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INDEXING OF FEDERAL RETIREMENT SYSTEMS FOR INFLATION

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ABSTRACT

This paper describes the impact of inflation on the design, reporting, and actuarial analysis of the federal retirement programs for civilian employees and military personnel. The impact of inflation on these programs will be of interest not only because federal annuity payments are a large portion of the federal budget, but also because the annuities have been fully indexed since 1963 and have gone through many of the design and valuation problems that would be experienced by other fully indexed pension systems. After presenting the history of the indexing provision and a discussion of the valuation method, the paper discusses two technical actuarial aspects of the fully indexed retirement system. First is a discussion of the leverage effect of changes in one or more of the three key economic assumptions—inflation, salary-scale increases, and investment returns. Second is a discussion of anomalies that occur both in the system cost and in individual benefits as a result of voluntary retirement decisions in a fully indexed system.

I. HISTORY OF INDEXING OF FEDERAL ANNUITIES

Federal pension systems can be dated from an 1855 statute that required a compulsory retirement plan for Navy *officers*. Over the years following 1855, various legislative acts created involuntary and voluntary retirement benefits for specific services. A 1946 act authorized voluntary retirement of Navy and Marine Corps officers after twenty years of active service, including ten years of commissioned service, under the 2.5 percent per-year-of-service formula that is used today. Two years later, with the addition of the Army and the Air Force, a uniform voluntary retirement authority existed for *officers* of all services.

An 1885 act promulgated the first *enlisted* nondisability retirement law, authorizing voluntary retirement of Army and Marine Corps enlisted personnel after thirty years of service, at 75 percent of pay. By 1907 all branches of service had adopted this method under one statute. The fol-

lowing years provided for different permutations of this law including, at one point, sixteen-year retirements. By 1946 the present-day 2½ percent formula, with a 75 percent cap and full retirement after twenty years of service, had been adopted.

The first civil service retirement system was enacted in 1920. Following a series of major changes, the 1956 law established the basic retirement ages and formulas now in effect. Federal civil servants can retire with full benefits after age 55 with thirty years' service, age 60 with twenty years' service or age 62 with five years' service. The benefit provides 1½ percent of high-three-year salary for the first five years of service, 1¾ percent for the next five years and 2 percent thereafter, with a maximum of 80 percent of high-three-year pay.

The need to adjust benefits to allow for inflation or extension of benefit formula liberalizations to past retirees has been recognized since the federal retirement systems began. The preferred adjustment method, however, has varied significantly depending on the prevailing political and economic situation. Updating of benefits in the sixty years that both systems have been in place has been affected by three distinct political and economic climates.

During the first quarter century, 1920–45, the Consumer Price Index (CPI) changed very little. In fact, the index peaked in 1920, dropped to a much lower level in the mid 1930s, and then rose again to the 1920 level right after World War II. As a result of this economic situation, and the fact that federal annuitants were among the few who had any annuities, there was no direct provision for any change in the cost of living for civil servants. Instead, at the time of the three major revisions in the civil service retirement law during this period (1926, 1930, and 1946), benefits were recomputed to reflect the liberalizations in the benefit formula.

The pattern of inflation changed radically after World War II, causing annuitants and Congress to worry about the erosion in fixed annuity values. The cost of living rose 14.6 percent in 1946–47 and a total of 18.7 percent in the succeeding five years.

The second phase of adjustments, which saw increasingly liberal indexing provisions, began in the early 1950s as the sudden upsurge in inflation led to demands for adjustment of annuities. The first adjustment to civil service annuities following World War II was a 25 percent increase in 1948. This increase occurred at the same time as a major change in the retirement law so it can be viewed as either an adjustment to reflect plan liberalizations, as had been done in the past, or an attempt to keep up with the cost of living.

The next civil service annuity increase, in 1952, was the first real in-

flation increase under the civil service retirement system. This increase was 25 percent for most annuitants with a maximum of $324 per year. The legislation expressed what now seems to be a hopelessly optimistic statement that the allowance was only temporary and would be removed if the cost of living dropped. When the cost of living did not drop, the change was made permanent.

From 1952 through the early 1960s, inflation was 1 to 3 percent per year, which seems quite low today but was high compared to prewar levels. This led to ad hoc adjustments in 1955 and 1958 and, ultimately, to the first formal indexing system in 1963.

While civil service retirement benefit adjustments went through two distinct phases, military benefits were adjusted on one basis through 1958. Each time military basic pay was increased, the pay of persons on the retired rolls was recomputed on the basis of these newly established pay rates. Because of the excessive cost involved, that practice was discontinued in 1958 and the pay of retired personnel was increased by 6 percent. This approximated the increase in the cost of living since the last retired-pay increase in 1955.

In 1963, a permanent system was adopted for increasing retired pay in both systems, based on a formula geared to increases in the cost of living. This system granted cost-of-living increases whenever the CPI increased by at least 3 percent.

The indexing was liberalized in 1969 by the addition of a "1 percent kicker." Impetus for this provision, which added 1 percent to every cost-of-living increase, arose from the rather questionable argument that, because of the lag of five months between the time the index increased 3 percent and the time that it was added to benefits, the annuitants should be given an extra increase. Even if this argument were accepted, the actual change had no basis in equity. Instead of adding 1 percent once for each annuitant, the law added 1 percent to every periodic increase. Thus, during the time the kicker was in effect, annuities rose 72 percent while inflation was only 56 percent.

The sharp increase in inflation in the 1970s, the increasingly heavy impact of annuities on the federal budget, and adverse publicity about the kicker led eventually to reductions in the liberality of the cost-of-living indexing. There was, however, one last improvement before the system was deliberalized.

This last liberalization was due to another somewhat strained argument. Civil service employees pointed out that a retiree could lose substantial future annuity value by retiring one day after an increase since the increase was given to everybody on the rolls even if they had just retired. The

logical solution to the problem was to grade the initial increase for new retirees, since salary increases allowed for preretirement inflation. However, in 1973 Congress instead granted the increase to all civil servants who retired after an increase if their earned annuity was less than it would have been if they had retired before that increase. A similar adjustment had already been added to the military system in 1967.

The third phase of changes in the indexing method began in the mid-1970s. This phase has seen a number of proposed and actual deliberalizations in the formula. The first deliberalization was a direct result of the publicity about the 1 percent kicker. The debate on this issue went far beyond the usual pension forums of the appropriate congressional committees and technical journals. The inequity of the system was discussed in newspaper editorials throughout the country, and there was even an article in *Reader's Digest* on the issue [3]. Public pressure resulted in removal of the 1 percent kicker in 1976, but an accompanying gesture to the annuitants guaranteed twice-a-year increases. Ironically, during the high inflation that followed 1976, the old 3 percent method would have produced more frequent increases than the semiannual indexing.

The second deliberalization occurred in mid-1981 when the twice-a-year increase was changed to once a year for both systems. The fallback provision for the civil service retirement system, which provided that annuitants would not lose by retiring late, was changed to the more logical system of giving only a portion of the increase to recent retirees. Thus, the sharp drop in annuities after the date of an increase was avoided by the less expensive route of not giving any increase to people who had just retired. Although this provision was enacted as part of the first Reagan budget, the legislation had been proposed by President Carter a year earlier.

The deliberalizations of the indexing formula in the most recent phase are a result of increasing taxpayer concern about the liberality and cost of the systems. A cost-of-living increase of 5 percent, for instance, would add over twenty billion dollars of combined liability for the two systems. Even though the cost-of-living increase method has been reduced to a more supportable system of once-a-year increases with no fallback provision, it is likely that further steps will be taken that would actually give federal annuitants less than the full effect of future cost-of-living increases. One proposal would cap the index by the amount of the wage increase to federal employees if that was lower, as it has been in each of the last three years. Another alternative would be to provide only a portion of the full CPI increase.

II. VALUATION

Method

Since the systems are fully indexed before and after retirement, actuarial valuation techniques that value retirement and ancillary benefits separately are difficult to use and unnecessarily complicated. The seriatim model approach is used by both the military and the civil service retirement systems. Seriatim projections cannot be used for all pension plans because of the time and cost involved, but they are appropriate for large systems where projected outlays are often as important as traditional valuation results. Flexibility is important to price accurately the many proposed changes to the plans.

Modeling takes the actuary out of the commutation function era and into the very basics of actuarial science—the decrement rate and the economic assumptions. Modeling could not be done in a precomputer age, but it is a powerful tool for the actuary with a time-sharing terminal tied into a large-capacity computer. The model projects the plan members and their associated salaries or annuities into the future year by year. Each data cell in the model is decremented and the numbers and dollars are aged. Rates are applied that may, for example, transfer some active people into the disabled retired status where they join the rest of the disableds and are then subject to decrements that apply to that group. Retiring, withdrawing, dying, divorcing, remarrying, and so on, all take place methodically each year in the model, and the appropriate transfers are made. Salary increases and cost-of-living annuity increases are given at the correct points in time. Exact benefits are calculated for new survivors and retirees at the time of retirement. Modeling easily permits the use of varying economic and decrement assumptions over time. As the years progress in the model, data are collected and categories of salaries and annuity disbursements are totaled for each year. The final step in the model is to discount all these yearly payouts back to the valuation date to obtain present values.

The same model is used to find accumulated benefits by altering the benefit formulas and future pay increases. The entry-age-normal cost percentage is determined by aging a typical set of new entrants through the program.

Board of Actuaries

Soon after the civil service retirement system began in 1920, a board of actuaries began issuing annual reports on the actuarial status of the system. While the board is appointed by the director of the Office of

Personnel Management (OPM), it is independent of that office, being selected from actuaries who are prominent in the pension field. Current membership includes Douglas Borton, Harrison Givens, and Edwin Boynton, who has been the chairman since 1977.

The board meets periodically to approve the valuations performed by OPM and to select assumptions. Not surprisingly, their main discussion in recent years has centered on selection of the three key economic variables—rate of interest, rate of salary growth, and rate of inflation. At the last meeting the board reviewed past economic data on the federal government and determined that the incremental rate of interest to be used in valuations should be 1 percent and the incremental rate of salary growth should be 0.5 percent. They recognized that selection of the rate of inflation was not as important as the real growth of salaries and rate of interest but, in order to provide an explicit set of assumptions, they did select a rate of inflation. The rate of inflation selected was 6 percent, so interest was set at 7 percent and salary growth at 6.5 percent.

The Department of Defense is sponsoring a legislative proposal that would establish a board of actuaries for the military retirement system, and also specify an entry-age-normal cost funding method that recognizes dynamic assumptions. Prior to 1935, the Navy had a pension fund (on a nonactuarial basis) that provided for payments to persons retired for disability whenever there was a sufficient amount in the fund. Other retired pay was paid directly from appropriations, and when the fund was insufficient, the disability retired pay was also paid from appropriations. The income to the fund consisted of the government's share of the proceeds from the sale of enemy or pirate ships captured by the Navy, and from interest received on fund investments. This fund was abolished in 1935, and since that time the military retirement system has been entirely on an unfunded or "pay-as-you-go" basis. The civil service retirement system, however, has been prefunded to some degree for its entire existence. Before 1969, various provisions were in effect but, in general, the government and employees each paid an amount about equal to half the normal cost. Obviously, the unfunded liability eventually would have caught up with and depleted the fund. If there had been no corrective legislation, the civil service retirement fund would have disappeared by 1981 and the system currently would be relying on pay-as-you-go appropriations as is the military system.

A 1969 law established the funding basis for the civil service retirement system. (Since the administration was anxious to obtain a funded system, they accepted liberalizations such as the 1 percent kicker at that time.) While the basic benefits are prefunded, the effect of future inflation is not

prefunded, so increases in salaries and annuities due to inflation are funded only from the point at which they occur. Salary increases are funded through thirty-year amortization payments and cost-of-living increases, and annuities are funded by additions to the unfunded liability, on which only interest is paid. The board of actuaries has recommended that the entire system be placed on a dynamic funding basis and this recommendation has been supported by the General Accounting Office (GAO).

Public Law 95-595 Reports

Reflecting congressional desire for unified reports on all federal retirement systems, Public Law 95-595, signed by the president in October 1978, requires annual reports from federal retirement systems similar to the ERISA reports on private sector plans. The law did not, however, subject these systems to ERISA's funding, minimum benefit level, or individual participant reporting requirements. The president delegated his P.L. 95-595 responsibilities to the Office of Management and Budget (OMB).

The law contemplated, but did not require, consistency among the reports. The funding method agreed upon was entry-age-normal. OMB mandated the long-term annual inflation assumption to be 5 percent, but otherwise left the assumptions to each actuary's own judgment. The military and the civil service retirement systems are fully indexed, so the actuarial accrued liabilities vary only slightly for different sets of economic assumptions with the same differentials. To be consistent with the assumptions of the board of actuaries, the real annual interest rate was assumed to be 1 percent and the real annual salary-scale increase to be 0.5 percent. Consequently, to be consistent, both retirement systems used an assumed investment rate of 6 percent and an assumed general salary-scale increase of 5.5 percent per year. Thus, the P.L. 95-595 economic assumptions are each 1 percent lower than the board's assumptions, so (as explained below) the key actuarial costs are about the same.

A table of the values of accumulated plan benefits and an analysis of the change in these values are required in the report. These values do vary significantly according to the assumption used, since annual salary increases are set to zero so the preretirement inflationary washout is eliminated. The report also contains a brief plan description; various ERISA tables such as net assets, normal cost as a percentage of covered payroll, and accumulated plan benefits; and a seventy-five-year projection of outlays. An enrolled actuary's statement is a requirement that may have been placed in the law without full realization of the impact. Over the years, some government actuaries have been frustrated because eco-

TABLE 1

	Retirement System	
	Military	Civil Service
Normal cost as percentage of covered payroll	46.3%	36.8%
Present value of future benefits	$523.3*	$814.3*
Present value of future accumulated benefits	348.9	430.3
Entry-age-normal unfunded liability	431.1	468.9
Fund balance	0.0	73.7

* Dollar amounts in billions.

nomic assumptions are decided upon by political appointees who use only a thorough knowledge of politics to determine the values. However, with the requirement of an enrolled actuary's opinion, even the OMB mandate on the long-term inflation assumption would not have to be accepted if the enrolled actuary did not agree. We should note that, to our knowledge, the Department of Defense and the Office of Personnel Management have never tried to influence the choice of assumptions for these two systems. The figures in Table 1 can be found in the P.L. 95-595 reports for the end of fiscal year 1980.

Misunderstandings

One problem faced by actuaries of fully indexed systems in general, and the federal retirement systems in particular, is the misuse of inflated dollars in public debate. While the misuse is often unintentional, some popular commentators delight in deliberately taking gargantuan numbers out of context.

It is especially tempting to take projected dollar amounts out of context. For example, in fiscal year 1980, the military retirement system's outlays were $11.9 billion or 57 percent of basic payroll. Although the number of retirees should increase 30 percent by the year 2010, the outlays are projected to increase nearly seven times. There probably will be no increase in the number of retirees from 2010 to 2055, if the numbers of military personnel do not increase, but the outlays in 2055 will be ten times greater than in 2010, or seventy times greater than the 1980 appropriation. In isolation, the projected $776 billion obligation in 2055 can be the subject of professional as well as nonprofessional concern. This figure must be placed in perspective, however, by relating it to an indexed base and noting that it will be 54 percent of basic payroll in that year, actually a decline from the current level.

In a more technical area, we believe that the use of level dollar am-

ortization as a measure of the cost of the system is also inappropriate. Under an entry-age-normal cost method, when salaries are assumed to increase, the normal cost is defined not as a level dollar amount payable each year but as a level percentage of salary. This spreads the payments out so that the financial impact is a uniform percentage of salary in all years. Using level *dollar* amortization of the unfunded liability when annuities are tied to CPI and salary increases creates an early year financial burden and leads to misunderstanding of the true cost of the system. Amortization of the unfunded liability as a level *percent* of payroll is a more defensible approach.

Both the military and the civil service retirement systems are under constant attack and scrutiny by employee and retiree associations, unions, taxpayers, GAO, OMB, the administration, the Congress, presidential task forces, news reporters, aspiring students, contractors, lawyers, and many others. This large and varied audience creates a major problem when valuation reports are written. The valuations must clearly define actuarial methods in laymen's terms, and the actuary must be prepared to explain the valuation process at all levels of sophistication.

Through the early 1970s, actuarial valuations of the federal systems were hidden from the public eye, not because there were no reports but because they were too esoteric to make headlines. As popular writers began to take notice of the valuations, attention has centered on isolated big-dollar items, such as total liabilities, often taken completely out of context. The actuary's role is to patiently explain the costs of the system to as many as will listen, and hope that policy will be based on fact instead of fantasy. Unfortunately, the misunderstandings resulting from one misleading article by a syndicated columnist cannot be corrected by a thousand actuarial reports.

It is also important that all aspects of potential changes in benefits be analyzed, including long-term as well as short-term effects. Political solutions to short-term problems can themselves become problems much later. For example, reaction to present high levels of inflation has produced a desire by many legislators to return to "recomputation" in the military, whereby annuities are increased at the same rate as active pay. In a stable economy, this would be much more costly than straight indexing—the very reason recomputation was eliminated years ago.

III. SENSITIVITY TO INFLATION

Actuaries who deal with pension plans are familiar with the effect of changes in the interest rate and salary scale on the actuarial cost of the pension system. They are also familiar with rules of thumb—such as the

rule that a ¼ percent change in interest produces a 7 percent change in normal cost. While the effects of changes in salary and interest assumptions are well known, the effects of changes in the cost-of-living increase are not as well known because few pension systems provide automatic cost-of-living increases. However, the leverage of the cost of living on the valuation of fully indexed plans is often as great as the leverage of salary.

Examination of the fully indexed federal systems provides interesting insights into the amount of, and reasons for, the leverage produced by a change in each of the economic assumptions. Allison and Winklevoss [1] showed how the costs of a fully indexed retirement system, with benefits based on final salary, would be totally impervious to equal changes in all three of the assumptions. The civilian and military retirement systems do, in fact, come close to meeting these conditions, and equal changes in all three assumptions generally produce almost the same normal cost and unfunded liability.

Examination of the effect of each incremental change on the military system as it existed before 1980 (i.e., with benefits based on final salary) shows that a 1 percent increase in salary will increase the normal cost numerator (present value of future benefits), by $(1.01)^{20.2}$. A 1 percent increase in the interest rate will reduce the same value by $(0.99)^{35.9}$. A 1 percent increase in the cost of living will increase the present value of benefits in the normal cost by $(1.01)^{17.4}$. Since these values almost exactly offset each other, a change of 1 percent in each of the factors would reduce the normal cost by only $(0.99)^{1.4}$.

The reason that the impact of an equal change in all three assumptions does not exactly follow the Allison-Winklevoss formula is that the interest, cost-of-living, and salary changes in the valuation program formulas, reflecting the actual benefits, are applied at different points in the year.

These values can be used to explain why the degree of leverage exists. In the military retirement system the earliest service retirement is after twenty years. Since disability retirements occur at less than twenty years, and many of the nondisability retirements occur after twenty years, the average period of service until retirement is about twenty years. Thus, the salary has a leverage equal to twenty.

The cost-of-living increases occur after retirement. The life expectation of the average retiree is around twenty-seven years while the leverage factor is only 17.4 years, since the average effect of the cost of living is weighted over the expected lifetime rather than representative of the full period from retirement to death.

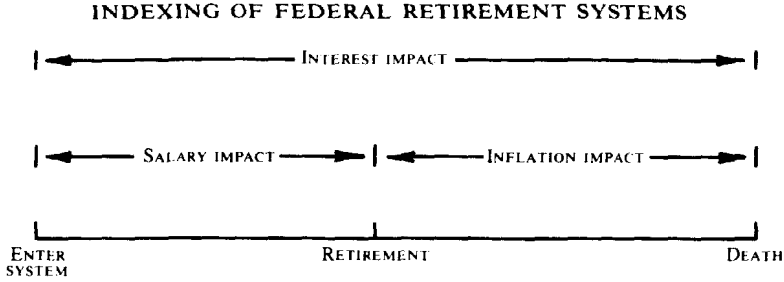

FIG. 1

The impact of interest is close to the total of the active service plus the weighted impact of the cost-of-living increase. In the military system, the interest leverage, thirty-six years, is close to the total of the inflation and salary-scale leverage. Figure 1 illustrates the effect of each of these changes.

The additional step needed to determine the effect on the normal cost is to divide the present value of future benefits by the present value of future salary at entry. Since the divisor incorporates the effect of salary and interest over the average career, this step reduces the effect of the salary and the interest leverage by about eight years. Thus, for the normal cost, the leverage of a 1 percent change in cost of living is seventeen years, a 1 percent change in salary affects twelve years, and a 1 percent change in interest affects twenty-eight years.

The relationships change as the retirement age and indexing provisions change. Since the earliest full civil service retirement is at age 55 with thirty years' service, there is more impact on salary and less on cost of living than in the military system. Table 2 shows the leverage of each of the factors on the normal cost under the final-pay military retirement system and the civil service retirement system.

TABLE 2

LEVERAGE EFFECT OF A 1 PERCENT INCREASE IN KEY ECONOMIC FACTORS

Factor	Military Retirement (Final Pay)	Civil Service Retirement System
Inflation	17	12
Salary-scale increase	12	11
Interest	(28)	(25)
Total	1	(2)

The impact of economic assumptions on fully indexed systems is easy to estimate and explain because of the interrelationship of the three factors. An actuary who values a fully indexed system can estimate the effect of changes in actuarial assumptions derived from the formula and explain why each of the leverages occurs. This does not suggest that the actuary should use implicit assumptions, and this is not done in the federal systems.

IV. VARIABLE RETIREMENT AND INFLATION

Valuation Anomaly

One critical problem in reporting on fully indexed retirement systems is that, under certain circumstances, a reduction in the earliest age at which full retirement benefits are payable may *appear* to be less expensive than the existing system. For instance, traditional actuarial measurements (normal cost and unfunded liability) would show that the military retirement system would cost less if the twenty-year full-retirement provision were reduced to nineteen years. This finding contradicts the experience of most actuaries and can be reduced to the obviously absurd conclusion that the cheapest military retirement system would be for everyone to retire after one year, thereby eventually putting half the population on military retirement rolls, albeit for very small benefits.

We derived (see Appendix) the following relationship, which must be met if the present value of active benefits is to increase as the earliest full retirement age is decreased:

$$\frac{(n-1)(1+c)}{n(1+s)-(n-1)(1+c)} > a^{j}_{r-1},$$

where

r = Existing earliest full retirement age;
n = Existing service for full retirement;
s = Total salary increase (merit and inflation) in the year before retirement;
c = Increase in annuities due to inflation; and
j = Real interest rate after retirement.

The formula assumes that there is a uniform increase in benefits, and that the benefit is based on the salary immediately before retirement as is the case with military retirements today.

The left side of the equation has to be greater than an annuity at the end of the year following retirement age or the earlier retirement will

appear to cost less than the current retirement conditions. In its simplest form, where c and s are both zero, the relationship states that the current service required for full retirement, less one, must be greater than the annuity value at the current average retirement age.

There are at least two types of retirement conditions under which the necessary condition does not exist. If service is very short, the left side will be less than the right side. This could occur, for instance, with a plan that has an age 65 and five years' service requirement and all new entrants are aged 60. Reducing the conditions to age 64 and four years' service will appear to cost less for people who enter at age 60.

The other way that the condition can fail is if a'_{r-1} is very large. This occurs in the military retirement system where the fully indexed annuity for officers and enlistees is greater than twenty-five and only twenty years' service is required for full retirement.

If early retirement does cost less, the actuary must report that to the plan sponsor who can then determine whether or not to reduce the retirement conditions. However, the actuarial status of the system must be examined very carefully before reporting that it is cheaper to retire early. When all facts are examined, it will usually turn out that it is, as expected, more expensive to reduce the retirement conditions.

There are two reasons why the earlier retirement actually costs more even if the equation is not satisfied. First, while the present value of benefits for the current population may decrease, the total population ever covered, and therefore the total number ultimately on the retirement rolls, will increase. Thus, the open-group present value may increase even if the closed-group value decreases.

Second, lowering of the retirement age will lower withdrawal rates since all current employees will then be closer to full retirement benefits and more likely to stay. Therefore, the actuary must not only introduce a retirement rate for the employees newly eligible, but also lower the withdrawal rates in the years near retirement.

The following table shows the change in total liability due to a given reduction in the earliest military retirement service as measured under different methods:

Closed group:	
Current withdrawal rates	$13.2 billion decrease
Reduced withdrawal rates	3.3 billion decrease
Open group:	
Current withdrawal rates	22.9 billion decrease
Reduced withdrawal rates	15.2 billion increase

The real cost situation appears only when all future entrants are considered and all relevant actuarial rates are modified to reflect the new condition.

Benefit Discontinuities

A related problem is the effect of the change in potential retirement earnings on the individual with a choice of retirement times. Many civil service employees and military personnel have a "window" of fifteen or more years in which they can choose their point of retirement. Either through poor design in the past, or unusual economic conditions today, many employees have lost, or will lose, future annuity value by delaying retirement. This is sometimes a desirable effect (e.g., during times of reduction-in-force) but it is more often a problem that should be corrected.

One aspect of this problem is the ratchet effect. Figure 2 shows the relationship of earned annuity to the annuity plus cost-of-living increase for the typical civil service employee eligible for retirement. If all annuitants are provided cost-of-living increases if they are on the rolls on a certain date, and retirement is delayed until after that date, an employee can lose money by delaying retirement. This was the situation before 1967 in the military system and before 1973 in the civilian system and, as inflation worsened, the effect was to lump more and more retirements right before each cost-of-living increase.

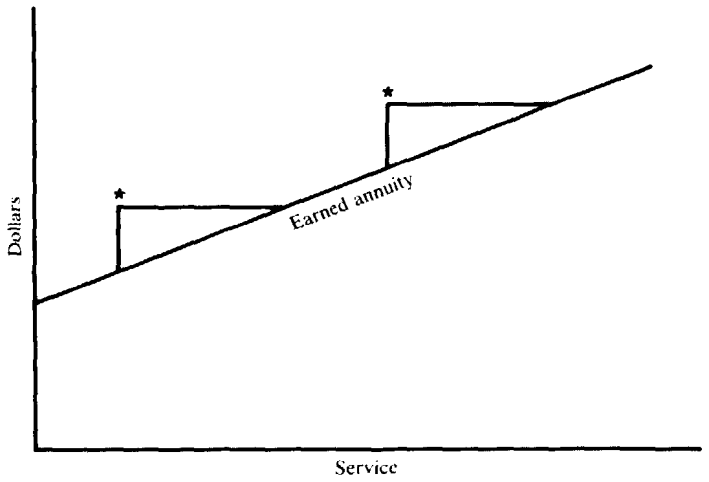

FIG. 2.—Asterisks show increase in annuity if employee had retired before cost-of-living date.

The first large bulge in new civil service retirements resulting from the ratchet effect was in 1969. Normally, there are about 100,000 retirements in the civil service retirement system in a year. Just before the October 1969 cost-of-living increase, however, there were 25,000 retirements on one day. There were also about 25,000 just before each of the cost-of-living increases in the succeeding two years. In 1972, when inflation had escalated sharply, the number of retirements shot up to over 45,000, and then almost 50,000, in one day.

This problem was corrected by providing that employees who retire after the cost-of-living increase would get at least as much as if they had retired on the date of the cost-of-living increase. As a result, retirements were spread fairly evenly over the year. The initial correction has now been changed to the less costly but equally effective method of reducing cost-of-living increases for recent retirees.

The current solution to the ratchet effect works well for the large majority of employees whose earned annuities are growing at a steady rate greater than inflation. Over any given year, the increase in the earned annuity due to salary base and service growth will usually exceed the rate of inflation even if inflation exceeds salary growth, as it has in the last few years. However, if there is no growth in the service credited because the employee has reached the maximum formula, or if there is no increase in salary, the continuing employee can lose annuity value with each cost-of-living increase. This situation is illustrated in Figure 3.

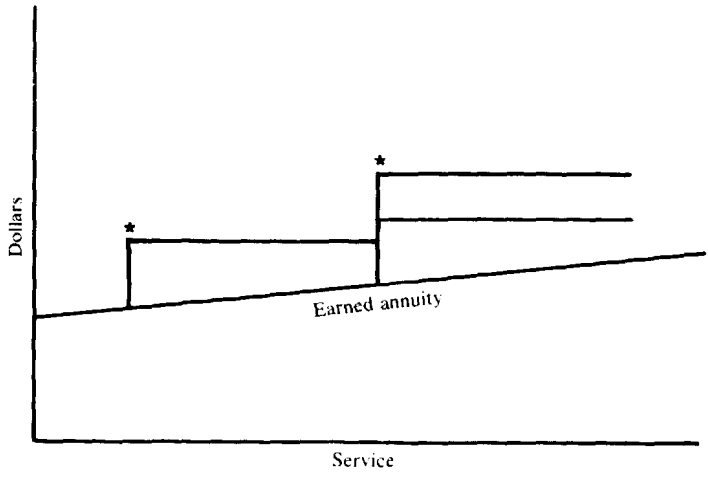

FIG. 3—Asterisks show increase in annuity if employee had retired before cost-of-living date.

This effect has been particularly noticeable in recent years for federal executives whose salary had been frozen at $50,112. As a result, there has been tremendous incentive to retire since the executives are losing valuable annuities with each cost-of-living increase that occurs. During the last year, for instance, two-thirds of the executives eligible to retire did retire. Normally, around one-fifth would retire.

Since 1967, the military retirement system has provided a fallback increase to eliminate the ratchet effect. In 1976, provisions were made so that a delay in retirement would not penalize a serviceman, even if the earned annuity did not grow as rapidly as inflation. This "Tower Amendment" stipulated that new retirees' initial annuities could never be lower than the annuities would currently be if they had retired at any earlier date. This provision avoids the problem of the civil service retirement system by guaranteeing that a person will never lose money by delaying retirement.

V. SUMMARY

Fully indexed retirement systems present challenging problems in design, valuation, and reporting. The history of the two largest federal retirement programs shows how to solve, or not solve, the design problems, and the undesirable consequences of mixing pension design and politics.

The actuary for a fully indexed public pension system has to be very careful that all the potential effects of a proposed change are carefully measured and reported. Even with full and continual disclosures, the actuary must prepare for the inevitable misinterpretations and patiently attempt to correct any misunderstandings, especially on the part of the policymakers.

APPENDIX

The development of the condition necessary for the present value of benefits at age x to increase when the age at retirement for full benefits, r, is reduced by one year is presented below.

Assumptions:

The plan provides the same percentage of final pay for each year of service; n is service at r.

Cost-of-living increases, c, are added at the end of each year.

${}_tp_x$ is the probability of remaining in the system for t years after age x.

The only decrement between r and $r - 1$ is death.

Benefits are paid once at the beginning of each year (use of monthly benefits would give the same general result).

Other symbols:

$t = r - x$ = Years until retirement.
$j = (1 + i)/(1 + c) - 1$ = Real interest rate after retirement.
B = Benefit at $r = n \times$ (percent credit) $\times$ (salary at r).
s = Increase in pay in the year before retirement (merit and salary scale).
B' = Benefit at $r - 1 = (n - 1) \times$ (percent credit) $\times$ (salary at r)/$(1 + s)$.

Reduction in benefit for retiring one year early:

$$B' = \frac{n - 1}{n} \frac{B}{1 + s} .$$

Present value of benefits at r = PVB:

$$\begin{aligned} PVB &= v^t {}_tp_x B[1 + vp_r(1 + c) + v^2 {}_2p_r(1 + c)^2 + \ldots] \\ &= v^t {}_tp_x B\ddot{a}_r^j . \end{aligned}$$

Present value of benefits at r − 1 = PVB′:

$$\begin{aligned} PVB' &= v^{t-1} {}_{t-1}p_x B' + v^t {}_tp_x B'(1 + c) \\ &\quad \times [1 + vp_r(1 + c) + v^2 {}_2p_r(1 + c)^2 + \ldots] \\ &= v^{t-1} {}_{t-1}p_x B' + v^t {}_tp_x B'(1 + c)\ddot{a}_r^j \\ &= v^{t-1} {}_{t-1}p_x B \frac{n - 1}{n} \frac{1}{1 + s} + v^t {}_tp_x B \frac{n - 1}{n} \frac{1}{1 + s} (1 + c)\ddot{a}_r^j . \end{aligned}$$

Therefore, $PVB' > PVB$ if

$$v^{t-1} {}_{t-1}p_x B \frac{n - 1}{n} \frac{1}{1 + s} + v^t {}_tp_x B \frac{n - 1}{n} \frac{1}{1 + s} (1 + c)\ddot{a}_r^j > v^t {}_tp_x B\ddot{a}_r^j ,$$

$$\frac{n - 1}{n} \frac{1}{1 + s} + \frac{n - 1}{n} \frac{1}{1 + s} (1 + c)vp_{r-1}\ddot{a}_r^j > vp_{r-1}\ddot{a}_r^j ,$$

$$n - 1 + (n - 1)(1 + c)a_{r-1}^j > a_{r-1}^j n(1 + s) ,$$

$$n - 1 > a_{r-1}^j [n(1 + s) - (1 + c)(n - 1)] ,$$

$$\frac{n - 1}{n(1 + s) - (1 + c)(n - 1)} > a_{r-1}^j .$$

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DISCUSSION OF PRECEDING PAPER

JAMES L. COWEN:

Mr. and Ms. Hustead are to be commended for their fine paper on the federal retirement systems. As a beneficiary under the plan for civilian employees, I am particularly interested in this subject. Some of the material in the paper concerns me greatly because it involves the way the public looks at public employees.

The first section of this paper is historical, showing how cost-of-living increases have developed for the federal programs. This section ends by stating that we are now in a deliberalizing period, and more can be expected. It ends with the following two sentences that emphasize the public's treatment of its employees: "One proposal would cap the index by the amount of the wage increase to federal employees if that was lower, as it has been in each of the last three years. Another alternative would be to provide only a portion of the full CPI increase."

The first sentence in the quotation above looks reasonable on the surface. What has not been said, however, is that although the law calls for federal employees to receive automatic increases in salary equal to the average increases in the private sector, the president has the right to revise the federal increases downward unless Congress overrides him, and this downward revision has occurred in recent years. Thus, this proposal would give federal retirees smaller increases than social security beneficiaries would receive, were a similar proposal enacted for OASDI. The index used for federal employees should be the same as that used for OASDI.

With respect to the second sentence, all the arguments against a similar proposal for social security apply equally well for federal retirees. The cost of living for retirees is affected by inflation, and retirees should not be required to change their buying habits and downgrade their standard of living by getting only a partial cost-of-living increase. The arguments concerning the proper index to be used for retirees are too extensive for this discussion; they have been covered at meetings of the Society of Actuaries and are printed in the *Record*.

One thing that should be said is that government employees would strongly object to a return to ad hoc increases. History has shown that when times are difficult as at present, the chance of enacting ad hoc

increases is practically nil because the public is interested only in its own pocketbooks and has little consideration for its employees. Government employees would have no recourse, since strikes are illegal for them. This lack of consideration on the part of the public is one reason why the unions of government employees have become more militant and why it is difficult for the government to recruit and retain top-level employees.

The next section of the paper discusses the valuation procedures. The use of a board of actuaries independent of the administration is something that all government retirement plans should adopt, and this includes OASDI. The civil service retirement system has had such a board of actuaries for as long as I can remember. It is to be hoped that any legislation enacted for the Defense Department plans will call for such a board of actuaries.

The discussion of the Public Law 95-595 reports was very interesting. I have no problems with the use of entry-age-normal funding methods for the civil service retirement fund and those plans sponsored by the Defense Department, but would not feel comfortable if this were extended to OASDI. I would also feel more comfortable if the legislation required the government to make the amortization charges for the unfunded actuarial liability. I remember that President Eisenhower vetoed an appropriation bill because it contained about $500 million to pay the interest on the unfunded actuarial liability, and I remember times when no government contributions at all were made to the civil service retirement fund, even those to cover the normal cost. The public is not aware of these circumstances, and because government payments now are increasing, the public objects, not realizing that much of the problem is due to its past attitudes. Thus, because of the fickleness of the public, ERISA-type standards are needed to protect government employees.

The recommendation in the paper that the amortization charges for the unfunded liability be made in terms of level percentages of payroll rather than in terms of level dollars is appropriate. This same procedure should be adopted for salary-related plans in the private sector covered under ERISA.

The paper states that equal changes in the three assumptions—interest rate, salary scale, and postretirement cost-of-living increases—result in almost the same normal cost and unfunded liability. This is understandable, but it is not realistic to think that equal changes will occur in the real world or even in the assumptions. If the automatic cost-of-living increases were to be amended to give only a partial CPI increase, the equality of change definitely would not occur.

The authors discussed what they called the ratcheting effect, which caused a bunching of new retirements just before cost-of-living increases

were due. The same kind of thing occurs in negotiated plans where employees postpone their retirement until after the new contracts go into effect.

The authors comment on the consequences of mixing pension design and politics. It must be remembered that, except for the cost-of-living provisions and a high three-year average on earnings, most of the liberalizations followed similar liberalizations in negotiated plans. The full retirement at age 55 with thirty years of service followed the adoption of similar provisions by the auto and steel industries. The cost-of-living increases were enacted because of the problems inherent in getting ad hoc increases enacted in years with an unbalanced budget. Thus, the problems of plan design in the public sector are not much different from those in the private sector. One difference is that public sector employees lack the protection given to those in the private sector through ERISA. Another major problem is that federal employees lack the floor of protection provided by OASDHI and, as a result, have gaps in their protection that add to the problems of plan design. Universal coverage under OASDHI is desirable, but government employees must be told that they will have protection over and above social security if universal coverage is enacted. Most government employees are unaware of the advantages that would accrue to them as a result of universal coverage, and the only argument they hear in its favor is that it would prevent windfalls to so-called double-dippers like me.

(AUTHORS' REVIEW OF DISCUSSION)
EDWIN C. HUSTEAD AND TONI S. HUSTEAD:

The authors are delighted with the many comments received on the paper, including the written comments of James Cowen. We hope, with Mr. Cowen, that the exigencies of reducing the federal deficit do not lead to unreasoned modifications to the civil service and military retirement systems. If changes are indicated, we trust they will be taken very thoughtfully. We also believe that the best step to take now, for both political and economic reasons, would be coverage of federal employees by social security and an integrated civil service retirement system.

We also wish to express our thanks to Donald L. Prullage, who pointed out some technical errors in our formula, and to Michael Virga, who kindly pointed out some statements that were not correct. With their advice, we were able to improve the accuracy of the paper.