      b.   Because of both the ongoing nature of the Normal Cost and General Policy Objective 5 (Sound Governance), amortization of UAAL and Surplus should not be symmetrical.

            i.   It is appropriate to amortize Surplus over a period longer than would be acceptable for UAAL.

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[12] For example, a Government Finance Officers Association (GFOA) 2004 recommended practice states that "the incremental costs of an early retirement incentive program should be amortized over a short-term payback period, such as three to five years. This payback period should match the period in which the savings are realized."

[13] A benefit restoration occurs when a previous benefit reduction has been fully or partially restored for a group of members who were subject to the earlier benefit reduction.

Amortization Method

        ii.   Such an asymmetric policy would reduce the magnitude and/or likelihood of partial or full contribution holidays.

        iii.   One approach would be to disregard the Surplus and always contribute at least the Normal Cost. However, if Surplus becomes sufficiently large then some form of Surplus management may be called for.

    c.   Note that long amortization of Surplus does not preclude other approaches to Surplus management that are beyond the scope of this discussion, including:

        i.   Treating some level of Surplus as a non-valuation asset, for example, only amortizing Surplus that is some percentage of liability above 100%.

        ii.   Changing asset allocation to reflect the Surplus condition.

9.   A separate Surplus-related issue, which depends on facts and circumstances: When a plan first goes into Surplus, should existing UAAL amortization bases be maintained or eliminated? Consider the following alternatives:

    a.   Eliminate the existing amortization bases and restart amortization of initial Surplus (and any successive Surpluses) over a long period (e.g., 30 years).

        i.   In effect, this is rolling amortization of current and future Surpluses.

        ii.   Restart amortization bases when plan next has a UAAL.

        iii.   May result in loss of future recognition of large gain bases.

    b.   Maintain amortization bases and have minimum contribution of Normal Cost less a long amortization of Surplus (e.g., a 30-year amortization of Surplus). Maintaining bases can result in net amortization charge even though overall plan is in Surplus.

    c.   Adjust the existing amortization bases to effectively grade into a Surplus contribution level (e.g., Normal Cost or Normal Cost plus 30-year amortization of Surplus) over a short period.

10.   Multiple, fixed period layers vs. single, rolling period layer for gains and losses.

Amortization Method

a. Multiple, fixed amortization periods for each year's gain or loss ensures that all gains and losses are funded by a known date. This is consistent with General Policy Objectives 2 (Demographic Matching) and 4 (Transparency and Accountability).

b. A single rolling amortization period avoids tail volatility where contributions are volatile when each year's gain or loss is fully amortized.

11. With fixed, separate amortization periods, tail volatility can occur when amortization charge and credit bases are fully amortized in successive years causing the net amortization payment to decrease and then increase or vice versa. Tail volatility can be controlled by limited active management of the amortization bases.

a. As with asset smoothing, active management should be used only to manage the pattern of future UAAL funding and not to accomplish a short-term manipulation of contributions.

b. In particular, the net remaining amortization period should be relatively unaffected by any combination of offsetting UAAL amortization bases.

c. The use of active management of the amortization bases may add complexity to the application of the policy and may reduce transparency.

d. One option is to synchronize the charge and credit amortization bases causing tail volatility. Synchronizing amortization bases keeps the original bases but with new remaining periods and payment amounts. This method retains the history of the original amounts and outstanding balances while simultaneously addressing the resulting tail volatility.

e. Another option is combining charge and credit amortization bases as necessary to manage tail volatility. This results in a new combined base with a new single remaining period and a new net amortization amount. This method loses the history associated with those charge and credit bases.

12. Plans with layered amortization of a UAAL should monitor any emergence of negative amortization and in particular estimate how long before contributions exceed the Normal Cost plus interest on the UAAL and consider actions to minimize any period of negative amortization.

13. Rolling amortization periods for a single base of gains and losses or for the entire UAAL.

Amortization Method

a.   Rolling amortization is fundamentally different from fixed period amortization.

    i.   Rolling amortization will have a substantial unamortized outstanding balance at the end of the nominal amortization period.

    ii.   A rolling base should have no negative amortization and reduce the outstanding balance by a reasonable amount each year. However, in order to reduce the outstanding balance by a reasonable amount each year, the amortization period may need to be so short that the resulting initial amortization payment may be more volatile than is consistent with General Policy Objective 3 (Volatility Management).

b.   An argument can be made for a single, rolling amortization base for gains and losses if the actuarial valuation assumptions are expected to be unbiased so that there is an equal likelihood of future gains and losses that will offset each other.

    i.   Such rolling amortization also requires that there are no systematic sources of future actuarial losses from plan design features, such as a subsidized service purchase option.

    ii.   Extraordinarily large gains or losses that are not reasonably expected to be offset by future losses or gains should be isolated from the single rolling gain/loss amortization base and amortized over separate, fixed periods.

    iii.   Plans with a significant single rolling gain or loss amortization base should affirmatively show that policy objectives will be achieved without substantial violation of General Policy Objective 2 (Demographic Matching). Otherwise, converting a significant rolling amortization base to a fixed amortization base to fully amortize the base over a reasonable period should be considered.

c.   This argument is substantially weaker for rolling amortization for assumption changes (especially if consistently in a single direction).

    i.   Inconsistent with General Policy Objectives 2 (Demographic Matching) and 4 (Transparency and Accountability).

    ii.   Similar concerns for rolling amortization of gains and losses in the presence of biased assumptions or other systematic sources of actuarial losses.

Amortization Method

d. It is very difficult to reconcile rolling amortization of plan amendments with General Policy Objectives 2 (Demographic Matching) and 4 (Transparency and Accountability) because the cost of the plan amendment will never be fully funded.

e. Specific exception for rolling, lengthy amortization of Surplus, since as described earlier this helps meet General Policy Objective 5 (Sound Governance).

14. Rolling amortization and the Aggregate cost method[14].

a. The Aggregate cost method produces contribution levels and patterns similar to using the Entry Age method with a single rolling level percent of pay amortization base for the entire UAAL and a relatively short rolling amortization period.

i. Effective rolling amortization period reflects average future service of active members.

ii. The effective amortization period should be disclosed.

b. However, the Aggregate cost method is fundamentally different from Entry Age (and other immediate gain cost methods) in that Aggregate does not measure an AAL or a UAAL.

i. Aggregate combines a high level of tail Volatility Management (General Policy Objective 3) with high levels of Demographic Matching and (General Policy Objective 2).

ii. Aggregate also provides no policy flexibility in the selection of an amortization period (since no UAAL is calculated) which provides protection from some agency risk issues, consistent with General Policy Objective 5 (Sound Governance).

iii. As a plan matures and its assets and liabilities become larger relative to the remaining future service, the Aggregate method produces higher contribution volatility as larger changes in assets and liabilities are spread over a typically stable future service which

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[14] While there is some discussion of the Aggregate cost method here, please refer to the Actuarial Cost Method section of the paper for additional discussion and categorization of practices.

Amortization Method

> may not be consistent with Volatility Management (General Policy Objective 3).

Practices (for ongoing, open plans)

Based on the above discussion, and consistent with the policy objectives, amortization methods and parameters are categorized as follows:

LCAM Model Practices

- Layered fixed period amortization by source of UAAL.

  - o Sum of outstanding bases should equal UAAL.

  - o Different considerations may apply to plans in Surplus.

- Level or declining percent of pay amortization, including level dollar amortization.

- Amortization periods:

Source	Period
Experience Gain or Loss	15 to 20 years
Assumption or Method Changes	15 to 25 years
Active Plan Amendments	Active demographics, or up to 15 years as an approximation
Long-Term Inactive Plan Amendments[15]	Inactive demographics, or 10 years as an approximation
Short-Term Inactive Plan Amendments[15]	5 years or less

- Synchronize remaining periods for bases only to avoid tail volatility.

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[15] See discussion item 5 for an explanation of short-term versus long-term inactive plan amendments.

Amortization Method

- o Synchronizing remaining periods should result in substantially the same current amortization payment.

- o Avoid using restart of amortization to achieve de facto rolling amortization.

- Long (e.g., 30-year) amortization of Surplus (for plans with ongoing Normal Cost and/or plan expenses) – see discussion items 7 and 8.

  - o Upon entering into Surplus either eliminate or maintain current bases.

  - o Consider grading into a Surplus contribution level over a short period.

Acceptable Practices

- Up to 15 years for long-term inactive plan amendments.

- Combine bases to avoid tail volatility.

  - o Combining bases should result in substantially the same current amortization payment.

Acceptable Practices, with Conditions

- Up to 25-year layered fixed period amortization for gains or losses and 20-year layered fixed period amortization for plan amendments.

  - o Ideally with some rationale given for using periods outside the model ranges.

- Rolling amortization of a single combined gain and loss layer with an amortization period that does not entail any negative amortization and reduces the outstanding balance by a reasonable amount each year, provided the resulting near-term contribution volatility is still consistent with General Policy Objective 3 (Volatility Management).

  - o With model periods for other sources of UAAL.

  - o Use separate, fixed period layers for extraordinary gain or loss events.

  - o Plans with a significant single rolling gain and loss amortization base should demonstrate that policy objectives will be achieved.

Amortization Method

- Up to 30-year fixed amortization of initial liability for a newly funded plan (i.e., an existing plan previously funded on a pay-as-you-go basis but not a new plan creating new past service benefits). See discussion item 4.c.

- Amortization periods shorter than model or acceptable periods, provided the resulting contribution volatility is still consistent with General Policy Objective 3 (Volatility Management).

Non-recommended Practices

- Fixed period amortization of the entire UAAL as a single combined layer, with periodic re-amortization over a new (longer) starting amortization period.

- For layered amortization, periodic combining of bases and restarting amortization, which approaches de facto rolling amortization.

- Layered fixed period amortization by source of UAAL from 26 to 30 years.

- Rolling amortization of a single combined gain and loss layer with an amortization period that does not entail any negative amortization but does not reduce the outstanding balance by a reasonable amount each year and meets the three conditions that apply to Acceptable with Conditions rolling gain and loss amortization.

- Rolling amortization of entire UAAL as a single combined layer (exclusive of plan amendments but inclusive of gains and losses, assumption, and method changes) where the amortization period does not entail negative amortization and reduces the outstanding balance by a reasonable amount each year.

- Rolling amortization of assumption and method changes that reduce the outstanding balance by a reasonable amount each year.

Unacceptable Practices

- Layered fixed period amortization by source of UAAL longer than 30 years.

- Rolling amortization of a single combined gain and loss layer that entails negative amortization.

- Rolling amortization of a single combined gain and loss base that does not reduce the outstanding balance by a reasonable amount each year and does not meet the three conditions that apply to Acceptable with Conditions rolling gain and loss amortization.

Amortization Method

- Rolling amortization of the entire UAAL as a single combined layer (exclusive of plan amendments) where the amortization period entails negative amortization or otherwise does not reduce the outstanding balance by a reasonable amount each year.

- Rolling amortization of the entire UAAL as a single combined layer (including plan amendments) even where the amortization period does not entail negative amortization.

  - Rolling amortization for plan amendments is unacceptable in all situations.

- Rolling amortization for assumption/method changes that does not reduce the outstanding balance by a reasonable amount each year.

Transition Policies

Transition policies are particularly applicable to amortization policy. Generally, transition policies for amortization would allow current fixed period amortization bases (with periods not to exceed 30 years) to continue, with new amortization bases subject to these guidelines. Transition from rolling amortization would fix any rolling layer at its current period, with future liability changes amortized in accordance with these guidelines. During the transition (i.e., as long as the remaining period for the formerly rolling base is longer than model or acceptable periods) any new credit layers (e.g., due to actuarial gains or less conservative assumptions) should be amortized over no longer than that same remaining period.

Output Smoothing Method

Although not part of the LCAM model, an actuarial funding policy may include some form of output smoothing, where the contribution rates that result from applying the three principal elements of funding policy (including asset smoothing) are then directly modified.

As noted in the Introduction, some practitioners are developing output smoothing techniques as an alternative to asset smoothing. At this time, there are no widely accepted practices established for this type of output smoothing. This discussion does not address the use of output smoothing techniques as an alternative to asset smoothing. The CCA PPC is considering the development of a separate side paper on output smoothing including methods that serve as an alternative to asset smoothing.

To illustrate the immediate impact of any output smoothing method, the contribution rate should be disclosed with and without output smoothing. In addition, the plan and its sponsors should be clearly aware of the additional time value of money cost (or savings) of the output smoothing, due to the plan receiving less (or more) than the actuarially determined contributions due to the output smoothing.

The balance of this discussion pertains only to output smoothing when used in conjunction with asset smoothing. Two types of such output smoothing policies that are known to be in current practice were evaluated for this development:

1.   Phase-in of certain changes in contribution rates, specifically, phasing-in the effect of assumption changes over a short period.

2.   Contribution collar where contribution rate changes are limited to a specified percentage of pay or percentage of the current rate from year to year.

Discussion

1.   Contribution rate phase-in can be an effective and reasonable way to address the contribution rate impact of assumption changes. When there is an unexpected change in liability due to an assumption change, phasing in the impact of the change may be consistent with General Policy Objective 3 (Volatility Management).

        a.   Ideally the phase-in period should be no longer than the time period until the next review of assumptions (experience analysis).

Output Smoothing Method

      i.   This approach is most appropriate when experience analyses are performed on a regular schedule.

      ii.   For systems with no regular schedule for experience analyses, the phase-in period would ideally be chosen so as to avoid overlapping phase-in periods.

  b.   Any ongoing policy to phase-in the effect of assumption changes should be applied symmetrically to both increases and decreases in contribution rates.

  c.   An ongoing policy may be to phase-in only significant cost increases or decreases.

  d.   Note that the phase-in of the contribution rate impact of an assumption change is clearly preferable to phasing in the assumption change itself. While a detailed discussion is outside the scope of this paper, phasing in an assumption change may be difficult to reconcile with the governing Actuarial Standards of Practice.

  e.   Using a phase-in of a contribution rate change due to actuarial experience or plan amendments appears inconsistent with the development of parameter ranges for the other elements of the funding policy.

2.   Contribution collars have the policy drawback that the collar parameters arbitrarily override the contribution results produced by the other funding policy parameters (including asset smoothing), each of which have a well-developed rationale.

  a.   LCAM model practices seek an appropriate balance between General Policy Objectives 2 (Demographic Matching) and 3 (Volatility Management) without output smoothing. Adding contribution collars on top of the model practices may shift the balance excessively toward objective 3.

  b.   If contribution collars are used, they should be supported by analysis and projections to show the effect on future funded status and future policy-based contribution requirements (prior to the application of the contribution collar).

  c.   There may also need to be a mechanism to ensure adequate funding following extraordinary actuarial losses.

Output Smoothing Method

> d. Using a contribution collar for the impact of plan amendments appears inconsistent with the amortization periods for plan amendments that were developed to be consistent with General Policy Objective 2 (Demographic Matching).

Practices

Based on the above discussion, and consistent with the policy objectives, actuarial cost methods and parameters are categorized as follows:

LCAM Model Practices

- The level cost allocation model developed in this paper does not include output smoothing.

Acceptable Practices

- For systems that review actuarial assumptions on a regularly scheduled basis, phase-in of the cost impact of assumption changes over a period no longer than the shorter of the time-period until the next scheduled review of assumptions (experience analysis) or five years.

  - Phase-in should be accompanied by discussion and illustration of the impact of the phase-in on future contribution rates, including disclosure of the contribution rates before applying the phase-in.

  - Phase-in may be applied only to cost impacts deemed material but should be applied consistently to both cost increases and decreases.

Acceptable Practices, With Conditions

- For systems that do not review actuarial assumptions on a regularly scheduled basis, phase-in of the cost impact of assumption changes over a period of up to five years.

  - Phase-in of the cost impact of any prior assumption changes must be completed before commencing another phase-in period.

  - Phase-in should be accompanied by discussion and illustration of the impact of the phase-in on future contribution rates, including disclosure of the contribution rates before applying the phase-in.

Output Smoothing Method

- Phase-in may be applied only to cost impacts deemed material, but should be applied consistently to both cost increases and decreases.

Non-Recommended Practices

- Phase-in of the cost impact of assumption changes over a period greater than five years or a period that overlaps with another phase-in period.

- Phase-in of the cost impact of actuarial experience, in conjunction with model or acceptable practices for asset smoothing and UAAL amortization.

- Contribution collars in conjunction with model or acceptable practices for asset smoothing and UAAL amortization.

- Phase-in or contribution collars for the cost impact of plan amendments.

Appendix

Description of Actuarial Cost Methods

A brief description of the actuarial cost methods discussed in this section.

Entry Age

To allocate individual Normal Costs as a level percentage of pay, an individual's Normal Cost rate is their Present Value of Future Benefits (PVFB) valued at entry age divided by their Present Value of Future Salaries, also valued at entry age.[16]

The total Normal Cost of the plan is the sum of each individual member's Normal Cost. Under this method an individual's Normal Cost is designed to be a level percentage of pay throughout the member's career.

The Actuarial Accrued Liability (AAL) for an individual member is the portion of the PVFB allocated by the cost method to service already performed. The plan's AAL is the sum of each individual member's AAL.

Funding to Decrement Entry Age

In this version of Entry Age, the Normal Cost rate is determined as a separate level percentage of pay for the benefits associated with each decrement (generally including termination, disability, pre-retirement death and retirement). Each decrement's Normal Cost stops being accrued at the first age after which the decrement is no longer applied.

While the Normal Cost rate is level for each decrement, the total Normal Cost rate for a member is not level over a member's entire career. However, this method avoids the possibility of a negative AAL for benefits other than retirement.

As an example, for a given plan member suppose:

- The Normal Cost rate for the termination decrement is 2% of pay and the termination decrement stops at age 55.

- The Normal Cost rate for the disability decrement is 1% of pay and the disability decrement stops at age 65.

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[16] To allocate individual Normal Costs as a level dollar amount, an individual's Normal Cost rate is PVFB valued at entry age divided by their Present Value of Future Service, also valued at entry age.

Description of Actuarial Cost Methods

- The Normal Cost rate for the retirement decrement is 4% of pay and the retirement decrement stops at age 70.

- The Normal Cost rate for the pre-retirement death decrement is 0.5% of pay and the pre-retirement death decrement stops at age 70.

Then the member's Normal Cost rate would be as follows: 7.50% to age 55, 5.5% from age 55 to age 65 and 4.5% from age 65 to age 70.

Aggregated Entry Age

In this version of Entry Age, the Normal Cost, Present Value of Future Normal Costs and AAL are first determined for each member under the Entry Age method. Then, an aggregated Normal Cost rate is determined as the Present Value of Future Normal Costs for all active members, divided by the Present Value of Future Salaries for all members. The actual Normal Cost amount is then determined as the aggregated Normal Cost rate applied to the total salary for all members.

This methodology produces an inconsistency between the Normal Cost that is funded and the Normal Cost on which the AAL is based. The method also will generate small but systemic gains and losses (generally losses) even if all assumptions are met.

Entry Age Cost Methods for plans where plan provisions within a Tier change for future service

These methods apply to plans where the benefit accrual rate (or other plan provisions) for future service has been changed for members in a single tier as of some fixed date for service after that "change date".

Averaged Entry Age

The Normal Cost rate for each member is determined based on the projected benefit for that member, which will include a combination of the benefit accrual rates before and after the change date. As a result, the Normal Cost rate will vary based on the proportion of the member's service before and after the change date, thereby producing a different Normal Cost rate for different members with the same entry age in the same tier.[17]

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[17] This variation in Normal Cost is in addition to the usual variation in Entry Age Normal Cost rates for members with different entry ages.

Description of Actuarial Cost Methods

The Averaged Entry Age method uses each member's actual PVFB reflecting the combination of benefit accrual rates that apply to the member as the basis for calculating their Normal Cost and AAL.

As an example, for a plan member with expected total service of 30 years, suppose:

Old benefit accrual rate:

- 3% of pay per year serviced at member's expected retirement age.
- Full-career Entry Age Normal Cost rate for this member is 15%.

New benefit accrual rate:

- 2% of pay per year serviced at member's expected retirement age.
- Full-career Entry Age Normal Cost rate for this member is a proportionate 10%.

Years of service at the time of the benefit structure change: 6

After the change in benefit structure, the member's PVFB would be based on a projected benefit of 6 years at 3% plus 24 years at 2% or 66% of pay, which over the member's career is an average benefit of 2.2% of pay per year.

Then, under the Averaged Entry Age method the Normal Cost rate after the change in benefit structure would be a proportionate 11% of pay, based solely on the member's actual PVFB.

The AAL may be determined either prospectively (as the PVFB minus the Present Value of Future Normal Costs) or retrospectively (as the accumulated value of past Normal Costs), all based on the Averaged Entry Age method Normal Cost rate of 11%. As a result, in this simple example, the actuarial accrued liability will also be reduced proportionately.

This example illustrates that the change in the Averaged Entry Age Normal Cost rate depends on when the benefit accrual rate change occurs in a member's career. For example, if the change occurred after 18 years of service (instead of 6 years), the Averaged Entry Age Normal Cost rate would be 13%.

Because the change in benefit structure's effect on the Normal Cost is averaged over the full career of the member, the change in the Normal Cost rate will be less than the proportionate change in the future benefit accrual rate as may be expected by some stakeholders. Conversely, the AAL will change due to the averaging of Normal Cost

Description of Actuarial Cost Methods

rates over the member's career. Some stakeholders may expect no change since only future benefit accrual rates have changed.

Once the plan change has been enacted, if the change is a benefit decrease the plan's total Normal Cost rate will systematically decline in the future from the rate under the old benefit accrual rate to what the rate would be if determined entirely under the new benefit accrual rate.

Note that this is the method used for GASB 67 and 68 financial reporting.

Replacement Life Entry Age

The Normal Cost rate for all members is based on the future benefit accrual rate after the change date, as if that benefit accrual rate had always been in place. The terminology "replacement life" reflects that the Normal Cost for each member is calculated as the Normal Cost for a replacement member in the same tier with the same entry age but with all service under the new benefit accrual rate.

Under the Replacement Life Entry Age method each member's actual PVFB still reflects the combination of benefit accrual rates that apply to the member. However, this method uses for each member a hypothetical PVFB calculated as if all service is under the new benefit accrual rate as the basis for calculating their Normal Cost.

Once this Replacement life Normal Cost is determined, the AAL is determined prospectively as each member's actual PVFB (reflecting the combination of benefit accrual rates that apply to the member) minus the Present Value of Future Normal Costs (reflecting only the new benefit accrual rate).

Note this means that the Replacement Life Entry Age method requires two PVFBs, a hypothetical value to determine the Normal Cost, and the member's actual PVFB to determine the AAL.

Using the same example as above, for a given plan member suppose:

Old benefit accrual rate:

- 3% of pay per year serviced at member's expected retirement age.
- Full-career Entry Age Normal Cost rate for this member is 15%.

New benefit accrual rate:

- 2% of pay per year serviced at member's expected retirement age.

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- Full-career Entry Age Normal Cost rate for this member is a proportionate 10%.

    Under the Replacement Life Entry Age method, the member's Normal Cost rate for the year after the change in benefit structure is simply 10%, i.e., the full-career Entry Age Normal Cost rate under the new benefit accrual rate. Note this does not reflect the combination of benefit accrual rates that apply to the member and so does not depend on the member's years of service at the time of the benefit change.

    The actuarial accrued liability can only be determined prospectively, as the member's actual PVFB minus the Present Value of Future Replacement Life Normal Costs.

This method produces a consistent Normal Cost rate for all members with the same entry ages and demographic characteristics. Under this method changes in the Normal Cost rate will be proportional to changes in the benefit accrual rate, as might generally be expected by stakeholders. Furthermore, this method produces a new total Normal Cost that is expected to remain stable, avoiding the systematic decline observed above for the Averaged Entry Age variation of the Entry Age method. Finally, while there will still be a change in AAL even when only future service benefits are changed, the change will be less than under the Averaged Entry Age method.

Entry Age Cost Methods for plans with multiple tiers of benefits

These methods apply to plans where a new open tier of benefits is adopted for future hires.

When there are multiple tiers of benefits, the most common practice is to base each member's Normal Cost on the benefit structure of the tier they are in.

Ultimate Entry Age

In this version of Entry Age, Normal Cost and AAL are calculated based on the Entry Age cost method; however, the Normal Cost is based solely on the Normal Cost rate for the open tier of benefits, <u>even for members not in that tier</u>.

While this method does provide plan-wide Normal Cost stability and is easy to communicate, it does not allocate the cost of benefits for each member to their years of service, because the Normal Cost rate for older tiers is unrelated to the benefits provided to those tiers. It will also cause a change in the AAL for an older tier at the

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time of the creation of a new tier, even though the PVFB for members in the older tier does not change due to the creation of the new tier.

Note that this method uses the same concepts as the Replacement Life Entry Age method except that instead of applying it within a tier, the Ultimate Entry Age method applies it across tiers.

Using the same example as above, suppose for members with a given entry age:

> Old Tier benefit accrual rate:

- 3% of pay per year serviced at member's expected retirement age.
- Full-career Entry Age Normal Cost rate for this member is 15%.

> New Tier benefit accrual rate:

- 2% of pay per year serviced at member's expected retirement age.
- Full-career Entry Age Normal Cost rate for this member is a proportionate 10%.

Under the Ultimate Entry Age method, after the New Tier is established the Normal Cost rate for all members is simply 10%, i.e., the full-career Entry Age Normal Cost rate under the New Tier benefit accrual rate. Note that the Normal Cost rate for members in the Old Tier no longer reflects the benefit accrual rates that apply to those members.

The AAL can only be determined prospectively, as the member's actual PVFB minus the Present Value of Future Ultimate Entry Age Normal Costs. The AAL for the Old Tier would increase at the time of establishment of the New Tier.

Other (non-Entry Age) Cost Methods

Traditional Unit Credit (TUC)

Under the Traditional Unit Credit method, the AAL for active members is the Present Value of Accrued Benefits. The Normal Cost is the difference between the AAL at the beginning of the year and at the end of the year (i.e., the expected cost of the benefit accruing during the coming year, including the effect on accrued benefits of pay increases during the year).

This method has a backloaded cost pattern (particularly for pay-related benefits) and may be demographically unstable.

Projected Unit Credit (PUC)

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Under the Projected Unit Credit, the AAL for active members is the Present Value of Accrued Benefits using projected pay instead of current pay. The Normal Cost is the difference between the AAL at the beginning of the year and at the end of the year (i.e., the expected cost of the benefit accruing during the coming year based on projected pay).

This method has a somewhat backloaded cost pattern and may be demographically unstable.

Aggregate

The Normal Cost rate is determined on a plan-wide basis as the PVFB minus the Actuarial Value of Assets divided by the Present Value of Future Salaries. Under this method, the PVFB minus the Present Value of Future Normal Costs (by definition, the AAL) equals the Actuarial Value of Assets. Thus, under this cost method, the UAAL is always zero.

This is a fundamentally different type of actuarial cost method known as a "spread-gain" method that spreads gains and losses over the future working lifetime of the current plan population, as opposed to an immediate gain method (e.g., Entry Age, TUC, and PUC) that recognizes gains and losses immediately.

Frozen Initial Liability (FIL)

The Normal Cost rate is determined on a plan wide basis as the PVFB minus the UAAL minus the Actuarial Value of Assets at the valuation date, with that net amount divided by the Present Value of Future Salaries.

The initial UAAL is calculated based on an Entry Age AAL and amortized over a closed period. After the initial UAAL is calculated, additional amortization bases may be established for plan changes and/or assumption changes, but not for gains and losses. The sum of the remaining outstanding balances of the amortization bases is each future years' UAAL. When all amortization bases are completely amortized, this method turns into the Aggregate method.

This is a fundamentally different type of actuarial cost method known as a 'spread-gain' method that spreads gains and losses over the future working lifetime of the current plan population, as opposed to an immediate gain method (e.g., Entry Age, TUC, and PUC) that recognizes gains and losses immediately.