

**RETIREMENT SYSTEMS FOR  
PUBLIC EMPLOYEES**

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# Retirement Systems for Public Employees

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## Chapter 6

# Financing—Paying the Cost

THE FINANCIAL WORKINGS of a public employee retirement system are generally set in motion for a new employee by his initial contribution to the fund associated with the system. Often this contribution triggers a payment to the fund on the employee's behalf by his employer. As the fund builds up from repetition of this operation for each employee, the money is invested, adding interest and dividends to the flow into the system. In some cases, a portion of the fund is used to pay the expenses of administering and maintaining the system. The final step in the process is the payment of benefits to the participants in the system and their beneficiaries.

The whole fiscal arrangement has been compared to a water network, with the system's funds represented by a reservoir.<sup>1</sup> Inputting to this reservoir are three flows: employee money, employer money, and earnings on the investments of the fund. The outflow is for benefit payments and administrative expenses. So long as the reservoir is not empty, the system will continue to operate. Because the input from employee contributions and investment earnings is not easily

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<sup>1</sup> Charles L. Trowbridge, "ABC's of Pension Funding," *Harvard Business Review*, Vol. 40, No. 2 (March-April 1966), pp. 115-26.

altered, proper design of the system requires anticipation of the expected outflow in advance, so that the demands on the employer can be scheduled. This is the essential scope of financing techniques—measuring the anticipated outflow and regulating the rate of input of employer contributions into the fund.

This analogy can be extended to illustrate two methods of financing. At one extreme is the “empty reservoir” approach, where practically no money is accumulated in the fund and the employer contributes only what is necessary to meet the current outflow after allowing for the employee contributions and the minimal investment earnings. Such a method is often referred to as the pay-as-you-go method, or current disbursement approach. Since the benefit flow will tend to increase, this method requires correspondingly increasing employer contributions.

At nearly the other end of the spectrum is a method employing a stable flow of water into the reservoir in an amount exceeding the initial outgo. This fills the reservoir, which serves to bring in a substantial flow from interest earnings and to anticipate the larger demands of later years. This technique and its variations are called funding methods, since they involve the setting aside of significant funds for the payment of future benefits.

The previous chapter was designed to give an understanding of what happens in the important pipes and valves of the system and an appreciation of the differences between the flows at the input and output ducts. In this chapter the discussion will focus on the master valve—the one that regulates employer contributions into the system. As this chapter is read, it will be well to keep in mind the problems that can occur when the watershed is dry and no employer contributions are forthcoming. It will also be advisable to recognize the planning and foresight needed because of the size of the input pipe, which limits the flow of employer contributions. The implications of both an increasing and decreasing community on the workings of the system should also be noted.

The simplistic concepts of the analogy are not adequate,

unfortunately, to encompass the complication of the time factor. Some benefit payments may follow the period of work during which they were earned by half a century or more. This interval tends to dim the sense of responsibility of taxpayers and their legislative representatives for providing the proper employer input into the reservoir. It also introduces an area of uncertainty in the prediction of the outflow from the reservoir many years hence. Despite these handicaps, the system should not be altered nor should a valve be turned without attempting to determine the effect on the total operation, now or in the future. In plain language, responsible management demands that the fiscal implications of the benefit program, or a change in that program, be disclosed to the taxpayers and understood by their representatives.

One final introductory note is in order. A conscious effort has been made in this chapter to present each side of the funding issue impartially, despite a strong conviction of the author that the costs of public employee retirement systems should be met as the benefits are being earned. In other words, the fundamental arguments in favor of funding are more convincing than those against, in the author's opinion.

## **TO FUND OR NOT TO FUND**

The term "funding" is commonly used to denote the practice of building up a fund of money or investments for the purpose of meeting future retirement system obligations. Unfortunately, the definition in this form is not sufficiently limiting to distinguish trivial funding practices from those of some significance. For example, such a definition might cover a scheme whereby sufficient funds are accumulated at the beginning of a biennium to pay all the benefits coming due during the biennium. However, such a procedure has essentially all of the attributes, both good and bad, of a nonfunded program and none of those described later for a funded one.

It might be well to review the reason funding exists at all. Consider, for the moment, the distinction between retire-

ment benefits and most other types of nonsalary benefits such as, say, a group life insurance policy making immediate lump-sum settlements. At the end of any period of time, the benefits granted by such a policy for a group of persons will have been fully paid. If no one died, there is no residual liability; if deaths did occur, payments will have been made to the beneficiaries. At the end of the period no employee has the right to any payments yet to be made. Not so for a retirement plan. If no one has terminated during the period, no benefits will have been paid for the active group, yet each active employee will have been credited with additional benefits. At the end of the period, a liability exists for the ultimate payment of those benefits. As the term will be used in this book, *funding* refers to a systematic program under which assets are set aside in amounts and at times approximately coincident with the accruing of benefit rights. As a by-product of a funding technique, in the example given, funds are on hand at the end of the period in approximately the same amount as the value of the liability for benefits credited since the system was established.

The methods that can be used to measure the costs of retirement systems were discussed in the previous chapter. Two of the methods were called actuarial cost methods. If such methods are used, the costs of a retirement system are assigned to the periods during which the credits for benefits are being granted. If the employer contributions are made to match the costs being incurred, as measured by one of the actuarial cost methods, the system is being funded. Failure to make such employer contributions is a failure to fund. The extreme of nonfunding techniques is for employer contributions to be at just such a level as to meet current payout. This obviously is meeting the costs as measured by the current disbursement method, or "pay-as-you-go" method.

In the next few pages arguments on either side of the funding question will be given. Analysis of these arguments will be simplest in most instances if the current disbursement method is thought of for a nonfunding approach and if one of the actuarial cost methods described in the previous chap-



ter is thought of as the guide to employer contributions under a funded method. The funding methods are identified by the corresponding actuarial cost methods: e.g., the *accrued benefit funding method* or the *projected benefit funding method*.<sup>2</sup>

## ARGUMENTS AGAINST FUNDING

**Financial Hardship.** At the core of essentially all arguments against funding is the type of financial commitment that funding requires. At the establishment of a system employer contributions are needed for funding, both for benefits credited for earlier service and for current accruals. A funding method requires these employer contributions, even though the need is not evidenced by equal demands for current benefit payments. Likewise, in a system whose active membership is growing, each additional employee generates an additional actuarial cost and thus a need for increased employer contributions, even though the current benefit level may not be growing so rapidly. This results in the allocation of current tax revenues for the purpose of building up a fund that will not be called upon for many years. This is not easily accepted, especially when the competition for the tax dollar is extreme such as during an economic downturn. The legislative body may have to choose between the retirement fund and a relief project. Having both by raising taxes is an alternative not easily chosen. Even if a funded system has been adopted and maintained, it is not immune to efforts to reverse the situation. In fact, the pressures to abandon funding may be intensified by a system that has built up a substantial fund. Continuation of funding will probably result in continued growth of the fund, whereas a nonfunding approach will allow the fund to be drawn upon until ex-

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<sup>2</sup> Only two funding methods are discussed, corresponding to the two cost methods presented in Chapter 5. For ease of description, these methods are referred to by their family names and the technical distinctions within the family are omitted. The correct name of the projected benefit method generally referred to in the text, for example, is the "individual projected benefit funding method with supplemental cost."

hausted, completely eliminating employer contributions for awhile.

**Inadequate Investment Return.** The return on invested funds may not be sufficient to make it worthwhile to pay now for future cash needs. Governments have traditionally been borrowers. They need money before tax revenues are available and borrow to obtain it. The interest charges exacted by the lenders for the use of the borrowed money are accepted as a necessary governmental expense. The same economic forces which put a premium on immediate cash militate against the governmental agency becoming the lender (i.e., buying securities) if the investment yield to the agency is near that which the government must pay for its money. In this respect, governmental bodies do not have the same tax incentive for funding their retirement systems that private employers have. In the private sector, interest on a corporation's borrowed money is tax-deductible, while interest income on pension fund investments is tax-free, giving the employer the advantage of leverage if he borrows and invests in his retirement fund. The only comparable leverage in governmental systems stems from the tax-free status of interest on most municipal and state bonds held by private lenders in the United States. This reduces the interest rate the local government must pay on its borrowed money relative to what a private borrower must pay. If governmental systems invest in corporate bonds or stocks and the money for the investments is thought of as being derived from a comparable volume of borrowing at the lower municipal bond rates, there will be a difference in yield favorable to the local government. In the case of investment in stocks, part of the differential must be considered as a premium for the risks taken in buying stocks. In any event, the difference in earnings may not be sufficient to offset the immediate needs of the government for the money it would be investing.

**Export of Money.** Another objection raised against funding in a public employee retirement system is that the invested monies tend to flow out of the locality from which they were generated, a phenomenon at odds with most gov-

ernmental expenditures below the federal level. Although this objection can be met by confining investments to local issues, such a policy carries with it a number of hazards.<sup>3</sup> The objection can be completely met by not funding at all, since the government's money will then flow directly to the retirees when their benefit rights mature.

**Inflation.** When public employee retirement systems are funded, present taxpayers must set aside funds for payment to employees and their beneficiaries many years in the future. If present inflationary trends continue, the payments ultimately made will probably have substantially less purchasing power than the same dollars do now. A penny saved may only be a half cent earned by the retiree in terms of today's purchasing power. If there is no funding, payments may be made in cheap dollars when they come due rather than in more expensive dollars now.

**Hazards of a Large Fund.** A most salient argument against funding in a public system is advanced by the politically cynical. Funding sets aside assets which can attain very substantial proportions. The temptation such a fund can place before the legislature, particularly when beset by pressures for more benefits on the one hand and severe budget limitations on the other, can lead to procrastination in the carrying out of the legislature's fiscal responsibilities at best, or political expedience and extravagance at worst.

**Government's Guarantee of Benefit.** An argument widely used for funding in the private sector is that the fund itself provides assurance that accrued benefits will be paid when due if future employer contributions are cut off because of bankruptcy, merger, or the like. In public employee retirement systems, particularly at the state and provincial level, their perpetual life and access to theoretically unlimited taxing power may make unnecessary the protection of the large fund.

**Administrative Simplicity.** An unfunded system has substantial administrative advantages. Eliminated are the ex-

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<sup>3</sup> See p. 136 for arguments against investments in local municipal bonds.

penses of acquiring and maintaining a portfolio of investments. It is also unnecessary to carry out the periodic actuarial valuations required under a funded system for the setting of employer contribution rates. The expenses so eliminated may be a significant portion of the overall cost of the retirement program in a small system.<sup>4</sup>

## ARGUMENTS IN FAVOR OF FUNDING

**Current Payment for Current Services.** One major pitfall for a system which does not fund is that it is prey to the "go now/pay later" tactic, by which the legislative authority can appease public employees by raising benefits without increasing current outlay (and thus taxes) significantly. The converse of this, which might be used by the advocate of funding as a rebuttal to the pay-as-you-go argument, would be about as follows: Sound financing of any retirement system requires that benefits accruing to each member be paid for during his active working lifetime by regular contributions to a retirement fund. Thus, when benefit payments commence at retirement, the money will be on hand to provide such benefits until death. In this way, *the cost of benefits for present active members will be borne by present taxpayers and will not become a liability to future taxpayers.*

A corollary to the foregoing argument is that sound financing, as defined above, carries with it an effective discipline on the legislative authority to know and be prepared to meet the costs of a retirement program or its improvements.

The immediate budgetary effect of funding an increase in benefits, even though the change results in no appreciable increment in benefit payments at the moment, is that the legislature must balance the worth of the increased benefits against the immediately increased outlay. In fact the concept of retirement costs as an integral part of payroll not only emphasizes the source of the liability being incurred by the

<sup>4</sup> See Donald A. Woolf, "Funding Pensions for Public Employees," *Public Personnel Review*, Vol. 30, No. 3, July 1969 for an expanded version of this argument and of others given here.

employer but also allows a practical means of allocating retirement costs to the appropriate departments and programs.

This same argument can be expressed in a somewhat different manner. When an employee is credited with a unit of retirement benefit for a year's work, his employer has incurred the liability to pay this benefit when it comes due. The debt may not be as formal as a bond issue incurred to build a bridge, for example, but it has many of the same characteristics. If the government fails to fund the retirement commitment, it has an unfunded debt, just as it does with the bonds. However, there is a fundamental distinction between the two types of borrowing. Borrowing to build a bridge can be justified because the bridge will be utilized during the period of repayment. Borrowing for a retirement program, on the other hand, is borrowing for a current payroll expense. Little, if any, justification can be given the future taxpayer as grounds for his having to pay this debt. The debt is being incurred to pay part of the wages of an employee whose services are currently being rendered and are thus of little or no value to the future taxpayer.

**Protection of Employee Rights.** The myriad of local plans, below the state or provincial level, are subject to shrinkage of resources as a result of possible population and industrial changes. When such a shrinkage of available money occurs under a nonfunded plan, the results can be disastrous for employees having vested benefits. A properly funded system is much more likely to be able to weather the storm.

This same argument applies to the larger systems but in an altered context. A shortage of tax resources can occur at the state and provincial levels for different reasons but with the same effect as at the lower levels of government. When this occurs, legislative body may find itself hard pressed to meet the commitments left it by its predecessors. Unlimited taxing power may prove very limited indeed. This issue has been eloquently summed up by Rubin G. Cohn as part of an exhaustive and scholarly study of the legal rights of public employees in the benefits provided by retirement systems:

A vested or contractual right in public pensions depends upon the financial stability of the funds. There is little comfort and less sustenance in a contractual right in a fund which is or may become insolvent because of inadequate financing. State financed funds which are determined to be contractual may in fact create illusory and unenforceable rights under circumstances of financial stress. Given typical constitutional grants of sovereign immunity and the legal impracticability if not impossibility of compelling the legislature to make appropriations, or to grant pensions to qualified annuitants where default is threatened or has occurred, the contract right may turn out to be the stuff of which dreams are made . . . The critical factor is not the legal label which defines the rights, but the extent to which the fund can redeem the statutory promises when they fall due.<sup>5</sup>

**Investment Earnings.**<sup>6</sup> The assets accumulated in a funded retirement system are generally invested in securities whose yields will help meet the costs of the system. Any costs so met would otherwise have been the responsibility of the taxpayer. Funding a system, then, serves to reduce the taxes that will be required for its maintenance.

The effect of inflation on the funding process deserves further attention. A commitment to pay \$1,000 30 years hence can be financed by investing about \$250 now at 5 percent interest and letting the investment grow to the \$1,000 amount, or it can be financed by waiting 30 years and meeting the obligation at that time. If inflation has reduced the purchasing power of the dollar so that the \$1,000 buys, say, only what \$500 would buy now, this has, in one sense, reduced the true investment yield earned on the \$250 from 5 percent to about 2.5 percent. The lesser rate is still to the employer's advantage, since the investment earnings have reduced the employer's commitment both in dollars and in terms of purchasing power. Investment earnings will continue to do so as long as the yield on investments exceeds the rate of inflation, a situation that has essentially always ex-

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<sup>5</sup> Rubin G. Cohn, "Public Employee Retirement Plans—the Nature of the Employees' Rights," *Law Forum*, Spring 1968, p. 62.

<sup>6</sup> The significance of investment earnings is discussed more fully in the next chapter.

isted. To improve their odds in the battle against inflation, many public employee retirement systems invest in common stocks, which are widely considered to provide a hedge against inflation. Even if the foregoing were not true, a previous argument might be restated by asking what right the present taxpayer, the one who incurred the \$1,000 commitment, has to pass the debt along to the taxpayers 30 years hence.

A response might also be made to the argument about exporting the local government's money. In the first place, it is difficult to maintain a parochial view in the complex financial structure characterizing the present economies of the United States and Canada. Beyond that, any investment out of the local area will return funds in greater amounts as the interest payments or dividend checks are received. In the example cited above the \$250 payout resulted in a \$1,000 payback, the difference most likely coming from a debtor outside the locality of the government.

**Use of the Best Cost Measurement Method.** As indicated in Chapter 5, the costs of a retirement system's benefits and of modifying those benefits are best measured by a method currently responsive to the elements making up that cost. This specification for measuring the cost is met only by actuarial cost methods. Such a cost method can be used with any funding method. If the cost and funding methods are the same, however, the system's financing will be better understood. For example, the fiscal implications of a change in the benefits will certainly be more evident, especially to those who are not initiated into the mysteries of pension financing, if the costs are expressed as actual appropriations to be made currently, instead of as theoretical employer commitments.

There is another objection to measuring costs by an actuarial cost method while making employer contributions using the current disbursement method. Inherent in an actuarial cost method is the assumption that normal costs will be less than the benefit payments they are intended to cover, because of interest between the time normal costs are assigned and the time the benefit payments are actually made. The

difference between the two cost methods, then, is the hypothetical interest earned in the interim. In the political arena, subtleties such as hypothetical interest are easily lost. Confusion of this sort can be avoided if the employer's contributions follow an actuarial cost method.

A related point of minor importance deals with the expense of determining actuarial costs. As current measures of accruing costs and of costs of benefit changes, nothing takes the place of actuarial costs. They should be calculated regardless of the method the employer is using to finance the retirement system. For example, no legislature would write a blank check in the authorization of a building project—the specific dollar costs would have to be authorized and appropriated. By the same token, no legislature *should* authorize a retirement program without knowing the cost, regardless of how it is to be paid. Thus, the expense of calculating the actuarial cost should be viewed as a necessary adjunct to a retirement system, and not as a deterrent to the use of a funding method.

**Flexibility.** Funded systems are protected against adverse financial experience by their ability to draw upon their funds when unforeseen needs arise. These needs can occur because of adverse experience, such as an abnormal number of early retirements or an exceptional amount of death or disability benefits resulting from a catastrophe. These needs can also be the result of the employer's facing a fiscal crisis which brings about a temporary stoppage of employer contributions. In either event, the existence of a fund gives the employer flexibility in meeting his commitments under the retirement program. Under a current disbursement method, in contrast, the employer has no flexibility but must meet each payment from current tax revenue. This requirement can be particularly onerous if the adversity coincides with other fiscal problems. This might be the case when, for example, poor economic conditions induce an abnormal number of early retirements or when a catastrophe causes exceptional death or disability payments.



## FINANCING FEDERAL OLD-AGE INSURANCE

On occasion the lack of full funding in the two federal old-age programs—U.S. social security and the Canada Pension Plan—has been used as an argument against funding non-federal public employee retirement systems. This argument was omitted from the pros and cons in the previous sections because it is specious, in the author's opinion. For one thing, there is no unanimity of expert opinion that the present way of paying for federal programs is right.<sup>7</sup> Some might contend that using a bad example as a precedent is compounding a felony. Regardless of one's viewpoint on this controversy, there is much less quarrel with the concepts that the federal programs occupy unique positions in the economies of the two nations and that their financial affairs must be handled accordingly.

The following comments were made by a panel of actuaries and economists reporting on their study of the financial policy governing the U.S. social security program:

. . . Relatively large trust funds are [not] necessary for the proper management of the social security system. If it were possible, by accumulating a trust fund invested in obligations of the United States, to lighten the economic burden carried by future generations for the support of the beneficiary part of the population, . . . [higher] tax schedules might be appropriate. But in an economy such as that of the United States, the assumption of a tax burden by a current generation in order to accumulate a trust fund of government obligations will accomplish no such transfer. . . . Excesses of social security contributions over benefits will be used for reducing deficits or increasing surpluses of the unified budget. The securities held by the System and the interest they are projected to earn are simply a claim on future revenues of the government. During any period of time that the trust funds are reduced or interest is used to finance benefits, revenue sources

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<sup>7</sup> For example, see Ray M. Peterson, "Misconceptions and Missing Perceptions of our Social Security System (Actuarial Anesthesia)," *Transactions, Society of Actuaries*, Vol. 11, p. 812, and the discussion of this paper.

other than the payroll tax will be diverted to finance those benefits.<sup>8</sup>

A basic question here is: Can funding reduce the tax burden in future years? The panel says no. So also, in effect, does Walter Shur in his paper "Financing the Federal Retirement System," published by the Society of Actuaries.<sup>9</sup> Although his attention was primarily focused on the U.S. federal employee systems, the following comments apply equally to social security:

Those who argue [that funding can reduce future taxes] . . . say that the additional taxes collected to cover the excess of accruing costs over actual benefit disbursements would reduce the need for borrowing from the public. In effect, the government would borrow from the retirement fund [which would become a buyer of government bonds in quantity] instead of from the public . . . Thus, the argument goes, the total Treasury debt and interest on the debt would be unchanged, but a portion of the interest on the debt could be used to pay retirement benefits instead of interest payments to public bondholders.

The proponent of this line of reasoning may think that he is arguing the merits of a reserve plan but, in fact, he is arguing the merits of increased taxation. He is saying that (1) the reserve method will result in higher taxes; (2) higher taxes will result in a transfer of debt from the public to the retirement fund; and (3) the revised fiscal policy implied by (1) and (2) will result in economic growth and stability at least as favorable as without the revision.

If higher taxes will put the economy of the future in a better position to bear the burden of retirement payments, then higher taxes are desirable with or without a reserve method of financing and the point should be argued on economic grounds, not on actuarial grounds.

These arguments against funding the massive federal programs do not transfer to the nonfederal systems. The primary

<sup>8</sup> *Report of the 1971 Advisory Council on Social Security*, House Document No. 92-80, Washington, 1971.

<sup>9</sup> Walter Shur, "Financing the Federal Retirement Systems," *Transactions, Society of Actuaries*, Vol. 16, p. 281. This paper also deals with other aspects of retirement system financing in a lucid manner.

reason for this is that the federal governments are unique in the effect their fiscal and taxing policies have on the economy. Another reason the arguments do not transfer to the local level is the enormity of the portfolio of securities the federal systems would acquire if they were funded. In the United States, for example, if the social security program were being funded, assets of about one-half trillion dollars would have accumulated by 1972. If these assets were represented by U.S. securities, as would be almost certain, the fund would have been greater than all the issues of U.S. bonds and notes actually outstanding at that time. Clearly this puts the financing questions associated with federal old-age programs in a different league from all other retirement systems.

### **UNFUNDED ACTUARIAL LIABILITY**

The *unfunded actuarial liability* is similar in nature to the supplemental cost described in the previous chapter. The primary distinction is that the unfunded actuarial liability gives weight to the value of the actual assets held by the system and is thus a measure of the degree of funding at any time.

At the establishment of a system when no fund exists, the unfunded actuarial liability under any cost method equals the supplemental cost. If subsequent employer contributions are geared to the costs produced by that cost method, the employer payments are the sum of the normal cost, interest on unfunded actuarial liability and an additional amount to liquidate that liability over a period of years. The unfunded actuarial liability at any time is then the initial unfunded actuarial liability reduced by the portion of the annual payments allocated for its amortization. If experience follows the actuarial assumptions, the unfunded actuarial liability will be disposed of over the number of years originally scheduled in the calculation of the total employer contribution rate.

Adopting a program for amortizing the unfunded actuarial liability is a basic step in the financing of a retirement system. Some of the considerations affecting such a decision

are similar to those given in Chapter 5 concerning the period to be used for spreading the supplemental cost. An additional point should be noted: The shorter the period chosen, the greater the cushion against adverse future experience. This is particularly important in small systems, where the financial capabilities of the local community may ebb and flow. Establishing a short amortization period builds up the fund and helps it to withstand adverse experience.

A common event disrupting a schedule for amortizing the unfunded actuarial liability is an improvement in the benefit structure. Such an event generally creates an additional unfunded actuarial liability which in turn requires an adjustment in the employer contributions, in the period of amortizing the unfunded actuarial liability or in both. The schedule of liquidating the original unfunded liability may be altered for another reason—the occurrence of actuarial gains and losses.

## **ACTUARIAL GAINS AND LOSSES**

In many public employee retirement systems going the funded route, the employer contributions are set to match costs determined by an actuarial cost method. Because of this, actuarial assumptions come into play. The appropriate costs are calculated on the basis of these assumptions. If the contributions are made precisely to match the costs so generated, the fund grows on schedule to conform with the predictions of the cost method, provided the assumptions are perfect predictors of the future.

Obviously this last proviso is a practical impossibility. The amount computed as the present value of future benefits will not be exactly sufficient to meet all the payments—it may be too much or too little. The employees will not die precisely according to the assumed death rates. The employees will not retire exactly at the assumed time. Interest and dividends will not be earned on the fund exactly as predicted. In these and in other ways, differences will arise between the rates assumed by the actuary and the way things actually happen.

These differences give rise to what are called *actuarial gains and losses*.

The actuarial gain or loss for any period is the difference between the system's actual financial status at the end of the period and its expected status then as estimated by the application of the actuarial assumptions during the period. Thus, for example, the value of the fund at the end of a period can be anticipated by calculating the expected interest earnings on the fund at the beginning and on the money added during the period. If all other actuarial assumptions are precisely realized and the actual fund at the end exceeds the expected fund, a gain from interest earnings has occurred. If the actual fund is deficient, a loss has occurred. If other actuarial assumptions are not precisely realized, a gain or loss from each source is calculated. All of the elements making up the total gain or loss can then be combined to derive the net actuarial gain or loss for the period. In practice, analyzing the gain or loss by source can be quite difficult because of the effects of the various assumptions on each other. For this reason the gain or loss will sometimes be obtained only in total, without an analysis by source. This is done by comparing the total expected actuarial costs with the actual costs as reflected in the changes in the fund balance and value of benefits yet to be paid.

In the typical system, where the employer contribution rate varies from time to time, an actuarial gain results in a tendency for a reduction in the employer contribution rate and an actuarial loss results in a tendency for an increase. Because of this, experience dictates the true costs of the program in the long run; the funding method and actuarial assumptions regulate the varying contribution rates meeting these true costs.

**Effect of Actuarial Gains and Losses on Funding.** Each actuarial funding method has its own characteristic way or ways of treating actuarial gains and losses. Under either the projected benefit or the accrued benefit funding method, for example, gains may be used to reduce, and losses to extend, the period of years during which the unfunded actuarial

liability is being amortized. If the resulting variation in the period of years is within a range considered acceptable by the system's managers, it is not necessary to change the employer contribution rate whenever an actuarial gain or loss occurs. Thus, barring substantial variations in the actuarial assumptions, employer contribution rates may be relatively stable for several years under such a method, a feature of substantial advantage to a public employee system where contribution rates affect appropriations and budgets are fixed as many as three years in advance.

Another approach to handling actuarial gains and losses can be followed under the projected benefit funding method. Under this approach all gains and losses are spread over the remaining working life of the employees and merged into the current normal costs. Where this approach is used, the normal cost varies from year to year, as the cumulative effects of gains and losses are added or subtracted, but the schedule for amortizing the unfunded actuarial liability is not affected. Actually, because of the dampening effect of spreading them over long periods of time, actuarial gains and losses do not necessarily result in changes in contribution rates of any significant amount from year to year.

A third way of treating actuarial gains and losses is to reflect them immediately in the employer contribution. Under this method the employer contribution is the regular normal cost plus the payment for amortizing the unfunded actuarial liability, plus the total amount of the previous year's actuarial loss, or less the total amount of the previous year's actuarial gain. If the gains or losses are not kept to a minimum, this method can produce rates of employer contribution which vary by substantial amounts.

**Failure to Fund.** In the normal course of events, an actuarial loss occurs in a funded system if the interest yield is smaller than anticipated, or if pensioners' longevity is greater than expected, or, if for any number of other reasons the employer contributions required by actual experience turn out to be in excess of those made. In like fashion, if the actual employer contributions are below those required by the

actuarial cost method being used as a guide, the effect on funding will be the same as if an actuarial loss had occurred. For example, in a time of emergency, all employer contributions may be diverted for other purposes for a year. This will have the effect of extending the period of amortization of the unfunded actuarial liability or of increasing subsequent employer contributions, depending on the way the actuarial gains and losses are being treated.

This aspect of funding adds considerable flexibility to the employer's contribution requirements under a funded system. It also can pose a threat: If the privilege of deferring required contributions is abused, a funded system can become unfunded. If deferral is allowed at all, provident management will set bench marks in its funding program, and will not allow deferral of employer contributions or any of the conventional actuarial losses to drop the funding status below these levels. One commonly used criterion is that the unfunded actuarial liability should not arise above its initial balance,<sup>10</sup> as might otherwise happen if employer contributions were deferred. A second bench mark might be that the relationship between assets and earned benefits for all employees should constantly progress toward parity and reach it within, say, 25 years of the establishment of the system to give an appropriate degree of assurance to the employer's promise to pay benefits. A third control of the misuse of the privilege to defer employer contributions might be the requirement that any such deferrals must be made up with interest within five years.<sup>11</sup> Many other types of guidelines might be used, including combinations of those given above. The basic purpose of any set of such bench marks, of course, is to prevent a system from falling away from its original funding goals. It is

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<sup>10</sup> In private pension plans in the United States, Internal Revenue Service requirements that a plan be permanent have been interpreted to require that this bench mark be met.

<sup>11</sup> This type of rule is applied to many Canadian corporations by the federal Pension Benefit Standards Act and by several provincial acts. However it is not applicable to deferrals of employer contributions, but only to any actuarial loss which sets back the required funding of the initial unfunded actuarial liability.

obvious that this purpose can best be carried out if the employer contributions are always made as required by the governing funding method.

**Valuation of Assets.** As the investments of a system grow, the method used for valuing them plays an increasing role in determining the actuarial gains or losses the system will incur. The portfolios of most systems are made up of securities held for extended periods. This permits the market values of some of the investments to diverge significantly from their costs—the prices paid for them. Valuing a portfolio at cost thus fails to give a realistic value to securities whose market values change substantially, common stocks being the most obvious example. The use of market value gives precision to the current value but creates substantial variability in the asset values. The special asset valuation methods in use are thus designed to strike a balance between two purposes, which are sometimes in opposition:

A recognition of each security's intrinsic value at the time of valuation;

An attempt to gain stability of valuation, so as to avoid fluctuating gains and losses which have no long term significance.

Different asset valuation methods are often employed for the fixed income portfolio (bonds, mortgages, etc.) and the equities (common stocks, convertible bonds, preferred stocks). A fixed income security may be valued at cost or market, or it may be given a value somewhere between its cost and its maturity value. For example, a common method used to value a bond purchased at a discounted price (as compared with the maturity value) is the purchase price increased by the discount accrued ratably to the maturity date. Similarly, if the purchase price of a bond includes a premium above the maturity value, this method puts a value on the bond of the purchase price less an amortization of the premium to the maturity date. Another method values the bond at whatever price is necessary to make the coupons and maturity amount have a yield equal to the interest rate



assumed by the actuary in his calculations, regardless of actual cost or market.

In the case of common stocks, various valuation methods in use include cost, market, a weighted average of cost and market, cost improved by an assumed growth rate or by a portion of the retained earnings of the corporations whose stock is held, and variations or combinations of these.

One inherent hazard of special asset valuation methods is the danger that investment decisions might be influenced by the method being used. For example, any method of valuing a security which results in its being valued below the actual market might encourage its sale, even though the security replacing it may have even less potential for yield. In fact, securities with a substantial growth in market value would tend to be sold if such a valuation method were a governing factor while those with little gain would tend to be held. Such a practice could not be considered conducive to good portfolio management.

The influence of valuation methods on investment decisions is overcome in one problem area by the practice known as *bond-swapping*. In a market with rapidly rising interest rates, the price of long-term bonds drops substantially. If a system values each bond at the price paid for it, at its maturity value, or at some amount in between, sale of the bond can substantially reduce the apparent value of the assets held by the system, even if the bond bought to replace the sold security has a greater potential yield. Because of this, many systems are reluctant to sell securities at depressed prices. To give relief in this situation, the "swapping" concept has been widely adopted. Under this method, a replacement bond of about the same quality is bought when the old one is sold. The new bond matures for the same amount and at nearly the same date but usually has a higher coupon rate. The replacement bond is carried on the books of the system at its actual cost plus the loss realized on the sale of the original security. Assume, for example, that an original \$1,000 bond was bought for \$970 and sold for \$900. The bond-swapping method assigns the \$70 loss to its replacement. Thus, if the replacement bond was bought for \$920, it would

be carried at a book value of \$990, \$920 plus the \$70 loss on the original bond's sale. The new discount of \$10 (\$1,000 par value less \$990) is accrued over the lifetime of the replacement bond. This technique eliminates an artificial dip in the asset value which would otherwise create an actuarial loss.

**Actuarial Revaluation Gains and Losses.** All of the actuarial gains and losses discussed so far are called *actuarial experience gains and losses*. A second category of gain and loss is called *actuarial revaluation gains and losses*. These arise when the actuarial assumptions are changed to reflect a reassessment of anticipated experience.

As an example, a system's future employer commitments may have been calculated on the assumption that the portfolio of investments held by the system, and those to be purchased in the future, will earn 4 percent compound interest per year. Because of a change in the investment market or in the system's investment philosophy, the actuary of the system may feel a 5 percent interest assumption is justified for future yields. Accordingly, all of the future payments to members and their beneficiaries would be revalued at the higher rate. This reduces the present value of these commitments, since a greater portion of the disbursements are assumed to come from interest earnings. The normal costs and unfunded actuarial liabilities would also be recalculated and the results would be lower for the same reason.

The gain that results from this procedure is an actuarial revaluation gain. If the new assumptions result in increased liabilities, an actuarial revaluation loss would result. In either case, the gain or loss could be treated as are all other actuarial gains or losses for the system. Alternatively, because of the special nature of the gain or loss, special treatment could be given appropriate to the new funding status of the system.

## EMPLOYER CONTRIBUTION RATES

When the actuarial cost method has been determined, the actuarial assumptions set, and the data gathered for valuation, all of the raw materials are at hand for budgeting the

current employer cost or, if the employer contribution rate is fixed by statute, testing the rate's adequacy. Although the specific technique varies, depending upon the size of the system and other characteristics peculiar to the group of employees in the valuation, the process is essentially one of adding together costs associated with each employee. The costs for each employee are produced by evaluating each of the potential benefit payments for which the employee or his beneficiary might become eligible and determining the probability of the payment occurring. If a projection is being made for the purpose of estimating costs on a pay-as-you-go method, each payment is associated with all others expected to occur in a particular year, to obtain the total estimate of payments in that year. If a valuation is being made for the purpose of funding benefits in advance, each of these future payments is discounted at the assumed interest rate to the date of valuation.

In some instances, the results of the valuation are expressed in terms of a projected employer contribution rate as a percentage of salary. If the actuarial assumptions are realized in the developing experience, the regular contribution into the system's fund of an amount of money equal to the determined percentage of payroll of the covered employees sets aside sufficient funds to meet the commitments of the system, all in accordance with the actuarial cost method used. The required contribution is often expressed as a range of rates within which satisfactory funding will occur. The difference between the contribution at the low and at the high rate is generally the difference between amortizing the unfunded actuarial liability over the longest acceptable time versus the shortest such period.

The governing boards of many systems have the right and responsibility to set the employer contribution rates. After receiving the actuarial report giving the range of acceptable contribution rates, each board acts to specify the rate to be used in determining the employer contributions. The choice of rate within the acceptable range is often governed by decisions to amortize the unfunded liability in a specified period

and to maintain a reasonably stable rate. The rate chosen remains in force until a subsequent valuation is performed. A modification of the rate takes place then if the new valuation so indicates. This general approach is probably the best from an actuarial viewpoint, particularly if the board is required to take corrective action if the employer contribution rates fall outside the specified range. If the discretionary power of the board is too wide, it might take on a legislative function since its actions could affect the budgetary authority of the legislative body.

In some systems, the legislative body retains its full budgetary discretion through specifying by law what the employer contribution rate is to be. If this is regularly modified pursuant to actuarial review, the effect is much the same as if this responsibility is passed along to a retirement board. The potential pitfall of this method is that a budgetary imbalance can be eased by failing to make such increases in the employer contribution rates as are called for by an actuarial valuation. The temptation can be strong since failure to take action rarely results in any immediate shortage of cash in the funds of the retirement system.

Where the employer contribution rate is specified as a percentage of salary, the necessary contribution can be treated as a payroll expense and need not be budgeted independently from other salary-related expenditures. In some systems, the specific dollar amount required to meet the entire employer contribution from legislative session to legislative session is treated as a separate item under the budget. This method probably faces the greatest peril of legislative irresponsibility in retirement system financing of any method except the pay-as-you-go method.

In many smaller systems the employer contribution matches the employee contribution on a dollar-for-dollar basis. If an employee terminates before his benefit is vested, the employer contributions matching the refunded employee contributions are released often to help meet the required employer's contribution for other employees. One variation of this approach allows the employer to anticipate future

employee terminations and thereby only partially match employee contributions on a current basis. When an employee retires, the difference needed is made up from unallocated employer funds. A second variation is to make similar contributions but not allocate any of the employer money to any particular employee until he retires. At that point, the pool of unallocated money is drawn upon to provide a sum equal to the employee's accumulated contributions.