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USE OF VARIABLE ECONOMIC ASSUMPTIONS FOR PENSION PLANS

Moderator: E. ALLEN ARNOLD. Panelists: NEELA RANADE, A. FREDERICK ROHLFS, JR. Recorder: RODERICK R. SPROULE

1. Goals and objectives of variable economic assumptions in pension valuations.

2. Types of variable investment return and pay increase assumptions actually in use.

3. Technical aspects:
   - Reasonable funding regulations
   - Gain and loss
   - Funding standard account
   - Disclosure of assumptions - Schedule B
   - Present value of accumulated benefits
   - Entry age normal costs

4. Explanation to:
   - Plan sponsors
   - IRS
   - Auditors
   - Users of company and plan financial statements

MR. E. ALLEN ARNOLD: This is the panel discussion on variable economic assumptions. My name is Allen Arnold, and I am a Consulting Actuary with TPF&C in San Francisco. Ms. Neela Ranade, Actuary for American Telephone & Telegraph Company in New Brunswick, New Jersey, and Mr. A. Frederick Rohlfs, Jr., Consulting Actuary of CB Buck Consulting Actuaries, New York, are also panelists. Our recorder is Mr. Roderick R. Sproule of TPF&C in Vancouver.

Our purpose today is to discuss the objectives, techniques and problems of variable economic assumptions in pension valuations, but not to determine just what the assumptions should be.

Ms. Ranade and Mr. Rohlfs will report on the study which the Committee on Pensions is making of the variable economic assumption question. When they have finished, I shall discuss a very easy and practical way to use a short-term interest assumption which differs from the ultimate assumption, and also discuss the relationship of variable interest rates with variable general pay salary scales briefly.

Mr. Rohlfs will start the program.

MR. A. FREDERICK ROHLFS, JR.: The Committee on Pensions of the Society has as one of its current projects, an analysis of the use of select and ultimate financial assumptions in pension plan valuations. We took this project on since we felt there was a growing interest in the use of variable economic assumptions and we suspected that there would be a host

of technical issues to address. Almost concurrent with our decision to look at this topic the Academy of Actuaries' Pension Committee asked us if we would consider putting together a paper on the merits and problems of using variable financial assumptions. We started this project in the Spring of 1982, we are now on our 3rd draft, and we hope to have our paper completed by late 1983 or early 1984.

There are several external forces which are contributing to the increasing use of time variable financial assumptions. Heading the list would be the extremely high level of short term investment yields in recent years and, as a result, a very large gap between these rates and our valuation assumptions. The magnitude of this gap has caused an increasing number of questions from the various publics that we deal with, concerning our rationale for using interest rates which seem so out of touch with the marketplace. On countless occasions I have explained my valuation rate of, say 7%, as being a composite of an initial first year rate of 12%, grading down to an ultimate rate of 4 1/2% or 5 % in 15 years. The funding level would be the same, I explain, and with the use of the flat 7%, the valuation is less complicated and the valuation fees are lower.

Another external force is the disclosure information required by FASB Pronouncements 35 and 36. In determining the actuarial present value of accrued benefits, the FASB requires, and I quote, "assumed rates of return shall reflect the expected rates of return during the periods for which payment of benefits is deferred and shall be consistent with returns realistically achievable on the types of assets held by the plan and the plan's investment policy".

When FASB's Preliminary Views on Accounting for Defined Benefit Pension Plans came out, they did not address the selection of actuarial assumptions. However, in mid-April of this year they published a discussion memorandum in which they gave their views on actuarial assumptions. Not surprisingly, the statement in the Discussion Memorandum for assumed rates of return is identical to the FASB 35 definition quoted above.

In Schedule B of Form 5500, the instructions to items 6(d) and (e) require that in calculating the present value of accrued benefits "each significant actuarial assumption should reflect the best estimate of the plan's future experience solely with respect to that assumption...". While this requirement isn't as strongly worded as the FASB's, it does set the scene for the use of an interest assumption other than the valuation rate and, in fact, in Item 12 where the actuarial assumptions are stated, there are two separate columns - one for valuation and funding standard purposes and the other for the value of accrued benefits.

An acquisition or a divestiture is another situation where it is becoming more common to value the accrued benefits using interest rates higher than the valuation rate. These calculations are the basis for asset transfers, for adjustments to the sale price in some instances or even of the determination of whether or not to go through with the acquisition in the first place.

The PBGC's interest rates used for valuing guaranteed benefits are a form of variable financial assumptions, although the structure is different from

the traditional approach to select and ultimate assumptions. Their approach is to use a single interest rate for annuities that are payable immediately, which for the month of June has been set at 9 1/4%. This rate also is used for the maturity value at age 65 for deferred annuities, with lower interest rates used during the deferred period. The June interest discounts for the deferred periods are 8 1/2% for the first 7 years of deferral, 7 1/4% for the next 8 years and 4% thereafter. The net effect is a select period where the duration is measured individually by the number of years of deferral to each individual's annuity starting date. In the traditional approach the select period is based solely on the number of years from the valuation date and has no direct relationship to individually determined annuity starting dates.

Variable assumptions are also used is the valuations of some large governmental retirement systems. The Social Security system, the Railroad Retirement system and the Civil Service's retirement plan all employ select economic assumptions in their valuation bases.

Finally, due to the 1980 multi-employer legislation, an employer who withdraws from a multi-employer plan could be liable for an allocable share of the plan's unfunded vested liability. There have been several recent situations where the opposing parties have spent most of their energies arguing over the selection of the proper interest assumption. Perhaps these debates would be lessened if select and ultimate rates were chosen and the earlier select rates were reasonably close to market expectations.

PROS & CONS

I would like to briefly summarize some of the pros and cons of using variable financial assumptions as the Committee sees them so far.

Perhaps the greatest advantage of using select and ultimate financial assumptions is the opportunity to enhance communications with plan sponsors, accountants, participants and others interested in the results of our work. High current interest rates and an increased awareness of the pension actuarial process have combined to challenge long standing practices, which include our recommendations with respect to actuarial assumptions. In this environment, the use of select and ultimate assumptions may serve to enhance the actuary's credibility and to help satisfy the actuary's professional responsibilities as well.

FASB and Schedule B calculations regarding the actuarial value of accrued benefits would be automatically determined as part of the valuation process, without having to choose an interest rate different from the valuation rate.
Spin-off calculations in acquisition or divestiture situations could be done using the valuation assumptions, presumably with less hassle over the selection of assumptions.

Another area where the use of variable financial asumptions is advantageous is in the pricing of plan improvements - one example would be the cost of a pension update for retireds. The average period over which these improved benefits will be paid is only 15-20 years and it may be a better reflection of the actual cost of the improvement if variable assumptions were used instead of the traditional flat interest rate.

One of the problems encountered using variable financial assumptions is the increased complexity of doing actuarial valuations. Some of these complexities will be discussed in Neela's part of the session.

Section 415 limitations on benefits from qualified plans can be another troublesome area, especially after TEFRA's reductions last year. This is because we can't fund for projected benefits over these limits, and if we move to a salary assumption which has higher rates of increase in the early years it will make the situation worse.

I will address two last items, problems with amortization periods and option factors, after Neela is finished with her segment.

MS. NEELA RANADE: When one talks of economic assumptions for pension plans, the two that come to mind immediately are interest rate and salary scale. However, turnover rates and retirement rates are economic assumptions as well, in that they are impacted to a tremendous degree by economic factors such as productivity of the economy, recession or inflation, and the supply and demand for labor.

Variable levels for certain actuarial assumptions have been commonly used. For instance, turnover rates that depend on age at employment and years of service at valuation date have often been used in pension plan valuations. For a young group, a select period of 2 to 5 years in the turnover scale would be more realistic than a level scale and could reduce required plan contributions by about 10%. Another type of actuarial assumption in which variability has been employed is the salary scale. Salary scales based on age at entry and years of service have been used by many actuaries. The Bell System pension plan covers a million active employees. We use several different salary scales that depend on age at entry, years of service and sex for various groupings within the Bell System. Allen will discuss variable salary scales further later in the session.

Interest rates have been extremely volatile in the last few years. Who could have predicted a year ago that long term bond rates would drop from 16% to 11% within a year and that mortgage rates would tumble from their recent high of 18% to 12 1/2%? Financial institutions have taken note of the volatile interest climate around them and reflected it in their product design. A maxim credited to bankers in the past was called the 5-8-3 rule; 5% interest on savings, 8% interest on mortgages, and on the golf course by 3 p.m. Attitudes have changed in this period of money market bank accounts, adjustable rate mortgages, and mortgages with balloon payments. Some of the hottest products designed by insurance company actuaries are universal life policies which use variable interest rates in computing the cash value and even in calculating the cost of death protection. For instance, one company uses rates of 8 1/2% for the first 8 years, and 4% thereafter in pricing the term insurance portion of its universal life policy.

However, pension plan actuaries still usually use a level interest rate assumption. There are some exceptions, for example, the PBGC mandates variable interest rates in connection with valuing termination liabilities, and social security actuaries employ variable interest rates in their projections of liabilities. Actuaries for private pension plans, however, have by and large been using level interest rates. The most common rate

used currently appears to be 6% per annum. The difference between this rate and the market return on the pension fund becomes glaring in a year like 1982 when most pension portfolios earned 20% to 25%. The interest rate assumption plays a critical role in the pension plan valuation process. Contributions are very sensitive to changes in the interest rate - one rule of thumb is that a 1% change in the interest rate assumption produces a 24% change in the contribution level in the opposite direction. Currently the stock market is shooting up, yielding very high return to pension portfolios invested in equities, and bringing the conservative level interest rate assumption under scrutiny. However, the change to a higher level interest rate is not a very satisfactory answer given the instability of interest rates that we have seen over the last year. An interest rate assumption that varies by calendar year may provide a good alternative.

AT&T's investment experience will serve as an illustration of the recent investment climate placed in historical perspective. Due to the large size of AT&T's pension fund, the approximate market value at the end of 1982 was $45 billion, the fund can be expected to mirror general investment conditions. For years, AT&T has used an interest assumption of 5%. During the first 7 years, actual investment earnings were less than the assumed earnings. Actual earnings which were more favourable than the assumed began to appear in 1979. In 1982, the actuarial rate of return on the pension funds was approximately 12.2% while the market rate of return was approximately 23.4%. Actuarial rates of return from 1979, 1980 and 1981 have ranged from 7.4% to 10.6%. With short term rates that are 50% over the assumed rate, a change in the interest rate assumption becomes worth exploring. If one does not believe that long term rates will continue at the current high levels, the type of variable interest assumption called the select and ultimate interest assumption is a good option.

In the rest of this discussion, I will focus on select and ultimate interest assumptions. Much of this material follows from studies by the Society's Pension Committee. In literature the term select and ultimate interest assumptions has been interpreted in different ways. One possibility is that the select period would remain constant in much the same way that mortality tables have a select period. Suppose, for example, that for the initial year 1983, the rates are set at 10% for the first 10 years, and 5% thereafter. Under this approach (approach (1)), the interest rates for the 1984 valuation would also be 10% for the first 10 years, and 5% thereafter. This approach runs counter to the reasonable funding regulations, however, as I will later demonstrate.

Under the second approach (approach (2)), the interest rate is variable for a certain calendar period called the select period, after which the interest rate attains its ultimate level. The select and ultimate rates for the 1983 valuation year for our example, under this approach, would also be set at 10% for the first 10 years and 5% thereafter. However, for the 1984 valuation year, the rates assumed would be 10% for the first 9 years and 5% thereafter. In other words, the select and ultimate interest rates are assumed to be calendar specific. This is the approach preferred by the Society of Actuaries' Committee on Pensions since it does not generate spurious gains or losses as approach (1) does.

The Society's Pension Committee is currently studying the use of select and ultimate interest rates for pension plan valuations. In this discussion, I will talk about some of the Committee's findings. I will start with the philosophical and technical problems that select and ultimate assumptions pose in connection with certain cost methods. When one says an interest rate assumption is 5%, the implication is that the rate is 5% for all years into the future as well as all past years that enter the valuation process. When one establishes an interest rate assumption of 10% for the first 10 years and 5% thereafter, one has to answer what the interest rate is assumed to be for past years. In truth, then, one has to set a retrospective rate in addition to the select and ultimate rates. This is not merely a philosophical question, but is critical for performing the valuation calculations for certain cost methods. Under the Unit Credit cost method the normal cost is the present value of benefits assumed to have accrued during the year and the accrued liability is the present value of benefits accrued up to the valuation date. The present value calculation requires only assumptions as to future interest rates. Similarly, under the aggregate cost method the normal cost is determined by first calculating the present value of projected future benefits and neither the projection of benefits nor the present value calculation requires an assumption as to past interest rates. However, under the entry age normal method, the normal cost and accrued liability calculations require the calculation of an annuity from the participant's entry age to his retirement age. Thus it is essential to be able to determine the interest rate assumption for prior periods, dating back to the participant's entry age.

Consider that a plan first uses select and ultimate interest assumptions in 1983 with the assumptions being 10% for the first 10 years, and 5% thereafter. If one views retrospective rates as a mechanism for releasing liabilities into the future, an assumption of the ultimate valuation rate of 5% for past years may not be unreasonable. It should be noted, however, that this simple device of setting the retrospective rates equal to the ultimate rate works only for the first valuation year when select and ultimate rates are introduced. When the 1984 valuation is performed and the interest assumption is 10% for the first 9 years, and 5% thereafter, what is the retrospective interest rate? According to the reasonable funding methods regulations no gains or losses must be generated under a reasonable funding method if past experience exactly matches assumptions. To satisfy this requirement, the retrospective rates in 1984 must be set at 10% for 1983 and 5% for years prior to 1983. For the 1985 valuation, the retrospective rates would be 10% for the prior 2 years, and 5% for the years before that. In other words, the retrospective rates would be calendar specific just as the select and ultimate prospective assumptions are. The Entry Age Normal, Individual Level Premium and Frozen Initial Liability cost methods will require assumptions as to the level of retrospective rates. Although the aggregate cost method does not require an assumption about the level of retrospective interest rates, the full funding limitation calculations for this method must be performed under the Entry Age Normal cost method which does require an assumption regarding the retrospective interest rates.

We talked earlier about two possible interpretations of the term 'select and ultimate' as it applies to interest rates. The following example will illustrate the problems that arise with approach (1).

For our example, consider the present values of benefits PVB_1 at the beginning of Year 1:

$$PVB_1 = \sum_{k=1}^{N} \left(\prod_{s=1}^{k} \frac{1}{1+i_s} \right) B_k$$

or $$\frac{1}{1+i_1} B_1 + \frac{1}{(1+i_1)(1+i_2)} B_2 + \text{-----}$$

where B_k = benefits projected to be paid at the end of year k.

$i_s = .10$ for $1 \leq s \leq 10$

$.05$ for $s > 10$

The equation for the expected present value of benefits at the end of year 1 is:

$$\text{Expected } PVB_2 = PVB_1 (1 + i_1) - B_1$$

Under the reasonable funding regulations the actual PVB_2 must equal the expected PVB_2 if experience exactly matches assumptions.

Assuming that the projected benefits B_2, B_3, ... remain the same at the end of Year 1 as at the beginning.

Actual PVB_2 under approach (1) where interest rates for 1984 are 10% for the first 10 years and 5% thereafter, can be written as:

$$PVB_2 = \frac{1}{(1+j_2)} B_2 + \frac{1}{(1+j_2)(1+j_3)} B_3 + \text{----}$$

where $jk = .10$

for $2 \leq k \leq 11$

$jk = .05$ for $k > 11$.

Actual PVB_2 under approach (2) where interest rates for 1984 are 10% for the first 9 years and 5% thereafter can be written as:

$$PVB_2 = \frac{1}{(1+i_2)} B_2 + \frac{1}{(1+i_2)(1+i_3)} B_3 + \text{----}$$

It is easy to see that under approach (2) PVB_2 = Expected PVB_2 so that this approach meets the requirements of the reasonable funding regulations. However, this is not the case with approach (1).

When I talk of select and ultimate assumptions hereafter, I will mean approach (2) or the calendar specific approach.

Having talked of some of the basic and philosophical considerations, let us now consider the practical aspects. Assuming an actuary decides to use

select and ultimate interest assumptions, what are the implications in terms of added complications and added expense for the valuation? Some actuaries use a projected cash flow approach for their valuations in which the present value of benefits is calculated by discounting the projected benefit stream, in other words:

$$PVB = \frac{1}{1 + i_1} B_1 + \frac{1}{(1+i_1)(1+i_2)} B_2 + \text{----}$$

where B_1, B_2, B_3... are benefits projected to be paid out in years 1, 2, 3,... and i_1, i_2, i_3... are the assumed interest rates for years 1, 2, 3,... It is clear that using a variable interest rate instead of a level interest rate poses no problem at all under this approach.

When the commutation function approach is used, the use of select and ultimate interest rates does complicate calculations. A different set of commutation functions must be calculated for each attained age. Assuming the lowest attained age is 17 and the highest 70, this means the calculation of a set of 54 commutation tables instead of 1. Moreover, the commutation tables must be recalculated each valuation year. Although this sounds like a horrendous amount of work, it means extra effort only for the first year when a switch is made from level interest rates to select and ultimate interest rates and when the software must be developed to generate the sets of commutation functions. We did go through the whole process at AT&T and it was our experience that, once the programming was completed, the additional computer cost to generate the commutation functions was surprisingly low.

Diagrams 1-8 illustrate some projections that the actuaries at Metropolitan Life Insurance Company prepared for the Pension Committee. Accrual rates over time were calculated for a typical population for select and ultimate interest assumptions and an equivalent level interest assumption. By an equivalent level interest assumption we mean a rate for which the present value of benefits equals the present value of benefits under the select and ultimate interest assumptions. Accrual rates were studied for a closed group under the two interest rate assumptins for combinations of three different benefit formulas and two actuarial cost methods. For the purposes of these projections experience was assumed to be identical to the select and ultimate assumptions.

Projections - Summary of Variables

1. Level interest rate and salary scale:
   - Interest 6.2%
   - Salary 4.2%

2. Select and ultimate interest rate and salary scale:
   - Interest 10% from time 0 to time 5
     5% after time 5
   - Salary 2% below interest

3. Types of benefit formulas:
   - Flat dollar plan - $120 flat benefit
   - Final average plan - 1% final average
   - Career average plan - 1% career average

4. Actuarial cost methods:
   - Aggregate
   - Projected unit credit

5. Experience assumed to exactly follow select and ultimate assumptions.

Accrual rates as a percent of payroll can be compared under the select and ultimate interest assumptions versus the level interest assumption for each benefit formula valued under each cost method as illustrated in diagrams 1-6. As is to be expected, the accrual rate is much more stable under the select and ultimate interest assumption than under the level interest assumption.

Comparisons can also be made of the pattern of accrual rates between the aggregate cost method and the projected unit credit cost method when (a) a level interest rate is assumed, and, (b) select and ultimate interest rates are assumed. Diagrams 7 and 8 are given as examples. One can compare relative levels and crossover points when different cost methods are used and when (a) level interest rates are used, and, (b) select and ultimate interest rates are used.

Admittedly, more work needs to be done on the projections. The Societies' Pension Committee is working on projections to study the impact of select and ultimate interest assumptions with an open group, and when plan experience does not match exactly the select and ultimate assumptions.

MR. ROHLFS: One of the technical problems our Committee is addressing is the amortization of unfunded actuarial liabilities, experience gains or losses under certain funding methods, and liabilities which are established as a result of changes in actuarial assumptions.

There are any number of approaches which could be taken in amortizing unfunded actuarial liabilities, both for minimum funding standard purposes as well as for actual funding purposes. We looked at three approaches for setting up an amortization schedule. None of these three methods is without problems, as we'll see when we look at the schedules.

Amortization methods:

1. Level installments - varying interest rates

2. Level installments - constant interest rate (same amount as in 1)

3. Varying installments - varying interest rates (same rates as in 1)

The first method is level annual installments over the whole period. The level payments are determined using varying interest rates and the amortization schedule would also be determined by using the year-by-year interest rates.

The second method we analyzed was level annual payments over the whole period determined using the varying interest rates as in Method 1. However, the amortization schedule uses an average interest rate over the full period. This average rate would be derived from the relationship of the level installments and the initial unfunded actuarial liability.

The third method was to develop annual installments which would remain level only for the duration of a particular interest rate assumption. When a new select interest rate, or the ultimate rate becomes effective, a new level amount would be determined. This new level amount would be based on the remaining unamortized unfunded actuarial liability, the number of years remaining and the new interest rate, based on the assumption that the new interest rate would be in effect for the rest of the amortization period.

Let's look at each of these 3 methods in a little more detail. The assumptions used for this analysis are as follows: the period of amortization we'll use is 30 years and the variable interest assumptions will start off at 10% for the first year and will grade down each year by one-half of one percent until the ultimate rate of 5% is reached starting in year 11. The ultimate rate of 5% then continues to effect for the remaining 20 years of the 30 year period.

Method 1 Schedule:

Level Installments - Constant Interest Rate

Year	Interest Rate	UAL Jan 1.	Payment
1	10%	$100,000	$ 8,038
2	9 1/2	101,962	
3	9	103,611	
4	8 1/2	104,898	
5	8	105,777	
6	7 1/2	106,201	
7	7	106,129	
8	6 1/2	105,520	
9	6	104,341	
10	5 1/2	102,564	
11	5	100,167	
.	↑	.	↑
.	↓	.	↓
.		.	
29	5	14,945	
30	5	7,654	8,038
31	N/A	-0-	-0-
			$241,140

In Method 1 and Method 2 the level annual payment for 30 years works out to be $8,038. As I indicated before, in Method 1 the amortization calculation for any particular year uses the interest rate in effect for that year.

If we look at the schedule we can see that the payment in the first year is not large enough to meet the 10% interest requirement and the unfunded actuarial liability is actually increased by the end of year 1, that is the $101,962 figure. In fact, the unfunded accrued liability increases each year until the interest rate falls low enough to where some principal is being repaid. As the chart shows, this occurs between the 6th and 7th year when the interest rate drops to 7 1/2%. The progression is then steadily

downward; it gets back under $100,000 at the end of year 11 and reaches zero on schedule at the end of the 30th year.

Ostensibly, this method of amortization would meet ERISA's funding requirements in that the $100,000 obligation is taken care of in the required time and it was accomplished by equal annual installments as required by section 412(b) of the Internal Revenue Code.

Oddly enough, this method would not have met the less stringent minimum funding requirements which were in effect prior to ERISA. These minimum funding rules required, on an accumulative basis, that the normal costs had to have been paid, and that the interest payments had to have been met on any initial unfunded accrued liabilities. So, for the first 11 years, this method, now presumably a proper method, would have failed to meet the pre-ERISA funding requirements.

Even though Method 1 seems to satisfy ERISA's minimum funding rules, some actuaries are concerned that no apparent funding of the liability is taking place, in this case for the first 11 years, and from a professional viewpoint it would seem to constitute an unsound funding practice.

Method 2 Schedule:

Level Installments - Constant Interest Rate

Year	Interest Rate	UAL Jan. 1	Payment
1	6.9741%	$100,000	$ 8,038
2		98,936	
3		97,798	
4		96,581	
.		.	
.		.	
.		.	
8		90,803	
9		89,097	
10		87,273	
11		85,322	
.		.	
.		.	
.		.	
29		14,535	
30	6.9741%	7,510	8,038
31	N/A	-0-	-0-
			$241,140

Let's now look at the amortization schedule under Method 2. The annual payment is identical to the amount in Method 1 since there is only one level amount which will amortize the $100,000 in 30 years at the designated variable interest rates. However, in Method 2 we solved for the average effective interest rate to develop the amortization schedule. You can see that the problem in Method 1 is cured as the unfunded actuarial liability never gets higher than the initial amount and repayment of principal is

taking place over the entire 30 year period. The problem we see with Method 2 is that, by using an average rate for amortization purposes we are creating artificial actuarial gains and losses, depending on whether the actual assumed rate is higher or lower than the average rate. In the earlier years where the actual rate is higher than the average rate, artificial actuarial losses occur. This can be seen by comparing the unfunded amounts at the beginning of year 2 for Methods 1 and 2. The amount for Method 1 was $101,962 which is $3,026 higher than the amount shown above for Method 2. Therefore, on any given valuation that uses frozen initial liabilities, the present value of future normal costs would be higher under Method 2 by the $3,026 amount at the end of the first year. Under cost methods where gains and losses are not spread over future normal costs, the net experience loss for the year would be higher under Method 2 at the end of the first year by the same $3,026 amount. After the variable interest rate slips below the average rate, in this case between years 7 and 8, apparent actuarial gains start to occur and continue for the rest of the period, offsetting the artificial losses of the first 7 years.

As a practical matter, if this method were to be used, the actuarial gains might never be recognized in the way I just described, since it is likely that before the 7 years were up, the assumptions would be changed and new amortization schedules would be set up. Under this scenario we would be in a perpetual state of creating artificial losses.

Method 3 Schedule:

Varying Installments - Varying Interest Rate

Year	Interest Rate	UAL Jan. 1	Payment
1	10%	$100,000	$ 10,608
2	9 1/2	99,392	10,174
3	9	98,660	9,753
4	8 1/2	97,786	9,344
5	8	96,754	8,950
6	7 1/2	95,544	8,571
7	7	94,139	8,208
8	6 1/2	92,521	7,861
9	6	90,674	7,530
10	5 1/2	88,584	7,217
11	5	86,239	6,920
.	↑	.	↑
.	|	.	|
.	↓	.	↓
29		12,868	
30	5	6,590	6,920
31	N/A	-0-	-0-
			$226,616

The third method the Committee looked at, and the one we generally favored, was similar to Method 1, where the actual variable rate in effect for the year was used to develop the amortization schedule. The difference between

Methods 1 and 3 is that the payments under Method 3 are not level. They were determined each year based on the unfunded actuarial liability at the beginning of the year, the number of years remaining, and the variable interest rate currently in effect. For example, the first year payment of $10,608 was determined by dividing $100,000 by the value of a 30 year annuity certain at 10% interest. Similary, the second payment comes from dividing the $99,392 amount by the value of a 29 year annuity certain at 9 1/2% interest. At the end of the 10 year variable period, the payment becomes level and remains at $6,920 for the last 20 years. Method 3 does not have the actuarial gain or loss problem of Method 2 and does not have Method 1's problem of increasing unfunded amounts.

The main problem we see with Method 3 is that it may be in conflict with ERISA's minimum funding rules. Specifically, Section 412(b) of the Internal Revenue Code, which covers the handling of the minimum funding standard account, requires "amounts necessary to amortize in equal annual installments until fully amortized...".

We would hope that this apparent problem can be overcome. One argument would be that, while any particular interest rate is in effect, the payments are, in fact, level. This argument could be supported by today's accepted practice of changing the amount of payment when there is a change in the interest assumption, the only difference being that under Method 3 there is no real change in the interest assumption each year - rather it is a scheduled change in interest rate in accordance with the variable interest assumption itself.

I would like to switch topics now and turn to another area which can get a bit complicated when variable interest rates are in effect - option factors for converting the regular retirement benefit into an alternate form of retirement income.

The problem occurs where the option factors in a plan are based on actuarial equivalence, and the valuation assumptions are used to determine the actuarially equivalent factors. These option factors would automatically change each year during the select or variable period, since the prior year's select rate is dropped, and the average prospective interest rate has been changed. This can be best illustrated by looking at the effect of this on lump sum distributions as shown below.

Example:

Option Factors - Lump Sums

Year	Lump Sum Amount* ($1 Per Month)
1	$ 91.61
2	92.75
3	94.12
4	95.76
5	97.72
6	100.04
7	102.79
8	106.01
9	109.79
10	114.20
11 and later	119.33

*Assumptions: Mortality - 1971 GAM (Male)
Interest - 10% for years 1 thru 10
5% thereafter
Age - 65

In the example, the $91.61 value in year 1 is based on 10% for the first 10 years and 5% thereafter to the end of the mortality table; the value in year 2, $92.75, is based on 10% for 9 years and 5% thereafter; and so forth until year 11 and later, when the lump sum equivalent would be based only on the ultimate interest rate, 5%.

As you can see, with no change in the underlying interest assumption the lump sum value, per dollar of monthly annuity, increases each year during the select period. While this pattern properly reflects the underlying actuarial assumptions, it is questionable whether the results are practical or make sense from an administrative point of view.

Other optional forms which provide death benefits, such as life annuities with terms certain or joint and survivor options, also would vary year by year during the variable period. The relative changes would not be as drastic as we saw with the lump sum option. However, in these situations, with the interest rates we used for the lump sum example, the option factors would generally decrease each year until the ultimate rate was reached. Presumably this would be a permissable reduction in accrued benefits since there was no change in actuarial assumptions.

The Committee has not arrived at a consensus yet on this problem. There are some major conflicting issues - as we have mentioned before, one of the reasons for using variable economic assumptions is to avoid having to use different assumptions for different purposes such as annual valuations, FASB calculations, optional benefits, etc. and that once these variable assumptions are set, everything should flow from that. On the other hand, there are areas of plan administration which become more complicated, not so much because of the underlying concept of variable economic assumptions, but more so because of the increasing constraints we are forced to operate

within. Revenue rulings 79-90 and 81-12 are perfect examples of this and the push towards unisex actuarial tables is another.

Perhaps the answer to the dilemma on optional benefits is to adopt empirical unisex factors which are reasonably close to actuarial equivalence at the start. These factors could be reviewed periodically to find out if they have strayed too far from actuarial equivalence and adjusted when appropriate.

Another solution would be to develop subsidized empirical factors and avoid the problem entirely. The administrative cost savings might even offset the cost of the subsidies.

MR. ARNOLD: The first topic I will briefly explore is variable pay increase assumptions. The two key factors influencing actual pay increases are presumably merit and outside economic forces. Ideally then, the pay increase assumption would be a combination of two salary scales one would be a merit salary scale select by duration of employment and the other would be a general pay salary scale select by plan or calendar year. This approach is complicated and may lead to extra programming expenses to perform the valuation and therefore the simpler level salary scale may be more practical in some cases. An intermediate approach is to use a graded salary scale select by plan year only. Such an approach does lead to some problems in the valuation process similar to those discussed by Neela regarding variable interest rate assumptions in general, yet I feel that in the past it produced a better estimate of the real costs of the plan.

While actuaries should assume that there is a long-term correlation between investment return and general pay increases, we should not automatically assume the same for the short term. A rapid, very temporary inflation, for example, might increase benefits by 20%, but investments made during the period and shortly thereafter would be the only source of additional income. In addition, the interest rates actually earned on these investments would not necessarily reflect the full amount of inflation because of the lag in credibility accorded to inflation by the financial markets. Even if interest rates fully and immediately included the right inflation premium, the extra yield on the net cash flow during such a short period could not pay the cost of permanently increased benefits forever. In such a scenario of temporary inflation the funds on hand and the funds invested after the period of inflation would not be invested at the inflated interest rates.

Next I will discuss a method of using a select and ultimate approach to interest rates which overcomes the problems which Neela and Fred have described. Dick Daskais of Daskais & Walls has developed a simple and effective way to allow for the differences between current rates of return and an ultimate assumed interest rate. His firm has been using this approach since 1975, and I have been using it for three years. The objective of his formula is to recognize in a practical and conservative manner just what is happening, or at least what easily could be happening, to earnings of the fund on hand.

In meeting this objective, his formula takes temporarily into account a current interest rate for the amount of liability already funded and applies the ultimate rate for future funding and, on a gradual phase-in basis, to the funded liability.

The formula adjusts the actuarial liability or the present value of benefits (if a frozen actuarial cost method is used) by a discount or a premium, depending on whether the current rate is higher or lower than the ultimate. The amount of discount or premium is the premium or discount, respectively, which is applicable to a j% mortgage of N years when evaluated at i%, where i% is the ultimate rate and j% is the current rate. If, for example, i=8, j=11 and N=20, then the discount is about 23%. If the fund is invested in bonds or mortgages with a cash-flow pattern similar to the hypothetical mortgage payments, then a change in the current market rate of return produces a change in the discount or premium which is about the same as the change in asset value, thus providing a minimum change in the unfunded actuarial liability (or normal cost, if under a frozen method).

Inherent in this approach is the complete use of the ultimate assumption for every element of the valuation except the calculation of the premium or discount. This means that there is no complication in completing Schedule B of Form 5500; the valuation itself is completed normally using the ultimate interest assumption; and actuarial equivalents are not affected. The reason that things are so simple is that use of the formula does not alter the assumption that all reinvestment is at the ultimate interest rate.

I have followed Dick's lead in determining the current rate, j, to be the yield of Moody's AAA Industrials. Since this yield is about the lowest such rate for private sector obligations, its use produces a conservative result. When a pension fund is not invested entirely in AAA Industrials, then presumably its money manager expects to produce higher yields.

The purveyors of dedicated bond funds and other devices to immunize retiree liabilities have been emphasizing the reductions in contributions which result, rather than protection against interest rate changes. If reduced pension contributions through recognition of higher current yields are the only objective, then immunization, of course, is not necessary. In fact, it then is just a superfluous complication which will increase expenses and might reduce yields.

The Daskais liability adjustment formula permits taking into account today's higher interest rates without resort to any such artificial and potentially expensive approaches and provides an easy, practical way to make "best estimates" under present economic conditions.

This completes our presentation. There is time left for questions or comments from members of the panel or from the audience.

MS. RANADE: I would like to add a comment regarding Allen's statement that investment return and general pay increases are not necessarily correlated in the short term. If select and ultimate interest rate and salary scale assumptions are to be used, refinement of the relationship between the interest rate and salary scale assumptions in the short term should be considered rather than automatically using the assumed ultimate or long term correlation as a basis for the short term.

Mr. JON L. KING: My comments concern the amortization of unfunded actuarial liabilities. I don't feel that a temporarily increasing unfunded

liability according to the amortization schedule implies an unsound funding practice. There is a body of practitioners in the public sector who use an amortization schedule with increasing payments so that the total contributions each year will be a level percentage of payroll if all assumptions are realized. The increasing payment pattern causes an increasing unfunded liability for a number of years under many common sets of assumptions and amortization periods. In my opinion this is not an unsound funding practice because the unfunded liability is decreasing as a percentage of expected total payroll.

MR. ARNOLD: It is interesting to note the different approaches used for public plans in the United States which are not subject to ERISA requirements.

MR. L. JACQUES PELLETIER: First, the point I want to make is that as a professional, the Actuary is being asked to assess the amount of the liabilities of the plan as of a given moment. I do not see how this can be achieved without him carefully analysing current market conditions, assets of the plan, etc...

Thus, I see the use of variable assumptions not as a technique for valuation, but as the only way to cope with the present economic climate as it pertains to pension plans. To be consistent with this principle, I have difficulty understanding why the Society's Committee is still struggling with the acceptability of approach (1) or approach (2) as representing the proper definition or the proper use of variable assumptions over a time period.

Obviously in my mind, if you use variable assumptions, each particular set of assumptions selected at one point in time, applies to that point only and cannot be used again, in the future, without the proper time adjustment; if used again, this particular set becomes in fact a change in assumptions from the previous valuation. For example, if you use 10% for 3 years, 9% for the next 3 years, and so on to, say 6% after 12 years, to be consistent, your next triennial valuation will have to start at 9% for 3 years, and so on to 6% after 9 years; in other words the first 3 years at 10% have to be dropped. Any other choice of assumptions becomes a change in assumptions. So I wonder what the reasons can be for still wondering whether approach (2) is preferable to approach (1).

MR. ROHLFS: The conclusions of the Committee are consistent with your views.

MS. RANADE: I believe the reasons the Committee studied approach (1) are the similarity to the approach implicit in mortality select tables and that some actuaries were in fact using this approach to select and ultimate interest assumptions.

MR. PELLETIER: My other fundamental position is: Whenever you compute options, partial refunds of commuted values, etc... you have to use not only explicit but very "close to reality" assumptions in order to maintain equity towards the various plan members and to the plan sponsor. In fact, I submit that the use of the valuation assumptions, even if these are on a select and ultimate basis, may not be adequate for such calculations because they usually still include a margin for conservatism and this may not yet be close enough to the real world.

I just do not like the idea of giving a terminated employee a partial refund of a pension whose value is computed at 6% interest and see this employee turn around and increase his pension by buying a deferred annuity from an insurance company or investing the money at 15%. This is clearly not fair in my opinion to the plan sponsor or other plan members.

MR. ARNOLD: Lump sum options have become rather popular in the United States and the problems that have been discussed today have been faced. As a result a number of companies are determining the value of lump sums based on an interest rate in accordance with a preset index. For example, the index might be related to a current interest rate such as the prime rate or another well publicized rate. This approach does, however, result in different cash values at different points in time due to changes in interest rates which can cause employee communications problems.

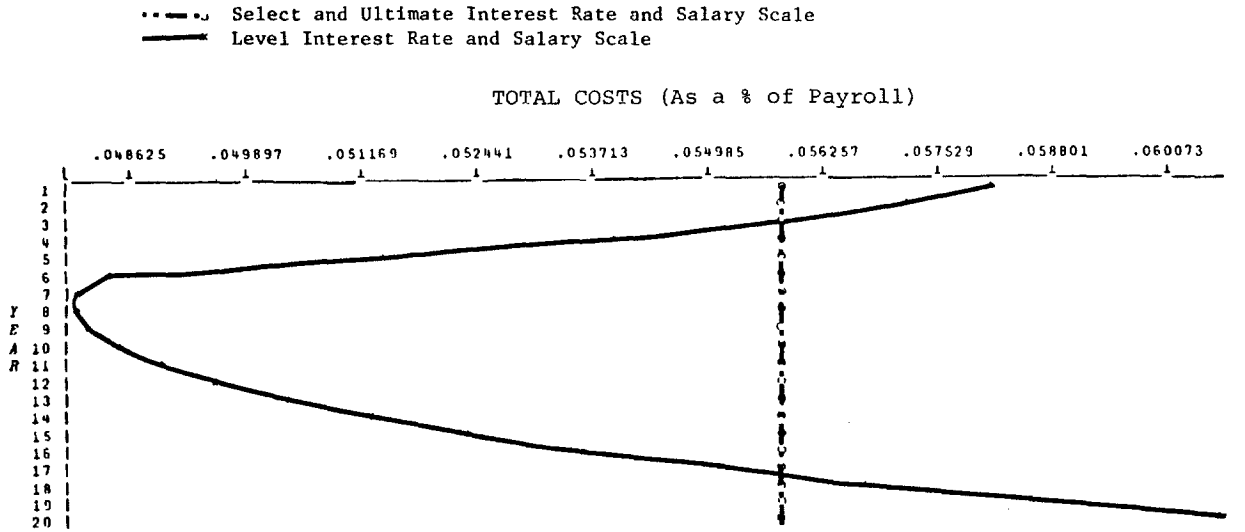
MR. DANIEL C. RUDIN: Another approach to select and ultimate interest rates is to use a break point of normal retirement age - different rates are assumed before and after normal retirement age. Has the Committee considered this type of approach and the problems and issues it raises?

MR. ROHLFS: We have not studied such an approach yet. We have concentrated on select periods of a fixed number of years from the valuation date. The method you have described involves different select periods for each individual rather than time variable rates.

Mr. ARNOLD: If there are no more comments the session is adjouned. Thank you.

DIAGRAM 1

CLOSED GROUP PROJECTION



Notes: 1. Flat dollar plan

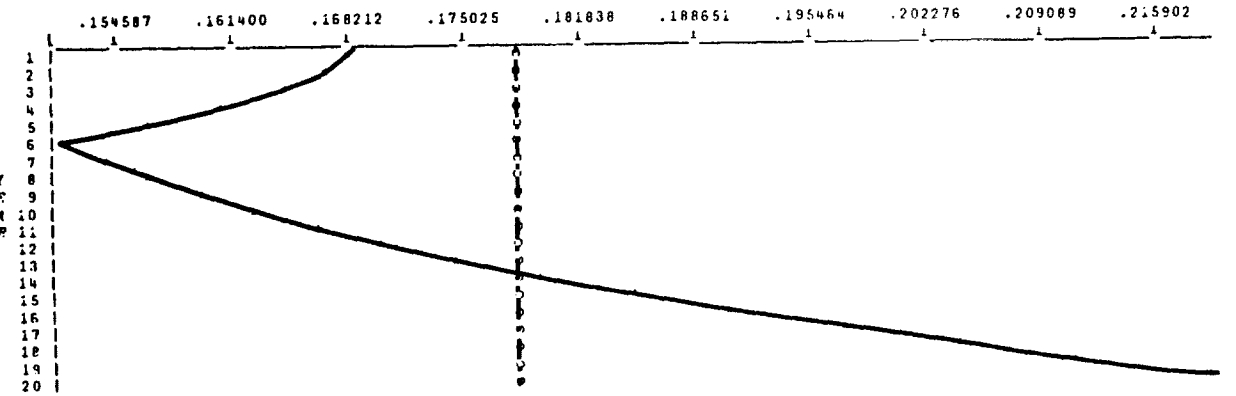
2. Aggregate cost method

CLOSED GROUP PROJECTION

DIAGRAM 2

Select and Ultimate Interest Rate and Salary Scale
Level Interest Rate and Salary Scale

TOTAL COSTS (As a % of Payroll)

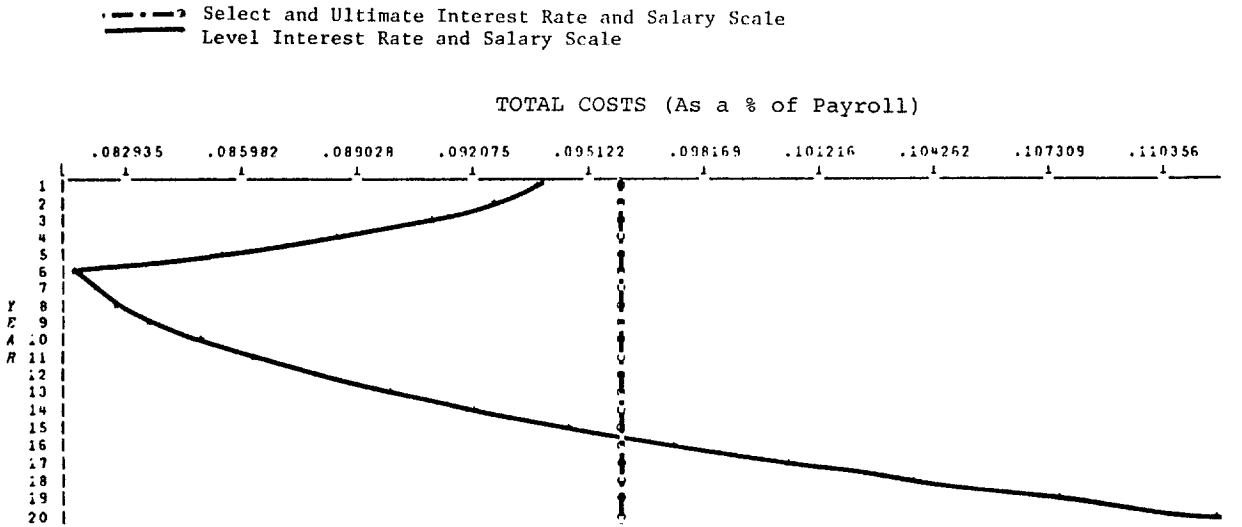


Notes: 1. Final average plan

2. Aggregate cost method

CLOSED GROUP PROJECTION

DIAGRAM 3



Notes: 1. Career average plan

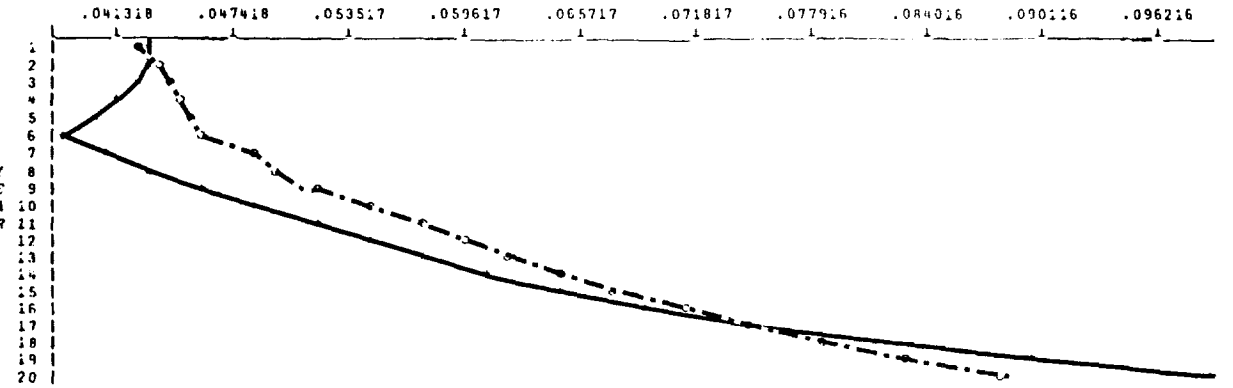
2. Aggregate cost method

CLOSED GROUP PROJECTION

DIAGRAM 4

Select and Ultimate Interest Rate and Salary Scale
Level Interest Rate and Salary Scale

TOTAL COSTS (As a % of Payroll)



NOTES: 1. Flat dollar plan

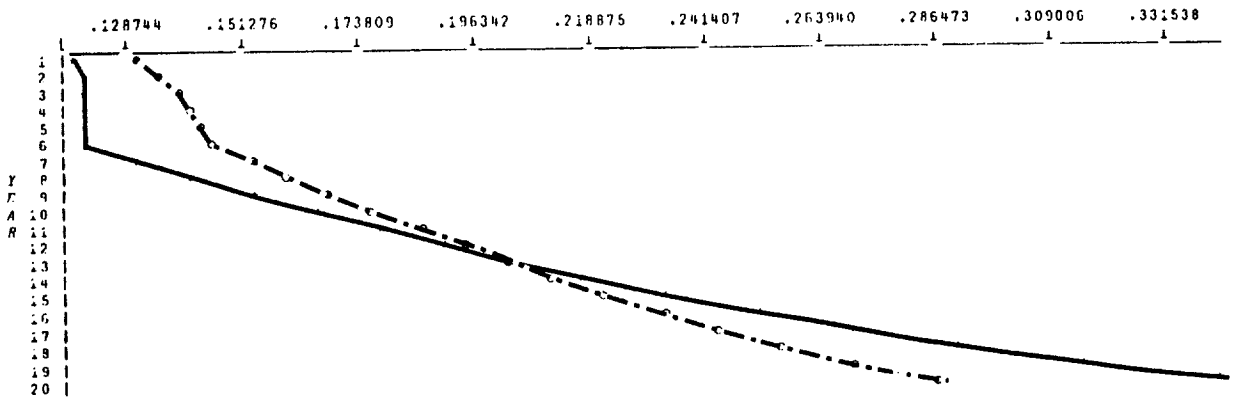
2. Projected unit credit cost method

CLOSED GROUP PROJECTION

DIAGRAM 5

Select and Ultimate Interest Rate and Salary Scale
Level Interest Rate and Salary Scale

TOTAL COSTS (As a % of Payroll)



Notes: 1. Final average plan

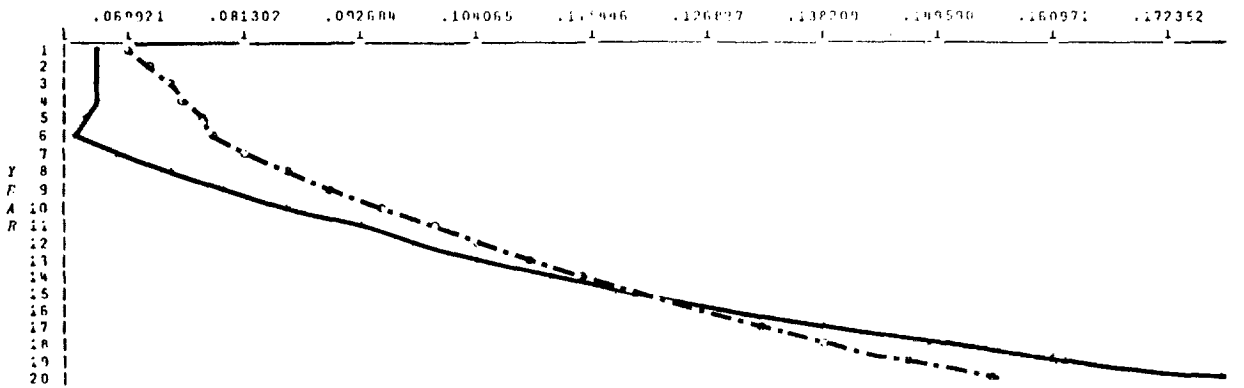
2. Projected unit credit cost method

CLOSED GROUP PROJECTION

DIAGRAM 5

Select and Ultimate Interest Rate and Salary Scale
Level Interest Rate and Salary Scale

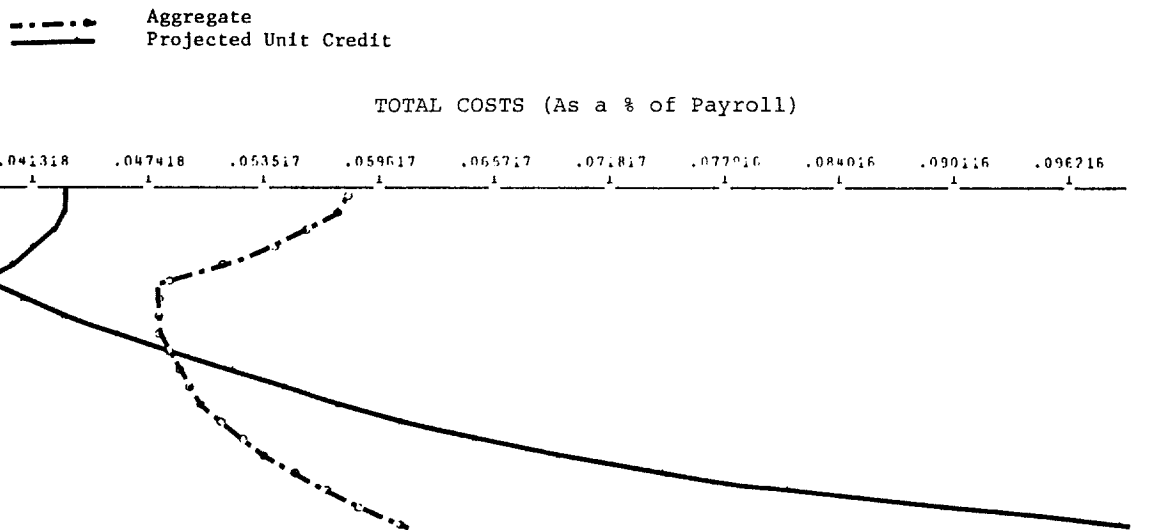
TOTAL COSTS (As a % of Payroll)



Notes: 1. Career average plan

2. Projected unit credit cost method

CLOSED GROUP PROJECTION DIAGRAM 7



Notes: 1. Flat dollar plan

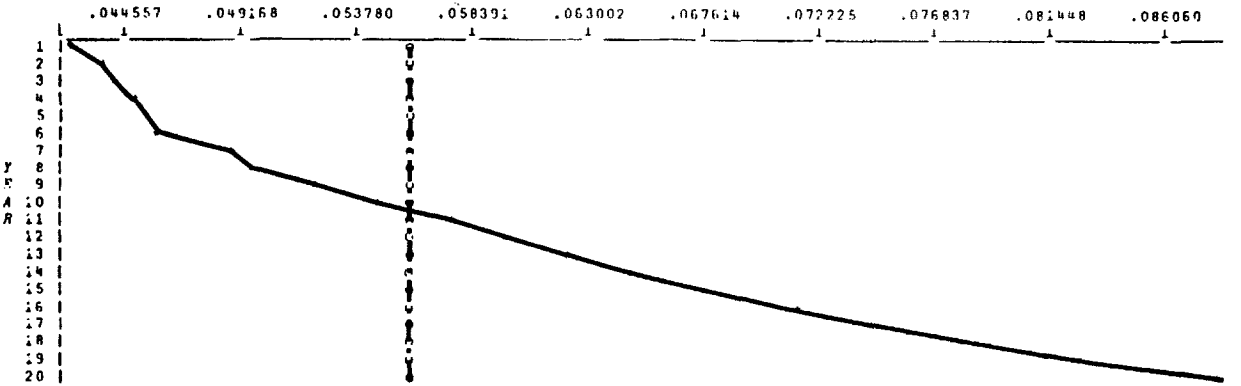
2. Level interest rate and salary scale

CLOSED GROUP PROJECTION

DIAGRAM 3

Aggregate
Projected Unit Credit

TOTAL COSTS (As a % of Payroll)



Notes: 1. Flat dollar plan

2. Select and ultimate interest rate and salary scale