Defined Contribution Retirement Plans
For U.S. Public Employees
by Thomas P. Bleakney (USA)

A 1988 publication of the U.S. Bureau of Labor Statistics provided the following data about pension coverage of U.S. state and local government employees:

| Employees Covered by: | |
|---|---|
| Defined Benefit Plans | 89% |
| Defined Contribution Plans | 5 |
| Both Kinds of Plan | 4 |
| Neither Kind of Plan | 2 |
| | 100% |

Thus, 98% of all nonfederal public employees have pension coverage, and virtually all of them are in defined benefit plans.

These statistics differ markedly from those for private employees. In the first place, only about half of the private employees in the U.S. have pension plan coverage.

Moreover, defined contribution plans for private employees are much more common than for public employees, and becoming even more so. The Employee Benefit Research Institute recently reported that over 28% of the private employees covered by pension plans had their primary coverage under a defined contribution plan. This percentage more than doubled in ten years, from a little over 13%.

Many forces are at work causing this shift.

- The increasing burden placed by the federal government upon the administration and maintenance of defined benefit programs

- The excellent investment returns of recent years

- The attractiveness of defined contribution plans to the entrepreneurial young workers sought after by employers

Employees in plans that have shifted from defined benefit to defined contribution may have to deal with the adverse affects of poor investment returns in some future period. When that happens, there may be some (or many) employees who want to switch back. Employers may resist such a switch, recognizing that the money the employees lost in poor financial years might have been theirs.

Plan sponsors in the public sector are probably less able to resist such pressures to change, since public employees exert pressure not only as workers but also as voters. For at least this reason, maybe only plan sponsors in the public

sector need to heed Santayana's warning that "those who cannot remember the past are condemned to repeat it". For them, though, what happened among the many U.S. state and local systems that have been around since the 1920's or earlier is probably instructive. As an example consider the not atypical pattern of the California Public Employees' Retirement System.

## The California PERS

When originally established in 1931, the California system provided for employee contributions which varied by a member's sex and the age at which he or she entered the plan. The reasons for the variation in contributions by age and sex are related to the benefits which were provided under the system. Member contributions, accumulated to retirement, were designed to provide half of the targeted total retirement benefit. This accumulation was matched at retirement by the employer, so that the employer-paid pension equaled what the accumulated contributions of the employee provided when converted to an annuity.

The targeted benefit was not always met. In 1947, following the economic turmoil of the Great Depression and World War II, the law was amended. The pattern of employee contributions was left basically unchanged, but the total retirement allowance was converted to a defined benefit basis. If the goals of the new program were precisely met, the accumulated contributions at the retirement of an employee whose entire service was under the new formula would still provide one half of the retirement allowance, with the employer being responsible for the balance. However, even if

the employee's contribution accumulation fell short, the targeted benefit would still be payable. The shortfall would be covered by the employer, who had to provide whatever pension was necessary to supplement the benefit provided by the accumulated employee contributions. This might require a contribution by the employer which more than matched the employee's accumulated contributions, or it could require less than matching. In any event, employees could plan their retirement finances around the levels of benefit which they had been led to believe would be theirs.

The final stage in the evolution took place in 1971 in connection with an improvement in the benefit level. At that time, the employee contribution rate was changed to a uniform 7% of salary from a schedule graded by sex and by age at entry.

Similar mutations have occurred in other systems around the United States. Sometimes the systems started like California's, with both employer and employee benefits based on defined contributions. In other cases, the systems started with defined benefits paid for by the employer, but with a generally equal benefit expected to be bought by employee contributions. There are two major exceptions to be noted, the Federal Employees' Retirement System (FERS) and the Teachers Insurance and Annuity Association - College Retirement Equities Fund (TIAA-CREF).

## The Federal Employees' Retirement System

For a comprehensive view of FERS, the reader is directed to the paper by Richard G. Schreitmueller in Volume XL of the

Transactions of the Society of Actuaries. As Schreitmueller points out, a new retirement program became necessary when federal employees hired after 1983 were mandated into Social Security coverage (federal employment earlier did not include Social Security coverage). Adding the benefits under the old Civil Service Retirement System to those provided by Social Security was simply too rich a package to consider. After some delays, largely due to the political process, the FERS came to be.

FERS combines a comfortable, but not overly generous, defined benefit plan (providing, for each year of service, essentially 1.1% of pay averaged over the final three years of employment) and a thrift plan. Under the thrift plan, the government contributes 1% of pay to a defined contribution plan, to which it adds an equal match of the first 3% of pay the employee contributes, and a 50% match of the next 2%. Thus, the maximum total contribution under the thrift plan is 10% of pay, 5% by the government and 5% by the employee.

FERS has already become a major player in the public employee retirement scene, with membership of 900,000 and investments of about $200 billion. Schreitmueller concludes that "FERS is likely to be a model for revision of other large public employee retirement systems" [TSA XL, page 597 (1988)].

## TIAA - CREF

The other example of a major defined contribution program in the public sector is TIAA-CREF. Teachers Insurance and Annuity Association (TIAA) is a legal reserve life insurance and annuity company. The College Retirement Equities Fund

(CREF) is a related variable annuity company providing for investment of contributions in a diversified common stock fund. Both are nonprofit organizations that specialize in retirement and tax-deferred annuity plans for employees of colleges, universities, and related organizations.

The employee decides how much of each month's contributions, along with the investment earnings on previous contributions, are to be allocated to TIAA and how much to CREF annuities. Contributions allocated to TIAA have a guaranteed protection of principal and a guaranteed minimum rate of return. Contributions to CREF purchase accumulation units, representing shares of participation in CREF common stock investments.

The program provides full and immediate vesting of all annuity and survivorship benefits in the participant - cash surrenders or loans are not permitted, nor are transfers or assignments. The TIAA "fixed-dollar" annuity provides a retirement income that does not change in amount from year to year except for dividends as declared. The CREF "variable-dollar" annuity provides a retirement income that varies year by year, reflecting primarily the investment experience of CREF's common stock portfolio.

## Changing to Defined Contribution Plans

By having limited or no defined benefit components, FERS and TIAA-CREF are exceptions to the rule in the public sector. As pointed out at the outset of this paper, the vast majority of state and local employees in the United States are currently covered by defined benefit retirement plans. Thus the decision by a public employer to have a defined contribu-

tion plan nearly always involves giving up all or part of a defined benefit plan in exchange. What factors affect such decisions?

Portability - Overall benefits for migrating employees under defined benefit programs tend to be poorer than if all employees stayed with only one employer through their entire working career. This fact is probably the biggest shortcoming of pension programs in the United States. The President's Commission on Pension Policy, established by President Carter in 1979, studied this problem. It recommended establishing a minimum universal pension system (MUPS) having certain similarities to TIAA-CREF. This would assure all employees of a benefit in addition to that provided by Social Security. Although this recommendation received some support, it was largely ignored or opposed in both the retirement and political communities. As a consequence, the basic lack of portability in retirement benefits remains to this day.

If all programs were like TIAA-CREF, with accumulated contributions protected against withdrawal, the goals of the President's Commission's MUPS would be realized. However, not paying accumulated contributions in cash to a terminating employee is particularly out of favor. For this reason, substantial portions of defined contribution accumulations tend to be dissipated as severance pay.

Investment Risk - A major appeal of defined contribution programs is the immediate gain perceived by employees during the time of high investment returns, such as the current era. Conversely, probably the most common reasons defined

contribution plans have been converted to defined benefit plans have been the economic factors which adversely altered the relationship between benefit and final salary.

Poor investment returns just before retirement drive down benefits. A compound negative effect occurs when such experience is combined with high salary growth, so that the benefit purchased at retirement is leveling off or even declining, when the salary of the individual is increasing rapidly. What might have appeared to be a quite adequate benefit turns out to be woefully inadequate.

These problems are avoided under the TIAA program, with fixed income assets and benefit guarantees. Thus, the accumulations over the working lifetime are protected against severely adverse investment returns, as are the benefits purchased at the time of retirement. The process involves the buildup of substantial reserves by the insurance company which evens out the flow of income from the accumulations. In effect, the investment risk and volatility which the underlying assets would normally impart upon the accumulations are cushioned by the spreading of the risk over time by the insurance company. The company can afford to ride out dips in the investment market, since essentially no withdrawals of accumulated TIAA funds are allowed, except by the payment of annuities. Thus employees may not tap these gains by withdrawing funds during favorable investment years.

In contrast, as an example, the value of a CREF accumulation unit plummeted in 1974 to not much more than half of its 1972 value. An unfortunate individual commencing retirement at that point would be receiving benefits substantially less

than anticipated a mere two years earlier. Although there was a fairly rapid recovery from the 1974 dip, it still took several years for the unit to return to its 1972 level.

Effects of Adversity - The example just given illustrates how adverse experience can create severe hardships for a pure defined contribution plan. In turn, since all employees retiring in any one era will have similar experiences, pressures for legislative relief are substantial. In fact, the situation often becomes rather ironic: what had been viewed by the employer as a program with built-in protection from additional cost becomes suddenly subject to additional unplanned costs. Moreover, the need for additional costs often comes at a very poor time, with investment yields down and salary growth up. The overall economic conditions that accompany such experience can also lead to substantial other pressures for tax revenues in a public system, further burdening the legislative body. Such a period, for example, occurred in the United States in the early- and mid-1970s.

Legislative relief can take at least two different forms. One of the forms is to provide a "safety net" for retirees during such a period. Thus, a program guaranteeing a minimum benefit can be initiated, with the expectation that the additional costs associated with this benefit will be minor since the need for the minimum benefits will be of a short-term nature. Although this expectation will probably be realized, the situation has certain elements of "heads I win/tails you lose", in that the employee gets the advantage of favorable investment returns in good periods, whereas the employer has to provide the protection in down times without the offsetting gains of the good times.

The other alternative, which has been wide-spread among U.S. public employee plans, is to shift from a defined contribution program to a defined benefit plan. Once this has occurred, the defined contribution plan is simply phased out for older employees with most new employees being covered only by the defined benefit program.

Benefit Levels - A defined contribution plan tends to give more benefits to employees who terminate prior to retirement and less to those who retire, when compared to the same money contributed to a defined benefit plan. This is because the same amount of annual contributions under both a defined benefit and defined contribution plan will accumulate, at any point prior to retirement, to a smaller amount under a defined benefit plan than under a defined contribution plan. In like manner, for the same amount of benefit at retirement, a defined contribution plan costs more than a defined benefit plan. This analysis is given more technical support in a presentation by Daniel F. McGinn transcribed on pages 1385 - 1392 of the Record of the Society of Actuaries, Volume 10 (1984).

An employer considering a switch from a defined benefit plan to a defined contribution plan is thus faced with a major decision: either to increase contributions - so as to provide the same benefits at retirement as those currently provided - or else to limit the contribution to the current level, recognizing that there will be smaller pensions. Generally, the latter approach is more common, since the existing benefits of older employees tend to be protected anyway. Thus, the effects of lower contributions are not

going to be felt immediately, and it is only after the program has reached some maturity that the shortcomings of the defined contribution plan are felt by those reaching retirement. In the meantime, substantial sums have been paid out to employees who have terminated with short service, amounts that are not available in case the employer should decide to shift back to a benefit program providing more to the retirees.

Transitional Problems - If all or parts of a defined benefit plan are to be converted to a defined contribution plan, some major transitional issues must be resolved. Consider first the simplest approach. This would be to freeze all accrued benefits under the existing defined benefit plan, and to implement the defined contribution plan for everyone immediately. A decision to be made would be whether or not to raise the percentage contribution above the underlying cost of the existing program. An increase would be needed to assure new employees who work an entire career the same amount of benefit as the current program provides.

Suppose, for the sake of discussion, that the decision has been made to go to the greater contribution level, presumably as a level percentage of pay for all employees. Even so, this program would not be fully satisfactory under the simple transition just described. Under the transition arrangement, either an additional supplement must be provided for the existing older employees, or they will have a decline in their benefit expectations. Note that the cost of this additional supplement is over and above a cost that is already greater than existing costs.

One transitional approach would be to set up the defined contribution plan only for new employees, and run out the defined benefit plan for existing employees. This approach has substantial advantages in correcting the problem discussed in the previous paragraphs, but it also has problems of another sort.

A defined contribution plan, as described earlier, has great appeal for younger employees. Employees who leave the system while young often look forward to the withdrawal of accumulated contributions in cash. If the defined contribution program is set up so that only new employees can join, the recently hired employees in the old program are likely to exert great pressure to allow the option to transfer. Such options have at least two adverse effects.

In the first place, the employees who switch will almost certainly cost more in the new plan than they would have cost in the old. As an example, suppose that both plans have the same vesting provisions and the same contribution rates. An employee who terminates shortly after becoming eligible for a vested benefit under the defined benefit plan qualifies for a deferred monthly benefit worth substantially less than the contributions actually made on his or her behalf. The funding of the existing defined benefit system discounts the total costs for this difference, and anticipates redistribution of the unneeded money to help pay for benefits of continuing employees. If the employee has transferred to a defined contribution plan, more money must be contributed to the existing plan to make up for the shortfall.

A second adverse effect is less obvious but can turn out to

be even more expensive. Employees who transfer may do so for what appear to be good reasons at the time but which turn out to be poor guesses in the long run. The investment returns may turn sour, or other economic conditions may cause some employees to do more poorly under the defined contribution plan than they would have under the defined benefit plan. Under such circumstances, employee groups may exert political pressure or employees may sue the plan or their employer, arguing that they were not given adequate information about the consequences of their election. In the litigious society of the United States, this phenomenon poses a substantial hazard, particularly among public employees.

## The Investment Decision

In the long run, the existing defined contribution plans for public employees will survive and others will be set up only if they are successful in providing retirement security for employees. In turn, this success will be governed, in large part, by how effectively investment decisions under defined contribution programs produce those adequate benefits.

This general topic was discussed by the author at a Society of Actuaries meeting in Montreal and reported in the Record of the Society of Actuaries, Volume 13, pages 2516-2525. The accompanying graph and table come from that presentation.

The graph shows what would have happened over various 20-year periods if an employee under a defined contribution plan had chosen to invest 10% of salary in the "Standard and Poor's 500 Index" - that is, in effect, had invested all of the plan contributions in a broad range of stocks. The result is

illustrated on the graph as a solid line, which shows what the benefit formula under a defined contribution plan would have to be to produce the same amount of benefit. For comparison, the checked line indicates what a comparable formula would have to be if the entire investment over the same 20-year period had been in bonds.

At least two conclusions about investments in stocks can be drawn from the graph:

- They provide a volatile and unreliable benefit level

- They always result in a better benefit than investment in bonds, at least for the 20-year periods illustrated

In other words, the employee who has the patience and confidence to ride out the swings in the stock market, and to continue to invest in stocks, will always do better, at least if the history of United States investments during much of this century can be taken as a guide. However, the table accompanying the graph suggests that most investors are not willing to bear such risks.

The table shows the distribution of TIAA-CREF participants by their investments in TIAA (essentially fixed income investments) and in CREF (essentially equity investments). As the table indicates, TIAA investments outweigh CREF investments by about 5 to 3. This relationship is fairly constant by age, even among the very young participants, where a more aggressive investment philosophy should prove to be more effective, at least based upon past investment

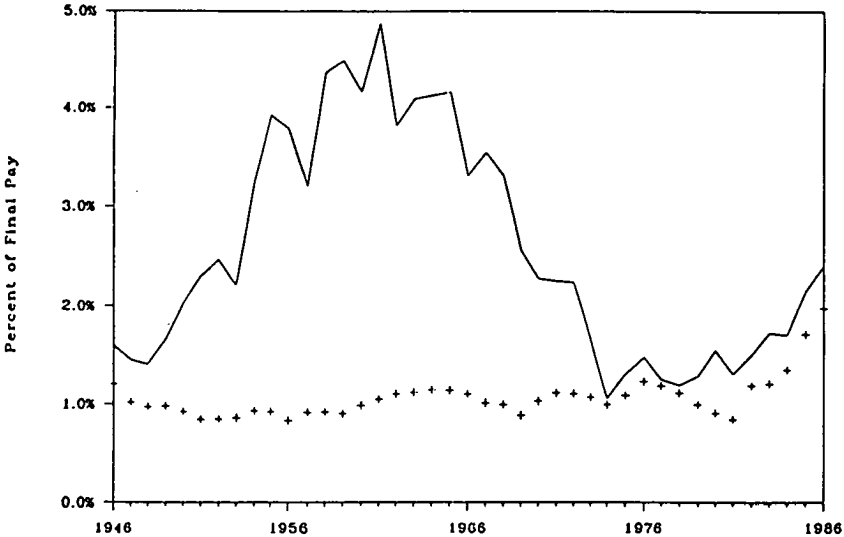
experience. Employers can - and do - invest more aggressively and, have generally done better as a result. For the same amount of employer resources converted into pensions, then, employees will probably do better under defined benefit than under defined contribution plans, because investment practices by the employer are likely to be more aggressive - and therefore, yield better returns - than when the employee is taking the investment risks.

## Summary

Although U.S. private sector plans are trending towards defined contribution plans, that trend has not been evidenced to any great extent among state and local public plans. Public sector plans have generally been around for longer periods of time. In many instances, they have changed from defined contribution to defined benefit plans. Some of the problems with switching from defined benefit to defined contribution plans have been cited in this paper. In the long run, the employee is probably better served at retirement if the same amount of government resources go into providing a defined benefit plan than if those resources go into a defined contribution plan.

## ANNUITY BOUGHT BY DEFINED CONTRIBUTION BALANCE

**Expressed as Percent Credited for Each Year of Service**




Contribution for Twenty Years Ending in Year Shown;
Funds Invested in Common Stocks and Corporate Bonds

Allocation of Premiums Between TIAA and CREF Retirement Annuities
(Premium-Paying Contracts as of December 31, 1986)

| | | Age of Contract Holder | | | | | |
|---|---|---|---|---|---|---|---|
| TIAA | CREF | < 30 | 30-39 | 40-49 | 50-59 | > 59 | All |
| 100% | 0% | 27% | 23% | 20% | 23% | 33% | 24% |
| 75 | 25 | 17 | 17 | 14 | 11 | 9 | 14 |
| 50 | 50 | 45 | 48 | 49 | 46 | 40 | 47 |
| 25 | 25 | 5 | 6 | 10 | 13 | 11 | 9 |
| 0 | 100 | 3 | 3 | 4 | 4 | 4 | 3 |
| All Others | | 3 | 3 | 3 | 3 | 3 | 3 |
| Totals | | 100% | 100% | 100% | 100% | 100% | 100% |
| Weighted Averages: | | | | | | | |
| | TIAA | 65% | 63% | 59% | 59% | 64% | 62% |
| | CREF | 35 | 37 | 41 | 41 | 36 | 38 |