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THE FEDERAL CIVIL SERVICE RETIREMENT SYSTEM:  
AN ANALYSIS OF ITS FINANCIAL CONDITION AND  
CURRENT REFORM PROPOSALS

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ABSTRACT

This paper analyzes the financial condition of the Federal Civil Service Retirement System. It begins by examining various official annual reports about the system published by the Office of Personnel Management, discussing their differing assumptions and resulting differences in estimates of the unfunded liability. It then discusses the construction of a simulation model in which the current unfunded liabilities can be estimated under an entry age normal definition of pension obligations.

The results suggest that, for reasonable estimates of salary increases, inflation, and benefits indexing, the unfunded liabilities of the CSRS are between \$500 billion and \$600 billion. (Even under the accrued benefits definition of pension obligations, which I argue is more relevant to private sector employment, the unfunded liability exceeds \$400 billion). I argue that this constitutes a debt similar in burden per dollar to that represented by the explicitly recognized national debt, and nearly half as large.

The last part of the paper considers current proposals to reform the CSRS to reduce the unfunded liabilities. They are found (1) to reduce the pension wealth of current federal workers by nearly one half, (2) to fall rather dramatically on middle aged federal employees, and (3) to leave the unfunded liabilities of the system still in excess of \$400 billion.

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# The Federal Civil Service Retirement System

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When career civil servants discuss the pay differential between government and private employment, they frequently remind each other to allow for the effects of their rather generous pension program. What has been a commonplace for federal employees -- that the nation has incurred substantial future obligations to them -- has not, however, attracted much attention from the public at large or even from commentators on government spending until very recently. When "federal borrowing" is discussed, the term almost never includes the borrowing implicit in making promises to pay future pensions. Even when "off-budget" spending is discussed, the failure to note promises of future pension payments in current budget documents is rarely mentioned. And when commentators try to reconstruct the actual deficit of the federal government, correcting for the absence of

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a capital budget and for credit and off-budget programs, accrual of liabilities for federal pensions is virtually never proposed.

The commitments embodied in the Federal Civil Service Pension System exceed the currently and prospectively available assets out of which they are supposed to be paid by over one half trillion dollars. Comparable estimates for the net liabilities of the military pension systems are of the same order of magnitude, and those for the Social Security system indicate net liabilities of over one trillion dollars. Thus, the three major "retirement" programs of the federal government have net liabilities of approximately twice the currently officially recognized national debt. If the annual "deficit" and the size of the "national debt" are major political issues, the "quasi-debt" constituted by the net liabilities of federal retirement systems should be an issue as well. Yet, because they are shrouded in the mystical cloak of "actuarial estimates" and are not treated in the standard budget documents considered by the Congress, they have generally received little attention. Recently, the Social Security system has come under greater scrutiny, largely because it threatened to run out of cash. Until the latest round of considerable attention and public study, only a few of the most educated commentators were aware of its long term actuarial position. The Civil Service Pension System and its military counterpart are hardly noticed at all.

An interesting example of the lack of enthusiasm for these issues may be found in a recent compendium of papers from the American Economic Association annual meetings. The Proceedings volume of the American Economic Review in May of 1982 devoted

considerable space to a variety of papers discussing various aspects of the economics of government. A wide range of on- and off-budget programs were treated. Federal wages, tax expenditures, credit programs, and entitlement programs were scrutinized in detail. There is almost no mention of the Civil Service Retirement System.

This paper considers the fiscal condition of the Federal Civil Service Retirement System and analyzes a major proposed reform of that system embodied in the budget requests currently before the Congress. The central findings of the study are:

- (1) The "unfunded liability" of the current system is approximately \$540 billion in 1982 dollars.
- (2) Labor expenses recognized in the direct expenditures budget considered by Congress should be about 22 percent higher than they currently are to account for full funding of pension obligations accrued in each year. In 1982, this would increase federal labor expenses by about \$14 billion.
- (3) The existing system provides a strong financial incentive for federal employees to continue working up until they attain full retirement eligibility -- usually between ages 55 and 60. It then provides a strong incentive for them to retire.
- (4) The reform proposal advanced by the Office of Personnel Management would constitute a major overhaul of retirement benefits. It would close the current funding gap solely by cutting benefits received by and net wages paid to current federal employees. It would constitute a 50 percent cut in the net pension wealth of current employees. It is comparable financially to a 15 to 30 percent cut in the annual compensation of federal employees over the remainder of their working lives.
- (5) The OPM reform proposal would reduce the cash outlays of the retirement system funded by taxpayers by about \$4 billion per year for the remaining years of this decade, and by larger amounts in later years. It would cut the unfunded liability of the system by one-quarter, to \$400 billion. It would

reduce the full funding rate from 36 percent to 20 percent.

- (6) The OPM reform proposal would substantially alter the retirement incentives of the current system, completely eliminating the existing incentive to retire as soon as full eligibility is attained. This could have a considerable impact upon the age and experience composition of the federal workforce.

## Section I

### **The Existing System**

The Office of Personnel Management annually presents a number of reports on the status, changes, and prospects of the Civil Service Pension System. These views are not entirely consistent with one another. The differences among them reflect differences in statutory requirements for how the system is to be viewed and funded. None gives an adequate picture of the condition of the fund.

#### **Basic Characteristics of the Retirement System**

The only widely agreed-upon characteristics of the fund are those having to do with the objective facts of its operation and status -- anything involving projections of its future operations is almost by definition a matter of controversy. The system is a defined benefit pension plan providing retirement and disability insurance benefits for a covered enrollment of approximately 2.7 million employees, 1.3 million retired employees, and 430 thousand survivors of employees or annuitants. The plan has provided benefits that are generous compared to most private

pensions. Employees can currently retire with full benefits at age 55 with 30 years of service, at age 60 with 20 years of service, and at age 62 with 5 years of service. The current annuity formula provides benefits of:

1 1/2 percent of average salary per year of service for the first 5 years of service;

1 3/4 percent of average salary per year of service for the next 5 years of service; and

2 percent of average salary per year of service for any remaining years of service, with a maximum of 80 percent of average salary.

Full disability benefits are available to any employee with 5 years of service. Disability benefits are 40 percent of salary or the retirement formula projecting service to age 60, whichever is higher.

A critical feature of the current system is that benefit payments are indexed to the cost of living after retirement. Moreover, the "average salary" used in the benefit formula refers to the three highest years of earnings (generally the last three years of employment). Thus, the level of benefits with which the retiree starts is also indexed to inflation, provided that federal salaries are increased to keep pace with the cost of living. Both of these features have very large impacts on the financial status of the pension system, and both are the subjects of considerable controversy. Indeed, the appropriate treatment of these two features of the system is perhaps the most important choice involved in the actuarial estimation of the financial

condition of the system.

The benefits of the retirement system have been increased and the coverage extended to additional employees in a number of major revisions of the system since its inception in 1920. Thus, the system has accrued substantial unfunded prior service costs over the years. The last major alteration in the system was in 1969, when the basis for the average salary calculation was reduced from the highest five years of earnings to the highest three.

In theory, the system is funded out of contributions of 14 percent of payroll -- 7 percent each from employees and their agencies. In fact, these payments are not adequate to cover the current cash obligations of the system, and the federal Treasury annually makes an additional contribution to the fund. This contribution is computed on the basis of an analysis of the "unfunded liability" of the system, and is supposed to constitute a payment in lieu of the interest that would have been earned on assets in the fund if it were fully funded. The actuarial estimation of the obligations of the fund, and thus its unfunded liability, is therefore an issue of current operating interest both to the fund and to the Congress. Indeed, the Congress' direct interest in the matter led it to specify its intentions concerning how the fund's obligations were to be valued.

In part because the issue is of such material importance to the fund and in part because the Congress specified its preferred form of valuation, a variety of different accountings of the fund are rendered each year. Under any estimation procedure, the present value of the obligations of the system substantially



exceed the present value of its prospective income plus its current assets. All valuations thus agree that the system has a large "unfunded liability." But different valuation methods lead to quite disparate estimates of what this liability is, and hence to controversy about the appropriate methods of valuation.

[Appendix I discusses alternative methods of valuation of pension obligations and evaluation of pension fund performance.]

### **"Economic" Assumptions and Fund Valuation**

In the actuarial valuation of any retirement system, a series of interrelated assumptions about future economic conditions are crucial. Among these are assumptions about the future values of interest rates, rates of salary increase, increases in retirement benefits, and so on. In addition, the estimates rely upon the future stability of existing patterns of career promotions, promotion-related salary increases, and retirement decisions.

There is, however, one aspect of future economic conditions that should not make much difference in valuing the pension system. If inflation in general prices is treated consistently in the actuarial valuation, its assumed rate will be of little consequence. This is because any consistent valuation method will present the estimated values in real terms -- that is, in terms relative to the rate of general price increases. So long as values are consistently expressed in real terms and the assumed rates of increase (or decrease) of specific values -- like salaries or benefits after retirement -- are expressed as real rates, the rate of inflation by itself is an unimportant

assumption.<sup>1</sup>

What is crucial, then, is the assumed real rate of return on fund assets and the real rate of increase (or decrease) in salaries and benefits after retirement. There has been little controversy concerning the appropriate real rate of return to assume for fund assets. In contrast to a rather odd valuation in the 1980 annual report in which the Board of Actuaries for the fund assumed a five percent real rate of return on assets for the indefinite future, recent official reports of the fund's condition have presumed modest real rates of return in the range of .5 to 2 percent. (In some cases real rates as high as 3 to 5 percent have been assumed for the next one or two years.) Given the historical performance of the fund -- invested by law in fixed interest special securities of the US Treasury -- it may be optimistic to presume that the real rate of return on fund assets will exceed zero -- that is, that the fund will do any better than just keep even with inflation. If, however, the fund were somewhat more aggressively managed -- not an inconceivable outcome of current criticism of its operations -- it might well be able to achieve a modest positive real return.

The rate of return on fund assets is a crucial parameter because it provides the rate of time discount that allows us to compare the values of obligations in future periods with currently and prospectively available fund assets. It is, therefore, most appropriately interpreted as the rate at which we should discount the pension obligations of the government. Since we are trying to discern the value of these obligations on the

theory that they constitute real governmental debts, there are powerful arguments for using the real risk free rate of return in the economy -- perhaps 1 to 2 percent -- as the appropriate discount rate. This choice is independent of the actual financial performance of the fund, as it should be since any eventual deficit in the fund will have to be paid by the Treasury. In the work presented here, all obligations have been discounted at an assumed risk free rate of 1.5 percent in real terms.<sup>2</sup>

Different official reports of the Fund are of different minds about how to treat future inflation. Table 1 shows three official estimates of the unfunded liability of the system. The first estimate is from **Fringe Benefit Facts 1980**, a publication of the Office of Personnel Management that provides an official overview of the fringe benefits received by federal employees and presents financial information associated with each plan. It assumes that there will be no future increases in either salaries or benefits other than those currently mandated. For purposes of this valuation, OPM interprets this to mean that there would be no future increases, even though benefits after retirement are indexed by law to the cost of living. Even with these highly restrictive assumptions, the unfunded liability of the system is over \$160 billion, about \$62 thousand for each current employee.

The "normal cost" of the system under these assumptions is worth noting. "Normal cost" is the percentage of an average employee's salary that must be put aside in each year of service in order to fund the pension over the employee's career. According to the fund's actuaries, if there is no future

inflation in salaries or benefits, combined annual contributions from the employee and employer of about 14 percent of salary would be adequate to prevent deterioration in the financial integrity of the system. The current funding rate is consistent with the continued financial health of the system **only** in the absence of future inflation.

In its 1982 annual report, the Board of Actuaries of the fund presented an alternative set of estimates of the financial status of the system based on the assumption that retirement benefits would continue to be indexed to the cost of living and that inflation would continue at the (Office of Management and Budget estimated) rate of 5 percent per annum. They chose, however, to treat future increases in salaries as a matter of choice for the Congress, and therefore did not project any "general schedule" increases in future salaries. The result is shown in line 2 of Table 1; the unfunded liabilities of the system are approximately \$360 billion, about \$130 thousand per current federal employee. At current average wages, this amounts to nearly six years of salary for each employee.

This is still not an accurate measure of the condition of the fund, because it ignores the effects of future salary increases. Such increases will have two effects. First, they will provide a larger source of incoming contributions. Second, and more powerfully, they will raise the retirement benefits of future retirees. The Board of Actuaries recognizes that ignoring these effects constitutes a potentially serious misrepresentation of the condition of the fund. Accordingly, they present an

additional alternative set of calculations of the obligations of the fund based on the assumption that both benefits and salaries are likely to keep pace with future inflation. Specifically, the Board assumed that salaries will rise in real terms by one-half percent per year, and that benefits after retirement will stay constant in real terms. The results are shown in line 3 of Table 1, taken from the 1982 annual report of the retirement system.

The substantive difference between the results in lines 2 and 3 of Table 1 is in the estimated cost of future payments to those who have not yet retired. If salaries continue to keep pace with inflation (as is assumed in the calculations for line 3), benefit levels for employees who have not yet retired will be considerably higher. The projections for those who have retired already are unaffected, since in both valuations their benefits were presumed to be constant in real terms. The change is substantial; the unfunded liability rises by over \$100 billion, to \$469 billion, about 7.5 years of salary for the average federal employee.

Under these assumptions, the current funding structure of the retirement system is far from adequate. The "normal cost" computed by the Board of Actuaries allowing for inflation in both salaries and benefits after retirement amounts to 36 percent of payroll. Since the employees' contribution is 7 percent, this would leave 29 percent to be paid by the government -- four times current agency contributions. Recognizing the inadequacy of the current funding structure, Congress has moved to address the issue of the unfunded liability, albeit through rather an indirect method. As we shall see, even the device chosen by

Table 1. Official Estimates of the Unfunded Liabilities of the Civil Service Pension System, September 1980  
(All figures in 1980 dollars)

	Total Unfunded Liability	Unfunded Liability Per Employee
No future increases in salaries or benefits	\$ 166.4 billion	\$ 62 thousand
Future increases in benefits but not in salaries	357.3 billion	132 thousand
Future increases in both salaries and benefits	469.5 billion	174 thousand

Sources: Line 1: Office of Personnel Management, **Fringe Benefit Facts 1980**. US Government Printing Office, 1981, page 11.

Line 2: Office of Personnel Management, "Statement of General Information for the Civil Service Retirement System Plan Year Ending September 30, 1980," mimeo, February 16, 1982, Table 1. Assumes no future general schedule increases in salaries; benefits after retirement are assumed to be constant in real terms.

Line 3: \_\_\_\_\_, Table 4. Assumes salaries grow in real terms at 1/2 percent per year; benefits after retirement are assumed to be constant in real terms.

Congress will not long provide adequate coverage.

### **Current Treatment of the Unfunded Liability**

The inadequacy of the funding of the retirement system has been a matter of more than academic interest for several years. The Congress moved during the 1970s to address the problem as a consequence of projections indicating that the fund would not only have a substantial and increasing unfunded liability, but would also quickly run out of cash. The operating revenues of the system -- the direct employer and employee contributions from payroll -- were substantially less than fund disbursements in 1980. Table 2 shows the 1980 operating flows, the effect on available funds in the absence of Congressional action, and the supplemental payment appropriated by Congress to maintain the cash basis integrity of the system.

If Congress had not supplemented the funding of the retirement system, the fund would have decreased by nearly \$3 billion in 1980. This would have eroded the fund's earning potential, and would have started a downward spiral leading quickly to bankruptcy. This prospect motivated the Congress to provide additional funding for the system during the 1970s. The action Congress took does **not**, however, guarantee the integrity of the fund. Congress chose a modestly rational and relatively inexpensive expedient that insures only that the cash position of the fund will not deteriorate precipitously in the near future.

A standard solution to the problem that the retirement system faced -- indeed, the solution that the Congress legislated for **private** pension funds in the Employee Retirement Income

Table 2. Operating Flows of the Civil Service Retirement System,  
1980. (All figures in billions of dollars)

ASSETS AVAILABLE AT YEAR START		63.9
Investment Income		
Net capital gains	( .3)	
Interest	5.1	
Contributions		
Employer	3.6	
Employee	3.7	
TOTAL ADDITIONS		12.1
Benefits paid	14.9	
Administrative expense	.1	
TOTAL DEDUCTIONS		15.0
NET FLOW FROM OPERATIONS	( 2.8)	
PROSPECTIVE ASSETS AT YEAR END		61.0
Supplemental Treasury Payment		11.9
ACTUAL ASSETS AT YEAR END		73.0

Source: Office of Personnel Management, "Statement of General Information for **The Civil Service Retirement System** Plan year ending September 30, 1980," mimeo, February 16, 1982. Computed from figures in Table 2.



Security Act of 1974 -- consists of two parts:

- (1) Raise the contribution rate to the fund to the "full funding" level. Based on the "entry age normal" cost concept, this would mean raising the level of contributions from the current 14 percent rate to about 36 percent of payroll;<sup>3</sup> and
- (2) Adopt a funding schedule to pay off the principal and accumulating interest of the "unfunded liability" of the system.

In its 1980 annual report, the appointed Board of Actuaries of the system argued at length for these reforms. Congress had already chosen, however, to adopt a variant of the "interest" portion of part 2 of this program, and not to adopt part 1 at all. Congress chose to pay only the **interest** on the unfunded liability, leaving the principal unamortized. The reason why its method is a variant of this portion is that it chose to define the interest and the unfunded liability without reference to current or future inflation. The resulting construct is a strange animal indeed.

Why would the Congress choose not to amortize the principal of the indebtedness? Obviously, it is less expensive -- currently -- to ignore it. One rationale for ignoring it is that the current unfunded liability represents underfunded past service costs incurred on behalf of past taxpayers for services they received. These costs should have been borne at the time the services were rendered to the taxpayers who received them, but they were not. There is no obvious reason why current and future taxpayers should make back payments against this debt. According to this argument, there is no reason to retire the accumulated unfunded debt as long as the fund remains solvent on

a cash basis.

This would make a good deal more sense if it were combined with a commitment to end the practice of underfunding from now on. The Congress chose, however, to continue adding to the unfunded liability in addition to ignoring its current size. It did, however, realize that the fund was losing interest because it was not fully funded. The interest income from the investments the system would make if it were fully funded would be an important source of additional cash for current payments. The Congress decided to "simulate" full funding: an annual payment is made to the fund representing the additional interest payments it would have received if it had been fully funded.

This left the problem of determining the rate of interest to be paid and the amount of the hypothetical funding on which to pay it. The rate was relatively simple: the interest is paid at the rate of other special issues of the Treasury, approximately -- but typically a little below -- the current long term Treasury bond rate. As we have seen, however, the amount of the "unfunded liability" is a matter of some controversy. The legislation passed by the Congress establishing the "in lieu of interest" payments has been interpreted to mean that the "unfunded liability" of the system is to be evaluated under the assumption that there will be no inflation in either salaries or in benefits after retirement. This leads to a valuation like that shown in line 1 of Table 1, which, as indicated above, gives far too favorable a view of the financial condition of the system.

There are three major conceptual flaws in the solution adopted by the Congress. First, the financial integrity of the

system cannot be insured by any means that does not eventually bring the current funding into line with the current accrual of liabilities. Second, while payment of interest on the "unfunded liability" will keep the debt from growing any larger (if the current practice of underfunding is discontinued), it will not do so if the principal amount on which this interest is figured is grossly underestimated. Finally, if the purpose is to keep the unfunded liability from growing, this should probably be interpreted in real rather than nominal terms. Thus, the "in lieu" interest payment that the Congress should make should be figured on the basis of the real liability and should be figured at the real interest rate. By contrast, the Congress has chosen to pay interest on what might be termed the "nominal" liability -- which ignores inflation and is far too small -- and at the "nominal" interest rate, which includes a charge for the inflation erosion of principal.

As it turns out, the current high nominal interest rates, in conjunction with a substantially underestimated "debt" on which to pay them, led the Congress to pay, by accident and not by design, approximately the "right" amount of interest last year -- about \$10 billion -- and perhaps even a bit more than would be required to pay the real interest rate on a more accurately estimated liability. The current economic setting might, therefore, provide a natural time to switch from the rather awkward method that has been employed to date toward one that has a better conceptual and practical basis.

**The Financial Condition of the Civil Service Retirement System:  
The Baseline Simulation for 1981**

To provide a baseline for comparison of the major reform proposal for the retirement system, an analysis of the Civil Service Retirement System for 1981 was prepared using a computer simulation model that represented 1700 age-experience categories of employees for each sex. Simulations were run for 120 years. All computations were carried out in real terms, and all economic assumptions were specified in terms of real rates. The rates of promotional salary increases, voluntary, involuntary, and disability retirement, and separation of employment due to withdrawal or death were projected from recent experience of the system, published in its annual reports.

**Critical Economic Assumptions** The baseline simulation assumes that the fund will earn a risk free real return of 1.5 percent on its assets. As indicated earlier, the fund could conceivably be managed so as to earn a higher expected rate of interest, but probably only by investment in higher risk assets. On a risk-adjusted basis, this rate would appear to be reasonable. It simply assumes that there are no "bargains" -- securities with higher than average risk-adjusted returns -- available in the capital markets. A lower rate would be defensible, but in the spirit of erring on the side of conservatism in estimating the unfunded liability, this rate was chosen for the base case.<sup>4</sup>

General schedule increases in federal salaries are assumed to proceed at the rate of 1 percent annually in real terms. This presumption is based on the notion that long term real national

economic growth will be sustained in excess of 1 percent per annum, and the real wages of federal employees will not decline permanently relative to the real wages of private sector employees.

Under existing law, benefits paid to retired employees are indexed to the cost of living. In the past, the form of indexing guaranteed growth of these benefits in real terms. Recently, however, the indexing has been modified so that increases are granted only once each year, and are related to the increase in the consumer price index over the preceding 12 months. Accordingly, the baseline simulation assumes that benefits after retirement will be constant in real terms.

Estimates of real values for the current retirement system are nearly neutral with respect to the assumed rate of inflation. The only aspect of the system that is defined in nominal terms is the computation of "average" salary, which is used to establish the annuity payment in the first year of retirement. This average, which is taken over the highest three years of salary, is lower relative to salary in the final year if inflation is high than if it is low. Even this effect, however, is relatively minor. The baseline simulation assumes continuing annual inflation at the rate of 5 percent.

Table 3 summarizes the fundamental assumptions of the baseline simulation.

**Baseline Simulation Results** A summary of the results of the baseline simulation is shown in Table 4. The unfunded liability of the retirement system as of October, 1981 was about \$540 billion. This net liability results from a current present value

Table 3. Baseline Simulation Assumptions

	Annual Rate
Real rate of return on fund assets	1.5 %
Real rate of salary growth	1.0
Real rate of benefits growth (after retirement)	0.0
Rate of general price increase	5.0

Retirement, Disability, Death, Separation Rates:

As reported in Office of Personnel Management, **Annual Report of the Civil Service Pension System, 1980.** US Government Printing Office, 1981.

Table 4. Baseline Simulation Results for the Civil Service Retirement System, October 1981

Present Value of Projected Benefit Payments:

Current Annuitants	\$269 billion	
Future Annuitants	\$625 billion	
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Total		\$894 billion

Present Value of Projected Future Salaries:

Current Employees	\$776 billion
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Present Value of Future Contributions:

Employees	\$ 54 billion
Employer (current funding rate)	\$ 54 billion
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Total Contributions	(\$108 billion)
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Current Assets:	(\$ 73 billion)
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Excess of Liabilities over Assets (current funding rate)	\$713 billion
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Additional Employer Contributions (full funding rate)	(\$172 billion)
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Actuarial Unfunded Liability	\$540 billion
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Normal Cost as fraction of salaries	36.2 percent
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Unfunded Liability per Employee	\$200 thousand
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Source: Simulation. See Table 3 and text for assumptions.

of projected benefit payments of \$894 billion, with projected future collections (at a full funding rate) of \$281 billion and current assets of \$73 billion. The estimated present value of future benefit payments to employees now working or on the annuity rolls **exceeds the present value of projected total future salary payments to current employees.** Even if we used all of the current funds, and contributed an amount equal to all future salary payments to existing employees, we would be unable to pay the benefits to these employees and those currently on the rolls. Cash solvency will only be maintained through supplemental appropriations and the contributions made by and on behalf of employees not yet employed.

The actuarial unfunded liability effectively assumes that future funding of the system will be at the full normal cost rate. As Table 4 indicates, this amounts to an additional contribution over the remaining working lives of current employees of about \$172 billion (in present value) more than is currently contemplated under existing official employer contributions. Thus, an alternative way to read the results of the baseline simulation is to observe that if we make additional contributions over and above the official 7 percent of salaries in amounts equal to a present value of \$172 billion, then we will only be behind in funding the retirement of current employees by \$540 billion (in present value) when they retire. If we continue current underfunding, our net liability to these workers will be over \$700 billion.

The full funding rate associated with the current employee,



benefit, and economic structure of the retirement system is about 36 percent of payroll, roughly the same as that projected by the Board of Actuaries on the basis of similar assumptions for the preceding year. Since the contribution rate (exempting the supplemental payment from the Treasury) is only 14 percent, the annual underfunding of the current obligations of the system is approximately 22 percent of payroll, or about \$14 billion this year. In addition to this underfunding, the fund is depleted by virtue of not receiving interest income on the investments it would have made with the extra funds it would have if it were fully funded. In 1981, with an unfunded liability of \$540 billion and a presumed real rate of return of 1 1/2 percent, this was an additional \$8 billion loss.

The condition of the retirement system would have deteriorated by about \$22 billion in real terms last year if the Treasury had made no supplemental contribution to it. As it was, with a supplemental contribution of about \$14 billion, the financial condition of the fund deteriorated by about \$8 billion. Thus, presuming 5 percent inflation, the current unfunded liability can be expected to be about \$575 billion in 1982 dollars.

Under the baseline assumptions, the projected cash position of the retirement system is not critical for the moment, due to the projected continuing supplemental appropriations from the Treasury. In the early years of the next century, however, the situation can be expected to deteriorate. Following a decade of relative stability in the level of fund assets, funds will begin to flow out at the rate of about \$3 billion per year. This trend

will be exacerbated by the reduction in interest income received as the invested funds decrease, and will not be offset under current projections of the Treasury's supplemental payment. The baseline simulation projects approximately \$40 billion in available funds in the year 2000 -- roughly half today's assets -- and a zero cash balance in 2008.

The financial condition of the current retirement system is precarious. The system has an enormous net liability -- roughly half the size of the currently recognized national debt. In nominal terms, the unfunded liability of the civil service retirement system appears to be growing at roughly the same rate as the national debt, and so is staying about half as large. The nominal change in the national debt from year to year is referred to as the "budget deficit," and it attracts widespread attention in the Congress and in the media. The corresponding nominal "deficit" of the federal pension system this year is approximately \$35 billion.

As with the explicit national debt, great care must be exercised in interpreting the quasi-debt represented by the nation's civil service pension obligations. First, just as some of the costs are passed along to future taxpayers, some of the benefits may be also. If, for example, the pension obligations were incurred as federal workers built physical assets to be used in the future, some of the benefits will be received by future taxpayers. Second, while their liability is a real one, taxpayers presumably obtained some benefits in the form of reduced wages paid to federal workers as a consequence of the

pension "compensation" those workers received. Indeed, there is evidence that, excluding pension compensation, federal employees receive lower pay than comparable workers in the private sector. If part of the (political) purpose of having a federal pension system is to move some of federal worker's compensation off-budget, the political goal of reducing the apparent cost of government services to taxpayers is only met if the on-budget portion of compensation (wages) is in fact reduced. We would thus expect that pension obligations were incurred in exchange for some reduction in wages. However, this exchange is likely to be inefficient, because both workers and taxpayers appear to view \$1 of present value of pension benefits less than \$1 of current wages. If, for example, workers value \$1 of pension benefits at 50 cents, then total compensation must be increased as wage reductions are achieved by granting pension benefits.

Moreover, many would argue that public debts should be a source of alarm only when they grow as a fraction of gross national product -- that is, when the burden of taxes they represent grows as a fraction of taxpayers' incomes. Even on this standard, however, the nation's civil service pension obligations are growing, albeit rather slowly. Unlike the explicit national debt, which consists of nominal governmental obligations whose real burden is eroded by inflation, federal pensions are fully indexed, so that inflation does not materially alter the real size of the taxpayers' debt. In addition, continuing underfunding adds to the real unfunded liability each year. In 1982, a contribution of about \$19 billion more than the official employee and employer funding would have been required

to keep the pension obligation constant as a fraction of GNP (at about 20 percent). Ever after the Treasury's supplement payment of \$14 billion, an additional \$5 billion would have been required. Thus, even viewed against the rather weak standard that public debts should not be permitted to rise faster than the economy is expanding, federal pension obligations constitute a material problem.

The magnitude of the pension debt might best be viewed in the context of the fact that while the national debt is ostensibly on behalf of and for the benefit of 230 million taxpayers, the pension fund is mainly for the benefit of 2.7 million current employees and 1.7 million annuitants. (The benefits to the taxpayer of accruing the fund -- the services of the employees as they earned these pensions -- have already been received.) This net liability is increasing at the rate of roughly \$10 billion per year in real terms. Including the inflation adjustment in the outstanding principal, this year's increase is about \$35 billion in nominal terms -- \$13,000 for every current employee.

Some observers regard the public's pension obligations as less binding than the explicit national debt. There is no contractual obligation, they argue, and the rules are subject to change at any time. Thus, this argument concludes, we should be less concerned about pension obligations than about other federal commitments. There is clearly some force to this logic; as we will discuss in the next section, there is currently before Congress a proposal that would substantially alter the existing

system. This should not, however, persuade us too easily to ignore the scope of the existing commitments. Precisely because they are a less visible and less directly costly form of compensation, it seems unlikely that they will disappear as a feature of the federal employment landscape.

## Section II

### **The Current Reform Proposal**

The financial condition of the Civil Service Pension System has finally begun to attract significant policy notice in Washington. The marked increase in attention is due in part to a spreading recognition and understanding of estimates like those presented in the last section, and in part to the more intense scrutiny given to all government retirement programs in connection with studies of Social Security reform. The Office of Personnel Management is currently drawing up proposals for substantial reform. While they have not yet been formally presented to the Congress, their general outline is beginning to emerge. Administration budget requests for the new fiscal year base estimates for receipts and disbursements of the retirement fund on a system of benefits considerably different from that currently in place.

This section provides an analysis of the proposed new retirement system embodied in the President's proposed FY 1984 budget. While this may not be the final form of the reform proposal eventually presented to the Congress, it does represent one seriously contemplated revision of the current system. It provides an intriguing counterpoint to the existing structure.

## **The Perceived Problem**

Why should the present system be reformed? A simple answer would be that it eventually will not be able to meet its obligations. As we saw in the last section, however, this is not an immediate problem. The current system can continue to meet its cash obligations until at least the turn of the century. Why, then, go to the trouble of reforming the system?

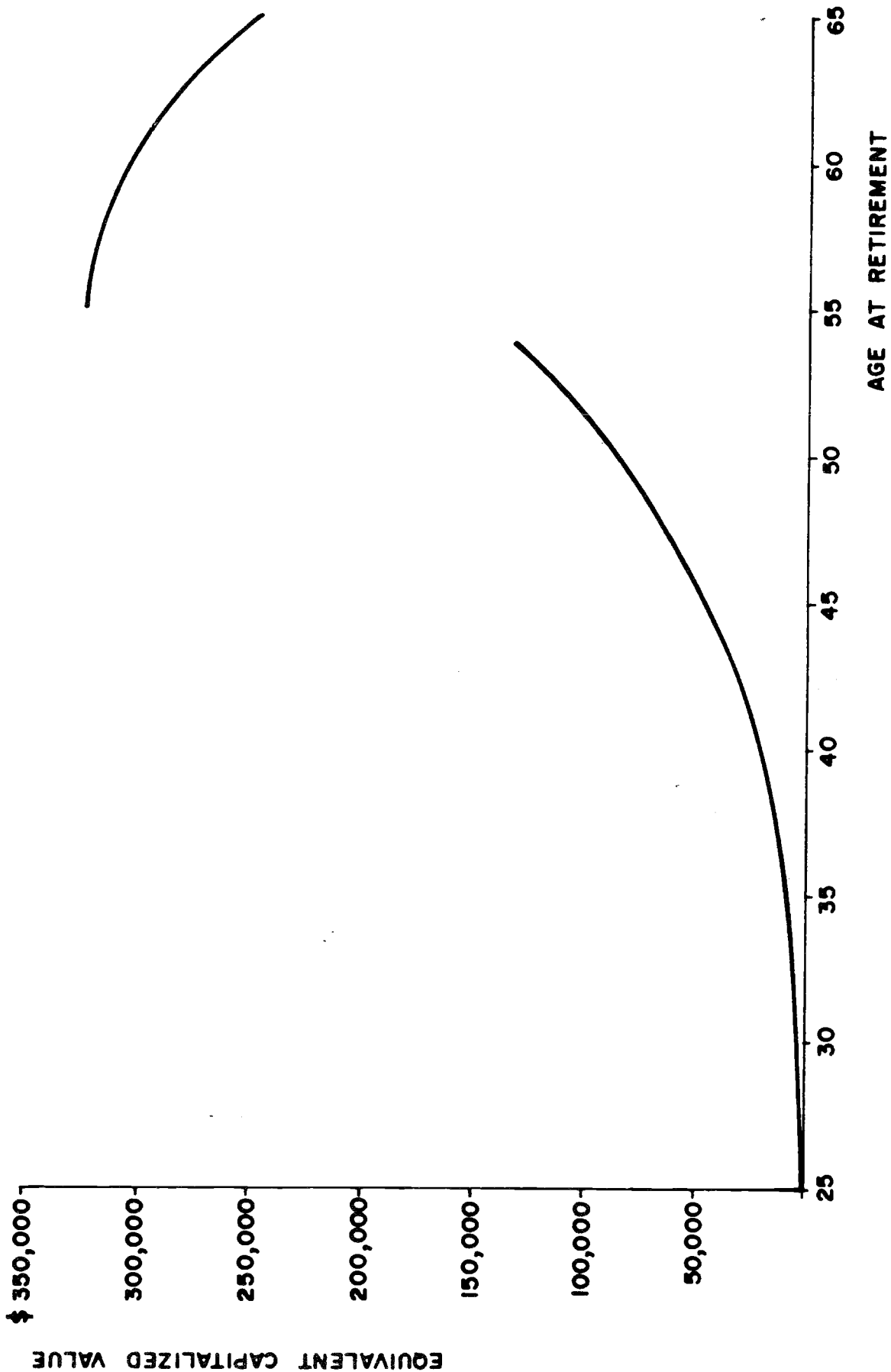
Officials involved in the reform process give two answers to this question. First, they observe that the system must be reformed at some point, and that now is as good a time as any to begin dealing with the fund's long term problems. Second, they observe that the system simply appears too costly, too generous, and too easy to abuse. It is costly in the sense that its normal funding cost is approximately twice that of a typical high quality private sector pension plan. It is generous in that it provides a relatively high level of benefits to many employees who retire at an early age -- some can retire as early as age 55 and qualify for pensions replacing nearly 60 percent of their pre-retirement incomes. Over half of federal employees retire before the age of 60; the comparable figure for the private sector is only 7 percent. The average replacement rate of pensions for pre-retirement income for federal retirees is over 55 percent, considerably higher than for their private sector counterparts. Finally, the system is easy to "abuse," in the view of some, because after retiring on an already generous federal pension at a young age, many former federal employees will take private sector jobs that will qualify them for at least the minimum benefit under Social Security. Indeed, about 75

percent of federal retirees receive Social Security benefits. This so-called "double-dipping" appears to many to be an excessively generous feature of the combined civil service retirement and the Social Security systems.

One way to characterize this perceived problem is to examine the value of pension benefits received at different retirement ages. While this will differ for each employee, depending upon when employment began, how long he or she will live after retirement, and so on, the general pattern will be similar across employees. As an illustration, we can look at the pension "entitlements" of a typical employee.

Figure 1 shows the capitalized value of the pension received under the current system by an employee who joins the system at age 25 and who receives "typical" longevity salary increases over his or her lifetime. General schedule increases compensate for a 5 percent annual rate of inflation and provide for a 1 percent real growth in salary. The figures are presented for an employee who would attain a nominal salary of \$25,000 at the age of 58. In order to make the figures for the value of pension benefits to employees retiring at different ages comparable, the values are shown in terms of their equivalent capital values at age 65. For example, if the employee retires at age 40, s/he would receive pension benefits equal in value to a \$21,000 check received at age 65; if s/he retired at age 62, the benefits received would be equal in value to a \$290,000 check received at age 65. Both the government and the employee are assumed to value assets and obligations at a 1 1/2 percent real rate of discount, and the





**Figure 1: Equivalent Capitalized Value of Pension Benefits at Age 65**  
 (computed for an illustrative federal employee)

Source Calculations. See text for assumptions

employee is assumed to live until age 74.

As Figure 1 shows, there is a substantial discontinuity in the value of pension entitlements when the employee becomes eligible for an immediate pension. Up to this point, the system provides for a deferred pension that starts at age 62. Deferred pension benefits are defined in nominal terms. Their present value is reduced by deferral, and is also eroded by inflation between the time of retirement and the start of the annuity. By contrast, once the pension benefits start they are indexed to inflation, so that they stay constant in real terms. The twin effects of deferral and inflation erosion of the deferred pension benefits keep the value of the pension entitlement small until the employee becomes eligible for full retirement and an immediate pension.

The discontinuity in the entitlement system comes from the shift in the entitlement's value as the employee crosses this combination of age and experience boundary. As Figure 1 shows, the value of pension entitlements for our illustrative employee accumulates slowly across his or her working life, reaching by age 54 an amount equivalent to about \$130,000 given on his or her 65th birthday. The next year, when the employee qualifies for full retirement, the value suddenly jumps to the equivalent of \$323,000. It stays at this level for approximately three years, and then begins to fall, reaching \$248,000 if the employee retires at age 65.

It is clear from Figure 1 that federal employees have a substantial, increasing incentive to work until they reach eligibility for full retirement. At that point, the equivalent

value of their entitlement peaks; if they continue working, it starts to fall. This is because the period of retirement gets shorter, an effect which outweighs the increase in pension benefits resulting from higher average salary at retirement and credits for additional service years. If the system is in fact too costly, it almost certainly has something to do with the level of entitlements attained at the ages of 55 to 60, and less to do with the entitlements thereafter.

To see this last point more clearly, we can examine the relationship between the age at retirement and the funding rate that would be required to set aside sufficient assets over the employee's working life to cover these pension benefits. Figure 2 shows that fraction of salary that would have to be set aside in order to fund the retirement obligations of the illustrative employee discussed above. The required funding rate rises slowly across the employee's working life; if he or she retires before age 54, the funding rate is below 15 percent. At the age of eligibility for full retirement, however, the required rate jumps sharply, to about 36 percent. If the employee retires later, the rate drops steadily, reaching about 19 percent at age 65. If the cost of the pension system -- in the sense of its normal cost funding rate -- is regarded as too high, it is likely to have more to do with the problem of providing benefits for employees who retire in the early years after they become entitled to a full pension, rather than with those who retire before age 55 or at the "normal" retirement age of 65.

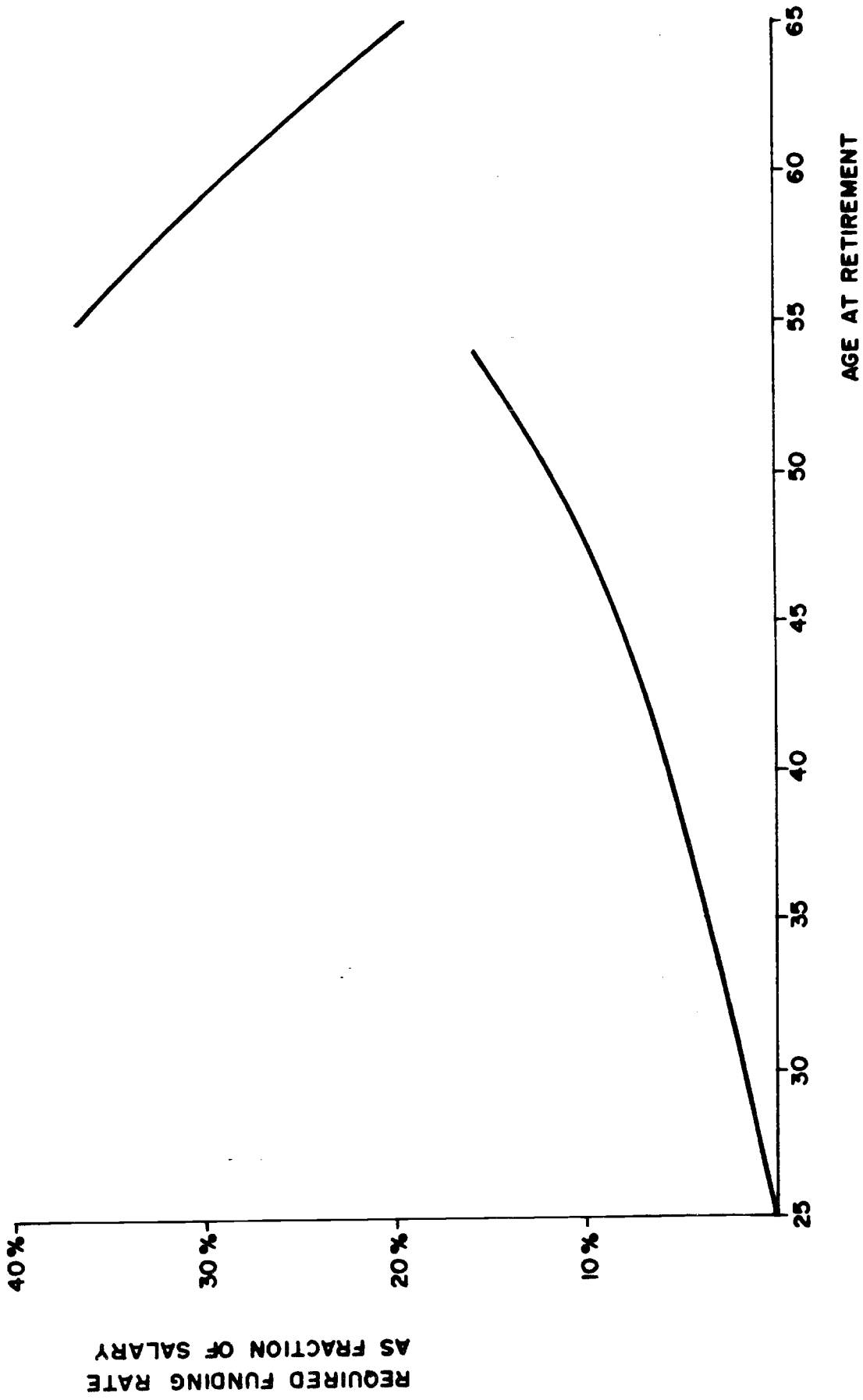


Figure 2: Funding Rates Required for Retirement for Illustrative Employee

Source: Calculations. See text for assumptions.

## **The Proposed Reform Package**

The reforms embodied in the President's FY84 budget request include four basic revisions in the pension benefits provided by the retirement system:

- o **A change in the definition of "average salary" on which the pension is based.** Currently, the average is based on the highest three years of earnings; the new system would base it on the highest five years. This would be a return to the definition used up until 1969;

- o **A modification of the credits for service years.** Currently, the system gives credits totaling 16.25 percent for the first 10 years of service and 2 percent for each year of service thereafter; the new system would give credits of 1.5 percent for every service year. This provision will only be invoked in FY89 and after, and then only if the calculated normal cost of the system continues to exceed 22 percent;

- o **A reduction in the adjustment of pension benefits for inflation for those who are under 62 years of age.** Currently, all pension benefits are fully indexed. Under the new system, those under age 62 would receive cost of living adjustments equal to one-half of the increase in the general price level; and

- o **A penalty for early retirement.** Pension benefits would be reduced by 5 percent for each year of age at retirement under 65. Thus, an employee retiring at age 58 would have benefits reduced by 7 times 5 percent. This penalty would be phased in by age cohort over a 10 year period. Thus, an employee who is 54 when the system is instituted would have benefits reduced by 1/2 percent for each year he or she retires before age 65; an

employee who is 53 would have benefits reduced by 1 percent per year, and so on. Employees under the age of 45 would retire under a system with the full early retirement penalty.

In addition to these alterations in the benefits formulas and cost of living adjustments, the proposed package would alter both employee and employer contributions. In the first year, contributions for both employees and the Treasury would be raised from the current 7 percent of salary to 9 percent; in the following year and thereafter both would be set at 11 percent.

These "adjustments" in the benefit package are quite substantial, both individually and in combination. Table 5 shows the effect of shifting the definition of average salary from a 3 year to a 5 year basis. Since the average salary calculation is defined in nominal terms, this effect is a function of the underlying rate of inflation. As Table 5 indicates, the adjustment will reduce pension entitlements for all employees by roughly 4 to 9 percent, depending upon the rate of inflation.

For those retiring after more than 10 years of service, changing the credit for service years also represents a substantial reduction in pension benefits. Table 6 shows the current and new annual pension entitlements as fractions of "average" salary, and the resulting percentage reduction in benefits. As Table 6 shows, those who retire with more than 20 years of service face reductions of roughly 20 percent in their pension benefits relative to those received under the current system.

The benefit reductions from the proposed change in the cost

Table 5. Reductions in Pension Entitlements from Change in Definition of Average Salary

	Inflation Rate		
	2%	5%	8%
<u>Three year average</u> Final salary	.957	.931	.906
<u>Five year average</u> Final salary	.916	.868	.824
Reduction from using five year instead of three year average	4.3%	6.8%	9.1%

Source: Calculations based on average rates of salary increase due to seniority plus an assumed real growth of 1 percent per year in federal wages.

Table 6. Reductions in Pension Entitlements from Change in the Credit for Years of Service

Service Years at Retirement	Pension as a Fraction of "Average" Salary		Reduction
	Current	Proposed	
5	7.5%	7.5%	0.0%
10	16.3	15.0	7.7
15	26.3	22.5	14.3
20	36.3	30.0	17.2
25	46.3	37.5	18.9
30	56.3	45.0	20.0
35	66.3	52.5	20.8
40	76.3	60.0	21.3

Source: Calculations based on current and proposed pension benefit formulas.



of living indexing for pensioners under age 62 and the early retirement penalty affect only those who retire between age 55 and 65. Lowering the cost of living adjustment for early retirees reduces the value of the benefits that will be received for the rest of the employee's life. The net reduction in benefits therefore depends on pensioner longevity. If the employee were to die shortly after age 62, the reduction would be a smaller percentage of the total value of the pension than if the reduced pension is received for a long period. An illustration using our illustrative employee may be helpful. Table 7 shows the reduction in the present value of pension entitlements from adopting the proposed change in the cost of living adjustment for a retiree under the age of 62. The employee is assumed to live to the age of 74 and to discount at a rate of 1.5 percent in real terms. As Table 7 indicates, early retirees may face an overall loss of over 10 percent of the present value of their pension entitlements even if the rate of inflation is only 5 percent per year.

The effect of the early retirement penalty is, of course, the easiest to describe; it simply amounts to a 5 percent penalty for each year of "early" retirement, where "early" is defined as under age 65. Once this feature is fully phased in, it amounts to a loss of one half of the pension entitlements (relative to the old system) for anyone retiring at age 55.

Taken together, the proposed reforms amount to a considerable overhaul of the pension entitlements embodied in the Civil Service Retirement system, particularly for those who

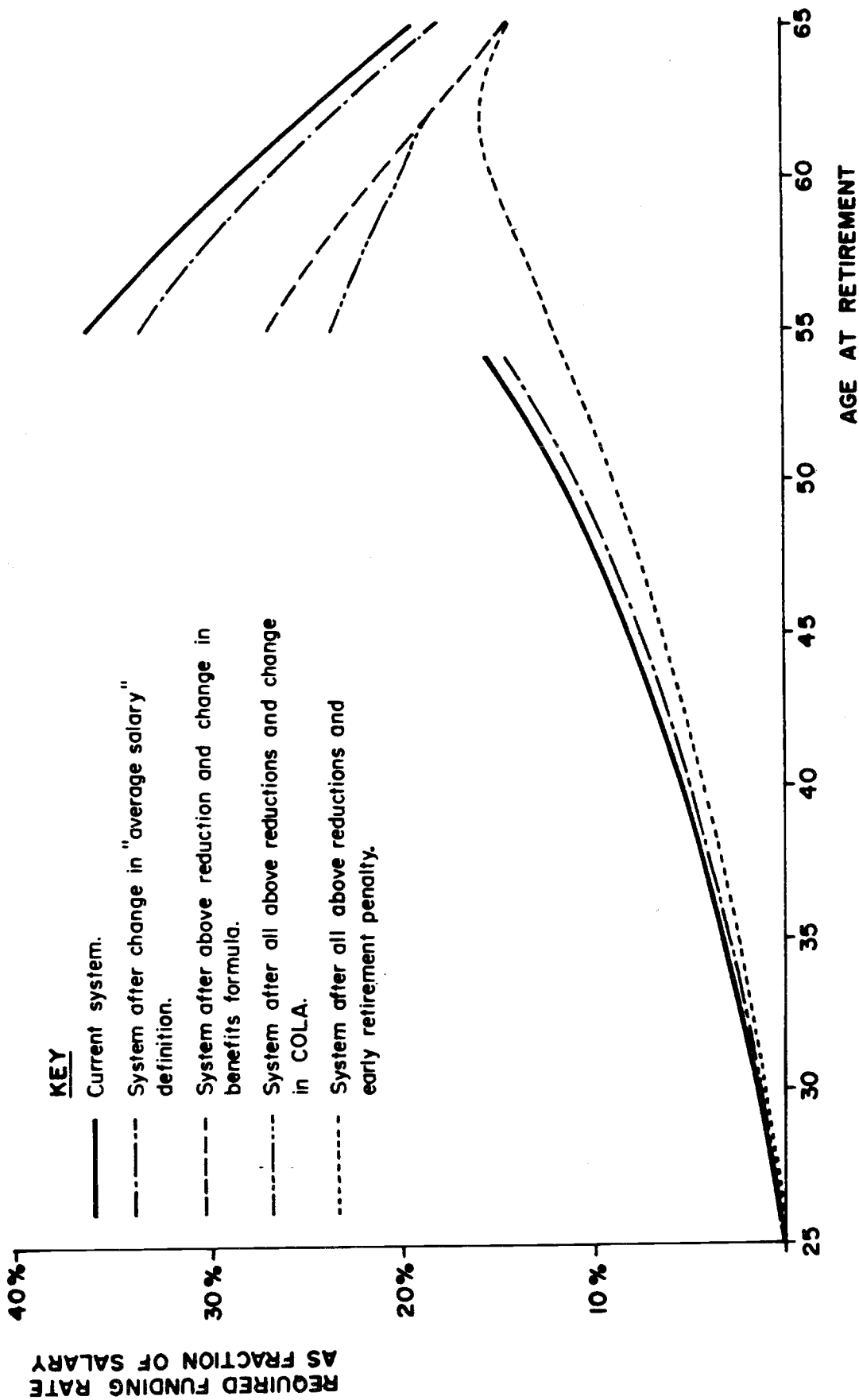
Table 7. Percentage Reduction in Present Value of Pension Entitlements from One Half Instead of Full Cost of Living Indexing to Age 62

Age at Retirement	Inflation Rate		
	2%	5%	8%
55	5.6%	13.3%	20.2%
56	5.0	11.8	18.0
57	4.3	10.2	15.7
58	3.5	8.5	13.1
59	2.7	6.7	10.4
60	1.9	4.6	7.3
61	1.0	2.4	3.8
62	-	-	-

Source: Calculations based on typical longevity salary increases and assuming real salaries increase at 1 percent per year in real terms. Based on an employee who will live to age 74 and who discounts at 1.5 percent in real terms.

retire between the ages of 55 and 60. Table 8 shows the percentage reduction for various retirement ages from each of the changes separately and for the package as a whole for the illustrative employee discussed above. These calculations assume a rate of inflation of 5 percent. As Table 8 indicates, even for the least affected group retiring at age 65, the package of reforms amounts to a reduction in benefits of more than one quarter. For those who choose to retire as early as age 55, the entitlement is reduced almost 70 percent.

Figure 3 shows the effect of these reductions on the rate of funding (as a fraction of salary) that would be required to support the resulting pension benefits for our illustrative employee. The most dramatic reductions are from the changes in the service years credits and from the early retirement penalty. The combined effect of the reductions is heavily concentrated on ages 55 to 60, as Table 8 indicated. Figure 3 shows that the combination of the proposed reductions results in the virtual removal of the anomalous discontinuity under the current system that occurs when the employee attains eligibility for full retirement. Reducing the anomaly of the old system is attained through a series of changes that decrease the level of benefits at every age, selectively targeted so that the reduction is greatest where the anomaly of the current system is largest.



**Figure 3: Funding Rates Required for Retirement Benefits for Illustrative Employee, Before and After Benefit Reductions**

Source: Calculations. See text for assumptions.

Table 8. Reductions in the Present Value of Pension Entitlements from Proposed Reforms for Illustrative Employee

Benefits Age at Retirement	Reduction in Present Value of Pension from change in				
	Defn of "Average" Salary (%)	Service Year Credits (%)	1/2 COLA <62 (%)	Early Retmt Penalty (%)	Entire Package* (%)
30	8	0			8
40	7	14			20
50	7	19			25
55	7	20	13	50	68
56	7	20	12	45	64
57	7	20	10	40	60
58	7	21	9	35	56
59	7	21	7	30	52
60	7	21	5	25	47
61	7	21	2	20	42
62	7	21		15	37
63	7	21		10	34
64	7	21		5	30
65	7	21			27

\* Individual reductions do not add to combined reduction because effects are multiplicative, not additive.

Source: Calculations. See text for assumptions.

## Effects of the Proposed Reductions in Benefits

The proposed changes would substantially reduce the costs associated with the federal pension system under any but the most perverse assumptions about the impacts of the reductions on retirement behavior. The funding rate associated with full retirement under the proposed system is less than that under the current system at practically any age. Almost irrespective of retirement behavior under the two systems, the new system will be less expensive than the old.

Examination of the detailed simulation results for the proposed system confirms this impression. Table 9 presents results for the new system under the (rather strong) assumption that retirement and other experience rates in the system are invariant to the regime of benefit formulas. The proposed benefit cuts would reduce the unfunded liability of the system by about \$140 billion, to about \$400 billion, and would reduce the full funding rate from about 36 percent to about 20 percent of salaries. Given the changes in the contribution rates embodied in the reform proposal, contributions would be approximately at the level of normal service costs, effectively putting the system on a full funding basis. By any standard, this would be regarded as a significant alteration in the long term position of the fund. What is perhaps surprising, however, is that, sizable and significant as these proposed cuts are, the system still has an unfunded liability of about \$400 billion. These alterations will not come close to eliminating the long term net liabilities of the pension system.

If these reductions are not sufficient to eliminate the

Table 9. Simulation Results for the Civil Service Retirement System with Proposed Benefit Reductions, October 1981

Present Value of Projected Benefit Payments:

Current Annuitants	\$256 billion
Future Annuitants	\$366 billion

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Total	\$622 billion
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Present Value of Projected Future Salaries:

Current Employees	\$776 billion
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Present Value of Future Contributions:

Employees	\$ 84 billion
Employer	\$ 66 billion

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Total Contributions	(\$151 billion)
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Current Assets:	(\$ 73 billion)
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Actuarial Unfunded Liability	\$398 billion
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Normal Cost as fraction of salaries	19.5 percent
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Unfunded Liability per Employee	\$147 thousand
---------------------------------	----------------

Source: Simulation. See text for assumptions. Assumes no change in disability and retirement rates from baseline case.

unfunded liability of the system, just what do they do? One answer comes from comparing the current and proposed systems in terms of the overall entitlements of current participants. Table 10 shows the net pension wealth of current federal employees under the two systems. The effect of the benefit reductions on the entitlements of current participants is dramatic, even if the impact on the unfunded liability is not. Under today's system, existing federal employees will receive benefits whose present value exceeds their future contributions by about \$570 billion, or about \$211 thousand per current employee. Under the proposed modifications to the system, this would be reduced to about \$280 billion, or by almost \$107 thousand per current employee. This is a reduction of **over one half** in the net entitlements of current federal employees. If the federal government had been putting aside funds to cover its pension obligations on a full funding basis in bank accounts with its employees' names on them, then the proposed modifications of the system would remove half of the amounts in those accounts. For the advantage of a \$53,000 per employee reduction in unfunded liability and reduced requirements for taxpayer contributions, existing employees lose \$107 each in net pension entitlements.

What cut in annual pay would be financially comparable to these benefit reductions? The answer for any particular employee depends on his or her current age, the age at which he or she joined the system, current salary, and the age at retirement. We can, however, easily compute the average for new employees entering the system. Over the course of their working lives,



Table 10. Net Pension Wealth of Current Federal Employees Under  
 Current and Proposed Retirement Systems  
 (All figures in 1981 dollars)

	Current System	Proposed System	Change
Present Value of Pension Benefits to Future Annuitants	\$625 B	\$366 B	(\$259 B)
Present Value of Future Contributions by Current Employees	(\$ 54 B)	(\$ 84 B)	(\$ 30 B)
<hr/>			
Net Pension Wealth	\$571 B	\$282 B	(\$289 B)
Per Employee Pension Wealth	\$211 K	\$105 K	(\$107 K)

Source: Simulations. See text for assumptions.

employees within the current system receive pension benefits equal in value to 36.2 percent of the value of their salaries; they make a contribution of 7 percent of their salaries toward these benefits, so the current retirement system constitutes, on average, a 29.2 percent supplement to wage income. The proposed system has a funding rate of 19.5 percent, and employees would contribute 11 percent of this; it thus constitutes an 8.5 percent supplement to wage income. Stated in terms of its impact on total compensation by employees over the course of their working lives, then, the proposed system represents a reduction from 129.2 percent to 108.5 percent of current wage income. This is equivalent to a 16 percent reduction in total compensation for employees with the bulk of their working lives ahead of them.

For employees who have already been in the system for a number of years, the annual pay cut equivalent to these pension entitlement reductions is substantially larger. The size of the pension entitlement cut is similar, but there are fewer working years remaining over which to amortize it. Consider, once again, the employee discussed above, and assume that he or she is currently 40 years old and has 15 years of service. In working from age 40 until retirement, the employee will be "paid" in two ways. First, s/he will receive an annual salary. Second, the value of his or her pension benefits will rise. Column 1 of Table 11 shows the percentage of such an employee's total compensation that would be expected to come in the form of increases in the value of pension benefit entitlements from the age of 40 up to various retirement ages. Column 2 shows the percentage reduction in the value of these entitlements. Column

Table 11. Pension Reductions as an Equivalent Percentage Reduction in Total Compensation for the Remainder of the Illustrative Employee's Working Life (All figures in percent, to nearest percent)

	(1)	(2)	(3=1*2)	(4)	(5)
Age at Retirement	<u>Pens Comp</u> Totl Comp	<u>Pens Cut</u> Pens Comp	<u>Pens Cut</u> Totl Comp	<u>Wage Cut</u> Totl Comp	<u>Totl Cut</u> Totl Comp
55	37	73	27	2	29
56	35	68	24	2	27
57	34	64	22	2	24
58	32	60	19	2	22
59	31	55	17	2	20
60	28	51	14	2	17
61	27	46	12	2	15
62	25	40	10	3	13
63	24	37	9	3	12
64	22	32	7	3	10
65	20	29	6	3	9

Column 1: Pension compensation as a percentage of total compensation, age 40 to retirement, current system

Column 2: Percentage reduction in pension compensation, age 40 to retirement, from proposed changes in pension entitlements

Column 3: Percentage reduction in total compensation, age 40 to retirement, from proposed reduction in pension benefits (column 1 \* column 2)

Column 4: Percentage reduction in total compensation, age 40 to retirement, from 4 percent decrease in net wages due to increase in employee contribution

Column 5: Total percentage reduction in total compensation (does not equal column 3 + column 4 because effects are multiplicative)

Source: Calculations. See text for assumptions.

3 shows the resulting percentage reduction in total compensation stemming from entitlement cuts; it is the product of columns 1 and 2. Column 4 shows the percentage reduction in total compensation stemming from the increased employee contribution to the retirement system. This represents a 4 percent cut in net wages; it is a smaller fraction of total compensation. Column 5 shows the combined effect of the reduction in pension benefits and the reduction in net wages as a percentage of compensation that would have been received under the current system. This gives the impact of the pension reductions, measured as a pay cut. As Table 11 indicates, the proposed reforms reduce annual compensation by nearly 30 percent for an employee currently aged 40 who planned to retire at 55. Even if the employee does not plan to retire for another 25 years, the proposed pension adjustments reduce annual pay by about 10 percent over his or her remaining working life. Viewed in terms of its equivalent in the form of a general salary reduction, the proposed reform package clearly constitutes a sizeable alteration from current policies.

The proposed modifications close the gap that currently exists between the contributions to the fund and the normal service costs of the system. Resources to close the gap must have come from somewhere. How much was involved, and where did it come from? A simple way to examine this issue is to compare the hypothetical "balance sheets" of the current and proposed systems through a "sources and uses" analysis. Table 12 presents the balance sheets, and Table 13 shows the "sources" of funds involved in the change from the current to the proposed system,

Table 12. Comparative Actuarial Balance Sheets, Current and Proposed Retirement Systems  
(All figures in billions of 1981 dollars)

	Current System	Proposed System
<b>ASSETS</b>		
Current Assets	\$ 73	\$ 73
Present Value of Future Contributions		
Current Employees	54	84
Employer (at full funding rate)	227	67
<hr/>		
Total Assets	\$354	\$224
<b>LIABILITIES</b>		
Present Value of Future Benefits		
Current Annuitants	\$269	\$256
Current Employees	625	366
<hr/>		
Total	894	622
Fund Balance (Unfunded Liability)	(540)	(398)
<hr/>		
Total Liabilities and Fund Balance	\$354	\$224

Source: Simulations. See text for assumptions.

Table 13. Sources and Uses Analysis of Proposed Pension System  
 Modifications  
 (All figures in present value, billions of  
 1981 dollars)

Sources of Funds:

Increases in future contributions by current employees	\$ 30
Reductions in benefits to current annuitants	13
Reductions in benefits to current employees	259
<hr/>	
Total Sources of Funds	\$302

Uses of Funds:

Reduction in future contributions by employer (at full funding rate)	\$160
Reduction in Unfunded Liability	142
<hr/>	
Total Uses of Funds	\$302

Source: Calculations based on Table 11.

and the "uses" to which these funds have effectively been put.

Table 13 indicates that all of the "sources" are effectively from current or former **employees**, while all of the "uses" of funds are to reduce obligations or payments of **taxpayers**. Employees pay more and receive less. Taxpayers are projected to pay less, and are responsible for a smaller unfunded liability. The proposed package of plan revisions amounts to a very considerable reduction of taxpayer obligations. Faced with a "gap" between obligations and income, the Office of Personnel Management proposal "balances" the system solely by cutting taxpayer obligations. As Table 13 shows, this would constitute a \$300 billion shift from current federal employees and annuitants to taxpayers.

#### **The Cash Implications of the Proposed Reforms**

Though they would reduce the net pension wealth of current employees by over one half, the proposed reforms have a relatively small impact on the cash outflow from the retirement system over the next few years. Table 14 shows estimates of the excess of benefit payments over employee contributions under the current and proposed systems for 1983 to 2050. This represents the annual cash deficiency of the fund, before employer contributions, interest on fund assets, and supplemental payments from the Treasury. It is the amount that must be made up out of some combination of payments from the Treasury and reductions in fund assets. As Table 14 indicates, the cash deficiency of the fund under the current system is approximately \$20 billion per year (in 1981 dollars) over the next seven years. Under the

Table 14. Estimated Annual Cash Deficiencies of the Current and Proposed Retirement Systems, 1983 to 2050  
(All figures in billions of 1981 dollars)

	Current System	Proposed System	Change
1983	\$ 18.2	\$ 14.8	\$ 3.4
1984	19.4	15.9	3.5
1985	20.4	16.8	3.8
1986	21.4	17.1	4.3
1987	22.2	17.4	4.8
1988	22.9	17.6	5.3
1989	23.5	17.6	5.9
1990	23.9	17.7	6.2
2000	26.3	15.7	10.6
2010	27.4	13.5	13.9
2020	22.8	9.7	13.1
2050	12.8	4.0	8.8

Source: Simulations. See text for assumptions.



proposed system, this would be reduced to about \$16 billion per year, or by about 20 percent. Thus, the net cash outflow from the Treasury (including the employer contribution, interest on the fund, supplemental payments, and so on) is reduced by about \$4 billion per year in the early years of the reform. For the years from 2000 to 2050, the annual cash deficiency will have been reduced by between \$10 and \$15 billion per year. Thus, the major gains of the proposed reforms -- viewed from the Treasury's perspective on a cash basis -- are not realized for many years.

### **Incentive Effects of the Proposed Reforms**

In addition to changing the level of pension benefits that will be received by federal workers, the proposed reforms dramatically change the time pattern of benefit accruals. Since the annual increments in pension entitlements are a considerable fraction of total compensation under the current system, the proposed system will have a strikingly different set of incentives for retirement behavior. The incentives for any given worker depend upon his or her personal salary history, years of experience, age, and prospective lifespan. For purposes of illustration, we can examine the incentives implicit in the current and proposed systems for the employee used in the examples discussed above. Table 15 shows the annual salary and annual increments to pension entitlements (both in real terms) under the current and proposed systems for an employee who enters the system at age 25 and who receives the average annual longevity salary increases as well as general schedule increases averaging 1 percent in real terms. In assessing the value of

Table 15. Annual Salaries and Increments to Pension Entitlements  
(In Excess of Normal Return to Accrued Entitlement),  
Illustrative Employee  
(All dollar figures in thousands)

Age	Real Salary (1)	Current System		Proposed System	
		Incr in Real Pension Entitlmt (2)	Totl Annual Compstn (3=1+2)	Incr in Real Pension Entitlmt (4)	Totl Annual Compstn (5=1+4)
45	\$17.1	\$ 3.0	\$ 20.2	\$ 2.3	\$ 19.4
50	20.1	5.5	25.6	4.0	24.1
51	20.7	6.1	26.7	4.5	25.2
52	21.3	6.8	28.1	5.0	26.3
53	21.8	7.7	29.5	5.6	27.4
54	22.5	8.6	31.1	6.3	28.8
55	23.0	117.0	140.1	3.6	26.6
56	23.7	0.0	23.7	7.6	31.3
57	24.4	- .8	23.5	7.7	32.0
58	25.0	- 1.8	23.2	7.6	32.6
59	25.6	- 3.0	22.7	7.3	33.0
60	26.3	- 4.1	22.2	7.3	33.6
61	27.0	- 5.5	21.4	6.7	33.6
62	27.6	- 6.9	20.7	6.1	33.7
63	28.3	- 8.4	19.9	1.7	30.0
64	29.0	- 9.9	19.1	.2	29.1
65	29.6	-11.6	18.1	-1.7	27.9

Source: Calculations. See text for assumptions.

pension benefits, we assume that the employee uses a discount rate of 1.5 percent in real terms and that he or she will live to age 74. To make it comparable to an annual salary figure, the annual increase in pension entitlements is measured as the change in the present value of future pension benefits above a 1.5 percent real return on the existing entitlement. It can be interpreted as the amount that was added in a given year to the pension entitlements in addition to crediting an annual interest payment of 1.5 percent in real terms.<sup>5</sup>

There is a sharp contrast in retirement incentives between the current and proposed systems. Under the current system, annual increments in the pension (in excess of the normal rate of return on what had already been accrued) are roughly 30 to 35 percent of salary in the years from age 50 to age 54. As the employee works from age 54 to 55, the pension entitlement jumps markedly, as we saw in Figure 1; in this year the increment to pension wealth is over 5 times the salary. After age 56, however, the pension wealth falls with additional years of work; the pension system actually constitutes a negative component in total compensation after employees become eligible for full retirement. By the time our illustrative employee reaches age 60, the pension system is acting as a 15 percent cut in salary; by age 62 it has become a 25 percent cut. The net effect of this pattern of pension entitlement increases together with longevity and general schedule increases in wages is to make total annual compensation climb steeply in real terms in the years before full eligibility and to make it drop dramatically when full eligibility is reached. Thus, under the current system federal

workers have a strong incentive to continue working in the last few years before they become eligible for full retirement; in the years thereafter, they have as strong incentive to retire.

In contrast, the pension entitlements in the proposed retirement system provide a relatively large supplement to salaries for continued work through age 62. As our illustrative employee works from age 52 through 61, the increment to pension entitlements (in excess of the real return on the portion already accrued) represents the equivalent of a 20 to 30 percent salary supplement. The only anomaly is at age 55, when the early retirement penalty of the new system has a particularly strong effect. Under the proposed system, total compensation for a year's work rises in real terms relatively smoothly up to about age 62. No sudden jumps in effective annual compensation would give the employee a strong incentive to retire early. Moreover, the reduction in the level of pension benefits may provide an additional incentive to keep working; many employees may not feel they can afford to retire.

As a consequence of these alterations in the retirement incentives, the adjustment in retirement behavior and in the age structure of federal employment could be dramatic if the proposed system were adopted. This may well be desirable, if, for example, too many highly experienced workers are retiring too early under the current system. On the other hand, its implications for the flexibility of the system and the opportunities for advancement for younger workers are obvious. Since this change may have a material impact upon the workings of

the entire federal employment system, its implications should be carefully reviewed.

### Section III

#### Reforming the Funding of the Retirement System

The Civil Service Retirement System is in need of reform. The current funding system is not fully coherent and is far from adequate. It represents neither full funding of current obligations nor a conceptually sound means of coping with past underfunding. There is a large and growing gap between the assets and obligations of the fund. It can be closed only by putting more money in or by taking less money out.

The reform proposal embodied in the President's FY84 budget request goes a long way toward closing the existing gap through a series of benefit reductions. The unfunded liability would be cut by some \$140 billion to about \$400 billion, and the funding rate would fall from 36.2 percent to 19.5 percent. The government's required cash payments would be reduced by about \$4 billion per year for the rest of this decade, and by larger annual amounts thereafter.

Reducing the government's liabilities -- which ultimately reduces funds taken in one form or another from taxpayers -- is one side of the story. The other side consists of a series of substantial benefit reductions for current federal employees. The present value of their pension entitlements (net of the value of their future contributions) would be cut by approximately one-half, or by about \$105 thousand for each current federal employee. This is equivalent to a general schedule decrease of about 15 percent on average for employees who have joined recently; the effective reduction in annual compensation for some

employees who have been in the system for more than 15 years is over 30 percent.

Whether such a substantial reconfiguration of the compensation of federal workers is wise or fair is eminently debatable. The issue cannot be settled with reference to the retirement system alone; pension benefits are one component of a total compensation package that includes wages and other fringe benefits. A full review of the level of total federal compensation is well beyond the scope of this paper; it should be obvious that no conclusions about "fairness" can be reached in the absence of such an analysis.

Some observers have argued that the level of federal pension compensation is simply too high on an absolute scale. Such arguments are often raised on the basis of comparisons with private sector pension plans. Most private plans provide benefits substantially less than those of federal retirees, and have full funding rates that are correspondingly lower than that of the federal system. Without a similar comparison of the wage compensation received by federal and private workers, it is impossible to draw any inference from such observations.

There is another reason to believe that such a comparison may be misleading. It is by no means obvious that private workers are appropriately providing for their retirement through their pension plans or through personal saving, even allowing for their access to Social Security. Most private pensions and other personal savings plans may not provide adequately for increasingly long retirements.

Consider, for example, an employee whose income rises by 2

to 3 percent in real terms across a working life of 40 years. Suppose s/he will live for 18 years after retiring, and desires a retirement income that is constant in real terms at a level of 70 percent of income before retirement. If the rate of return on assets put aside to provide this retirement income is 1.5 percent in real terms, then s/he should be saving about **one third** of income during the working years. Because of our increasingly long lifespans and the low real rates of return on invested assets (particularly on low-risk investments, after allowing for taxes), retirement is an extremely expensive consumption item.

Rather than criticizing the federal system for providing more than private plans, one might instead ask whether the retirement benefits those plans provide are adequate. It is commonly alleged that the provision of benefits fully indexed to inflation is bankrupting the federal pension system. But who among us would care to retire on a pension that provided a fixed annuity in a world where we might live as long as 25 years in retirement and where we have recently witnessed periods of unexpected inflation that in 5 years cut the purchasing power of fixed annuities in half?

If, instead of criticizing the federal system for its relative expense, we focus instead on the fact that it is nearly alone in providing well for what is a demonstrably -- and surprisingly -- expensive part of life, then we may be led to diagnose a very different set of "problems" of the federal compensation system. First, it may shift our attention to federal wages rather than pension benefits. If retirement is



expensive and federal employees want to provide for it through an (appropriately) expensive pension system, then they should not also expect their wages to be comparable to those in the private sector. Private sector workers have less generous pension plans and are -- we hope -- using their higher current incomes to set aside personal assets to supplement their inadequate pensions. Arguably, if the total compensation of federal workers is too high, it is perhaps their **wages**, rather than their pension benefits, that are out of line.

This suggests that we may want to look beyond benefit reductions as a means of closing the existing gap in the retirement system. Congress may eventually decide that the pension system is configured about right -- that is, that fully indexed pensions are the right form, and that the current level of benefits is appropriate. In that case, the gap would have to be closed from the other side, by finding additional funding either from the employees -- that is, from reductions in the net wages of federal workers -- or from taxpayers, in one form or another.

If we believe that the pension benefit adequacy of the federal system should be viewed as a strength rather than as a weakness, a second problem that emerges is the retirement behavior of federal workers. If the level of benefits granted is roughly right, but the system is too expensive, then perhaps the average employee works for too short and retires for too long a period. This view is entirely consistent with the existing structure of pay incentives, which provide substantially lower effective annual compensation for work after attainment of full

retirement eligibility. It is also consistent with the evidence that half of federal workers retire before age 60. If we take this view, then, a crucial problem of the existing system lies not in its level of benefits, but in the fact that they are accrued too early.

This view suggests that one approach to reforming the retirement system would include a combination of benefit adjustments to reconfigure retirement incentives and additional funding to permit maintenance of pension adequacy. In this case, the following options may be in the right direction.

#### **Improvements in Disclosure**

The public is almost completely unaware of the magnitude of the future burden represented by the net liabilities of the retirement system. Even knowledgeable commentators on federal budget issues are largely ignorant of the size of the system's quasi-debt. Substantially improved disclosure -- more frequent, less arcane, more accurate, and better presented reports on system status -- is a prerequisite to serious attention. As with most off-budget expenditures, a strong dose of public scrutiny might have a salutary effect.

Disclosure may also help make federal decision-makers aware of the full cost of federal employees. Current guidelines for costing employee time take account of "fringe benefits," but substantially underestimate the expense associated with the retirement system. Making this correction could bring decisions on labor expense and, for example, the advisability of substituting capital for labor in the federal government, more

into line with reality.

### **Increasing Officially Mandated Contributions**

The fund can continue to operate on a cash basis with little or no change in its funding for at least another 20 years, given current estimates of supplemental Treasury payments. Continuing the practice of underfunding the pension system will add to the burden future taxpayers bear for benefits presumably received by current taxpayers. Currently, roughly half of the system's obligations are being funded by "debt" -- increases in the unfunded liability. We may wish to continue funding some of the obligations of the retirement system through debt, but if we choose to do so our choice should be deliberate and considered. To make it explicit, we could first make contributions to the pension system at the fully funded rate, and then, as a separate action, decide how much of the current funding should be raised from a debt issue and how much should come from current funds.

Putting the system on a fully funded current basis calls for contributing about 36 percent of payroll annually, or about \$14 billion more than the current official contribution rate provides. This year, the Treasury made a supplemental payment of about this amount to the fund. Rather than simulating interest payments on non-existent assets, supplemental payments could be calculated based on the full funding rate. This would shift the basis of accounting for this transaction to a more consistent and conceptually sound foundation without increasing the funds transferred by the Treasury. Now seems to be an opportune time to change the basis of accounting for this transaction.

## **Making the Unfunded Liability More Explicit**

The principal and accumulated (and accumulating) interest on the existing unfunded liability is properly a responsibility of former taxpayers. There is no longer any practical way to make them responsible for it. How, if at all, should this accumulated "debt" be "funded?"

One possible approach would be to convert the unfunded liability to an explicit debt. Suppose, for example, that the government funded the system by issuing debt securities. The cash raised would be transferred to the retirement system, which is allowed to invest only in Treasury securities. Thus, it would wind up taking the money and buying back the securities issued to fund it. The net transaction is simply that the Treasury printed additional special obligations and gave them to the retirement fund to hold in its portfolio. No net funds would be exchanged.<sup>6</sup> The liability of the fund would now be backed by an explicit Treasury promise in the form of the securities held in the retirement system vault. What really backs the pensions is unchanged -- it is still a promise that the federal government will make the necessary funds available when the time comes. The obligation would simply be a little more explicit.

This more explicit recognition has a number of potential advantages. For one thing, the fund -- and the obligation -- might be taken more seriously by the public. The obligation might be easier to understand, and changes in the annual performance and experience of the fund might be easier to observe. These subtle changes of recognition are the stuff of

which real scrutiny and eventual policy may be made.

Moreover, the Treasury would owe interest on the obligations, and the fund would receive these payments annually. In a sense, it is exactly this transaction that the annual supplemental payment appropriated by the Congress is simulating. Thus, the current funding arrangement is equivalent to what would obtain if the Congress ordered the Treasury to **borrow** funds equal to the unfunded liability and put them on deposit in the retirement system account. The rest of the transaction -- printing these securities and handing them to the retirement system -- is merely a paper transaction. We might say that the Congress, recognizing this, has merely decided not to carry out the paper shuffle but **has** carried out the real part of the transaction -- the actual payment of interest.

The "simulation" approach adopted by the Congress thus misses a potentially important opportunity to provide a more explicit and understandable method for scrutinizing the fund's status and performance. If the fund held the securities, it would be much easier for the public and commentators to understand the whole system. Making the obligation explicit avoids the arcane notions of "unfunded liabilities" and payments of pseudo-interest on hypothetical securities. The change would relieve the fund of its mysterious cloak of subtlety, which currently masks what is in fact a relatively simple set of transactions and relationships.

Another possibility would be to raise the funds to cover the unfunded liability through additional taxes or through

expenditure reductions. Virtually no one would seriously propose such a drastic action. Actually raising the funds would explicitly back the government's obligations, but would be accompanied by extensive dislocations. The net impact on the economy will be difficult to judge, even if we know whether the funds came from net borrowing, taxes, or expenditures. Explicit federal borrowing may displace other borrowing, or may call forth more lending. If the former, what projects were displaced? If the latter, what would those funds now lent have been spent on otherwise? If the funds came from taxes or expenditures, what are the ultimate sources? What other spending was not done? Speculation about the ultimate source of the funds will quickly become ethereal. This is perhaps the most powerful conceptual reason for arguing that the unfunded liability of the system should be explicitly recognized, and prevented from growing, but not necessarily reduced through direct funding. Instead, the most sensible policy goal may be to move toward a system that (1) is fully funded on a current basis, and (2) has explicitly recognized obligations.

## Conclusion

The Federal Civil Service Retirement System constitutes a very large component of the federal government's future promises to pay. Its current size -- approximately \$540 billion -- is roughly half that of the explicitly recognized national debt. It is also about one half the size of the Social Security quasi-debt, which is a net liability on behalf of a considerably greater number of beneficiaries.

The retirement system can, in all likelihood, live out this century under the current arrangement without running out of cash, but it cannot live ten years into the next century without additional funding. By any standard, it represents a very large obligation of which the public is at best only dimly aware.

What should be done to reform its benefit structure is sure to be debated vigorously. Some will argue that the current system is far too generous, and that it amounts to considerably overpaying federal workers. Others will argue that changing the system now amounts to repudiating solemn promises of the government. Ultimately, the Congress will have to decide.

What, if anything, might or should be done to reform its funding is also a complicated issue. Does it make any difference if the Congress recognizes the obligations to pensioners in the form of explicit Treasury securities held in a retirement system vault? If so, why not fund it fully? If not, why fund it at all, since all of its investible funds are held in the form of Treasury securities?

At the present time, it could be placed on a more solid long term funding basis with little change in the current net flows from the Treasury. Funding crises do not lead to conceptually sound reforms; there is little reason to await the next crisis in the hope that it will generate fundamental improvement. This would seem to be an opportune time to improve the conceptual basis of the funding foundation upon which the retirement system rests.



## Appendix I

### **Evaluation of Pension Fund Obligations and Financial Condition**

A number of measures of the soundness of pension systems have been articulated by actuaries, accountants, economists, budget analysts, and others. Many of the proposed measures -- like those adopted by the Congress -- are internally inconsistent. The proliferation of such measures reflects the fact that there are several dimensions to the financial condition of a pension fund, and no one measure will appropriately summarize all of them.

Accountants argue persuasively that the only appropriate basis on which to evaluate the condition of any institution is the **accrual** basis. The future obligations that the organization has already contracted to meet are treated as liabilities, and the future contractual obligations of others to it are treated as assets. This perspective allows two interrelated portraits of the organization's solvency. First, one can present a snapshot of the condition at a given instant consisting of a summary of the existing liabilities and assets, and thus of the net liabilities (called the "unfunded liability") of the system. Second, the annual changes in the unfunded liability can be examined as a measure of the performance of the fund in a particular year.

**The Unfunded Liability** The essence of the "unfunded liability" measure is that it represents only the **existing** accrued deficit. If the system has made more promises than it

has collected funds to back, it has an unfunded liability. But this liability should reflect only promises already made. This means that, in computing the current unfunded liability, one must presume (for the sake of the computation only) that future contributions to the fund will be on a "full funding" basis. If the fund has been collecting 10 percent of payroll when 20 percent would be required for full funding, the computation of the current unfunded liability assumes that all future payroll contributions will be at the full funding rate of 20 percent. This counter-factual presumption is made so that the resulting deficit reflects only the failure to fully fund the system to date, not the possibility of future underfunding.

There is a further complication in choosing the funding method under which the system is to be evaluated. In the view of some, current funding of the system should be strictly construed. For example, if a given worker is currently entitled to no pension because he or she has not yet worked for enough years to qualify, a strict construction of the fund's existing obligation to that worker would deny any liability. This approach is known as the "vested benefits" valuation method. This method recognizes only current contractual obligations independent of the future career of the worker. The fundamental principle underlying this notion is that pension obligations are merely a part of an employee's compensation package; since we do not accrue liabilities for future salary payments, why should we for pensions?

To many, this is an unduly conservative estimation procedure. If, for example, half of the workers in the same age

and experience category as the worker in question will, on a statistical basis, go on to collect pension benefits, it seems imprudent not to recognize that the system has accrued some (albeit statistical) obligation to them. This would appear to be particularly relevant to the federal system, in which both employees and the employer frequently treat prospective pension benefits as "entitlements."<sup>7</sup>

The central question concerns the appropriate time pattern for this recognition. Using a statistical view of the cohort of employees rather than the micro view of each individual employee suggests that there should be an annual allowance for pension obligation buildup over the worker's lifetime. There are many ways in which this statistical obligation could be amortized across the years of the employee's career. A common approach is to amortize the projected expenses through a contribution stream that is a level fraction of the employee's salary over his or her career. This is easy to understand and to administer. It leads to more funding later in the career than would a level payment in nominal terms, preventing any substantial changes in the "effective rate" of the contribution as a fraction of income. This method is referred to as the "normal cost" approach to pension funding.

There is one further ambiguity within this approach. The fraction of salary required to fund a pension for a worker who enters the system at age 40 may be different from that required for a worker who enters at age 25. Depending upon the benefit structure and projected salary trajectories, the appropriate

funding rate may be either higher or lower for the worker who enters later in life. Rather than recognize a different funding rate for each entry-age cohort of workers, most systems compute an average funding rate appropriate for the mix of entry ages they experience. This is known as the "entry age normal" funding method. It is used as the basis for estimating the unfunded liabilities discussed in this paper.

**Changes in the Unfunded Liability** While the unfunded liability provides a useful snapshot of the condition of a retirement system at a given instant, its effect is to show only the accrued excess of obligations the system has accepted over its current and prospective available funds. This measure shows only status; it cannot show direction. We can, however, get a measure of the current performance of a system by focusing on changes in the unfunded liabilities from year to year. The unfunded liability shows the accumulated history from the start of the fund to the present; the change in the unfunded liability focuses on the current performance of the fund -- whether its funds are well invested, whether it continues to extend more promises than it is collecting funds to back, and so on.

**The Current and Prospective Cash Balance of the Fund** The accrual basis for evaluating a retirement system is designed to match the future income and obligations of the fund to give a coherent picture of its current status. It cannot, however, provide a summary of the current and prospective cash position of the fund, which is an equally vital aspect of its financial condition. Thus, in addition to examining appropriate estimates of the unfunded liability of the fund and of the year to year

changes in the unfunded debt, it is important to develop projections of the cash balances of the fund. This effort is complicated by the fact that it depends upon the number and average salary of employees who have not yet entered the employment system. (The measures that concentrate on unfunded liabilities can be computed with reference only to current employees and annuitants.) Thus, an evaluation of the fund's cash position involves projections of the size of the federal civil service over a considerable time period, and must be viewed as uncertain. However, given the importance of the cash basis integrity of the fund -- and particularly noting Congress's efforts to prevent, or at least delay, cash insolvency in the retirement system -- we cannot completely avoid making cash projections.

## Appendix II

### Sensitivity of the Estimates

The estimates presented here are, in a qualitative sense, relatively insensitive to the parametric assumptions of the model. Because civil service retirement benefits are indexed, the assumed rate of inflation is practically immaterial. Perhaps surprisingly, the unfunded liability is also insensitive to changes in the assumed rate of real salary growth. Briefly, this results from the rough balance between two offsetting effects: while more rapid growth of salaries would increase future pension costs, it also increases future contributions (at the full funding rate used in calculating the current unfunded liability).

Changing the assumed annual rate of real salary increase from 1 percent (used in the estimates reported in the text) to 0 or 2 percent generally changes the estimated unfunded liability by only \$20 to \$30 billion (depending on the other assumptions made), or by about 4 to 5 percent.

The one major assumption that does have a considerable impact on the estimated unfunded liability is the rate at which future flows are discounted. Because the bulk of both revenues and benefit payments lie well in the future, the rate at which they are discounted has a notable effect. Moreover, since we know that benefit payments exceed anticipated contributions but on average occur later, it is clear that the unfunded liability will be lower the higher is the assumed rate of discount. Table A1 shows the estimated unfunded liability under the baseline assumptions for other parameters and a range of discount rates. It is clear that any tenable assumption about the long-term real discount rate results in a very large unfunded liability. Even if we discount at 3 percent in real terms -- which seems very generous -- the unfunded liability remains over \$400 billion. Perhaps the most optimistic way to read the results in Table A1 is to note that even if we should be using a lower rate of discount -- 1 percent instead of 1.5 percent for, example, the unfunded liability remains below \$600 billion.

What rate of discount should we use? The discount rate should be the long term risk-free rate of return in the economy. A number of researchers (see, for example, Bodie [1980], Garbade and Wachtel [1978], and Carlson [1977]) have presented evidence that one proxy for this rate, the real rate of return on short-

Table A1. Sensitivity of Unfunded Liability Estimates to Changes  
in the Assumed Discount Rate  
(Dollar figures in billions)

Assumed Discount Rate	Unfunded Liability
.8 %	\$605
1.0	586
1.5	540
2.0	499
2.5	462
3.0	428

Source: Simulation. Parameters are as in baseline case except for discount rate.

term Treasury debt, ranged from approximately zero to about 3 percent over the period 1950 to 1975, with most values between 1 and 2 percent. Since the Federal Reserve Bank changed its monetary management policies in October of 1979, real returns have been considerably higher, at times as high as 6 to 8 percent. On the theory that financial effects are likely to be more volatile than real effects, and that the real discount rate should ultimately reflect the real rate of sustainable long-term economic growth, a moderate rate of 1.5 percent has been used here. To some this will seem very high when compared to the long-term rates of return achieved in the last 30 years. To others, it will seem too low as an estimate of what well-managed economic growth might produce. We can take some solace in the fact that the comparisons among alternative policies -- the main focus of this paper -- are likely to be little affected by changes in the discount rate.



## Notes

<sup>1</sup>It is not completely immaterial in the Civil Service Retirement System because of an anomaly in the calculation of benefits. Since the salary history used to compute the retirement benefit is an average of three years' salary -- expressed in nominal terms -- the nominal rate of salary increases has a slight impact upon the relation between the salaries paid and the retirement benefits, when both are converted into real terms. In addition, some reform proposals cut the rate of increase in pension benefits after retirement to something less than the full cost of living increase. If such a system were adopted, the real value of benefits received would depend on the rate of inflation. In every other respect, holding all real rates constant, changing the assumed rate of inflation has no impact.

<sup>2</sup>Taking this view raises an interesting point of controversy. We assume that assets in the fund are worth their current market value. In fact, however, they may be worth less than this, because there appears to be a consistent fund policy of investing them in below-market rate of return "special" federal securities.

<sup>3</sup>The appendix discusses the determination of "normal cost" and other technical aspects of the valuation of pension fund assets and liabilities.

<sup>4</sup>This rate was used throughout the analyses presented here; comparisons of different scenarios should be little affected by this choice. The basis for this choice, and the sensitivity of the resulting estimates of the unfunded liability, is discussed in Appendix II.

<sup>5</sup>This effectively assumes that a 1.5 percent real return to the entitlements already accrued should not be viewed as a part of annual compensation, because it is not a return received for working. Rather, it is an interest payment on amounts credited for earlier work.

<sup>6</sup>Because no funds actually need to be borrowed from private lenders, this transaction should have no direct impact on securities markets.

<sup>7</sup>The Office of Management and Budget classifies the Civil Service Retirement System as an "entitlement" program. It does not, however, classify the wages of federal employees as an entitlement. This is a puzzling distinction, since both are part of compensation for federal employment.

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