The Debate Over Applying FE Principle
to the Funding of Public Pension Plans:
A Transition Proposal and Other Ideas

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1. Introduction

This paper is primarily about transition considerations if bond-based discount rates are used for funding public pension plans. Sometimes this is referred to as (1) measuring liabilities based on their "market value" or (2) applying financial economic (FE) principles. This paper refers to it as FE.

The key "pragmatic" problem with going to a bond-based discount rate, is the sudden increase in liabilities and expense in today's interest rate environment. This paper includes (1) a specific transition proposal, (2) "details," some of which need to be considered whether or not there is a transition and (3) a quiz. The focus here is on funding and skips over the discussion of starting with disclosure or expensing[1] (accounting) changes. I understand that some view the current debate as being more about disclosure than funding. While some of these ideas can be used in the disclosure debate, it is not the focus. This paper also intentionally left out any discussion of the theoretical grounds for using a "risk-free" or "market-value" discount rate vs. the current best-estimate (traditional) approach, which factors in equity risk premiums. This is left to others to debate. The author's personal hope is that the current best-estimate approach stays in place but he recognizes the draw backs.

For ease of illustration it is assumed that the current best-estimate discount rate is 8 percent and the bond/risk free rate is 5 percent. Readers should appreciate the fact that in practice the best-estimate rate is changed less frequently than the bond rate since the 8 percent rate is not adjusted automatically by the market, and the spread will be different at different points in time. This is important since some of the pragmatic reasons against change will be temporarily different in a high interest-rate environment[2].

Several "attachments" at the end of this paper illustrate a specific proposal with detailed explanations. To understand the proposal, one must consider what happens in both the initial year of change and the following year. There is an illustration for each year (Attachments 2 and 3). The specific proposal would eliminate 20 percent to 50 percent of the cost increase associated with the adoption of FE principles in a relatively permanent fashion. If more of a reduction is desired, a phasing-in of the lower discount rate on the normal cost could be used, but this would not be permanent.

One issue with providing generalized results for a change in funding methods or assumptions is that each plan is different. For this reason I have looked at three different plans:

Plan A: A mature general employees' plan where retiree liabilities represent more than half of all liabilities. The average duration is 14.9 years. The results shown in the core of this study will be for this plan. Attachments 2 and 4 compare Plan A results to results for Plans B and C.

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[1] Accounting using FE ideas does not automatically mean funding using FE rates.
[2] Regardless of the initial spread, volatility will be higher using bond rates unless investments are less equity focused.

Plan B: A mature public safety plan where retiree liabilities represent more than half of all liabilities. The average duration is 17.1 years.

Plan C: A younger general employee's plan where retiree liabilities represent about 30 percent of all liabilities. About 10 percent of the employees have public safety style benefits. The average duration is also 17.1 years.

All of these plans include post retirement COLAs, which means the duration of the liabilities tend to be longer than for a traditional, private-sector plan. The longer the duration, the greater the impact when lowering the discount rate. The prevalence of employee contributions in public sector plans is also an important factor as discussed later.

Sections 6 through 10 briefly introduce other topics that need to be considered when moving to an FE approach. These sections discuss:

- Treatment of disability benefits (much more significant in public plans)
- Treatment of salary increases including longevity steps
- Treatment of gain-sharing designs
- Rules on amortization periods and impact on contributions

2. Transition Proposal

Private-sector, single-employer plans had about 20 years to transition to a full FE funding model. The transition started with FAS87 and continued with the addition of the ERISA deficit reduction contribution based on "current liability" and finally PPA rules. No such transition has started for public-sector plans. Going to a full FE approach could raise a plan's expense by 100 percent to 300 percent (e.g. from 40 percent of payroll to 90 percent of payroll for public safety Plan B that was 70 percent funded).

The ultimate FE concept is to get to a traditional unit credit funding method using market discount rates and a market value of assets. My main transition idea is a modification of the FE idea by measuring accrued benefits prior to transition (legacy cost) at current rates (8 percent) and future accruals at market rates (5 percent). The modification is based on creating (by the second year) three streams of payments that need to be discounted.

The first stream of payments would be the expected payout of the accrued benefits at the date of transition. The initial stream would be fixed into the future and not changed by liability gains and losses, plan amendments or future accruals. The initial liability would decline each year that this payout stream was discounted at constant rate (e.g. 8 percent).

In the year of transition (and later) there would be a second stream of payouts reflecting the traditional unit credit normal cost. This stream would be discounted at market rates (e.g. 5 percent). Normal cost for final average pay plans would include the impact of salary increases. The normal cost payout streams would change each year[3]. My expectation is a material increase (200 percent to 300 percent) in the employer normal cost. Few have discussed the magnitude of this part of a change to FE principles (perhaps due to a focus on disclosure). This is discussed more below.

After the first year a third stream of payments would be created equal to the updated accrued benefit (traditional unit credit actuarial liability). The remaining payments under the first stream of payments would be subtracted from this new third stream. The difference would be discounted at market rates (e.g. 5 percent, but it may change after year one). The "actuarial liability" would be the sum of the net stream discounted at 5 percent and the remaining first stream discounted at 8 percent (again, these rates are just examples).

Amortization bases in existence at the transition date would remain at the current rate (e.g. 8 percent) and new bases would be amortized at market rates. New bases and new amortization payments might apply the pension protection act single-employer method. An "effective interest rate" could be disclosed if desired.

I have taken three sample plans and compared the expense/contribution under: (1) current rules, (2) an FE approach with no transition rules and (3) potential transition rules.

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[3] As noted later, normal cost can be calculated without producing payout streams.

While this paper's focus is on the discount rate, there is also a change in the funding method. One issue with changing to the traditional unit credit cost method (regardless of the discount rate) is that it is not as appropriate for public sector plans as it is for private sector plans. Two reasons for this are:

1.   The nature of the promise or "contract" in public plans often goes beyond the 411(d)(6) style protection of accrued benefits.

2.   Disability benefits not tied to years of service are a bigger portion of liabilities (promises) made to public employees (particularly police and fire employees). This is discussed more below.

However, I will leave the debate on funding methods to others.

3. Illustration of Numbers in the First Year

Attachment 2 shows the details for three sample plans (Plans A, B and C). The following are key pieces of information needed:

Column A1: For the current funding method we need the actuarial liability (assumed to be under the entry-age normal (EAN) method), EAN normal cost and asset value. None require a payout stream be calculated and at this point I will not discuss asset smoothing. The discount rate is 8 percent.

Column B1: For the "pure" FE approach the actuarial liability (under the traditional unit credit (TUC) funding method), TUC normal cost and asset value is needed. None require a payout stream the first year, but the TUC normal cost amounts are consistent with the values used in Column C1. The discount rate is 5 percent.

Column C1: For our proposed transition approach the actuarial liability (under the TUC funding method), TUC normal cost and asset value is needed. No payout stream is required immediately but will need to be produced to calculate the second year's cost. The discount rate is 8 percent for the actuarial liability but 5 percent for the normal cost. See Attachment 1 for the payout streams.

The resulting calculations on Attachment 2 show an annual cost for Plan A as follows[4]:

Column A (Traditional):   7.1% of payroll
Column B (FE):   25.7% of payroll
Column C (Transitional):   17.2% of payroll

For Plan B (a public safety plan) the comparable results were: 19.6 percent/75.8 percent/50.9 percent. So what happened going from the traditional model to the FE model?

As others have noted, the actuarial liability may increase materially if we go directly to the FE model. The change is due to:

1.   Change in funding method from entry-age normal to traditional unit credit (reduces liability for active portion)

2.   Change in discount rate from 8 percent to 5 percent (increases liability for active and inactive portion)

The employer normal cost increased by 201 percent. The change is due to:

1.   Change in funding method from entry age normal to traditional unit credit (in this example it increased the normal cost): It should be understood that for final average pay plans the traditional unit credit normal cost includes both the extra

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[4] The 7.1 percent/25.7 percent/17.2 percent values are based on the plan being 100 percent funded to start. If the plan were 70 percent funded the cost as a percentage of payroll would be 15.0 percent/31.4 percent/25.1 percent.

service credit and the impact of the current year's expected pay increases on prior service accruals. If traditional unit credit normal cost is lower at the beginning of a person's career vs. entry age normal, it is higher toward the end.

2.   Change in discount rate from 8 percent to 5 percent (the duration of the normal cost is greater than the duration of the actuarial liability so the impact of the discount rate change is larger on the normal cost).

3.   Leveraging the "employer" normal cost: The employer normal cost is the difference between the gross normal cost (increased by the first two changes) less the employee contribution rate (normally a fixed percentage).

Now what happened going from the traditional model to the transition model?

Everything was the same as under the FE model, but the discount rate for the actuarial liability remained at 8 percent (the funding method was changed). This actually reduced the unfunded liability while the normal cost still increased. Later is a discussion of not abusing the effect of the reduction in the actuarial liability. However, next we need to discuss how year two is different than year one.

4. Illustration of Numbers in Year Two

Year two requires two payout projections:

1. The first is the payout projection of the actuarial liability at the date of transition. The present value at date of transition of this projection should match the liability used in the first year. The present value at year two of this payout projection (ignore first year's payment, which is now in the past) at 8 percent is the first portion of the year two actuarial liability.

2. The second is the payout projection of the actuarial liability at year two using new census data. The present value at 5 percent in year two of the difference between this payout projection and the prior projection is the second portion of the year two actuarial liability.

The unfunded liability is the difference between the total actuarial liability (measured at two different discount rates) less assets. The amortization payment and base for the first year (using an 8-percent discount rate and in the example a 3-percent payroll growth assumption) are rolled forward. This allows the calculation of a new base, which is amortized at 5 percent.

The new TUC normal cost is measured at 5 percent and could be calculated directly without producing a payout projection.

See illustration in Attachment 3.

5. Why Not Just Phase in Reduction in Discount Rate?

Other questions could be asked about this specific proposal. Under the proposed transition model, should the discount rate for the initial TUC actuarial liability be between 8 percent and 5 percent and how would the rate be set? Should the discount rate for the TUC normal cost be phased in from 8 percent to 5 percent?

Why not just phase in the rate from 8 percent to 5 percent? We could do this and it would be easier. However, the following should be considered:

1. One FE "goal" is to allow bargaining over direct pay vs. benefits to be on a market value approach. Under the transition approach the normal cost and benefit changes would immediately be done on an FE approach.

2. Under the transition approach the actuarial liability at will always be at the 8 percent rate. This is consistent with the idea of a separate treatment of legacy issues[5].

3. The drop in the amortization payment cushions the increase in the normal cost[6].

One of the SOA reviewers asked: "How long would the drop in the amortization payment cushion the increase in the normal cost?" The short answer is that for as long as the amortization period (assuming the same period is used both before and after the funding method change). A longer answer would require modeling and considering whether asset returns would be based on the 5 percent or 8 percent rate. Assume that at the time of transition the unfunded TUC actuarial liability was $0 at an 8-percent rate. The "contribution" might be the 5 percent TUC normal cost with no more amortization payment. Would the trustees invest existing assets in stocks and bonds and new contributions more conservatively?

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[5] Legacy cost would be anything other than normal cost. Someone will be asked to pay them currently or in the future since past taxpayers are no longer an option. There will be an intergenerational transfer of cost and our proposal is, in part, a way to transfer cost to more generations than a pure FE approach.

[6] It is important that the net amortization payment not be negative (unless also negative under the FE approach).

6. Disability Benefits

Nature of design and relative significance: Private sector employers tend to rely on LTD policies and possibly pension plan benefits equal to accrued benefits and tied to Social Security eligibility. Public employers tend to provide most disability benefits through their pension plans with the following characteristics not generally found in the private sector:

1. An "own occupation" definition and not tied to Social Security eligibility
2. Lifetime payments with COLAs
3. Benefit amounts depend on whether the disability is work-related or non-work-related
4. Tax-free work-related benefits
5. Work related benefits equal to 60 percent to 70 percent of pay and not tied to years of service
6. 20 percent to 50 percent of retired public safety employees retire with work related disability benefits

It is these last two factors that create an issue when deciding how to calculate TUC values and the significance of the determination.

Attribution method: The question is how to allocate normal cost over someone's career when the benefit is not tied to service. The two choices are: (1) normal cost only factors in the increase in pay or (2) prorate the benefit based on service to date of decrement and factor in pay increases. While of lesser significance, the same issue exists for ERISA PPA rules and for now the first choice above seems to be the IRS recommended method. The FE approach might lean more toward the first choice, but the strongest FE advocates tend to be theorists not focused on this level of detail.

Term-cost funding: A different type of alternative would be to break the rule that a single funding method be used for all benefits. Disability benefits (or the cost above the reserve for service retirement benefits) could be funded on a term cost basis. This will lead to a debate over (1) how to handle disability decrements in future years and (2) whether "contract" clauses apply to future disability benefits and their significance in determining the appropriate funding method. Throughout this paper, the FE is viewed as being well-defined but, often it is not. As we get into more practical details there is even less clarity. However, my own interpretation is that FE principles would favor a term cost funding approach to disability benefits.

7. Grow Ins

Even more than private-sector plans, public plans have early retirement subsidies into which employees grow. In the case of a public safety plan with a 20-and-out provision, this is not viewed by members (participants) as a grow-in but simply normal retirement for a group with very little turnover after the first three to five years of service. Many public plan actuaries are not as familiar as private sector actuaries with the term "grow in" since 411(d)(6)(B) does not apply to public plans.

A pure FE approach would treat the grow-in cost as part of the normal cost if the year eligible was achieved. However, given the "contract" nature of the benefit (beyond 411(d)(6) concepts), it would seem more natural to value the ongoing nature of the plan and included it in the normal cost from the date of hire (to the extent the members are expected to remain in the plan) as is currently the case with traditional methods. Even if anticipating grow ins seems natural, the FE style normal cost should be non-level for an individual (it might be level for a large group). Many others have shown the cost or benefit spike involved with grow ins.

Dealing with this issue is difficult due to a need to stay unbiased by current practices and the role of contractual obligations. For those interested in how this would impact liabilities and normal cost, I would suggest reading the discussion of "CBO" in the paper written by Rizzo, Ostaszewski and Krekora[7].

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[7] James Rizzo, Krzysztof Ostaszewski and Piotr Krekora, *Revisiting Pension Actuarial Science*, March 2009.

8. Volatility Issues

For the most part this paper deals with the transition shock and not the issue of year-to-year volatility. However, this deserves some attention and expansion into areas beyond changes in the market discount rate.

Market discount rate: If we went to a pure FE approach, volatility could be eliminated by investment choices with the exception of volatility in normal cost. Bond investing, however, will likely reduce long-term rates of return.   This author assumes that few trustees would want to give up the higher-expected long-term rates of return and that we would be discussing smoothing the discount rate. To some extent, normal cost volatility could be controlled if the plan were over funded by more than the normal cost and bonds were purchased even before benefits were accrued. The goal might not be to eliminate volatility but to invest in a manner to simply dampen it.

Salary increases: Under current traditional methods salaries are projected to retirement age. The impact of higher (or lower) increases in the coming year generated a loss (or gain) that was amortized over many years. However, under the TUC method, the increase in the salary in the coming year (and over the last three to five years) will be more important if the normal cost is to be calculated accurately. This might mean that actuaries need to be more aware of longevity-based pay scales. Half of the normal cost may be due to increases in pay and not service. This would imply that the actuary's input in bargaining over pay is more important. This is one of the goals of those advocating for an FE approach.

Asset gains and losses: One of the bright spots is that investment gains and losses would be amortized using a lower discount rate. This paper ignores any issue about changes in asset-smoothing methods.

There is one other issue about volatility at the point of transition. As was noted above, under the transition method the unfunded liability will decrease and may actually become negative. Rules need to be set to be sure that the amortization period is appropriate and that short contribution holidays are not created. A 20-to-30-year amortization of any overfunding or lowering the 8-percent rate is suggested. While it may be appropriate to pay less than the FE style normal cost, since this is the ultimate projected level of funding, the cost going far below normal cost is not desired.

As a generalization:

1.   Private sector employers place importance on minimizing contributions in part due to the asymmetry of responsibility for deficits vs. very limited "ownership" in surplus.

2.   Public sector employers need smooth budgeting changes (not lowest annual cost) in part due to the desire for limited volatility in taxing and focus on cash funding and not solvency.

9. Treatment of Gain Sharing and Skim Funds

Many plans have adopted provisions that used some specified portion of investment earning to provide for benefit increases. How investment losses are dealt with varies by design. The positive spin is to call these provisions gain-sharing plans and the negative spin is to call them skim funds. Not all of these are inappropriate, but some (e.g. State of New Hampshire) have been poorly designed and warnings of plan actuaries have been ignored in at least three plans. The key point is that the discount rate needs to reflect a balance between losses retained by the plan with net gains retained after a portion of earnings have been assigned to benefit improvements.

In an FE approach there tend to be at least two challenges with these designs. The first is no different than under the current rules and that is to assign a net reduction to the discount rate. The reduction should probably reflect the actual investment choices, but this is something that should probably be debated[8]. Assuming that the prior sentence is correct, the second challenge is to realize that the cost (and benefit improvements) are linked to how funds are invested. In a pure FE approach, this will increase pressure to use more conservative investments and minimize the value of the benefit.

If the actuary believes that the average return allocated to benefit increases is 2 percent, then under our transition model this paper uses discount rates of 6 percent and 3 percent instead of 8 percent and 5 percent respectively. However, there should be some debate as to whether the two rates should be 6 percent and 5 percent. One SOA reviewer suggested that this be valued like a stock option. I will let others debate and develop this idea.

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[8] The role of trustees in modifying investment choices and the impact on the cost of gain sharing is beyond the scope of this paper.

10. More Thoughts on Normal Cost and Phase-In

One of the biggest "pragmatic" problems with adopting an FE model is that the NC increases are large. In Plan B the gross TUC NC was 63 percent of payroll. Why so high? This is a public safety plan with a 3 percent COLA. Therefore the annuity factor at retirement age (discounted at 5 percent) is not much less than the life expectancy. Assume (1) the annuity factor is 20.000, (2) the years from current age to retirement is seven and (3) the accrual rate is 2.5 percent. This initially gives us a rough normal cost as a percentage of pay of 2.5 percent x 20.000 / 1.05^7 = 35 percent. Now realize that this is not a career average pay plan and assume FAE increased 5 percent and past service was 13 years. We now add 2.5 percent x 13 x 5 percent x 20.000 1.05^7 = 23 percent to get a total of 58 percent. Plan B also provides an unreduced 100 percent joint and survivor benefit. This plus ancillary benefits gets the FE normal cost to 63 percent of payroll.

Could we phase in the NC by gradually lowering the discount rate? Yes, but would employers be willing to fund an ultimate normal cost that is this high?

11. Quiz

Here is a quiz to see if you are a true believer in applying FE principles to public plans or believe in current traditional standards of practice. The purpose is to get people thinking. The higher your point total, the more of an "FE" believer you are. Where the scale is 0-10, feel free to be in between. As one reviewer noted, these questions are designed to identify where there is a split between FE and traditional methods. As noted earlier, there is not a single FE position. Think about why each question is being asked and why they are scored differently.

1. The following designs are <u>inappropriate</u> as there is no developed "market:"
   a. Traditional OPEB medical benefits (True = 10 points, False = 0 points)
   b. Most Gain Sharing/Skim funds (True = 5 points, False = 0 points)
   c. Traditional "Contract" Clauses (True = 10 points, False = 0 points)

2. Assets smoothing should not be used. That is the purpose of amortization periods. (True = 10, False = 0)

3. "I really don't need to know about 'contract' clauses or ancillary benefits or solvency of public employers. FE was right for private sector and is right for public sector." (True = 10, False = 0)

4. Disability benefits should be funded on a term-insurance basis even if the benefit is based on one's own occupation definition and benefits are lifetime benefits. (True = 2, False = 0)

5. Funding should be based on the most valuable retirement age assumption and should not use retirement rates. (True = 5, False = 0)

6. The need to fund based on bond discount rate depends on the current and expected future credit quality rating of the sponsor. (True = 5, False = 0)

7. Even if the plan sponsor is expected to be of the highest credit quality, accounting expense should be based on bond rates to allocate cost to the correct generation of taxpayers. (True = 10, False = 0)

8. Many public plans cover employees who are not covered by Social Security. Since Social Security has considerable intergeneration transfers, this needs to be factored in. (True = 0, False = 1)

9. The traditional unit credit attribution method is not meaningful. (True = 0, False = 5)

10. Level budgeting of cash cost is more important that FE principals. (True = 0, False = 5)

Scale of final score:
   48 or above: The "Gold" FE standard
   Between 35 and 47: Pragmatic FE believer
   Between 11 and 20: Probably signed the anti-FE petition
   10 or less: Don't believe FE is the answer

12. Attachment 1: Basic Building Blocks

This Attachment contains the benefit payment projections for Plan A.

Column A represents the payments for the traditional unit credit actuarial liability at the date of transition. (A1 is for actives and A2 is for inactives). The initial projection is important and will be used in future valuations and always discounted at 8 percent. However, it might make sense to reduce these values in future years if the plan is ever amended to reduce benefits (we might not want to give a credit at a 5-percent rate for something in the original schedule).

Column B represents the payments for the traditional unit credit normal cost for the year of transition. It is important to understand that this is the "gross" normal cost and no reduction has been made to reflect employee contributions. The normal cost can be calculated without the use of a benefit projection.

Column C represents the payments for the traditional unit credit actuarial liability a year after transition. To simplify the calculation I assumed about a 1-percent loss the first year by setting Column C = Column A x 1.01 + Column B. In practice this would be based on new data and a new valuation.

I assumed the second year's normal cost is simply 103-percent times the first year's normal cost. Again, in practice this would be based on new data, a new valuation and possibly a new discount rate.

Column D is the present value of column A at an 8-percent discount rate. For ease of calculation I have assumed mid-year payments with a slight adjustment for monthly payments with the first payment due immediately.

Column E is the present value of column B at a 5-percent discount rate.

Column F is the present value of column A at an 8-percent discount rate at the second year and ignoring the first year's payments

Column G is the present value of column C less column A at a 5-percent discount rate at the second year and ignoring the first year's payments.

13. Attachment 2: First Year Contribution Results

For the first year I want to show three potential results. One uses current methods (columns A1 and A2). The second is what I call the FE approach (columns B1 and B2). The third is the proposed transition approach (columns C1 and C2).

My focus is not on asset values, but I have shown two possible starting assets values. This is the only difference between A1-C1 and A2-C2.

I have assumed a 30-year amortization period. Periods between 20 and 30 years are common in public plans. Rarely is the amortization period longer than 30 years because of GASB rules.

Unlike private sector rules, GASB allows amortization payments that increase with covered payroll. I have shown both level-dollar and level-percentage of amortization payments. However, to determine the annual cost I used the level percentage method, since this is more common. I have assumed payroll, amortization payments and normal cost will all increase by 3 percent per year.

Amortization payments for columns A and C use an 8-percent discount rate and for column B use a 5-percent rate.

Actuarial liabilities and gross normal cost in columns B and C can be found in Attachment 1. The values in column A are determined using standard methods.

The normal cost is shown as the gross amount and reduced by employee contributions. For Plan A the employee contributions are assumed to be 4 percent of pay.

14. Attachment 3: Second Year Contribution Results

Attachment 3 only looks at how the transition approach would work. Traditional or pure FE approaches are no longer calculated. The focus is on showing how the actuarial liability and amortization payments each use both discount rates.

The actuarial liability comes from columns F and G of Attachment 1. Remember that column F is the expected accrued benefits at transition discounted at 8 percent. Column G is the *increase* in accrued benefits discounted at 5 percent. The increase shown in column G is the sum of (1) prior year normal cost/accruals, (2) gains and losses and/or (3) plan changes.

For the illustration, the asset value is rolled forward using an 8 percent return assumption. A 3-percent growth in (1) payroll, (2) normal cost and (3) employee contributions is also assumed.

There are now two amortization payments. The first is the amount from the first year increased by 3 percent (since the level percentage method is used). The prior year's unfunded liability is rolled forward (alternatively the balance equals the present value of remaining payments at 8 percent; both methods are shown) and subtracted this from the current unfunded liability. The difference (new base) is amortized using a 5-percent discount rate (still using the level percentage method).

Shown are two sets of results. One is based on a 1-percent liability loss. The other also includes a 5-percent asset loss. It is worth noting that the amortization of asset losses is much less using the 5-percent discount rate for the amortization factor than the traditional 8-percent rate.

15. Attachment 4: Comparison of Results and Duration for Three Different Plans

This shows the relative mix of active and inactive liabilities (both under EAN at 8 percent and TUC at 5 percent) and the duration of the TUC liabilities and normal cost. The highest duration is for the normal cost. It also shows total payroll and employee contributions. Employee contributions are important due to leveraging.

Plan B is a public safety plan and the gross TUC normal cost at a 5-percent rate is much larger than for the other two plans.

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