Methods of Financing 4

$\mathbf{T}$HE foregoing chapter outlined the basic features of the various contractual arrangements under which the benefits of a pension plan may be provided. This chapter will describe and illustrate the various techniques by which the sums required to provide the benefits of a pension plan can be accumulated or budgeted. These budgeting arrangements are usually referred to as *funding methods,* while the legal instruments, such as a group annuity contract, under which the funding arrangements operate, are properly called *funding media.* The ultimate true cost of a pension plan is in no wise affected by the choice of funding method. Yet, the funding method determines how much of the ultimate cost of a plan is to be met during any particular period of time.

Underlying the funding process are certain concepts which should be clearly understood. The most basic, perhaps, is that of *normal cost* which may be defined as that level of contributions that would currently be required under a particular funding method if the plan had been in effect and contributions had been made in accordance with such funding method from the earliest date of credited service and all actuarial assumptions had been exactly realized. The normal cost varies as between funding methods, particularly during the early years of a plan, but as the years go by and the employee group (including pensioners) matures, the normal cost will, in theory, stabilize at a level which is identical under several of the conventional funding methods.

The *accrued liability* of a pension plan, as of any given time, represents the difference between the present value of future benefits and the present value of future normal costs.[1] It reflects not only the present value of benefits credited for service prior to the effective

1. Accrued liability may be viewed retrospectively as the accumulation of all past normal costs incurred under the plan.

date of the plan but also the present value of all benefits credited for service subsequent to the effective date of the plan, up to the date of valuation. It follows, therefore, that the accrued liability grows with the passage of time, attaining its ultimate level only when the plan has matured and benefits to retired employees have reached their peak.

The accrued liability on the effective date of a pension plan is commonly referred to as the *initial accrued liability*. While originating in credited past service, the initial accrued liability is precisely equal to the present value of past service benefits only under the single premium method of funding, which makes a clear-cut distinction between past service and future service benefits. In connection with the latter method of funding, it is customary—and proper—to speak of the initial accrued liability as the *initial past service liability* and accrued liability as past service liability, meaning all service prior to the date of valuation.

The essence of the funding process is the accumulation of assets, in a segregated fund, to offset the liabilities arising under the pension plan. The sums set aside may be adequate, with future interest earnings, to pay all benefits which have accrued at a particular time, which might be designated as full funding, or, a more common situation, they may be adequate to meet only a portion of the accrued liability, which reflects a condition of only partial funding. That portion of the accrued liability of a pension plan which is not offset by assets is termed the *unfunded accrued liability*.

DISBURSEMENT APPROACH

All budgeting arrangements do not contemplate the accumulation of a pension fund. The simplest approach and, historically, the traditional one is for the employer to disburse the benefits as they become due. This is sometimes referred to as the pay-as-you-go approach or, derisively, as the owe-as-you-go approach. Under this plan, retirement benefits are treated as payroll costs and are paid directly to the superannuated employees by the employer. Such benefits, if reasonable in amount, are deductible from the employer's gross income as a necessary business expense and are taxable to the recipient as ordinary income. No distinction is made between past service and future service benefits since under this arrangement such a distinction would be meaningless.

The cost of providing retirement benefits under this method is normally low during the early years of a company's existence, since the number of retired employees is relatively small and no provisions are being made to meet the accruing benefits of those employees who are still working. As the employee group matures, however, a constantly increasing number of persons are added to the retired rolls until eventually retirement benefits constitute a significant percentage of the total payroll costs. In fact, for reasons which will be evident later, the annual outlay under this arrangement, expressed as a percentage of payroll, ultimately reaches a level that is considerably higher than that of any other financing method. Not infrequently the contributions become so burdensome that the pension plan must be abandoned or drastically modified.

In order to anticipate the heavy drain on cash resources that this method ultimately entails, some companies set up a balance sheet reserve for pensions. This action may involve the earmarking of specific assets for the payment of pension benefits, or it may be limited to a restriction against surplus, similar to a reserve for depreciation. In either case it does not place any assets beyond the control of the employer and fails, therefore, to insulate the pension benefits against the financial vicissitudes of the employer. Moreover, the reserve may not be established nor maintained on the basis of actuarial estimates of the liabilities of the pension plan. A final weakness of the balance sheet reserve from the standpoint of the employer is that the sums transferred to the reserve are not deductible as an ordinary and necessary business expense. To be deductible, such sums would have to be placed beyond the control of the employer as by transfer to a trustee under a suitably drawn trust agreement or payment to an insurance company for the purchase of benefits. The benefits, nevertheless, are deductible in the tax year in which paid.

Though once dominant, the disbursement method of pension financing is used only on a limited scale among larger employers today.

TERMINAL FUNDING

There is no funding in the proper sense of the term in connection with the disbursement method. The employer underwrites the bene-

fits and pays them out of current operating income. The receipt of benefits by the employees is completely dependent upon the employer's willingness and ability to pay them. The employees can look to no earmarked fund, irrevocably committed to the payment of pension benefits and administered by an impartial third party, for the satisfaction of their claims. Retired employees, however, can be provided with a high degree of security through an arrangement known as terminal funding.

Terminal funding is a compromise between no funding and full funding. Under this arrangement, the benefits payable to retired employees are funded in full, while the benefits standing to the credit of the active employees are completely unfunded. This funding may be accomplished through the purchase of an immediate annuity in the appropriate amount for each employee as he reaches retirement or by the transfer to a trust company of a principal sum actuarially estimated to be sufficient to provide the benefits promised. The principal sums required for such transactions normally come out of the operating income of the employer, since by definition the employer makes no advance provision, other than through the possible creation of a balance sheet reserve, for the accumulation of the sums needed. If otherwise eligible, such sums are deductible for Federal income tax purposes at such time as they are transferred to the insurance company or the trust company.[2]

The terminal funding device is frequently used among negotiated pension plans, a trust company usually serving as the funding agency. Under most of these plans the employer is legally obligated to provide retirement benefits only to those employees who retire during the term of the labor agreement. The benefits, nevertheless, must be continued throughout the lifetime of such employees even though the pension plan should be terminated. Although the presumption exists that the plan is a permanent venture and will be extended by mutual agreement to provide benefits to those employees who retire beyond the term of the current contract, many employers prefer not to fund for any employees who cannot qualify for benefits during the current agreement. In other cases, the financial commitment to which the employer agreed is no more than

2. The conditions under which contributions under the terminal funding arrangement are deductible for tax purposes are set forth in PS No. 67, April 26, 1951.

adequate to provide benefits on a completely funded basis to those employees who have retired.[3] The terminal funding plan meets the demands of either situation.

ADVANCE FUNDING

The term "advance funding" may be applied to any arrangement under which sums intended for the payment of retirement benefits are set aside under proper legal safeguards in advance of the date of actual retirement. It does not necessarily imply full funding, since it is usually many years after a plan has been established before the accrued liability is fully funded. In fact, the initial accrued liability may never be funded, a practice which is referred to as "freezing" the initial accrued liability.[4] It usually implies, as a minimum, that sufficient funds are set aside each year to meet the pension obligations created in that year, plus an amount equal to the interest on the unfunded past service liability. As a matter of practice, virtually all plans which follow the advance funding approach set aside each year enough funds to pay the benefits credited during that year, plus a portion of the initial past service liability, with a view toward having all obligations fully funded at the earliest practicable date. The advanced funding approach is the conventional financing technique used in pension plans today.

ARGUMENTS FOR AND AGAINST ADVANCE FUNDING

There are several arguments in favor of advance funding, the most persuasive undoubtedly being the financial advantage. The out-of-pocket cost of providing pensions is much smaller under the advance funding method of financing than under either of the other two methods. For example, an employer would pay out $17,200 on the pay-as-you-go basis if he were to provide $100 a month to an employee who retires at age 65 and lives out the life expectancy

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3. In the case of several negotiated welfare and retirement funds, current disbursements are approximately equal to current contributions. In effect, these plans are on a pay-as-you-go basis. Many negotiated plans are silent as to funding provisions, the emphasis being on the benefits to be paid.

4. See p. 144. If the initial accrued liability is frozen, contributions to the plan may well be smaller than those under a terminal funding arrangement. In fact, under a mature plan such a funding policy would, in theory, produce contributions precisely equal to those required under a pay-as-you-go plan.

accorded him under the 1937 Standard Annuity Table. Under the terminal funding arrangement, however, with the cost calculated on the basis of the 1937 Standard Annuity Table, 2½ per cent interest, and no allowance for expenses, the employer would need to set aside at the employee's age 65 only $13,766. Finally, if the sum required to provide the benefits were to be accumulated through a series of level annual instalments, extending from age 30 to age 65, discounted for interest but not for mortality, the cost would aggregate only $8,558, or approximately 50 and 62 per cent, respectively, of the cost under the disbursement and terminal funding methods.

The difference in the out-of-pocket cost under the three methods of financing is, of course, wholly attributable to the interest factor. Under the disbursement plan, the employer's contributions obviously earn no interest, and the total cost is the sum of the individual payments. In the case of the immediate annuity, the benefits are discounted for interest, and the employer, in effect, is credited with 2½ per cent interest on the unliquidated portion of the single premium. Under the advance funding scheme, each annual instalment earns 2½ per cent interest from date of payment until the time it is disbursed as a retirement benefit. Over the period of years, the sums which the employer contributes are credited with $8,642 in interest.[5]

These interest earnings should properly be viewed as a part of the cost of the pension plan. They represent money which presumably would have been earned if the sums transferred to the plan had been invested elsewhere. In fact, the counter argument for nonfunding is that such funds will earn more in the employer's business than in the hands of a separate funding agency. While this may be true on a gross yield basis, it should be remembered that under a pension plan which meets Treasury specifications interest earnings are not taxable. Therefore, at current tax rates a corporate employer would have to have an earnings rate, before taxes, at least double that of the funding agency in order to net the same rate. Furthermore, the funding agency credits the pension accumulations with the actual rate of interest earned, which is normally in excess of 3 per cent, rather than with the 2½ per cent assumed in the illustration.

5. The employer's outlay would be reduced by another $2,018 if his contributions were discounted for mortality prior to age 65 in accordance with the 1937 Standard Annuity Table. His outlay could be reduced by another $2,321 by applying a moderate discount for turnover.

A second argument for advance funding is the higher degree of security afforded the participants in the pension plan. Under the disbursement or pay-as-you-go arrangement, the employees are completely dependent upon the solvency of the employer. Under the terminal funding approach, retired employees can look to a separate agency for payment of their benefits, but the active employees enjoy no such protection and are just as dependent on the continued existence of the business as are the employees under a disbursement arrangement. Under the advance funding scheme, however, all employees, active and retired, enjoy the added measure of security afforded by a segregated fund dedicated to the payment of their retirement benefits. If the plan is fully funded, on the basis of conservative assumptions, all benefits which have accrued as of a particular time can be paid without further contributions from the employer. If the plan is only partially funded, the employees obviously enjoy a lesser degree of security.[6]

A third argument, which is closely related to the foregoing, is that advance funding facilitates the vesting of employer contributions, which is considered to be socially desirable. A vesting provision is basically inconsistent with either the disbursement or terminal funding method of financing. There is an inherent assumption under these two arrangements that no benefits will be disbursed until the employee reaches retirement, although benefits naturally could be provided earlier. It is generally assumed, however, that if employer contributions vest prior to retirement, the funds necessary to meet the accrued obligations should be accumulated by the earlier date. Certainly, the security attached to such vested benefits is greatly enhanced by advance funding.

A final argument in favor of advance funding is that it forces each generation of workers to pay for its own pensions.[7] This argument is fraught with economic ramifications but, in essence, it rests on the assumption that if the cost of pensions is added to the cost of production, and presumably to the price of the commodities produced,

6. It is interesting to observe that the concept of advance funding is based on the assumption that the pension plan will eventually terminate. If it could be assumed that a plan would continue in perpetuity, no reserves would be necessary. They might still be desirable, however, as a source of tax-exempt earnings and as a device for the leveling of costs.

7. See Arthur H. Dean, "Accounting for the Cost of Pensions," *Harvard Business Review*, Vol. XXVIII, No. 5, September, 1950, pp. 102-22.

in the year in which the benefits accrue, the increased prices will cause the generation of active workers to consume less than they would otherwise, thus conserving economic resources for their old age. The argument is complicated by the fact that there is no general agreement among economists as to the manner in which pension costs are borne by the employer, the employees, and the consuming public. In any case, the argument is valid only if the funds set aside for pensions are invested in capital improvements that will increase the flow of consumer goods in the future. Otherwise, the generation of retired workers would still be subsisting on the production of the younger generation.

The arguments against advance funding are few. The most serious one is that the funding process removes and segregates increasingly large sums of corporate funds which might be retained to better advantage for use as venture capital. From the standpoint of one employer, it involves the question of whether it would be more profitable to retain the funds in the business than to have them invested by a separate agency. From the standpoint of the economy as a whole, however, it raises the issue as to whether venture capital is being drained away from corporate enterprises more rapidly than it is being returned through investment channels.

A less serious argument against advance funding is that it involves a loss of flexibility and maneuverability. An unfunded plan can be operated without Treasury interference, whereas a funded plan, if it is to qualify for tax deductions, must meet the specifications of the tax laws.
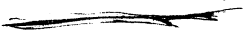
STATUTORY LIMITATIONS ON ADVANCE FUNDING

In order to prevent the employer from funding his pension obligations in a manner that would afford him the greatest tax advantage, the Congress has imposed certain maximum limitations on the rate at which a plan can be funded. These limitations are set forth in Subparagraphs (A), (B), and (C) of Section 404(a)(1) of the Internal Revenue Code and are applied as alternative tests. As a general rule, however, the employer must select the basis under which he will seek deductions and adhere to it. He cannot shift freely from one basis to the other in an effort to obtain maximum tax deductions.

The first test laid down in the law is known as the Five Per Cent Rule. Under this rule the employer is presumptively entitled to deduct annually an amount not in excess of 5 per cent of the compensation paid to employees covered under the plan. The law requires the Commissioner of Internal Revenue to audit the financial operations of the plan at not less than five-year intervals, and empowers him to reduce the permissible deduction if it appears from the actuarial evidence that the cost of the plan is less than 5 per cent of compensation. The annual cost of a pension plan, of course, will normally be considerably in excess of 5 per cent of compensation, particularly during the period that the past service liability is being liquidated. This provision would have been rather restrictive, therefore, if relief had not been afforded through the other two tests.

The second test, or Straight-Line Rule as it is usually called, permits the employer to deduct any amount in excess of 5 per cent of compensation "necessary to provide with respect to all of the employees under the trust the remaining unfunded cost of their past and current service credits distributed as a level amount, or as a level percentage of compensation, over the remaining future service of each such employee . . ." This simply means that an employer can deduct each year such sum as is needed to provide on a level contribution basis the total benefits payable under the pension plan. The calculation can be made with respect to each individual employee or on an aggregate basis, but the actuarial assumptions must meet the approval of the Treasury authorities. Under this rule, there is no limitation as to the minimum number of years over which the cost of an employee's benefits must be spread, except "if such remaining unfunded cost with respect to any three individuals is more than 50 per centum of such remaining unfunded cost, the amount of such unfunded cost attributable to such individuals shall be distributed over a period of at least 5 taxable years . . ." In other words, if more than half of the cost of a pension plan is attributable to the benefits payable to any three employees, who in the normal case would be officers of the company, the contributions would have to be spread over at least five taxable years.

The third, or Past Service Rule, states that the employer may

deduct, in lieu of the amounts allowed under the two previous rules, a sum equal to the normal cost of the plan, plus 10 per cent of the initial past service liability.[8] Referred to as the "standard 10 per cent base," this sum can be increased only through a retroactive increase in benefits or through correction of an actuarial error.[9]

The last mentioned rule is the one that regulates employer contributions under most pension plans. In most cases, the initial past service liability is of such magnitude that its liquidation requires financial management of the highest order. In the absence of restrictive legislation, an employer could be expected to liquidate his past service liability in a manner that would yield the greatest tax savings. If possible, the liquidation would be concentrated during a few years of unusual profits, when the costs could be charged off against income taxes, and in recent years against the excess profits tax. To forestall this loss of tax revenue, the law provides that no more than 10 per cent of the initial past service liability may be deducted in any one tax year. Since the initial past service liability is an interest-bearing item, representing a discounted value, liquidation at the rate of 10 per cent per year requires between eleven and twelve years, depending upon the rate of interest assumed.

The enactment of this limitation created a possible conflict with the second rule discussed above. Specifically, the question was whether the benefits of a particular individual could be financed on the straight-line basis, if such method resulted in the liquidation of the past service liability at a faster rate than 10 per cent per year. By regulation the Treasury ruled, in effect, that the straight-line method could not be used if it would violate the Past Service Rule.

8. The law and regulations use the expression "initial past service liability," but the initial accrued liability produced by other funding methods, particularly the entry age normal method (discussed later), may also serve as the 10 per cent base.

9. A special 10 per cent base may be substituted for the initial past service liability in order to fund increases in such liability arising out of (1) net losses arising from experience in previous years less favorable on the whole than that assumed in the estimated costs for such years, (2) changes in valuation assumptions or contract premium rates to a basis more conservative than that on which the original cost estimates were based, and (3) failure to fund the full normal costs and interest on unfunded past service costs in one or more years. See Paragraph 38 of Treasury Bulletin on Section 23(p)(1)(A) and (B), dated June 1, 1945.

The ruling was contested, and the Tax Court overruled the Commissioner of Internal Revenue, thus permitting the straight-line method to be used in any situation.[10]

It should be noted that any amounts contributed by the employer in excess of those permitted by the foregoing limitations may be carried over to future tax years and deducted in accordance with prescribed procedures.

The preceding rules impose limitations on the maximum amounts that may be deducted by an employer in any one tax year; the minimum amount that may be contributed to a pension plan is likewise the subject of regulation. This limitation, however, is couched in terms of total contributions to the plan, rather than employer contributions. Broadly stated, the contributions must be adequate to meet the normal costs of the plan plus interest on the initial past service liability.[11] That is, the contributions must be large enough to purchase all benefits that accrue after inception of the plan and at the same time prevent an increase in the initial past service liability. Since this latter sum is a discounted value, failure to contribute an amount equal to the assumed rate of interest would produce an increase in the total liability. Such an increase in the initial past service liability would be equivalent to unfunding a portion of the future service benefits which, by regulation, must be paid up at all times. After a portion of the initial past service liability has been funded, contributions for any particular year may be less than the amount needed to provide the benefits for that year, or may be omitted entirely, so long as, in the aggregate, contributions have been adequate to provide in full all future service benefits.

Apart from the exception noted in the preceding sentence, it may be said that the annual rate of funding can range from a minimum of the normal cost plus interest on the initial past service liability to a maximum of the normal cost plus 10 per cent of the past service liability.

10. *Saalfield Publishing Co.* v. *Commissioner,* 11 TC 756, November 1, 1948. The Commissioner appealed the decision to the Circuit Court of Appeals for the 6th Circuit but later acquiesced. See Internal Revenue Bulletin, No. 21, October 13, 1952, p. 1.

11. Paragraph 9(d), Mimeograph 5717, July 13, 1944; P.S. No. 64, November 9, 1950; and Paragraph 4, P.S. No. 67, April 26, 1951.

FACTORS AFFECTING PENSION COSTS

Advance funding, by definition, involves the setting aside of funds for the payment of pension benefits in advance of their due date. This means that the cost of providing the benefits must be estimated years in advance. Each factor that has a bearing on the cost must be analyzed and its influence evaluated. The factors that are normally taken into account are (1) mortality, (2) interest, (3) expenses of operation, (4) turnover, (5) age of retirement, and (6) changes in rate of compensation.

Mortality.—Mortality is one of the most important determinants of the cost of benefits. The rate of mortality among active employees, along with the rate of withdrawal, determines the number of employees who will become entitled to benefits. If death benefits are available before retirement, the rate of mortality will directly determine the cost of such benefits. The rate of mortality among retired employees is even more crucial than that among active employees, since it determines how long the benefits will be paid. The higher the death rate among both active and retired employees, the lower will be the cost of the pension plan.

Mortality among retired employees is estimated according to an annuity table, frequently the 1937 Standard Annuity Table, while mortality before retirement may be estimated according to an annuity, insurance or other type of table, depending upon the nature of the death benefits, if any. Contributions under virtually all plans, whether insured or uninsured, are adjusted to take account of the anticipated mortality before retirement. This process is referred to as discounting for mortality. In the interest of conservatism, a lower rate of mortality is usually assumed than that which is actually expected, the employer being credited with any gains as they accrue.

Interest.—Interest must be taken into account since the dollars that are set aside are invested and earn interest until they are paid out as benefits. This is particularly important during the period before retirement, or the accumulation period. In this connection it is interesting to observe that a dollar invested at 2 per cent compound interest will double itself in 35 years, while a dollar invested at 3 per cent interest will double itself in less than 24 years. Thus,

annual contributions on behalf of an individual who enters a pension plan at age 40, if invested at 3 per cent compound interest until age 65, would, in the aggregate, increase by 50 per cent from interest earnings.

Contributions under all plans are likewise discounted for interest, with the actual rate earned being credited to the funds.

Expenses of Operation.—Under insured plans an arbitrary allowance is made for anticipated expenses. This allowance is designed to take care of all expenses incurred before and after retirement. An allowance is also made for contingencies, the two items being combined into a composite increment to the net premium called loading. In group annuities the usual loading is 5 to 8 per cent of the gross premium, the major portion of which is for contingencies.[12] Under other insured forms, the loading is somewhat higher. Under all types of insured plans, except individual contracts issued by stock companies, if expenses are less than anticipated, the savings are credited to the employer, either as a dividend or as a premium credit.

Under self-administered plans, the employer is permitted by Treasury regulations to make advance provision for expenses of operation, but no deductions may be taken for contributions to the trustee for the purpose of accumulating a reserve for contingencies. As a general rule, however, expenses are handled on a pay-as-you-go basis.

Turnover.—Turnover among employees has the same effect on pension costs as mortality before retirement—it reduces the number of persons to whom retirement benefits must be paid. Under many plans turnover is a more important factor than mortality and interest combined. Most plans, however, attempt to exclude high turnover employees through the imposition of age and service requirements, which tends to lessen the influence of the turnover factor. Its influence is further modified in plans which vest the employer's contributions in the employees either immediately or after certain requirements have been met.

Contributions under self-administered plans are frequently discounted for turnover. In other words, no contributions are made on behalf of the employees who are expected to terminate their em-

12. See pp. 93-94.

ployment before date of retirement. The number of employees who will terminate their employment is generally estimated from a turnover table, which may reflect the actual or projected experience of the employer or may represent the turnover rates applicable to a broader segment of industry. A turnover table indicates the percentage of employees who may be expected to withdraw at each age, and it is applied in the same manner as a mortality table to determine the number of employees who should survive to retirement. In fact, the turnover table is usually combined with the mortality or annuity table to show the total decrements from employment age by age. Occasionally, the turnover table is on a select basis, which means that turnover rates are shown not only by age but also by duration of service. In such event, it would not generally be combined with the mortality table. In some cases, the contributions are not discounted in the technical sense, the employer, rather, simply failing to make contributions on behalf of employees known to be subject to high turnover.

Premiums under the usual forms of insured plans are never discounted for turnover. The insurance companies consider turnover to be uninsurable in that the risk is partly under the control of the employer and, in addition, is influenced by such broad economic forces as to be essentially unpredictable. For purposes of funding, the assumption is made that each employee who becomes a member of the plan will remain with the employer until retirement, and in the event that an employee withdraws before date of vesting or retirement, the employer is credited with the contributions he has made on behalf of the terminating employee.

Under the deposit administration and immediate participation guarantee forms of group annuity contracts, in connection with which employer contributions are not allocated to individual employees before retirement, contributions may be discounted for turnover at the discretion of the employer. If actual turnover should turn out to be less than that anticipated, the employer would have to contribute the additional sums needed. If, on the other hand, turnover should be greater than that estimated, future contributions of the employer could be reduced.

Age of Retirement.—For purposes of funding, it is necessary to make an assumption as to the age or ages at which employees will retire. In the majority of cases, it is assumed that retirement will

occur at the normal retirement age. In such cases, the normal retirement age fixes the date by which the funds for the employee's pension must be accumulated in full and, furthermore, determines the principal sum which will be needed. The lower the age at which retirement is permitted, the more costly the pension plan will be. Other things being equal, a plan with a normal retirement age of 60 will cost about 50 per cent more than one with a retirement age of 65, and the latter in turn will cost about 50 per cent more than a plan which provides for retirement at age 70.

The great majority of plans specify 65 as the normal retirement age, although a few plans permit female employees to retire at age 60. Retirement at an age younger than the normal retirement age, when permitted, generally does not increase the cost of the plan, since the employee usually receives only the actuarial equivalent of the benefit which would have been paid had he retired at the normal age. Retirement at an age later than the normal retirement age, however, may decrease the cost since, if the employee continues to draw his full salary, a common arrangement, the employer may be credited with the benefits which would normally have been paid to the employee.

Conventional insured plans must fund for a normal retirement age. Self-administered and deposit administration plans may and often do assume an average retirement age or a distribution of retirements over a range of ages.

Changes in Rate of Compensation.—This factor need be considered only in those plans whose benefits are directly related to compensation. Among such plans the type whose benefits are based on the compensation of the final years of service, presents the greatest complications in funding.

Self-administered plans usually attempt to anticipate the effect of increases in compensation through the use of an assumed or projected salary scale which reflects the rate of earnings for each age to retirement. In general, insured plans do not attempt to anticipate salary changes. The assumption is made that the rate of compensation for each employee will continue at its current level until retirement, and any changes, when they occur, are also deemed to be permanent. Under the deposit administration and immediate participa-

tion guarantee plans, however, salary projections may be used by the employer if desired.

METHODS OF ADVANCE FUNDING

Several methods of advance funding are in general use, but they may be broadly classified, as to approach, into three basic types: single premium, level annual premium, and aggregate.[13] The structure of these methods and the manner in which they influence the cost of a pension plan can be described most effectively by reference to concrete figures, but it seems advisable to preface such an analysis with a description of the general characteristics of the methods.

Single Premium Method.—This method, also known as the "unit credit" method, involves the setting aside, in one sum, of the amount of money needed to fund in full one unit of benefit. Theoretically, this unit of benefit could be defined in various terms, but in practice it is almost invariably related to a year of service. In other words, it is the benefit earned during one year of service. Thus, if in his first year of coverage, an employee age 25 should earn an annual benefit at age 65 of $30, a paid-up annuity in that amount would be funded for the employee at a cost, under one set of actuarial assumptions,[14] of $99.90. Each year thereafter that such employee participates in the plan, a paid-up annuity in the appropriate amount is funded for the employee at a constantly increasing cost per dollar of benefit. At retirement, his income is derived from a series of paid-up deferred annuities funded over the entire period of his participation in the plan.

13. This classification differs sharply from that developed by Charles L. Trowbridge in his paper entitled "Fundamentals of Pension Funding," *Transactions of the Society of Actuaries,* Vol. IV, 1952, pp. 17-43. Trowbridge derived a highly logical but rather complex classification of funding methods based on the magnitude of the ultimate fund that would be accumulated under the assumption of an initially mature population. Six classes were set up in ascending order of size of the ultimate fund, ranging from pay-as-you-go, under which the fund is zero, to *complete* funding, under which the fund would be of such size that interest on the fund would be adequate to meet the benefit payments.

14. 1937 Standard Annuity Table, 2½ per cent interest, and loading of 8 per cent of gross premium.

Under this method of funding, current and past service benefits are treated separately. The current service benefits of each employee are funded in full as they accrue, and the current service or normal cost of the plan is the sum of the single premiums required to fund the benefits of all employees covered under the plan. The past service cost is the sum of the single premiums required to fund in full all benefits credited to the employees for service prior to the effective date of the plan. These benefits need not be funded at the inception of the plan and as a rule are funded over a period of years. If the plan is insured, however, all benefits to which a particular employee is entitled, regardless of the period during which they were earned, must be purchased in full before retirement.

The single premium method of funding is virtually always used in connection with deferred group annuity contracts and may be used with other types of plans. It is equally appropriate for a benefit formula which provides a definite benefit and one which utilizes the money purchase concept. It is not suitable for a plan which provides a flat benefit or benefits based on the earnings of a future period, such as the last five years of service, or one which provides for the deduction of OASI benefits. Under such benefit formulas, it is extremely difficult, if not impossible, to determine the unit of benefit to be funded each year.

Level Annual Premium Method.—Contrasted with the method under which each unit of benefit is funded in full in the period during which it is earned is one under which the total benefits to be paid to an employee are estimated and the sum required to provide the benefits is accumulated through uniform increments over the remaining years of service. This latter method is known as the level annual premium method, of which there are two principal forms.

Perhaps the most familiar form of the annual level premium method is the "individual level premium" method which is employed in connection with individual and group permanent insurance contracts. The contract for a particular employee is written in an amount exactly adequate to provide the benefits that would be payable to the employee if his rate of compensation remains unchanged to normal retirement age, and the payment of premiums on the contract meets the funding requirements. As is true of all insurance contracts, the premium is calculated as of the attained age of the employee.

If the rate of compensation increases, with an attendant change in benefits, an adjustment in the amount of insurance is made in the manner described earlier, and the funding of the increase in benefits is accomplished by a separate and additional level premium, payable from the date of increase.

Inasmuch as the insurance contracts are written in amounts designed to provide benefits for the entire period of credited service, no distinction is made between past and current service costs. The sums necessary to amortize the past service liability are merged indistinguishably into the annual premium and are not identifiable as past service contributions. The total amount funded each year is simply the sum of the premiums on all contracts issued under the plan.

This method of funding, which is frequently referred to as "attained age level premium" funding, is not confined to individual and group permanent insurance contracts or to insurance contracts in general. It can be and frequently is used to fund self-administered plans. It lends itself to any type of benefit formula, being especially adaptable to formulas which provide a flat benefit or one expressed as a flat percentage of salary.

The other principal form of level annual premium funding is the so-called "entry age normal" method.[15] This method differs from the individual level premium approach in that the contribution on behalf of an individual employee is that level amount, or percentage of payroll, which would have been required to fund all the benefits of the employee if the plan had been in effect, and contributions had been made, from the beginning of the employee's credited service. In other words, it is assumed for purposes of funding that contributions have been made for the duration of the employee's credited service, and that a reserve equal to such contributions, plus interest and the benefit of survivorship,[16] is standing to the credit of the employee as of the effective date of the plan. Obviously, the

15. Some actuaries regard entry age normal as a separate funding method, since only the normal cost is calculated as a level amount or level percentage of payroll. It is further differentiated from the individual level premium method in that both normal and past service costs are frequently calculated on a collective basis, without reference to individual employees.

16. Benefit of survivorship is an actuarial concept meaning in this instance that those employees who are assumed to survive to normal retirement age share pro rata in the contributions, plus interest, made on behalf of those employees assumed to die before normal retirement age.

longer the period of prior service, the larger is the "reserve" or deficiency. For the plan as a whole, the sum of the individual "reserves," including those for retired lives, constitutes the past service liability, a definitely identifiable entity. Thus, it may be seen that the entry age normal method effects a separation between past service and current service costs. In fact, its very name denotes that the periodic contributions are designed to fund only the normal cost of the plan. The expression "entry age" refers to the age at entry into employment or membership in the plan if there are age or service prerequisites.

The deficiency produced by this method of funding can be liquidated in the same manner as any other accrued liability. Insurance companies, however, usually require that the accrued liability be funded at such a rate that benefits for retired lives are completely funded at all times. If the deficiency is completely liquidated, the distinction between the entry age normal and the attained age methods disappears when the last employee with prior service is removed from the payroll. At that point, the "entry age" and "attained age" are the same for all employees.

If the employer prefers, the past service liability need not be liquidated or even reduced, in which case it is said to be "frozen."[17] In other words, it will never be paid off. This can be managed by financing the past service benefits of retired employees out of the current service contributions for active employees, the process being continued ad infinitum. It is based on the assumption that the plan will exist in perpetuity. The concept is not confined to the entry age normal method of funding, but it cannot be applied under a funding instrument which allocates contributions to specific employees during their period of employment.

The entry age normal device may be used with any type of funding instrument which does not allocate contributions to individual employees before retirement. It is widely used to fund deposit administration, IPG and self-administered plans.

17. The expression "frozen initial liability" may also refer to a method under which funding of the accrued liability is contemplated but in accordance with which the initial accrued liability remains fixed, as the 10 per cent base, any adjustments for gains or losses being reflected in future normal costs. See Charles L. Trowbridge, *op. cit.*, pp. 38-39. See also Paragraph 55 of Treasury Bulletin, dated June 1, 1945.

Aggregate Cost Method.—This method is analogous to the individual level premium or "attained age" method of funding except that the benefits and contributions are calculated on a collective basis. The portion of the cost which is to be met each year is generally expressed as a percentage of annual covered payroll, which percentage is called the "accrual rate" or the "aggregate cost ratio." The precise manner in which the accrual rate is determined can be more easily illustrated than described, but, in essence, the present value of estimated future benefits, less any funds already accumulated, is divided by the present value of estimated future compensation of all covered employees. The rate must be recalculated periodically.

The aggregate cost method calculates past service and future service benefits together and is considered by the Treasury to be a Straight-Line method. The accrued liability is paid off rather rapidly in the beginning but at a progressively diminishing rate, so that it is completely paid off only at infinity.

This method of funding has found its widest use among self-administered plans, although it is adaptable to the deposit administration and immediate participation guarantee forms of group annuity. Once widely used, its popularity has declined in recent years.

Combination Methods.—There are two other significant forms of funding which can best be described as combination methods, since they possess some of the characteristics of more than one method. The first is a rather complex method going under the designation "attained age normal," not to be confused with the individual level premium method which is sometimes referred to as the "attained age" method. It is applicable only to the type of benefit formula associated with the single premium funding method, which is to say a definite unit of benefit for each year of service. The procedure consists of sealing off the past service liability as derived by the single premium funding method and funding future service or normal costs on the aggregate basis. The past service liability can be liquidated in any manner permitted by the funding agency or frozen at its original level.

The money purchase plan also has the characteristics of more than

one funding method. The contribution rate is a level percentage of compensation, which would seem to place the method in the level premium category, except that the contributions are usually applied as single premiums. Inasmuch as there is no real distinction between a series of equal single premiums and a level annual premium, a strong case can be made for classifying money purchase as a level premium method.

ILLUSTRATION OF ADVANCE FUNDING TECHNIQUES[18]

The impact of the foregoing funding techniques on the initial cost of a pension plan can be more clearly visualized in connection with a specific set of pension data. For purposes of illustration, a hypothetical but typical pension case has been formulated, with each of the major funding methods demonstrated. The case is presented in a series of integrated tables with the columns numbered consecutively. The illustration is applicable to both insured and self-administered plans.

The assumptions underlying the cost calculations of the case are as follows:

Employee Data.—The age distribution, average earnings, and average length of service, are based upon the data for an actual group of salaried employees. The characteristics of this group appear to be fairly typical of that class of employees. In order to simplify the computations, all employees are assumed to be males.

Mortality.—The mortality assumptions before and after retirement are based on the 1937 Standard Annuity Table with no setback.

Interest.—An interest rate of 2½ per cent was assumed. This is higher than the 2¼ per cent assumed by most insurance companies in their annuity premium calculations and somewhat lower than the rate commonly assumed in the valuation of self-administered plans.

Expense Loading.—No allowance was made for expenses. This seemed advisable in view of the divergent treatment of expenses as between insured and self-administered plans.

18. The cost calculations presented in this section were prepared for the author by the firm of Towers, Perrin, Forster, and Crosby, Inc., under the direction of Mr. John K. Dyer, Jr., Vice-President and Actuary.

Turnover.—No discount for future turnover was included. Since this is a major determinant of cost, the modifications in the cost figures that would be produced by inclusion of a turnover factor will be pointed out later.

Salary Increases.—No allowance was made for future salary increases. This factor exerts an influence on costs exactly opposite to that of the turnover factor, so that the two omissions cancel out to some extent.

Age of Retirement.—The normal retirement age was assumed to be 65, and no allowance was made for delayed retirement in individual cases. This is the customary procedure under both insured and self-administered plans, with credit being taken for postponements as they actually occur.

It is emphasized that these cost figures have been developed primarily to illustrate the effect upon costs of the use of the different funding methods, and the most significant comparisons, therefore, are those relating to relative costs and payments under the different methods.

Basic Data.—The basic data for the hypothetical pension case are presented in Table 7. The age distribution of the employee group is

TABLE 7

BASIC DATA FOR HYPOTHETICAL PENSION PLAN

Age Bracket	Age Assumed for Computations	Number of Employees	Total Annual Earnings	Average Annual Earnings	Average Years of Past Service
(1)	(2)	(3)	(4)	(5)	(6)
15-19	17	30	$ 60,000	$ 2,000	1
20-24	22	110	253,000	2,300	2
25-29	27	160	464,000	2,900	4
30-34	32	130	455,000	3,500	6
35-39	37	110	451,000	4,100	9
40-44	42	100	460,000	4,600	13
45-49	47	90	459,000	5,100	17
50-54	52	80	448,000	5,600	21
55-59	57	70	434,000	6,200	26
60-64	62	60	390,000	6,500	31
65 & over	65	60	378,000	6,300	33
Totals	39.7(Av.)	1000	$4,252,000	$4,252(Av.)	12.8(Av.)

shown by quinquennial age groups, with the median age in each group used for premium computations. The average age of the group, which numbers 1,000, is 39.7, while the average period of service is 12.8 years. The average annual earnings range from $2,000 to $6,300, the average for the group being $4,252. All funding calculations are based on the assumption that the plan is in its first year of operation.

Single Premium Method.—The cost calculations for single premium funding are shown in Table 7a. The plan provides an annual benefit at age 65 of 1 per cent of earnings for each year of service, past and current. For any particular age bracket, prospective benefits for the current year of service are derived by multiplying the total annual earnings of that group by 1 per cent, and benefits for past service are found by multiplying 1 per cent of total earnings for the entire period of credited service. For the 30-34 age bracket, for example, current service benefits total $4,550, while the benefits credited for the six years of past service aggregate $27,300. At age 32, the median age of the group, each $1.00 of benefit at age 65

TABLE 7a

COST CALCULATIONS FOR SINGLE PREMIUM FUNDING

| | Total Prospective Benefits Upon Which Costs Are Based | | | | |
| Age Bracket | Current Service (1% of Col. 4) | Past Service (1% of Col. 4 × Col. 6) | Single Premium Cost Factors | Normal Cost (Col. 7 × Col. 9) | Accrued Liability (Col. 8 × Col. 9) |
(1)	(7)	(8)	(9)	(10)	(11)
15-19	$ 600	$ 600	2.488	$ 1,493	$ 1,493
20-24	2,530	5,060	2.834	7,170	14,340
25-29	4,640	18,560	3.231	14,992	59,967
30-34	4,550	27,300	3.693	16,803	100,819
35-39	4,510	40,590	4.239	19,118	172,061
40-44	4,600	59,800	4.899	22,535	292,960
45-49	4,590	78,030	5.717	26,241	446,098
50-54	4,480	94,080	6.768	30,321	636,733
55-59	4,340	112,840	8.181	35,506	923,144
60-64	3,900	120,900	10.196	39,764	1,232,696
65 & over	–	124,740	11.360	–	1,417,046
Totals	$38,740	$682,500		$213,943	$5,297,357

requires a single premium of $3.69. Therefore, the cost of the benefits credited for the current year of service, or normal cost, is $16,803, or $4,550 times $3.69. By the same token, the cost of past service benefits, or the accrued liability, for the 130 employees in the 30-34 age category amounts to $100,819. The 1,000 employees, as a group, earn benefits of $38,740 in the current year, at a cost of $213,943. The accrued liability for the plan as a whole aggregates $5,297,357.

Level Annual Premium Method.—The cost data for the individual level premium and entry age normal forms of funding are set forth in Table 7b.

The first step in the calculation is common to both methods and entails the determination of the total benefits that will be credited to the employee group during their entire period of service, including service to be performed in the future. In this calculation the assumption is made that each employee will continue to earn his current salary until retirement, so that column 12 is derived by taking 1 per cent of the current earnings of each employee multiplied by the total prospective years of service. In the case of employees 65 and over the benefits have already been earned, since it is assumed that all such employees are at the point of retirement.

Column 13 is used in connection with the individual level premium or attained age form of funding. The factors in this column represent the sums which must be set aside each year from the attained age of the employees to normal retirement age for each $1.00 of annual benefit to be provided. For example, 17.5 cents set aside each year from age 32 to age 65 will, with interest and the benefit of survivorship,[19] amount to $11.36 at age 65, the sum required at that age to provide a life income of $1.00 per year. The initial annual cost of the plan is obtained by multiplying the prospective annual benefits at each attained age by the level premium cost of $1.00 of benefits at that age. The results in this particular case are distorted by inclusion of the single sum liability of $1,417,046 for employees age 65 and over.

The normal cost under the entry age normal method of funding is derived from the same set of prospective benefits and in the same

19. See p. 143, fn. 16. In this instance, the concept refers to the fact that the sums paid with respect to those employees who are assumed to die before age 65 are needed to provide the average accumulation of $11.36 for each of those assumed to survive to age 65.

TABLE 7b

COST CALCULATIONS FOR LEVEL ANNUAL PREMIUM
AND AGGREGATE FUNDING

Age Bracket	Prospective Benefits Upon Which Costs Are Based [1% of Col. 4 × (Col. 6 + Yrs. to 65)]	Level Premium Cost Factors for Attained Age	Initial Annual Cost on Attained Age Level Premium Method (Col. 12 × Col. 13)	Level Premium Cost Factors for Entry Age*	Normal Cost on Entry Age Normal Method (Col. 12 × Col. 15)
(1)	(12)	(13)	(14)	(15)	(16)
15-19	$ 29,400	.093	$ 2,734	.089	$ 2,617
20-24	113,850	.113	12,865	.104	11,840
25-29	194,880	.139	27,088	.118	22,996
30-34	177,450	.175	31,054	.133	23,601
35-39	166,870	.226	37,713	.146	24,363
40-44	165,600	.302	50,011	.152	25,171
45-49	160,650	.426	68,437	.159	25,543
50-54	152,320	.654	99,617	.167	25,437
55-59	147,560	1.187	175,154	.167	24,643
60-64	132,600	3.568	473,117	.167	22,144
65 & over	124,740	11.360	1,417,046	–	–
Totals	$1,565,920		$2,394,836		$208,355

* Based on assumed entry ages: Col. (2) - Col. (6).

general manner. Under this method, however, the level premium factors, listed in column 15, are based on the assumption that contributions on behalf of any employee have been made from the inception of his credited service. At each age bracket, therefore, the factor is lower than the comparable one under the "attained age" method. The factor for the 30-34 age bracket, for instance, is the level premium required at age 26 to fund a life income of $1.00 per year at age 65. The factor for the 50-54 age bracket, in which the employees have an average length of service of 21 years, is the level premium for age 31. No factor is shown for age 65 and over, since it is assumed that the benefits for such employees have been fully funded.

Column 16 reflects only the normal cost of the plan, or the cost of current benefits. The accrued liability under the entry age normal method is derived by subtracting the present value of future normal

TABLE 7b—Continued

COST CALCULATIONS FOR LEVEL ANNUAL PREMIUM
AND AGGREGATE FUNDING

Age Bracket	Present Value Factors	Present Value of Prospective Benefits (Col. 12 × Col. 17)	Temporary Annuity Factors	Present Value of Future Normal Costs (Col. 16 × Col. 19)	Present Value of Future Earnings (Col. 4 × Col. 19)
(1)	(17)	(18)	(19)	(20)	(21)
15-19	2.488	$ 73,147	26.779	$ 70,081	$ 1,606,740
20-24	2.834	322,651	25.089	297,054	6,347,517
25-29	3.231	629,657	23.192	533,323	10,761,088
30-34	3.693	655,323	21.083	497,580	9,592,765
35-39	4.239	707,362	18.763	457,123	8,462,113
40-44	4.899	811,274	16.221	408,299	7,461,660
45-49	5.717	918,436	13.433	343,119	6,165,747
50-54	6.768	1,030,902	10.354	263,375	4,638,592
55-59	8.181	1,207,188	6.894	169,889	2,991,996
60-64	10.196	1,351,990	2.858	63,288	1,114,620
65 & over	11.360	1,417,046	—	—	—
Totals		$9,124,976		$3,103,131	$59,142,838

costs (column 20) from the present value of prospective benefits (column 18). The present value of prospective benefits is obtained by multiplying the dollar amount of annual prospective benefits (column 12) by the present value of each $1.00 to be paid (column 17). Column 17 is identical with column 9 and shows the sum that must be set aside at each of the attained ages for each $1.00 of benefit at age 65. In other words, column 18 represents the single sum that would have to be set aside in the current year to provide, without further contributions, all benefits that will be earned by the present group of employees. The present value of future normal costs (column 20) is found by multiplying the contribution toward normal costs that is required in the current year (column 16) by the present value of $1.00 per annum for the number of years between the respective attained ages and age 65 (column 19). For example, if the present value of $1.00 per annum payable from age 32 to age 65 is $21.08, a series of annual payments of $23,601 from age 32 to

TABLE 7c

SUMMARY OF COST CALCULATIONS

Type of Funding	Basic Elements of Cost	
Single premium Method	Normal Cost (Total of Col. 10)	$ 213,943
	Accrued Liability (Total of Col. 11)	5,297,367
Level Annual Premium Method— Attained Age	Initial Level Annual Premium (Total of Col. 13)	2,394,836
	Note: This includes single sum liability of $1,417,046 for employees age 65 and over	
Level Annual Premium Method— Entry Age	Normal Cost (Total of Col. 16)	208,355
	Accrued Liability (Total Col. 18 minus Total Col. 20)	6,021,845
Aggregate Cost Method	Initial Annual Cost	656,041
	$\dfrac{\text{Col. 18}}{\text{Col. 21}} \times \text{Col. 4}$	

* Trends indicated assume organization of constant size and character and actual experience in conformance with interest and mortality assumptions.

age 65 is worth $497,580 at the present time. The difference between that sum and $655,323, the present value of future benefits of employees in the 30-34 age category, is the accrued liability for that age category. For the entire employee group, the accrued liability under the entry age normal method of funding is $6,021,845.

Aggregate Method.—The initial annual cost under the aggregate funding method can be easily ascertained from the foregoing tables. It will be recalled that the annual contribution under this method bears the same ratio to covered annual earnings that the present value of future earnings bears to the present value of future benefits,

TABLE 7c—Continued

SUMMARY OF COST CALCULATIONS

Initial Funding Contributions		Trend of Funding Contributions*
Minimum—Normal Cost plus 2½% of Accrued Liability	$ 346,377	Gradual increase in normal costs until group reaches stable age distribution. After accrued liability is paid off contributions reduced to normal cost only
Maximum—Normal Cost plus 10% of Accrued Liability	743,679	
Fixed amount, assuming cost for employees 65 and over is paid in lump sum	2,394,836	Decreasing year by year, ultimately reaching cost level equal to normal cost on level premium entry age method
Fixed amount, assuming cost for employees 65 and over spread over 11 years	1,119,495	
Minimum—Normal Cost plus 2.5% of Accrued Liability	358,901	Approximately level until accrued liability is paid off, then reducing to normal cost only
Maximum—Normal Cost plus 10% of Accrued Liability	810,540	
Fixed amount, equal to initial annual cost	656,041	Decreasing year by year, ultimately reaching cost level approximately equal to normal cost on level premium entry age method

less any accumulated funds. In simpler language, the "accrual rate" is multiplied by the covered payroll. In this case, since there is no accumulated fund, the accrual rate is obtained by dividing the present value of prospective benefits (column 18) by the present value of future earnings (column 21), which yields a percentage of 15.43 per cent. Applied to the total annual earnings of $4,252,000 (column 4), this percentage produces an initial annual cost of $656,041.

Summary of Cost Calculations.—A summary of the costs developed under each of the foregoing funding methods is presented in Table 7c. Under the single premium method, the normal cost is

$213,943, and the accrued liability is $5,297,357. If the plan is to qualify under Federal income tax laws, the normal cost plus 2.5 per cent of the accrued liability, or a total of $346,377, must be funded each year. In addition to the normal cost, 10 per cent of the accrued liability, or $529,736, may be funded each year and deducted as an ordinary and necessary business expense. Contributions equal to normal cost plus 10 per cent of the accrued liability would amount to $743,679, or 17.5 per cent of covered payroll. The normal cost will increase gradually until the age distribution of the employee group stabilizes. After the accrued liability is paid off, the contributions will be reduced to those necessary to meet only the normal cost.

The initial contribution required under the attained age method is $2,394,836, if the single sum liability of $1,417,046 for employees age 65 and over is liquidated in the first year. If the liquidation of such liability is spread over eleven years, the initial contribution will be $1,119,946, or 26.3 per cent of covered payroll. The cost will decrease year by year, ultimately reaching the normal cost level of the entry age normal method.

The normal cost under the entry age normal method of funding is $208,355, and the accrued liability is $6,021,845. As under the single premium method, the contributions may equal only the normal cost plus 2.5 per cent of the accrued liability, or a portion of the accrued liability may be paid off each year in addition to the funding of the normal cost. The normal cost plus 10 per cent of the accrued liability would equal $810,540, or 19.1 per cent of payroll. The contributions would continue at an approximately level rate until the accrued liability is liquidated, after which they would drop to the level of normal cost only.

Finally, the initial annual cost under the aggregate method is $656,041, with no distinction between normal cost and accrued liability. As previously indicated, this is 15.43 per cent of payroll. The contributions will decrease each year, ultimately reaching a cost level approximately equal to the normal cost under the entry age normal method of funding.

In considering these cost comparisons, it is important to realize that any differences in first year costs among the various funding methods must necessarily be made up in the future. The present value of all future costs is identical under all methods. Although it

may appear so from a comparison of first year costs, no method in
the long run is "cheaper" than another.

Modifications of Actuarial Assumptions.—The effect on the cost
projections of a pension plan produced by changes in certain basic
assumptions can be observed in Table 8. The cost projections in this
table are based upon the same set of data used in the construction
of Tables 7-7c and, with the exceptions noted, on the same set of
actuarial assumptions.

Section A of the table reflects the results of using a 3 per cent
interest assumption in lieu of 2½ per cent, the other assumptions
remaining the same. In other words, the cost projections are based
on the 1937 Standard Annuity Table with interest at 3 per cent, no
allowance for expenses or salary increases, and no discount for turn-
over. The table reveals that under the single premium method of
funding, the normal cost of the pension plan in question is reduced
by about 11 per cent while under the entry age method of funding
such cost is reduced by about 14 per cent. The accrued liability
under the foregoing methods of funding is lowered to a somewhat
smaller extent, 7.7 and 6.6 per cent, respectively. Decreases among
the other cost projections in Section A range from 5 to 9 per cent.

The substitution of the 1951 Group Annuity Table for the 1937
Standard Annuity Table has the opposite effect on costs, as Sec-
tion B discloses. This follows from the fact that the more recent
table, whose derivation and characteristics are described at a later
point,[20] shows a lower rate of mortality at all ages below 73 than
the widely used 1937 Standard Annuity Table, and at the younger
ages the divergence is significantly great. Nevertheless, only the
normal cost under the single premium and entry age methods of
funding registers any significant change, the increase being 5.3 and
6.6 per cent, respectively. Only slight upward changes are recorded
in the other cost categories.

The effect of introducing a moderate turnover factor into the cost
calculations is shown in Section C of the table. Substantial reduc-
tions are reflected in virtually every type of cost expression, the most
significant being those produced in the normal cost under the
single premium and entry age methods of funding, 36 and 50 per

20. Appendix D.

TABLE 8

COST PROJECTIONS UNDER VARIOUS ACTUARIAL ASSUMPTIONS[a]

	A			
	1937 Standard Annuity Table, 3% Interest, No Turnover			
	Basic Elements of Cost		*Initial Funding Contributions*	
Type of Funding	*Normal Cost*	*Accrued Liability*	*Minimum*	*Maximum*
Single Premium	$189,010	$4,891,901	$335,767[c]	$678,200[d]
Level Annual Premium— Attained Age	*Initial Level Annual Premium*			
	$2,273,496[b]		$1,048,225[e]	$2,273,496[f]
Level Annual Premium— Entry Age	$179,395	$5,616,445	$347,888	$741,040
Aggregate Cost	*Initial Annual Cost*			
	$617,545		$617,545	

a The supporting calculations, arranged in columns identical in nature and sequence with those of Tables 7a and 7b, are presented in Appendices A, B, and C.

b Includes single sum liability for employees age 65 and over of $1,361,412, $1,406,069, and $1,417,046, for Sections A, B, and C, respectively.

c Normal cost plus 3% (2½%) of accrued liability.

d Normal cost plus 10% of accrued liability.

e Based on the assumption that the cost for employees age 65 and over is spread over 11 years.

f Based on the assumption that the cost for employees age 65 and over is paid in lump sum.

cent, respectively. The impact of turnover is lighter on accrued liability under any funding method than on normal cost, since the employees who give rise to the bulk of the accrued liability are in the age brackets least affected by turnover. Even so, the accrued liability projection under the single premium and entry age methods is reduced 18 and 14 per cent, respectively, by recognition of the turnover factor. Exclusive of the single sum liability for employees age 65 and over, which sum would obviously be unaffected by turnover, the initial level premium under the attained age method of funding is reduced 15 per cent. Annual costs under the aggregate cost method are affected only to a minor extent by introduction of the turnover factor, since both benefits and wages are pushed down-

TABLE 8—Continued

COST PROJECTIONS UNDER VARIOUS ACTUARIAL ASSUMPTIONS[a]

	B			
	1951 Group Annuity Table, 2½% Interest, No Turnover			
	Basic Elements of Cost		*Initial Funding Contributions*	
Type of Funding	*Normal Cost*	*Accrued Liability*	*Minimum*	*Maximum*
Single Premium	$225,272	$5,425,973	$360,921	$767,869
Level Annual Premium— Attained Age	Initial Level Annual Premium $2,400,590[b]		$1,135,128[e]	$2,400,590[f]
Level Annual Premium— Entry Age	$222,085	$6,137,002	$375,510	$835,785
Aggregate Cost	Initial Annual Cost $667,970		$667,970	

TABLE 8—Continued

	C			
	1937 Standard Annuity Table, 2½% Interest, Moderate Turnover			
	Basic Elements of Cost		*Initial Funding Contributions*	
Type of Funding	*Normal Cost*	*Accrued Liability*	*Minimum*	*Maximum*
Single Premium	$136,478	$4,334,704	$244,846	$569,948
Level Annual Premium— Attained Age	Initial Level Annual Premium $2,247,458[b]		$972,117[e]	$2,247,458[f]
Level Annual Premium— Entry Age	$102,191	$5,156,064	$231,093	$617,797
Aggregate Cost	Initial Annual Cost $643,514		$643,514	

ward and to approximately the same degree. In fact, it is a peculiarity of the aggregate method that the assumption of withdrawal rates, or heavier withdrawal rates, as the case may be, sometimes leads to a higher initial contribution.

In connection with all the modifications considered in this section, and particularly with respect to turnover, it should be borne in mind that the sums in question are cost *projections* and that the true costs that finally emerge are neither increased nor decreased by the assumptions that enter into the projections.[21]

21. The true costs are affected to the extent that the cost projections influence the rate of funding and, hence, the magnitude of investment earnings.