RETIREMENT SYSTEMS FOR PUBLIC EMPLOYEES

PENSION RESEARCH COUNCIL PUBLICATIONS

Concepts of Actuarial Soundness in Pension Plans. Dorrance C. Bronson. 1957.

Continuing Care Retirement Communities: An Empirical, Financial and Legal Analysis. Howard E. Winklevoss and Alwyn V. Powell, in collaboration with David L. Cohen and Ann Trueblood-Raper. 1983.

Corporate Book Reserving for Postretirement Healthcare Benefits. Edited by Dwight K. Bartlett. 1990.

An Economic Appraisal of Pension Tax Policy in the United States. Richard A. Ippolito. 1990.

The Economics of Pension Insurance. Richard A. Ippolito. 1989.

Employer Accounting for Pensions: Analysis of the Financial Accounting Standards Board's Preliminary Views and Exposure Draft. E. L. Hicks and C. L. Trowbridge. 1985.

Fundamentals of Private Pensions, Sixth Edition. Dan M. McGill and Donald S. Grubbs. 1988.

Inflation and Pensions. Susan M. Wachter. 1987.

It's My Retirement Money, Take Good Care of It: The TIAA-CREF Story. William C. Greenough. 1990.

Joint Trust Pension Plans: Understanding and Administering Collectively Bargained Multiemployer Plans under ERISA. Daniel F. McGinn. 1977.

Pension Asset Management: An International Perspective. Edited by Leslie Hannah. 1988.

Pension Mathematics with Numerical Illustrations. Howard E. Winklevoss. 1977.

Pensions, Economics and Public Policy. Richard A. Ippolito. 1985.

Proxy Voting of Pension Plan Equity Securities. Planned and edited by Dan M. McGill. 1989.

Retirement Systems for Public Employees. Thomas P. Bleakney. 1972.

Retirement Systems in Japan. Robert L. Clark. 1990.

Search for a National Retirement Income Policy. Edited by Jack L. VanDerhei. 1987.

Social Investing. Edited by Dan M. McGill. 1984.

Social Security and Private Pensions: Competitive or Complementary. Planned and edited by Dan M. McGill. 1977.

Retirement Systems for Public Employees

THOMAS P. BLEAKNEY, F.S.A.
Consulting Actuary, Milliman and Robertson, Inc.

Published by the

Pension Research Council
Wharton School of the University of Pennsylvania

Distributed by the

University of Pennsylvania Press
Philadelphia

Library of Congress Cataloging-in-Publication Information

Bleakney, Thomas P.
Retirement systems for public employees, by Thomas P. Bleakney
(Pension Research Council Publications)
Published for the Pension Research Council, Wharton School of the University of Pennsylvania
xvii, 205 pp. 23 cm
Includes bibliographical references and index
1. Local officials and employees—United States—Pensions. 2. Local officials and employees—Canada—Pensions. 3. Civil service pensions—United States—States. 4. Civil service pensions—Canada—Provinces. I. Title. II. Series.
JS361.B53 72-90774
ISBN 0–256–01407–8 CIP

ISBN 0-256-01407-8 CIP

Printed in the United States of America

Chapter 5

Financing—Measuring the Cost

MEASUREMENT of costs is usually the responsibility of an accountant. The measurement of pension costs poses special problems, owing both to the complexity of the issues involved and to the necessity for employing another professional skill, that of an actuary, in arriving at meaningful results. Despite these problems, the accounting profession has developed measurement principles which accountants have applied throughout the private sector. In general, the use of these principles has led to a recognition, during the working lifetimes of the employees, of the cost of providing them pensions after retirement.[1]

[1] See Accounting Principles Board of the American Institute of Certified Public Accountants, *Accounting for the Cost of Pension Plans* (New York, 1966). A portion of that opinion, which is often referred to as *APB #8*, states: "To be acceptable for determining cost for accounting purposes, an actuarial cost method should be rational and systematic and should be consistently applied so that it results in a reasonable measure of pension cost from year to year. . . . Each of the actuarial cost methods described in [this *Opinion*] . . . except terminal funding, is considered acceptable when the actuarial assumptions are reasonable and when the method is applied in conformity with the other conclusions of this *Opinion*. The terminal funding method is not acceptable because it does not recognize pension cost prior to retirement of employees. For the same reason, the pay-as-you-go method (which is not an actuarial cost method) is not acceptable."

Adoption of appropriate cost measurement techniques is a logical prerequisite to the development of sound policy for the financing of retirement programs, whether public or private. It is unfortunate, then, that legislators must make decisions regarding the financing of public systems without a consensus comparable to the cost-measurement principles used by the accountants. This is all the more regrettable since most of the considerations applicable in the private sector are equally valid with respect to public systems.

Taxpayers and their leaders in the legislative councils cannot shirk their ultimate responsibilities for the financial functioning of the retirement systems under their jurisdiction. In particular, it is the fundamental duty of the lawmakers to *know* the nature and amounts of the costs of these systems. The purpose of this chapter is to help provide this knowledge by describing the ways pension costs are measured. Chapter 6 will take up the methods employers use to meet these costs.

THREE WAYS TO MEASURE PENSION COSTS

It is just as vital that the persons responsible for a retirement system be aware of its costs as it is that the managers of any other enterprise know the costs associated with it. Unfortunately, however, accounting for the cost of a retirement system is more complex than accounting for most other fiscal functions. The cost of fire protection service, for example, can be measured by adding such expenses as the payroll of the firefighters, the cost of gasoline used, maintenance and depreciation of the firefighting equipment, and rent or depreciation on the fire stations. Most of these items involve current expenditures, which are easily measured. Even the noncash items like depreciation are subject to generally accepted methods that allow the total departmental costs to be easily understood.

Not so in retirement systems. Current disbursements for a retirement system are primarily payments of pensions and

other benefits. Although any year's payout measures the cash drain of a system, the payout does not measure the cost. The payout is controlled by events which took place many years earlier. Payment may be continuing to a person long retired. The amount of benefit may have been determined by the pensioner's earnings during a working career which commenced 40 years ago. In a sense, money paid out in any year may be thought of as applying to the operations of a period a generation or more earlier. This basic peculiarity of pension costs points up the desirability of clearly distinguishing the purposes and limitations of the various ways of thinking about cost, especially the ways of assigning costs to specific time periods.

Current Disbursements. The simplest method of measuring the cost of a retirement system is to add up all of the checks being drawn on it for the credit of its participants and their beneficiaries. Some of these checks are payment for normal retirement, disability retirement, early retirement, and survivors' benefits. Others are payments to terminating employees of their accumulated contributions. Measurement of current disbursements can be in terms of the total payout, or in terms of the net current payout from employer funds. The latter is the excess, if any, of the system's total payout in any period over its income from employee contributions during the same period.

Another way of determining the net employer payout recognizes the special nature of employee contributions. In many systems, money contributed by employees is effectively held in trust for them, generally in the form of investments. The amount set aside for an employee is not released until it is used for a benefit in his behalf or returned to him upon his termination. In this context, the employer commitment can be thought of as being unaffected by current employee contributions or their withdrawal. Instead, under this version of the current disbursement method, the net employer cost is taken as the gross employer payout for retirement allowances less the portion of these allowances derived from employee contributions.

Projections. A major shortcoming of the current disbursement method of cost measurement is that significant changes in the pattern of payments may be impending without being reflected in current payout. Common causes of this adverse characteristic include benefit improvements, changing employment patterns, and salary adjustments. As a result, the finances of a retirement system cannot be properly managed without some method of forecasting future disbursements.

Forecasting methods normally involve the application of the laws of probability to the events to be forecast. Each employee's prospects of receiving various benefits are weighed. For example, based upon the experience of similar employees in the past, a young employee might have a small chance of continuing to retirement. The most likely change of employment status for such an employee is termination prior to retirement, although the chances of disablement or death must also be reckoned with. Attached to most contingencies is a payment or a stream of payments from the funds of the retirement system to the employee or his beneficiary. For each employee, then, probabilities are assigned to each of the possible occurrences which could cause payments to be made each year in the future. Where these payments are to continue on a monthly payment basis, such as after normal retirement, projection of the monthly payments for their expected duration is carried out by the further application of probabilities.

This process is unreal when applied to only one individual. While probabilities are given in fractions which assess the fractional likelihood of specific occurrences coming to pass, the individual's actual experience will take only one of the many available courses to the exclusion of all others. For this reason, the statistical techniques used in projections are more meaningful when applied to a group of people. The larger the group, the more precise the prediction, provided the underlying probabilities assumed for the predictions are correct. These probabilities are called *actuarial assumptions.*

The considerations which affect the choice of actuarial assumptions will be discussed later in this chapter.

The mechanics of cost projections can involve substantial labor. The computer is ideally suited to take over the arduous calculations formerly carried out by hand. As a consequence, the projection technique for measuring cost will continue to grow in usage.

Actuarial Cost Method. The current disbursement method reflects the cost of a payment in the year in which it comes due. A projection does the same, but anticipates future payments by forecasting them. The next step beyond such a forecast is an *actuarial cost method,* which creates an *equivalent* cost that does not need to occur at the same time as the actual payment. As a simple example, monthly payments involved in an installment purchase can be converted to a single equivalent cost at the time of purchase by applying interest discounts to the future payments. Although most applications of actuarial cost methods are more complex than this, the principle is the same. In essence, the difference between a projection and an actuarial cost method is simply the interest assumed to accrue between the incidence of the equivalent actuarial costs and the corresponding projected benefit disbursements.

One of the basic tools in actuarial cost methods is the *present value.* In general terms, this is defined at some point in time as the single amount equivalent to a payment or series of payments at some future time. For example, suppose the present value of a person's retirement allowance is evaluated at the time of his retirement. The calculation of the present value is based on an actuary's assumptions as to the life expectancy of the retiring person and the rate of interest to be accrued during that life expectancy. In more precise terms, consider a large number of persons retiring on the same day. If the sum of the present values of their allowances were deposited in a bank, the deposit would be exactly sufficient to allow withdrawal of all retirement allowances when they become due. Upon the death of the last pensioner, the

account would be completely exhausted, provided the bank regularly credited the rate of interest the actuary assumed and the life expectancies of the members of the group conformed to the actuary's predictions.

The same concept holds when one series of payments is being converted to an equivalent second set. Suppose an employee's benefits after retirement are equated to a series of level annual installments during his working career and the amount of the annual installment is to be determined. This type of equivalence is used in the projected benefit cost method described later in this chapter. The unknown monthly amount is determined algebraically to be sufficient to build a fund which would last for the life expectancy of the person after he retires. In this calculation, interest is assumed to be credited on the fund balance from the time the annual payments start until the entire fund is exhausted by the payment of retirement benefits.

TWO ACTUARIAL COST METHODS

Techniques used to obtain costs equivalent to the projected benefit disbursements are called actuarial cost methods because the measuring process must be carried out by an actuary, or at least by someone using actuarial techniques. Actuarial techniques are used to assign probable values during an employee's lifetime to the payment of retirement and other benefits on his behalf.

Actuarial cost methods take many forms, the differences resulting from the different purposes of the methods. As an aid to understanding these purposes and the methods themselves, two of the very common methods will be described.[2] These two methods have the common characteristic of allocating the cost of retirement benefits for an employee to the period of time in which the right to receive those benefits is being earned.

---

2 For a more comprehensive review of actuarial cost methods, see Dan M. McGill, *The Fundamentals of Private Pensions,* rev. ed. (Homewood, Ill.: Richard D. Irwin, Inc.), Chaps. 7 and 8.

Accrued Benefit Method (Unit Credit).[3] In the accrued benefit method, the retirement benefit is thought of as being apportioned into segments according to when the employee receives credit for the benefit. The cost of each segment is likewise assigned to the year in which the benefit is credited. The cost is the present value of a retirement allowance whose commencement is deferred until the employee's expected retirement. Normal retirement will usually not be a certainty, owing to the possibility of an intervening disablement, death, or other termination of employment. These contingencies are recognized and their effect reflected in the present value of the normal retirement benefit. For each of these occurrences which can also give rise to some form of benefit payment, a similar process is required in order to measure the total benefit cost of the program. Thus, each possible benefit will be apportioned to the years in which it is earned and the cost of each portion calculated. For any employee, then, a year's total cost under the accrued benefit method is the value of the normal retirement benefit segment credited during that year, plus the cost of any other benefits credited during the year. The employer's total cost, generally called the *normal cost,* is the sum of the year's cost for all employees reduced by any portion of that cost borne by the employees through their contributions.

Some forms of benefits are not easily allocated to the years in which they were credited. For example, in many systems a policeman or a firefighter eligible for normal retirement will receive a benefit equal to half salary, regardless of how many years he works. Since the accrued benefit method measures costs for an employee while he is still active and before the date he will retire has been determined with certainty, the crediting of a portion of such a retirement benefit in any year

[3] Many of the actuarial cost methods in common use have two or more names. The names used in this book are those recommended by the Committee on Pension and Profit Sharing Terminology, a unit formed by the Pension Research Council and the Committee on Insurance Terminology of the American Risk and Insurance Association to attempt to set a standard for usage. Reference will also be made, however, to essentially equivalent alternate terms in common use.

is done somewhat arbitrarily. If the entire basic benefit structure of a system is of such a nature, this method of cost measurement might not be as appropriate as a projected benefit method, which is described in the next section.

In defining the amount of benefit payable under various circumstances, most public employee retirement systems give credit for service rendered by an employee prior to the establishment of the system. Accordingly, at the establishment of a system a *supplemental cost* for such prior service may be calculated. This is generally done under all actuarial methods of measuring cost, although the techniques for determining the supplemental cost and its scope vary by the method used. For the accrued benefit method, the supplemental cost equals the present value, as of the date the system is established, of all benefits credited for service prior to that date. Sometimes this is called the *prior service cost*. Although this term is quite descriptive for the accrued benefit method, it does not easily translate to other actuarial cost methods and, in fact, can create misunderstanding in some cases.

The accrued benefit cost method is so named because it measures the cost of benefits as they are credited to the employee. In other words, under this method the employer costs for all benefits accrued to any date will have been recognized by that date either as normal costs or as a supplemental cost. The accrued benefit cost method can therefore be readily used in measuring the cash value of benefits which have vested.

Projected Benefit Method with Supplemental Cost (Entry Age Normal). Another actuarial cost method widely used for measuring the costs of a program of retirement benefits is the projected benefit method. Its concept is simple: A level annual employer cost, the normal cost, is established for each employee. This amount is considered to accrue annually from his employment until his termination of active service. In the aggregate, the normal costs are set at a level such that their accumulations will be equivalent to the projected disbursements on behalf of the covered employees as estimated

by actuarial methods. The normal costs may be level dollar amounts or they may be level percentages of payroll.

In some variations of this method, the normal cost is calculated from the date of establishment of a system for each person who is then an employee. This results in high normal costs for older employees, especially if benefits are provided for service prior to the date the system was established. The more common procedure is to calculate the normal cost as a level rate from date of employment as if there had always been a system. This procedure necessitates the calculation of a supplemental cost as a measure of the accumulation of normal costs which would have accrued prior to the establishment of the system.

There is an important difference between the supplemental costs calculated under this method and under the accrued benefit method. Under the accrued benefit method, the supplemental cost is affected solely by the level of benefits credited prior to the date the system was established. Under the projected benefit method, the supplemental cost is affected both by the commitments for prior service and by the leveling of normal costs inherent in this method. The latter factor merits further discussion.

Under the accrued benefit method, the employer normal costs for an employee tend to increase as the employee becomes older. This is primarily due to the effects of interest (the time for payment of benefits is coming closer), mortality (the chance of forfeiting benefits by death is lessening), salary growth (more benefit is earned by the older employee), and turnover (the older employee is more likely to stay on the job to receive his retirement allowance). The projected benefit cost method, on the other hand, is designed to produce a level normal cost rate. This rate must be equivalent to the aggregate of all normal costs under the accrued benefit method since both of these are actuarially equivalent to the ultimate disbursements anticipated, after allowing for interest, mortality, salary growth, and turnover. The normal costs under the accrued benefit method will thus be lower in

the earlier years of an employee's working career than those under the projected benefit method and higher as he nears retirement. The supplemental cost under either method is an actuarial accumulation of these normal costs from the date an employee is hired to the date the system is established. Therefore, the accrued benefit method, with lower normal costs in the early years of employment than the projected benefit method, will have a lower supplemental cost.

The two actuarial cost methods have another important difference. The normal cost for any one year under the accrued benefit method is affected by the average attained age of the employees. The normal cost of a group of young employees is lower than that for a group of older employees. The cost pattern may vary from year to year as the age composition of the group varies. Moreover, for a group with no turnover, the normal costs will tend to increase. Under the projected benefit method, on the other hand, the normal cost is designed to be level, so that a stable group produces a stable cost. Even for a group with rates of turnover that vary from year to year, the annual costs will tend to be level. In fact, if the average age of a group of new employees is about the same as the average entry age of all the participants of the system or of the terminating employees the group is replacing, the normal cost should remain constant. Although this rarely occurs precisely, the average age of new employees does not usually vary widely, even though the average attained age of the group may change. For this reason, the normal costs tend to remain more nearly level under the projected benefit method than under the accrued benefit method. This characteristic makes the projected benefit method of great value in assessing the long-term costs both of the basic benefits provided by a retirement system and of changes in these benefits.

The projected benefit cost method is actually a family of cost methods. The particular variation described above is in common use and is further identified as of the species having supplemental costs. The family name "projected benefits" distinguishes the method from the accrued benefit cost method. The name is derived from the necessity of projecting

the total benefit payable at retirement, including benefits accruing in the future, in order to determine a normal cost under the method. The normal cost rate calculated for a group of new entrants is the present value of all benefits projected to be payable to them or their beneficiaries during their lifetimes, divided by the present value of all the earnings which the employees are projected to receive during their lifetimes. The ratio of these two quantities is the normal cost rate and is the factor applied to future payrolls to calculate the normal cost of the retirement program.

Supplemental Cost. Under either of the actuarial cost methods described, a supplemental cost is created at the establishment of the system if benefits have been credited for earlier service. Supplemental costs can also arise subsequently, often because of a retroactive improvement in benefits. It is immaterial, in this respect, whether the improved benefits are for service before or after the establishment of the system: An additional supplemental cost will be created.

The amount of the supplemental cost will depend upon the cost method being used. In determining the cost of benefit improvements, a formula used to determine the supplemental cost under the projected benefit method can be extended to determine the increment to the supplemental cost under any method. The additional supplemental cost as measured by this formula is the increase in the present value of projected benefits to be paid because of the benefit improvements, less the increase in the present value of future normal costs. The increase in normal cost enters into the formula since an increase in benefits generally improves the benefits payable to currently active employees and therefore increases normal costs. The overall increase in the supplemental cost thus reflects the total increase in employer commitment, but the initial impact of this is reduced by the expected increase in future normal cost payments.

This general formula can also be used with all actuarial methods to determine the initial supplemental cost. The supplemental cost at the outset is the excess of the present value of projected benefits over the present value of all

normal costs expected to be charged. In the accrued benefit method, for example, the future normal costs cover all benefits expected to be credited for service after the date the system is established. Thus the supplemental cost is equal to the present value of the balance of the benefits—those credited for service prior to that date. When a change in benefits occurs, the supplemental cost will necessarily be increased by the change in the present value of the benefits and decreased by the change in the present value of the future normal costs, since all previously anticipated benefits have been accounted for in the supplemental cost and the pattern of normal costs earlier established.

Because of its magnitude and its retroactive nature, the supplemental cost is generally not charged to the year in which the system is established. Instead, it is ordinarily amortized over a period of subsequent years, somewhat as if it were a capital item. A justification for this procedure is that a retirement system aids in the recruiting of employees, improves their satisfaction with their work, and is therefore of continuing value after its establishment. Sound benefit design in such a system generally entails the granting of benefits for prior service. The supplemental cost is thus a price to be paid to acquire the system. As such, it may appropriately be amortized over an extended period of time.

A major consideration in choosing the length of the period for spreading the supplemental cost is the effect the period will have on the interest cost. The determination of the supplemental cost, like other actuarial calculations, is pegged at a particular date. This cost increases when measured at subsequent dates because the payments whose value is being estimated are closer to maturity and will not be discounted so heavily. When the cost is spread over a period of years, the charge to any year because of the supplemental cost is called the *annual supplemental cost* and has a principal and interest component. The sum over the years of all the principal components equals the initial supplemental cost. The interest components are determined as if there were an interest-bearing debt, with each year's interest charge being based on

the then outstanding balance. The rate of interest is the same as that used in the most recent determination of the present values of benefits associated with the supplemental cost. A perpetual amortization period may be assumed for the supplemental cost, in which case the outstanding balance remains equal to the initial balance and the amount of the annual supplemental cost will be one year's interest on that liability.

There is considerable leeway in determining the length of the amortization period. An argument advanced for relatively short periods (20 to 30 years) is that the advantages of providing prior service benefits wear off as the employees credited with the benefits retire. The periods of remaining service among employees active at the establishment of a system will rarely extend more than 40 years and tend to average less than half of that. At the other extreme is the contention that the supplemental cost should be converted to a level charge in perpetuity, since the supplemental cost is intrinsic to the system itself and not to any group of employees. The perpetual concept has the advantage of avoiding the discontinuity in cost associated with the termination of a finite amortization period.[4]

A compromise between these alternatives which has some of the advantages of both is to use a fixed number of years for the amortization period at the establishment of the system, and to maintain the *same* number of years each year thereafter. For example, if the period chosen were 30 years, each year the annual supplemental cost would be chosen so that maintenance of that level would amortize the *then* unamortized supplemental cost in 30 more years. If nothing occurs to increase the supplemental cost, the annual supplemental cost will gradually decrease under this method but never be completely eliminated. If the supplemental cost should be increased, such as would occur with an increased benefit structure, this method will cause the additional supplemental

[4] When used as a basis for meeting the costs of a system, failure to amortize the supplemental cost has important pitfalls. See p. 121.

cost to be amortized at the same rate as was the initial supplemental cost.

ACTUARIAL ASSUMPTIONS

If either projection techniques or actuarial cost methods are used, predictions of future events must be made. These predictions should be made by a competent actuary. They evolve from the compounding of probabilities or assumed rates of occurrence of certain types of events. The primary elements in the process are called actuarial assumptions and involve predicting rates of:

Termination from employment
Disablement
Retirement
Death
Salary increase
Postretirement adjustment
Investment yield
Administrative expense

Obviously it is to the retirement system's advantage to have the prediction of the costs of the system as nearly correct as possible. Thus, the actuarial assumptions used in making predictions must be chosen skillfully. If the data derived from the system's own experience is insufficient, the system's actuary may have to rely upon similar experience in other employee groups in making his predictions. Where possible, though, he looks to the experience of the system itself in establishing assumptions for the valuation of its costs. In either event he also attempts to spot trends so as to anticipate changes from past experience.

For example, in estimating the rates of future termination from employment, the actuary commonly reviews the experience of the system over a recent period of years and from this experience constructs a table of estimated withdrawal rates. Similarly, if the system provides a benefit based upon salary at the time of retirement, the actuary reviews actual salary

increases for the covered employees to aid in estimating future salaries and projecting the benefits payable at retirement. As another example, the yield on the system's investments in the recent past is used as a guide in establishing an assumed rate of interest earnings in the future. In each case, if employment conditions or the general state of the economy warrant it, he modifies the past rates in an attempt to predict future experience more accurately.

Setting the assumed rate of investment earnings poses special problems. A factor tending to complicate the measurement of past yields on a system's funds is the effect of capital gains or losses, both those realized in the sale of securities and those unrealized but recognized in the asset valuation technique being used by the system.[5] If gains and losses are included in the calculations, the yields tend to swing widely from year to year as the market swings, especially in a system having substantial stock investments. Such performance may not be much help in setting the assumptions for future yields, since for practical reasons it will generally be desirable to assume a stable rate or set of rates in the future. In many systems, eliminating capital gains and losses from the calculation does not solve the problem, since they may be the major factor in the long term yields of the system, particularly in those systems with aggressively managed investments. What is often needed is a method of averaging the yields to even out the swings. Techniques for this have been developed primarily as an aid to the investment manager, but they can also be used by the actuary to aid him in setting his assumptions as to future earnings rates. Another helpful procedure is to determine the yields separately for the various investment categories, such as bonds, stocks, and mortgages. This serves as a guide for investment results by category and facilitates forecasts if a change in investment strategy is contemplated.

Comparisons of yields among systems can be valuable as an indication of relative success in meeting investment goals.

[5] See p. 125.

Such comparisons can serve as a useful guide to future anticipated investment returns in a specific system. Unfortunately no uniform standard for comparing yields is in use. Comparisons will thus be inexact unless the systems being compared happen to be using the same procedure.

ANALYSIS OF TECHNIQUES OF MEASURING COSTS

The ultimate costs of a retirement system will be fixed as its actual expenditures emerge and are measured by the current disbursement method. It is important, however, that these costs be estimated in advance to measure the employer's commitment under the system. The two basic methods for doing this have been described earlier in this chapter. One way is by using projections. Another approach is to determine equivalent costs prior to the actual disbursements. These equivalent costs can then be used either to associate costs with the period in which the rights to benefits are acquired or to measure the relative expense of possible changes in the benefit structure. These general comments will serve to introduce a more detailed analysis and comparison of the cost measuring techniques.

Current Disbursement Method. The current disbursement method has one major advantage—simplicity. It is easily understood and there is no ambiguity about its results. Unfortunately, it also has a number of disadvantages. It fails to assign the cost of a retirement program to the time an employee is at work, when all other payroll costs are being accounted for. It measures the effects of events which occurred many years ago and are beyond the control of the present generation. It is therefore a very remote and insensitive measure of benefit changes and employment conditions of the present. Over an extended period, costs measured by this method tend to increase as the size of the retirement benefit payroll grows. In the short run, current disbursement costs are subject to substantial fluctuations, as active employ-

ees sporadically retire or retired employees die. In short, the current disbursement method is like a house thermometer read once a month: The results may be of interest, but the instrument used this way would hardly serve as an effective thermostat for regulating the furnace.

Projections. Probably no other actuarial technique is as meaningful to a layman as a projection. The final figures can be checked against actual results, at least in the short run, and this reinforces the understanding of the process. In a well designed and documented projection, the cost segments are sufficiently isolated that the skilled observer may test the reasonableness of the results. In like manner, if adequate detail is provided, the yearly progression of figures will illustrate the usual growth in benefit payments, whereas a single, long-term projection of the final amount might lack credibility.

A major disadvantage of any projection is its reliance upon statistical techniques. Time may prove the projection wrong, due to random variations in experience or because of inaccurate assumptions as to the underlying probabilities of future mortality, disability, rate of employment termination, and the like. For whatever reason, any inaccuracies in a prediction tend to diminish the acceptance of subsequent ones.

Actuarial Cost Methods in General. Actuarial cost methods are also afflicted with the disadvantages of inaccurate predictions. In addition, the nontechnical observer can find them complicated and difficult to understand. This is aggravated by the lack of a consensus as to a single proper actuarial cost method. There are several major types of methods used and many variations within each type. The distinctions between the variations generally arise for valid reasons. Nevertheless, even specialists in the retirement area, including actuaries, find it difficult to grasp the implications of all the actuarial methods to which they are exposed. It is not surprising, then, that confusion is easily bred in this respect among novices in the field.

Offsetting these disadvantages are many favorable features.

Actuarial cost methods assign the costs of a retirement program to the time an employee is at work, when all other payroll costs are being accounted for. They give a current measure of current changes in benefits or experience. They tend to be relatively stable. They readily put a price on the establishment of a retirement system and distinguish that cost from costs that arise after the system is in operation. They measure costs in today's dollars rather than in dollars payable at some time in the future. In short, actuarial cost methods are indispensable in the proper financial management of a retirement system.

Differences in Actuarial Cost Methods. Between the two actuarial cost methods described earlier in this chapter, there are certain distinctions to be noted. The accrued benefit method identifies the costs associated with benefits credited to any date. In the same manner, it identifies the costs of benefits earned in any year. It is therefore a valuable measure of benefits earned if a cash equivalent is to be offered to a terminating employee. On the other hand, the projected benefit method avoids the portrayal of increasing costs which generally are associated with the accrued benefit method.

Also, the projected benefit method is inherently superior in giving full recognition to benefits expected to be credited during an employee's working career, thereby avoiding deferred increases in cost and offering the best method of measuring the costs of benefit improvements. Moreover, its level cost characteristics make it the easiest to relate to payroll as a measure of the overall fiscal impact of a retirement program. Level costs simplify the comparison of one benefit structure with another.

COST COMPARISONS

Comparisons are commonly made of the costs of different benefit structures, either within a system or among systems. In general terms, where benefits are greater, costs are greater. Broad conclusions in the area of cost comparisons can thus be

based on benefit comparisons. The analysis of differences in benefit structures summarized in the previous chapter may help in making overall cost comparisons among public employee retirement systems and private plans.

The uses of cost comparisons are not limited to analyzing the benefit structures of two or more systems. Comparisons can be used to put a price on a change in the benefit structure within a given system. Such a process really involves a comparison of the costs of the existing benefit program with those of the new program, a simpler procedure than a comparison of costs between two systems.

In the ideal situation, the comparison of a particular benefit feature between two systems is made with all other factors identical. In practice, factors tend to be different rather than identical, making analysis of cost differences difficult. In addition to benefit differences, cost comparisons are affected by the cost methods being used, the actuarial assumptions, the effect of the benefit programs on termination of employment, the distributions of employees by age and service, and any number of other factors. The rest of this chapter deals with some of the factors whose cost implications are more obscure.

Cost Method. Fundamental to any cost comparison is the cost method being used. It is the yardstick used for the measurements. Substantial differences in cost may appear to exist solely because of differences in cost methods. It is nearly impossible to reach meaningful conclusions in an analysis of cost differentials in two systems if they employ different cost methods.

Even if the same cost method is used, comparisons can be difficult. For example, the current disbursement method will not display many of the effects of a simple benefit increase for many years. On the other hand, an actuarial cost method will give immediate recognition to such benefit changes. In fact, the current disbursement method is unresponsive to projected benefit changes for active employees. For this reason, this method is unsatisfactory for comparing the benefit struc-

tures of different systems. A projection may not be much better because of the difficulty of comparing a varying series of numbers.

When certain types of deferred benefits are compared, the projected benefit cost method is superior to the accrued benefit method. For example, suppose a plan with a benefit formula providing 1.5 percent of final salary for each year of service is compared with one providing 1 percent for each of the first ten years, 1.5 percent for the next ten, and 2 percent for the remainder. For various employees, the first plan would appear to be more costly, identical in cost, or less costly by the accrued benefit method, depending on the service of the employees at the time the cost is measured. The projected benefit method overcomes this anomaly by, in effect, merging the cost elements of the latter formula into an equivalent single rate. This rate can then be more readily compared with the rate appropriate to the level formula.

In general, cost comparisons using the projected benefit method are the most precise in establishing an immediate distinction between benefit features whose costs ultimately emerge under the other methods. The accrued benefit method ranks closely behind the projected benefit method in this characteristic, with the current disbursement method far behind. Although a projection improves on the current disbursement method, the projected results may be difficult to interpret because of variations in cost occurring over a long period of time. The ability of a cost method to respond promptly to the cost elements of benefits is obviously of basic importance in making cost comparisons, including those made to evaluate an improvement in benefits. For that reason, it is almost a prerequisite to a significant cost comparison that an actuarial cost method, and in some cases the projected benefit cost method, be used.

Actuarial Assumptions. The major area of uncertainty in the use of a projection or an actuarial cost method involves the choice of actuarial assumptions. If the assumed rates predict the future perfectly, the numbers produced are perfect measures of the costs of the system. Since the assumed

rates are, instead, only approximate, so also are the costs they project. The foregoing is essentially obvious. What is not so obvious is the effect the assumptions have on cost comparisons.

Just as the costs for a system will appear to change when a different cost method is used, so also will the costs appear to change when different assumptions are used. The difference in the first case is the result of measuring different costs—current outgo instead of anticipated outgo, for example. The difference in the second case results from actual error and, if the error is significant, any comparison using the erroneous costs will suffer accordingly. This is particularly important in comparing the costs of two systems where the actuarial assumptions used for one are significantly more accurate than those used for the other. The resulting comparison may be misleading. Ideally a comparison should be made using assumptions as close to reality as possible. Lacking this it is sometimes preferable to recalculate costs for one or both systems to get them on a comparable basis, even though the absolute level of costs so measured for each system may not be any more precise. This latter approach may give poor figures as to the absolute level of costs, but the errors may be cancelled when the relative costs for the two systems are compared.

Employment Characteristics. In any comparison of costs, attention must be paid to the characteristics of employment inherent to the groups of covered employees. This is especially important if the comparison involves classifications of public employees whose unique types of work create unusual work patterns. A good example is the category of policemen and firefighters. One of the most notable of the characteristics setting them apart from other employees is their tendency to retire at an early age. This, coupled with their relatively low turnover rates and high disability rates, makes their cost characteristics unusually high.

Examples of a similar nature are found in other job classifications. In some areas of public employment, such as in the legislature or the judiciary, participants in retirement

systems will be enrolled at ages which are higher than the average. This results in a cost, as measured by an actuarial cost method, which is substantially higher than that associated with the hiring of younger employees. The effects of interest and employee turnover on actuarial costs are primarily responsible for this higher cost. The employee hired at an advanced age is more likely to continue in service to retirement. The benefits he earns are paid sooner, so that the interest discount on the payments to be made following retirement is correspondingly less than would apply to an employee hired at a younger age.

A similar high cost factor is found in the unusual pattern of employment which typifies some women teachers. They work for a few years following graduation from college, marry and raise families, and then return to work when the children are grown. In many respects, particularly if the credit for earlier service is lost, this pattern of employment has cost effects similar to those of employees hired at a late age.

Rate of salary growth also has an important cost effect. In some occupations the peak salary is often reached fairly promptly after commencement of work, with a very flat growth in salary thereafter, except as caused by inflation. For reasons similar to those causing low costs for employees hired at an early age, employees having these relatively small increases of wages will tend to have lower retirement costs, when measured against their total earnings, than those with sharply increasing salaries.

Requirements for Employee Participation. Differences in the age or service requirements for participation in systems can give rise to apparent cost differences which may prove to be illusory. A high rate of cost, expressed as a percentage of the salaries of covered employees, may occur for a system having restrictive eligibility requirements. If the cost of this system were spread over the entire payroll, including salaries for those not yet eligible for participation, the resulting rate might prove more reasonable. This latter rate would prob-

ably be a better basis for a comparison with a system without such membership restrictions.

Consideration should also be given to the effect on benefits of the waiting period required before an employee can participate in a system. If this preparticipation period is not given credit in determining benefits, an employee in a system with more restrictive eligibility requirements will tend to get lower benefits than an employee in a system with immediate participation. If the systems are noncontributory, the total employer costs will be proportionately lower in the system with delayed eligibility. The same will be true in those contributory systems where the employee's contributions are converted to annuities at retirement to supplement the employer-bought pensions. In many contributory systems, however, the total retirement allowance is on a scheduled basis and the employee contributions are merged with the employer money to provide this benefit. In these cases, the employee contributions in the first year or two of employment can be more than enough to pay for the benefit credited during that time. In such an instance, the total employer cost would actually be reduced by eliminating the eligibility period and providing for immediate participation. In other words, in this type of situation the additional benefits created by eliminating the waiting period would be more than paid for by the additional employee contributions.

Employee Contributions. For a system providing a given level of retirement allowance, employee contributions result in an obvious reduction in the total employer financial commitment. This is of major significance in public employee retirement systems, nearly all of which are contributory. It is of even greater importance in comparisons with private plans in the United States, where noncontributory private plans predominate.

The effect of employee contributions on the actual cost of a retirement program can be deceptive. In the absence of full and immediate vesting provisions, contributions by the employer generally buy more retirement benefits than the

same amount in employee contributions. When a nonvested employee terminates, his own contributions are nearly always returned to him, usually with interest, whereas any employer contributions on his behalf are released to meet the commitments of the employer to other employees under the system. In this context, the money required to pay the retirement benefits of an employee might be thought of as coming from his own contributions, from the contributions of his employer with respect to him, and also from a portion of the employer's funds released by the nonvested terminations or deaths of other employees during the working career of the retiring employee.

The converse of this concept is worth stating: The level of costs of a particular portion of an existing system, or of a proposed modification in benefits, varies depending upon whether the employer or the employee is to pay the costs. Thus, if a certain benefit has been evaluated in terms of employer contributions, a larger total amount is required if the cost is to be split between the employer and the employees, and an even larger amount is needed if the cost is to be paid solely by the employees. This is because the employee portion will be made in the form of contributions which are returnable in the event the employee terminates or dies. If the same amount at retirement is to be provided as would be available if the employer only were making the contributions, larger contributions must be made by the employees ultimately retiring to make up for those withdrawn by terminating employees.

Normal Retirement Date. The age at which an employee retires has a most significant effect upon costs, but the measurement of the cost of changing retirement ages is difficult. In the simplest context, consider an employee eligible to retire at age 65. He is now age 60 and the law governing the system has just been changed to allow him to retire immediately and receive his full accrued monthly benefit. If he retires immediately, the monthly benefit payments he can expect to receive before age 65 are about 25 percent of those he would have expected to receive had he accrued no addi-

tional benefits, lived to age 65 and then retired. His true gain because of retiring early, however is even greater. He gains an interest advantage by receiving payments immediately. In addition, he has about 1 chance in 12 of dying before age 65, so that planning to defer his retirement until then creates the risk of losing all of his benefits by death. For these reasons, the value of his accrued pension has increased by about 50 percent as a result of his opportunity to retire at age 60.

In the usual circumstance, an employee would be able to accrue additional benefits after age 60 if he continued at work. If the cost effect of a normal retirement date at a younger age is viewed from the point of view of the retirement system, the potential benefit to be earned in the next five years of service has been forfeited by the immediate retirement. Recognition of this might reduce the extra cost of advancing the normal retirement date in the instance cited to a one-third increase, instead of a one-half increase in cost. Similarly, immediate retirement eliminates the cost of death benefits if they are provided only for active members by the system. Also, if the benefit is based upon final salary, the retiring employee forfeits any increase in benefit that would result from future salary increases.

As a further complication, it is not unusual for legislation lowering the age for normal retirement also to increase the amount of benefit which can be accrued at the younger retirement age, to make up for the pension otherwise earned to the later retirement date. If this is the case, the cost of the earlier normal retirement, of course, is further increased. In addition, the younger retiree must be replaced earlier, increasing the employer's expense of training each new employee. In short, the cost implications of an early retirement age are tightly intertwined with practically all the other factors influencing the costs of a retirement system. The specific costs are governed by the conditions surrounding each system. In general, though, it is quite clear that a lower age for normal retirement results in higher costs.

Postretirement Adjustments. The effect of the actuarial assumptions on cost comparisons was discussed earlier in this

chapter. Of particular difficulty is the prediction of the factors governing postretirement adjustments, such as changes in the consumer price index or in the salaries of active employees. The difficulty is compounded with earlier normal retirement dates, since early retirement extends the period over which postretirement adjustments operate. For these reasons cost comparisons are particularly difficult if they are of systems with post-retirement adjustment mechanisms related to indexes or salaries.

One adjustment mechanism that is usually an exception to this difficulty is the yield-related adjustment. A common form of yield-related adjustment mechanism is the equity annuity, where the amount of benefit payment rises or falls with the value of a portfolio of common stocks held by the system or on the system's behalf. The employer's cost is essentially unaffected if an equity annuity is used, since the portfolio is considered to be assigned to the retirees and any increases in benefits are covered by (in fact, generated by) increases in the value of the portfolio, and vice versa.[6]

A complicated cost comparison may result if a yield-related form of adjustment is combined with another mechanism. For example, some systems provide that an index-related adjustment will occur only if there are sufficient assets to meet the cost of the increase. If a block of common stocks is allocated to cover the retired life liabilities, this type of mechanism assumes many of the characteristics of an equity annuity. In any event, a cost comparison involving such a system poses special problems.

Vested Benefits. A negative approach may clarify the fiscal effect of vesting. Without vesting, a terminating employee loses the service retirement benefit he has accrued.

[6] This analysis somewhat oversimplifies the case. In a rising market, the employer's commitments might be thought of as being increased by the existence of the adjustment mechanism, since the capital gains might have been used to reduce the employer's other costs if they were not committed to the increased retirement benefits. The reverse holds true, of course, in a declining market. Another complication arises if mortality assumptions are not sufficiently conservative, resulting in an increased employer cost to pay larger benefits beyond the employee's expected life span.

The value of this accrued benefit is eliminated from the employer's responsibility, thereby reducing his costs. If there is a high rate of employee turnover, repeated releases of the employer's liabilities can account for one third, one half, or even more, of the employer's potential costs. Full, immediate vesting, then, increases the employer's costs by not allowing this release of liability to occur.

Under most public employee retirement systems, an employee will forfeit any vested benefits if he withdraws his accumulated contributions upon termination of employment. This form of vesting is called conditional vesting. The costs normally associated with vested benefits tend to disappear in a system having conditional vesting, since most employees forfeit their vested benefits by withdrawing their contributions.

The effect of vesting on the costs of a pension plan can be substantial. If a cost comparison is made between public and private plans, the question of conditional vesting becomes paramount. As mentioned in the previous chapter, provincial legislation in Canada tends to equalize the cost impact of vesting upon both public and private benefit programs by making vesting mandatory after certain age and service conditions are met and prohibiting the withdrawal of employee contributions when he is eligible for vesting. In the United States, on the other hand, vesting provisions would seem to place more of a cost burden on private plans than on public systems. This is due both to the generous vesting provisions in private plans and to the prevalence of contributory plans with conditional vesting in the public area.