

Funding Government Pensions: State-Local, Civil Service and Military

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The fiscal operations of government pension plans affect the growth of the economy as well as the welfare of its citizens. Economic theory implies and recent empirical evidence indicates that individuals reduce their private saving in anticipation of pension benefits.¹ The net impact on national saving, however, depends on whether the reduction in private saving is offset by pension fund asset accumulation. In the case of private pensions, the funding provisions serve to offset any reduction in individual saving.² In contrast, Social Security is financed on a pay-as-you-go basis and contributions are immediately paid out in benefits rather than accumulated in a fund; therefore a reduction in individual private saving

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¹See Martin Feldstein, "Social Security, Induced Retirement and Aggregate Capital Accumulation," *Journal of Political Economy*, Vol. 82, No. 5 (September/October 1974) and "Social Security and Saving: The Extended Life Cycle Theory," *American Economic Review*, Vol. 66, No. 2 (May 1976) pp. 77-86; Alicia H. Munnell, *The Effect of Social Security on Personal Saving* (Ballinger Publishing Company, 1974) and "Private Pensions and Saving: New Evidence," *Journal of Political Economy*, Vol. 84, No. 5 (September/October 1976).

²Munnell, "Private Pensions and Saving: New Evidence," *Journal of Political Economy*.

implies a reduction in total national capital accumulation.³ Similarly, other large government pensions such as civil service, military or state-local retirement systems which are financed either on a pay-as-you-go or only a partially funded basis will also, to the extent that they are underfunded, reduce national saving. This paper attempts to estimate the degree to which these other public pension systems are underfunded and to calculate the impact on national saving and capital accumulation of financing these programs on a fully funded basis.

In order to determine the impact of funding, 25-year forecasts of the financial operations of the state-local, civil service and military retirement systems are provided under two alternative sets of assumptions. The first estimates are based on extrapolations of current trends in benefit growth and contributions, while the second projections are based on the assumption that the state-local, civil service and military pension systems all attempt to cover normal costs and to amortize their unfunded liabilities over the next 40 years.

To derive a funding schedule it was necessary to calculate an unfunded liability for civil service, military and aggregate state-local systems and to calculate the normal cost for each program. Three different methods were employed in this gargantuan undertaking and the results for civil service and the military were compared with agency published estimates. Naturally, the least verifiable calculation was the estimate of aggregate state-local liability since almost no comparable data are available in this area.

These unfunded liabilities were then amortized over a 40-year period and this payment together with the normal cost payment yielded the required annual contribution for a fully funded system. These payments were then compared with projections made under the current financing scheme to determine the impact on fiscal flows of shifting to full funding.

The empirical results were interesting, although there is always the danger that they may be interpreted with more precision than deserved. The estimates of unfunded liability for the three systems amounted to \$629 billion — approximately \$270 billion for state-local; \$164 billion for

³Feldstein, "Social Security, Induced Retirement and Aggregate Capital Accumulation" and Munnell, *The Effect of Social Security on Personal Saving*. Although both of these studies point overwhelmingly to the conclusion that guaranteed retirement benefits discourage saving, the net impact of the Social Security program on capital accumulation remains unclear because of the existence of the "retirement effect." The Munnell study indicates that the negative effect of guaranteed benefits has been mostly offset in the past by a declining retirement age which compelled workers to save over a shorter working life for a longer retirement. Estimates of the net impact of Social Security now range from near zero (Munnell 1974) with the benefit and retirement effects virtually offsetting one another, to a halving of the individual saving rate with individuals reducing their saving by more than their OASDI taxes (Feldstein, 1974).

civil service and \$195 billion for the military.⁴ Amortizing these liabilities over 40 years and covering normal costs would require significantly higher contributions, almost all of which would serve to reduce consumption and increase saving. Comparing the contributions required for funding with those required under the current financial arrangements indicates additional annual contributions amounting to about 1.2 percent of GNP or 1.6 percent of disposable income. If the assumptions underlying the baseline projections are realistic, the additional contributions to fund these public pension systems would result in a significant increase in asset accumulation over the next 25 years.

I. The Growth of Government Pensions

Public pensions have experienced explosive growth in the last 15 years. This growth reflects the enormous increase in government employment, rising government salaries and the emergence at the state-local level of strong public employee unions. In 1975, 14.7 million individuals worked for Federal, state or local governments accounting for 19 percent of total wage and salary workers. In addition, another 2.2 million individuals were members of the armed forces. (See Table 1.) Today, approximately 14 million workers are covered by state-local, military or civil service retirement plans, compared to 80 million covered by Social Security or 30 million covered by private pensions. (See Table 2.)

In 1975, state-local systems, Federal civil service and the military each dispensed about \$7 billion, or a total of \$21 billion, in benefits to approximately four million beneficiaries. (See Table 3.) These figures compare to \$67 billion in benefits and 32 million beneficiaries under OASDI in 1975⁵ and \$13 billion and 6 million beneficiaries from private pension plans in 1974.⁶

The increase in benefits and beneficiaries is summarized in Table 4. Total benefit payments for each system have increased at least seven-fold between 1960 and 1975, while the number of beneficiaries for state-local and civil service pensions increased two and a half times and the number of military beneficiaries was four times the 1960 level.

Table 5, which presents the growth in asset holdings of various pension plans, provides considerable information about the financing and funding of the three public plans. First, the military pension involves no

⁴These estimates are based on a 6 percent interest rate and 5 percent wage growth; a higher rate of interest would yield lower figures and a lower rate higher values.

⁵U.S. Department of Health, Education, and Welfare, Social Security Administration, *Social Security Bulletin*, Vol. 39, No. 6 (June 1976) Tables M-1 and M-3, p. 32 and p. 34.

⁶Alfred M. Skolnik, "Private Pension Plans, 1950-74," *Social Security Bulletin*, Vol. 39, No. 6 (June 1976), p. 4.

Table 1

MILITARY AND WAGE AND SALARY WORKERS IN NONAGRICULTURAL ESTABLISHMENTS
1940-1975, SELECTED YEARS

	Military			Private			Government		
	(millions)	Total (millions)	Workers (millions)	Percent of Total	Workers (millions)	Percent of Total	Workers (millions)	Percent of Total	
1975	2.2	77.0	62.3	80.9	2.7	3.5	12.0	15.6	
1970	3.2	70.9	58.4	82.4	2.7	3.8	9.8	13.8	
1965	2.7	60.8	50.7	83.4	2.4	3.9	7.7	12.7	
1960	2.5	54.2	45.8	84.5	2.3	4.2	6.1	11.3	
1955	3.0	50.7	43.8	86.4	2.2	4.3	4.7	9.3	
1950	1.6	45.2	39.2	86.7	1.9	4.2	4.1	9.1	
1945	11.4	40.4	34.5	85.4	2.8	6.9	3.1	7.7	
1940	.5	32.4	28.2	87.0	1.0	3.1	3.2	9.9	

Source: *Economic Report of the President*, 1976, Table B-27, p. 202 and Table B-22, p. 196.

Table 2
 NUMBER OF WORKERS COVERED
 UNDER PUBLIC AND PRIVATE
 PENSION PLANS, 1975

System	Number of Workers (millions)
Private Pension Plans	30.0 ^a
Public Pensions	
OASDI	79.7
State-Local	9.0 ^a
Civil Service	2.7 ^b
Military	2.2 ^b

^aData for 1974

^b1975 Employment

Source: Alfred M. Skolnik, "Private Pension Plans, 1950-1974," *Social Security Bulletin*, Vol. 39, No. 6 (June 1976) p. 4; *Economic Report of the President, 1976*, Table B-27, p. 202 and Table B-22, p. 196; U.S. Department of Health, Education and Welfare, Social Security Administration, Office of the Actuary; Institute of Life Insurance, *Pension Facts 1975*, pp. 32-33.

Table 3
BENEFITS AND BENEFICIARIES
UNDER PUBLIC EMPLOYEE RETIREMENT SYSTEMS
CALENDAR YEAR 1975

Retirement System	Total Benefit Payments (millions)	Beneficiaries as of June 30 (thousands)
State and Local Systems	\$ 7,000.0	1,730.0
Federal Contributory Systems	7,615.9	1,381.2
Federal Civil Service	7,531.5	1,372.1
Foreign Service	62.4	4.2
Tennessee Valley Authority	18.6	4.4
Federal Reserve Board	2.3	.3
Federal Judiciary Survivors	1.1	.2
Federal Noncontributory Systems	6,979.3	1,098.5
Military	6,808.0	1,073.0
Coast Guard	115.2	16.5
Federal Reserve Banks	23.3	6.7
Public Health Service	22.7	1.5
Federal Judiciary	7.2	.2
Environmental Science Services	2.1	.1
Canal Zone Construction	.3	.4
Tax Court	.4	*

*Less than 500,000.

Source: U.S. Social Security Administration, Research and Statistics Note
 No. 16, August 20, 1976.

Table 4
**BENEFITS AND BENEFICIARIES OF PUBLIC PENSION PLANS,
 1940-1975 SELECTED YEARS**

	State-Local		Civil Service		Military ^a	
	Benefits (millions)	Beneficiaries (thousands)	Benefits (millions)	Beneficiaries (thousands)	Benefits (millions)	Beneficiaries (thousands)
1975	\$7,000	1,730	\$7,531	1,372	\$6,810	1,073
1970	3,280	1,291	2,819	959	3,133	773
1965	1,775	886	1,385	728	1,505	485
1960	1,021	660	816	575	751	264
1955	595	427	379	296	471	187
1950	320	294	192	172	290	125
1945	173	208	94	86	74	37
1940	125	152	68	63	52	32

^aData for military were estimated on the basis of the 1974 and 1975 ratio of military to "other Federal employees."

Source: U.S. Department of Health, Education and Welfare, Social Security Administration, *Social Security Bulletin*, Annual Statistical Supplement, 1974 and Research and Statistics Note No. 17, (August 20, 1976).

Table 5

ASSET HOLDINGS OF PRIVATE AND PUBLIC PENSION FUNDS
BOOK VALUE, END OF YEAR, 1940-1975
(billions of dollars)

	1940	1945	1950	1955	1960	1965	1970	1975
Private Pensions								
Insured	\$2.0	\$5.4	\$12.1	\$27.5	\$52.0	\$86.5	\$138.2	\$214.6
Noninsured	0.6	2.6	5.6	11.3	18.8	27.3	41.2	69.4
	1.4	2.8	6.5	16.1	33.1	59.2	97.0	145.2
Public Pensions								
OASDI	2.0	7.1	13.7	21.7	22.6	19.8	41.3	55.0
State-Local	1.6	2.5	5.3	10.5	19.3	33.1	58.1	106.5
Federal Civilian	0.6	2.3	4.2	6.6	10.6	15.9	23.1	38.6
Railroad Retirement	0.1	0.7	2.6	3.5	3.7	3.9	4.4	3.0
Military	—	—	—	—	—	—	—	—

Source: Figures taken from annual surveys by the Securities and Exchange Commission published in the SEC's *Statistical Bulletin*, Vol. 35, No. 4, April 1976, p. 212. OASDI data from 1976 *Annual Report of the Board of Trustees and the Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds*, Tables 16 and 20 pp. 58 and 62 and 1976 *Annual Report of the Board of Trustees of the Federal Hospital Insurance Trust Fund*.

asset accumulation and is funded entirely on a pay-as-you-go basis. Second, while the state and local systems and the civil service may be substantially underfunded, the assets held by these two systems total over \$145 billion — approximately two-thirds the total assets held by all private pension plans. Furthermore, the assets of these two plans are more than double those held in the Social Security Trust Fund. In view of their size, these often neglected government pension plans could have a significant impact on capital markets — especially if the funding targets were increased. The next sections will present a brief summary of the major features of each of the three public pensions. Then estimates will be developed of the impact of moving to fully funded systems.

State-Local Pension Plans

State and local pensions have grown rapidly in the last 15 years. This growth reflects the enormous increase in state and local employment and the influence of strong public employee unions. Over the period 1960-1975, membership in state-local pension plans increased from four and a half million to over nine million and the proportion of full-time employees covered by such plans now stands at 97 percent. (See Table 6.)

As of the last (1972) Census of Governments there were over 2,300 independent state-local pension plans of varying size, each with its own eligibility, vesting, financing and benefit provisions. (See Table 7.) While the characteristics of these plans are diverse and complex, it is possible to describe features of what might be considered a “typical” plan. Robert Tilove, in a recent study of state-local retirement systems, surveyed a large number of plans and summarized the following characteristics for such a plan.⁷

Benefit formula. Each employee’s annual pension is calculated on the basis of 1.67 percent of his final salary for each year of employment. Therefore, after 30 years of service, the benefit would be equivalent to 50 percent of final salary. Final salary is defined as the average of the five highest paid years in the last ten years of service.

Postretirement adjustment. Pension benefits are increased annually, up to 3 percent, in line with changes in the consumer price index.

Retirement age. Employees may retire with full benefits at age 60 with ten years of service and actuarially reduced benefits are available at age 55. Retirement is compulsory at age 70.

Vesting. If an employee leaves after ten years of service and does not withdraw his contributions, he is entitled to benefits at the appropriate age.

⁷Robert Tilove, *Public Employee Pension Funds*, A Twentieth Century Fund Report (Columbia University Press, 1976), pp. 9-11.

Table 6

NUMBER AND PERCENTAGE OF STATE AND LOCAL EMPLOYEES
COVERED BY RETIREMENT SYSTEMS,
1950-1974, SELECTED FISCAL YEARS

	Membership in Retirement Systems		Total Employees		Full-Time Employees	
	Total (millions)	Current Contributors (millions)	Number (millions)	Percent in Retirement System	Number (millions)	Percent in Retirement System
1974	10.4	8.9	11.8	75.4	9.2	96.7
1970	8.4	7.2	10.1	71.3	8.0	90.0
1965	6.6	5.7	8.0	71.3	6.6	86.4
1960	5.1	4.4	6.1	72.1	5.3	83.0
1955	3.8	3.4	5.1	66.7	4.3	79.1
1950	2.8	2.5	4.3	58.1	3.5	71.4

Source: U.S. Department of Commerce, Bureau of the Census, *Public Employment in 1975*, CE No. 1 (1976) and earlier issues. Institute of Life Insurance, *Pension Facts 1975*, Table 32, pp. 32-33.

Table 7

NUMBER AND MEMBERSHIP OF STATE AND LOCAL PENSION SYSTEMS,
BY SIZE OF SYSTEM
FISCAL YEARS 1957, 1967, 1972

Size of System	1972		1967		1957	
	Number of Systems	Total Membership (thousands)	Number of Systems	Total Membership (thousands)	Number of Systems	Total Membership (thousands)
10,000 or more	110	8,205	104	6,009	83	3,359
5,000 — 9,999	47	328	36	237	28	194
1,000 — 4,999	153	336	148	333	124	271
500 — 999	126	87	113	80	100	70
100 — 499	431	94	407	93	374	85
Less than 100	1,437	39	1,357	39	1,496	41
All Systems	2,304	9,089	2,165	7,068	2,205	4,021
			Cumulative Percent of Total			
10,000 or more	4	90	5	89	4	84
5,000 or more	6	94	6	92	5	88
1,000 or more	13	97	13	97	11	95
500 or more	18	98	18	98	15	97
100 or more	37	99	37	99	32	99
Less than 100	100	100	100	100	100	

Source: U.S. Department of Commerce, Bureau of the Census: *Census of Governments 1957, 1967, 1972*. "Employee Retirement Systems of State and Local Governments," Vol. 6, No. 1, Table 4.

Disability. Disability benefits of not less than 25 percent of final average salary are provided to workers with ten years of service. The service requirement is waived if the disability is job-connected.

Survivor's benefit. A retiring employee can elect a reduced benefit for himself in exchange for a survivor's benefit for his spouse.

Employee contributions. The employee contributes 5 percent of his pay; if he terminates employment, he can get a refund with interest.

Social Security. The employee is covered by Social Security and his state-local benefit is not reduced to account for Social Security coverage.

In short, the typical employee of state or local government after 30 years of service can retire at age 60 on a pension of 50 percent (and sometimes higher) of his average pay for the last five years. In addition, the employee can draw full Social Security benefits at age 65, which increases his pension income to about 80 percent of his final salary.

Table 8 presents the benefits, receipts and financial assets for all state-local government retirement systems from 1952-1975. Table 9, which allocates receipts by source of income, reveals that government contributions have consistently amounted to slightly less than one-half of revenues, while the employees' contribution has been declining as earnings on investment have increased in importance. As of 1975, assets of state-local retirement systems stood at almost \$100 billion. Table 10 presents the breakdown of the state-local reserves by type of asset for 1966 and 1975. This breakdown indicates a significant shift away from U.S. Government securities into common and preferred stocks during the last ten years.

Civil Service Retirement Fund

Virtually all civilian Federal workers are covered under the Civil Service Retirement System, which was established in 1920. As of 1975, the Civil Service System numbered 2.7 million contributors and paid out \$7 billion in benefits. The system is financed by contributions from employees and the employing agency combined with an appropriation from general revenues. The following sections will summarize the main features of the system's benefits, financing and reserve position.⁸

Benefits. The Civil Service Retirement System provides retirement, disability and survivors' pensions and also lump-sum refunds for those separating from service. Full retirement benefits are payable under several combinations of age and service, namely, age 55 with 30 years of service, age 60 with 20 years (10 years for members of Congress), and age 62 with 15 years. Full disability benefits are payable after five years service and the definition of disability is considerably more liberal than that under Social Security since benefits are awarded if the individual is incapacitated

⁸For a more detailed description of the Civil Service Retirement System see Robert J. Myers, *Social Security* (Richard D. Irwin, 1975), pp. 572-80.

Table 8

**BENEFITS, RECEIPTS AND ASSETS OF STATE AND LOCAL
GOVERNMENT RETIREMENT SYSTEMS,
FISCAL YEARS 1952-1975**
(millions of dollars)

Years	Benefits	Total	Receipts		Earnings on Investment	Assets
			Government	Employee		
1952	\$ 530	\$ 922	\$ 387	\$ 350	\$ 185	\$ 6,406
1953	585	N.A.	N.A.	N.A.	194	7,402
1954	679	N.A.	N.A.	N.A.	229	8,709
1955	722	N.A.	N.A.	N.A.	267	9,902
1956	825	N.A.	N.A.	N.A.	307	11,305
1957	941	2,455	1,200	899	357	12,834
1958	1,073	N.A.	N.A.	N.A.	417	14,555
1959	1,145	2,974	1,403	1,073	498	16,340
1960	1,265	3,393	1,652	1,140	601	18,539
1961	1,383	3,724	1,806	1,201	717	20,875
1962	1,567	3,997	1,883	1,288	827	23,294
1963	1,690	4,394	2,100	1,361	933	25,629
1964	1,844	4,787	2,256	1,466	1,065	28,639
1965	2,008	5,260	2,418	1,626	1,216	31,814
1966	2,219	5,771	2,630	1,771	1,370	35,262
1967	2,609	6,580	3,055	1,960	1,565	39,265
1968	2,824	7,568	3,585	2,193	1,791	43,652
1969	3,202	8,558	3,976	2,440	2,142	48,873
1970	3,638	9,848	4,600	2,788	2,460	54,918
1971	4,155	11,310	5,241	3,159	2,910	61,603
1972	4,768	12,620	5,750	3,100	3,471	68,760
1973	5,812	14,878	6,649	4,166	4,064	78,417
1974	6,639	16,527	7,821	4,207	4,500	87,488
1975	7,490	18,898	9,116	4,488	5,294	98,064

Sources: U.S. Bureau of the Census: *Finances of Employee-Retirement Systems of State and Local Governments*, 1960, 1961, 1963-64, 1964-65, 1965-66, 1967-68, 1968-69, 1970-71, 1972-73, 1973-74, Table 2 and in 1960, p. 3; John P. Mackin, *Protecting Purchasing Power in Retirement* (New York: Fleet Academic Editions, Inc., 1971) Table II-3, p. 14; Robert Tilove, *Public Employee Pension Funds*, (New York: Columbia University Press, 1976) Table 8.2, pp. 170-171.

Table 9

STATE AND LOCAL PENSION SYSTEM RECEIPTS
 BY SOURCE 1952-1975, SELECTED FISCAL YEARS
 (millions of dollars)

Year	Total	Employee Contribution	Government Contribution	Earnings on Investment
1975	\$18,898	\$4,488	\$9,116	\$5,294
1970	9,848	2,788	4,600	2,460
1965	5,260	1,626	2,418	1,216
1960	3,393	1,140	1,652	601
1957	2,455	899	1,200	357
1952	922	350	387	185

Receipts as a Percent of Total

1975	23.7	48.2	28.0
1970	28.3	46.7	25.0
1965	30.9	46.0	23.1
1960	33.6	48.7	17.7
1957	36.6	48.9	14.5
1952	38.0	42.0	20.1

Source: U.S. Department of Commerce, Bureau of the Census: *Finances of Employee Retirement Systems of State and Local Governments* 1960 p. 3, 1964-5, 1969-70, 1974-5, Table 2; Robert Tillo: *Public Employee Pension Funds* (New York: Columbia University Press, 1976) Table 8.2, pp. 170-71.

Table 10

ASSETS OF STATE AND LOCAL GOVERNMENT
RETIREMENT PLANS, 1966 and 1975
(Book Value, End of Year)

	Percent of Total Assets	
	1966	1975
Cash and Deposits	1.1	.6
U.S. Government Securities	21.4	6.5
State & Local Government Securities	6.8	1.8
Corporate and Other Bonds	51.1	61.2
Common and Preferred Stocks	5.7	23.2
Mortgages	12.2	6.9
Other	1.9	—
Total Assets	100.0 ^a	100.0 ^a

^aTotals may not add due to rounding.

Source: Securities and Exchange Commission, *Statistical Bulletin*, Vol. 35 No. 4 (April 1976); Louis M. Kohlmeier, *Conflicts of Interests: State and Local Pension Fund Asset Management*. (Twentieth Century Fund, 1976), Table 3, p. 28.

from performing the duties for his usual occupation rather than unable to engage in any reasonable gainful employment. Child survivors of employees are also entitled to benefits and a retiree can provide for his other dependent survivors by accepting a reduced annuity.

The amount of the basic employee pension is based on the number of years service and the average salary during the highest three consecutive years. The benefit formula is 1 1/2 percent per year for the first five years, 1 3/4 percent per year for the next five years, and 2 percent per year thereafter up to a maximum pension of 80 percent (attained after 42 years of service). Automatic cost-of-living adjustments are made whenever the CPI increases more than 3.0 percent monthly for three consecutive months. Until recently, benefits were increased by the amount of the CPI increase plus 1 "bonus" percentage point. This additional 1 percent was originally defended as compensation for the lag in the adjustment process. However, such an offset would be required only on a one-time basis for each employee rather than each time benefits were increased. When it was recognized that this provision overcompensated beneficiaries for cost-of-living increases, the procedure was then justified on the grounds that beneficiaries should share in the increased productivity after retirement. Finally, the additional 1 percent was eliminated in September 1976.⁹

Disability pensions are calculated in the same manner as retirement pensions, except that a special minimum of 40 percent of the high year average salary is provided for those with short service (but with at least the five years required for eligibility purposes). The minimum provisions are applicable for disability cases with less than 22 years of service.

Pensions are available for widows and widowers if the employee elects a reduced benefit. The survivor benefit is equal to 55 percent of the full pension for which the retired member was eligible (i.e., before the reduction to take account of the survivor protection). Actually the reduction required is minimal compared to the true actuarial cost of purchasing such additional protection.¹⁰ The first \$300 of monthly pension is reduced by only 2 1/2 percent and all pension above this amount is reduced by 10 percent — this compares favorably with the true actuarial cost which probably averages 15 percent.

Financing. Each employee contributes 7 percent of his total compensation and each employing agency makes a matching contribution to the Civil Service Retirement Fund. In 1971, the general Treasury began to

⁹When the 1 percent "bonus" was eliminated, the timing of cost-of-living increases was also changed. In the future benefits will be adjusted in March by the percentage increase in the CPI occurring between June and December of the prior year and again in October based on the CPI movement between December of the prior year and June of the current year.

¹⁰Myers, *Social Security*, p. 575.

make additional payments to meet the remainder of the overall cost of the program. As a result of the 1971 reforms, the Treasury began to transfer amounts equivalent to an increasing proportion of the interest on the unfunded liability (10 percent in fiscal 1971, 20 percent in 1972, etc.) and by 1980 will be paying all of the interest on the accrued unfunded liability. In addition, the Treasury also makes annual payments to amortize in level instalments over a 30-year period any increase in the unfunded liability resulting from any statute enacted after October 20, 1969 which authorizes new or liberalized benefits, extension of coverage or increase in salaries on which benefits are based.

In fiscal 1975, total contributions to the Civil Service Fund amounted to \$9.2 billion or 26 percent of payrolls. (See Table 11.) By 1980, after the phase-in of the interest payment on the unfunded liability is completed, costs as a percent of payroll will amount to almost 33 percent. Table 12 summarizes the benefits, revenues and assets for the Civil Service Retirement Fund for the last 25 years. As of 1975, the Fund held assets of \$38 billion.

Military

Members of the military services are covered by a noncontributory pension plan, which is operated on a completely pay-as-you-go basis. Pension benefits are awarded after 20 years of service regardless of age (with the readily obtainable consent of Congress) or unilaterally with 30 years of service. Retirement before 20 years of service is possible only in cases of disability. The retirement benefit is calculated on the basis of 2 1/2 percent of final basic pay for each year of service up to a maximum of 75 percent. However, since basic pay excludes allowances for subsistence and housing as well as special pay, a person retiring with 30 years of service at a benefit rate of 75 percent receives a pension equivalent to about 50 percent of his previous total compensation.

Survivors' benefits of 55 percent of retired pay are provided on an elective basis as under civil service. However, unlike civil service, survivors' benefits are integrated with Social Security. The military service benefit is reduced by the portion of the spouse's OASDI benefit which is attributable solely to military coverage under OASDI.

Benefits are automatically adjusted for changes in the cost-of-living. As for civil service, the additional 1 percent "bonus" for military beneficiaries was eliminated in September 1976.

Benefit payments under the military retirement system are summarized in Table 4. Since the program is financed on a pay-as-you-go basis, there is no interest income or asset accumulation.

Summary

The main characteristics of the three major pension plans are summarized in Table 13. For state-local and civil service, retirement is around age 60, while the military requires only 20 years of service which lowers

the retirement age to the early forties. The calculation of benefits in all three cases is quite similar: a designated percent for each year of service applied to (more or less) final salary. However, the cost-of-living adjustment under the military and civil service is more generous than the typical state-local plan where cost-of-living increases are generally limited to 3 percent.

The financing of the three systems varies significantly. State-local systems are generally contributory with the employee paying approximately 5 percent and civil service requires a contribution of 7 percent. This contrasts sharply with the financing of the Military Retirement Plan which is noncontributory. Furthermore, the military is financed on a pay-as-you-go basis and has no assets, while both state-local and civil service make some contribution towards funding their system.

The next section will establish baseline projections for benefits, revenues and asset accumulation for each system on the assumption that they maintain their current financial arrangements. The following section will develop flows based on the assumption that the system moves to full funding.

II. Baseline Projections

Forecasts of the performance of state-local, civil service and military pension plans were made for the year 2000. These estimates were based on the extrapolation of trends and on the assumption of no change in funding policy. Contributions and benefits were estimated independently, while interest income was calculated on the basis of the resulting asset position. Contributions in any year are the product of the number of workers, average earnings and the contribution rate.

$$C_t = N_t \cdot (P/N)_{1975} (1+g)^t \cdot a_t$$

when N_t = number of workers in year t

$(P/N)_{1975}$ = average earnings in 1975

g = rate of growth of average earnings

a_t = contribution rate in year t

The benefit calculation was quite similar.

$$B_t = BN_t \cdot (P/N)_{1975} (1+g)^t \cdot \beta_t$$

when BN_t = number of beneficiaries in year t

β_t = ratio of benefit to average earnings

Table 11

CONTRIBUTIONS TO CIVIL SERVICE RETIREMENT SYSTEM,
FISCAL 1975

	Percentage of Payroll ^a Total ^b	Amount (in millions) Total ^b	Amount (in millions) Paid
Employee	7.00	\$2,495	\$2,495
Employing Agency	7.00	2,495	2,495
Interest on Unfunded Liability (50 Percent Payable)	12.68	4,522	2,261
Increase in Unfunded Liability (after October 1969)	3.72	1,326	1,326
Postal Service Increase in Unfunded Liability	1.18	420	420
Military Service Credit	1.14	408	204
	32.72	11,666	9,201

^aThe contributions as a percent of payroll were calculated on the basis of a payroll \$35,643 million which was estimated by dividing the employees' contribution of \$2,495 by .07.

^bTotal contributions are calculated on the assumption that the phase-in for the interest and military payment was completed, and 1980 rates were applied to 1975 payrolls.

Source: Based on data from U.S. Civil Service Commission, *Annual Report of Financial and Statistical Data for Fiscal Year Ended June 30, 1975*, Table A-4, pp. 8-9.

Table 12
**BENEFITS, RECEIPTS AND ASSETS OF CIVIL SERVICE RETIREMENT SYSTEM,
 FISCAL YEARS 1950-75**
 (millions of dollars)

	Benefits	Total	Receipts		Earnings on Investment	Financial Assets
			Government	Employee		
1950	\$ 266	\$ 804	\$ 305	\$ 356	\$ 143	\$ 3,842
1951	269	847	307	375	165	4,420
1952	299	916	313	415	188	5,034
1953	361	960	325	420	215	5,636
1954	409	686	35 ^a	425	226	5,913
1955	428	707	33 ^a	440	234	6,193
1956	504	1,020	237	571	212	6,709
1957	588	1,392	531	640	221	7,512
1958	696	1,453	584	675	194	8,269
1959	792	1,736	754	762	220	9,213
1960	893	1,761	749	760	251	10,081
1961	963	2,027	890	856	282	11,145
1962	1,061	2,082	896	864	323	12,166
1963	1,176	2,247	951	934	362	13,238
1964	1,320	2,456	1,042	994	420	14,374
1965	1,438	2,664	1,115	1,067	482	15,601
1966	1,689	2,823	1,164	1,113	546	16,736
1967	1,969	3,094	1,264	1,206	625	17,861
1968	2,137	3,431	1,389	1,336	709	19,158
1969	2,410	3,753	1,486	1,430	837	20,500
1970	2,752	4,683	1,952	1,740	990	22,432
1971	3,230	5,816	2,663	1,920	1,233	25,018
1972	3,748	6,748	3,206	2,073	1,464	27,982
1973	4,588	7,611	3,902	2,140	1,569	30,980
1974	5,785	8,995	4,840	2,310	1,846	34,184
1975	7,207	11,377	6,707	2,534	2,136	38,351

^a1954 and 1955 Congress failed to make full appropriations.

Source: U.S. Civil Service Commission, Bureau of Retirement, Insurance and Occupational Health, *Annual Report of Financial and Statistical Data for Fiscal Year Ended June 30, 1962*, Table C-1, for Fiscal Year Ended June 30, 1970, Table C-1, for Fiscal Year Ended June 30, 1974, Table B-1, for Fiscal Year Ended June 30, 1975, Table B-1.

Table 13

COMPARISON OF STATE-LOCAL, CIVIL SERVICE AND MILITARY RETIREMENT PLANS

Characteristic	State-Local	Civil Service	Military
Age and/or Service for Retirement	Age 60-65 with 20-30 Years of Service	Age 62 with 5 Years Age 60 with 20 Years Age 55 with 30 Years	20 Years of Service
Calculation of Benefit	1 1/2 to 2 Percent Per Year of Service	1 1/2 Percent First 5 Years 1 3/4 Percent Second 5 Years 2 Percent for Years over 10 Maximum: 80 Percent of Salary	2 1/2 Percent Per Year of Basic Pay. Maximum: 75 Percent of Basic Pay
Base for Calculating Benefit	Basically High 3-5 Years	High 3	Terminal Basic Pay
Cost-of-Living Adjustment	Automatic Adjustments are Common; Generally Limited to 3 Percent	Automatic	Automatic
Vesting	After 5-10 Years	After 5 Years	None
Social Security Offset	About 85 Percent of Employees are Covered by Social Security; 25 Percent Provide an Offset or Step Rate Formula with Fixed Dollar Integration Level	None	None
Employee Contribution	More than 90 Percent are Contributory; 3 to 8 Percent of Salary	7 Percent of Salary	None
Funding	Partial	Partial	Pay-as-you-go

Source: Defense Manpower Commission, *Defense Manpower: The Keystone of National Security*, Report to the President and the Congress, April 1976, Table VIII-13, pp. 370-372.

The estimates presented in Tables 14-16 are based on a 5 percent wage growth assumption, 2 percent productivity and 3 percent inflation. An interest rate of 6 percent is used to calculate the earnings on investment. The specific assumptions for the individual system estimates are summarized below, while the data underlying the projections are presented in Appendix Table A-1.

State-Local

The contribution projections required an estimate of future employment and annual contribution rates. Employment was based on the Bureau of the Census population projections and was estimated for two groups — education and noneducation. State-local workers employed in education were projected on the basis of the increasing ratio of teachers to population aged 5-24, while noneducation employment was based on the rising ratio of state-local workers to the adult population. The projects and underlying assumptions are presented in Appendix Table A-2. Essentially, state-local employment is projected to grow 2 to 3 percent annually between now and the year 2000, increasing from 12 million persons in 1975 to 23 million by 2000.

Two alternative sets of assumptions were made for the contribution rates. First, total employee and government contributions were assumed to remain at the 1975 level of 11.8 percent of payrolls. With this contribution rate, the assets on state-local trust funds would continue to grow until 1994 after which time the funds would be rapidly depleted and would be exhausted early in the twenty-first century. A second set of assumptions provided for a slight increase in the contribution rate averaging 0.7 percent every five years — reaching 15.4 percent by the year 2000. Even with this higher rate, the trust funds would start to decline after 1999. An increasing contribution rate, even with current funding objectives, is probably the more realistic assumption since there has been a secular increase in the ratio of contributions to payrolls since 1960.

The benefit projection required an estimate of the number of beneficiaries in each year and the ratio of benefits to average earnings. Beneficiaries were assumed to increase by 6.1 percent each year. This figure reflected a continuation of the annual increase in beneficiaries experienced between 1960 and 1975.

The ratio of benefits to average earnings has increased from 40 to 45 percent between 1970 and 1975. For the projections, this proxy for replacement rate was assumed to rise to 53 percent in 1980 and then increase to 60 percent by 1990, where it was assumed to remain constant until the year 2000. This projected increase was designed to reflect the liberalization of benefits legislated in the last ten years. Furthermore, a 60 percent ratio of benefits to *average* earnings seemed consistent with the provisions of the "typical" state-local plan which calculates benefits as 50 percent of the five years of highest earnings in the ten years prior to retirement.

Table 14

**PROJECTIONS OF BENEFITS, RECEIPTS AND ASSETS
FOR STATE-LOCAL RETIREMENT SYSTEMS
UNDER CURRENT FINANCIAL ARRANGEMENTS,
FISCAL YEARS 1975-2000
(millions of dollars)**

	Benefits	Total	Receipts Contri- butions	Earnings on Investment	Financial Assets
1975	\$ 7,490	\$ 18,898	\$ 13,604	\$ 5,294	\$ 98,064
1976	8,629	20,882	14,999	5,883	110,317
1977	9,942	23,156	16,537	6,619	123,531
1978	11,454	25,645	18,233	7,412	137,722
1979	13,197	28,366	20,103	8,263	152,891
1980	15,204	31,337	22,164	9,173	169,024
1981	17,241	34,233	24,092	10,141	186,016
1982	19,552	37,349	26,188	11,161	203,813
1983	22,172	40,696	28,467	12,229	222,337
1984	25,142	44,283	30,943	13,340	241,478
1985	28,549	48,162	33,673	14,489	261,091
1986	32,032	52,234	36,569	15,665	281,293
1987	35,940	56,592	39,714	16,878	301,945
1988	40,324	61,246	43,129	18,117	322,867
1989	45,244	66,210	46,838	19,372	343,833
1990	50,684	71,473	50,843	20,630	364,622
1991	56,462	77,042	55,165	21,877	385,202
1992	62,899	82,966	59,854	23,112	405,269
1993	70,069	89,257	64,941	24,316	424,457
1994	78,057	95,928	70,461	25,467	442,328
1995	86,971	103,047	76,507	26,540	458,404
1996	96,886	110,284	82,780	27,504	471,802
1997	107,931	117,876	89,568	28,308	481,747
1998	120,235	125,818	96,913	28,905	487,330
1999	133,942	134,100	104,860	29,240	487,488
2000	149,251	142,833	113,584	29,249	481,070

Source: Authors' Estimates. See Text.

Table 15

**PROJECTIONS OF BENEFITS, RECEIPTS AND ASSETS
FOR THE CIVIL SERVICE RETIREMENT SYSTEM
UNDER CURRENT FINANCIAL ARRANGEMENTS,
FISCAL YEARS 1975-2000
(millions of dollars)**

	Benefits	Total	Receipts Contri- butions	Earnings on Investment	Financial Assets
1975	\$ 7,207	\$11,377	\$ 9,241	\$ 2,136	\$ 38,351
1976	7,948	12,613	10,312	2,301	43,016
1977	8,765	14,088	11,507	2,581	48,339
1978	9,666	15,740	12,840	2,900	54,413
1979	10,660	17,594	14,329	3,265	61,347
1980	11,756	19,670	15,989	3,681	69,261
1981	12,827	21,168	17,012	4,156	77,602
1982	13,995	22,757	18,101	4,656	86,364
1983	15,270	24,442	19,260	5,182	95,536
1984	16,661	26,224	20,492	5,732	105,099
1985	18,179	28,111	21,805	6,306	115,031
1986	19,456	29,993	23,091	6,902	125,568
1987	20,824	31,988	24,454	7,534	136,732
1988	22,287	34,101	25,897	8,204	148,546
1989	23,853	36,337	27,424	8,913	161,030
1990	25,529	38,670	29,008	9,662	174,171
1991	27,119	41,140	30,690	10,450	188,192
1992	28,807	43,762	32,470	11,292	203,147
1993	30,601	46,543	34,354	12,189	219,089
1994	32,506	49,491	36,346	13,145	236,074
1995	34,530	52,732	38,568	14,164	254,276
1996	36,524	56,139	40,882	15,257	273,891
1997	38,632	59,768	43,335	16,433	295,027
1998	40,863	63,637	45,935	17,702	317,801
1999	43,222	67,759	48,691	19,068	342,338
2000	45,717	72,079	51,539	20,540	368,700

Source: Authors' Estimates. See Text.

Table 16

**PROJECTIONS OF BENEFITS, RECEIPTS AND ASSETS
FOR THE MILITARY RETIREMENT SYSTEMS
UNDER CURRENT FINANCIAL ARRANGEMENTS,
FISCAL YEARS 1975-2000
(millions of dollars)**

Year	Benefits	Total	Receipts Contri- butions	Earnings on Investment	Assets
1975	\$ 6,149	\$ 6,149	\$ 6,149	—	—
1976	6,708	6,708	6,708	—	—
1977	7,317	7,317	7,317	—	—
1978	7,982	7,982	7,982	—	—
1979	8,708	8,708	8,708	—	—
1980	9,499	9,499	9,499	—	—
1981	10,196	10,196	10,196	—	—
1982	10,944	10,944	10,944	—	—
1983	11,747	11,747	11,747	—	—
1984	12,609	12,609	12,609	—	—
1985	13,534	13,534	13,534	—	—
1986	14,396	14,396	14,396	—	—
1987	15,314	15,314	15,314	—	—
1988	16,289	16,289	16,289	—	—
1989	17,327	17,327	17,327	—	—
1990	18,431	18,431	18,431	—	—
1991	19,501	19,501	19,501	—	—
1992	20,633	20,633	20,633	—	—
1993	21,831	21,831	21,831	—	—
1994	23,099	23,099	23,099	—	—
1995	24,440	24,440	24,440	—	—
1996	25,669	25,669	25,669	—	—
1997	26,959	26,959	26,959	—	—
1998	28,314	28,314	28,314	—	—
1999	29,737	29,737	29,737	—	—
2000	31,232	31,232	31,232	—	—

Source: Authors' Estimates. See Text.

The results of employing these various contribution and benefit assumptions are shown in Table 14. In this scenario, contributions from employees and state-local governments exceed benefit payments through 1989 and the assets in the trust fund grow as a result of increasing interest income and the excess of contributions over benefits. After 1989, an increasing proportion of interest income is used to meet benefit commitments, but the fund continues to grow although at a declining rate. Finally, in 2000 benefit commitments exceed all sources of income and some of the accumulated assets must be used for benefit payments resulting in an actual decline in the trust funds. In the next section, these flows and asset positions will be compared to those required for a fully funded system.

Civil Service

While the assumptions underlying the state-local projections are, by necessity, quite speculative, the projections for the Civil Service Retirement System are based on considerably better information. Employment growth has been more stable, beneficiary data are available and future contribution rates have been established.

Civil service employment grew unevenly from 1950 to 1975 reflecting the onset of two wars and interest in space technology as well as their termination. Over the period, the annualized growth rate was 1.3 percent. In keeping with the expectation that civil service employment has leveled off and that growth over the next quarter century will be slower reflecting tightened government budgets and demographic shifts, growth for 1975-2000 is assumed to average about one-half that of the 1950-1975 period or 0.6 percent per year. With this assumption, the Federal Government will employ approximately 3.3 million workers in the year 2000.

As shown in Table 11, contributions to the Civil Service Retirement Fund amounted to 25.81 percent of payrolls in fiscal 1975. By 1980, when the phase-in for the interest payment on the unfunded liability is completed, the total contribution rate should amount to 32.72 percent. Thereafter, the contribution rate was assumed to increase by 0.55 percent every five years to reflect financing of additional increases in unfunded liability occurring after 1969.

Civil service data on beneficiaries showed a significant increase from 1.4 to 1.9 million between 1975 and 1985 reflecting the high levels of government employment during World War II. After 1985, beneficiary growth slows substantially, reaching 2.2 million by the year 2000.

The ratio of benefits to average earnings amounted to about 35 percent in 1975. This ratio is assumed to increase to 39 percent by 1985 reflecting the large influx of new beneficiaries and then to grow slowly thereafter, reaching 42 percent by the year 2000.

As shown in Table 15, with these assumptions contributions to the Civil Service Retirement Fund will exceed benefit payments for the next 25 years, thereby allowing the fund to retain the interest income as well as

adding excess contributions. By the year 2000, assets will be approximately seven times benefit payments compared to the present five-to-one ratio. Nevertheless, the present unfunded liability of about \$165 billion will not have been reduced and Section III will show the impact of amortizing this liability in addition to making the scheduled contributions.

Military

Since military pensions are noncontributory and financed on a pay-as-you-go basis, contributions will always equal benefits under the current financing scheme. Benefit projections were made on the basis of projected beneficiaries and ratio of benefits to earnings. Beneficiaries were projected to 1980 by the military¹¹ and projections to the year 2000 were calculated by extrapolating the declining growth rate of the 1975-85 period to zero in 1995 after which time the number of beneficiaries was held constant.

Before 1970, the ratio of average benefit to average payroll was considerably in excess of one. However, in 1970 military salary scales were adjusted upward and the ratio of benefit to average earnings has been close to 0.80 since that time. This ratio was incorporated in the benefit calculations which are presented in Table 16.

Summary

These projections for the civil service, state-local and military retirement systems will provide a basis of comparison for the financial flows resulting from full funding of the three programs and therefore it is useful to evaluate their reliability. These baseline projections require many judgmental assumptions about the future number of beneficiaries and contributors as well as the ratio of contributions and benefits to average earnings. Contributors were estimated on the basis of future employment, which is relatively predictable for civil service and the military (provided there are no major wars) but quite speculative for state and local governments. Contributions as a percent of payrolls have been established in law for civil service and for the military, which is financed on a pay-as-you-go basis, contributions will equal benefit payments. However, for state-local governments it was assumed that the ratio of contributions to payrolls would continue to increase as in the past, which may or may not be correct. Beneficiary data for the civil service and military are reasonably certain, but the beneficiary projections for state-local governments, which are based on an assumed continuation of the historical rate of increase, are considerably less reliable. The other key assumption is the ratio of benefits to average earnings. Here again, the estimates for the military are the most solid since the ratio has been steady. For civil service

¹¹ *Pay and Allowances of the Uniformed Services and Supplementary Material*, prepared for the Committee on Armed Services, U.S. House of Representatives (Washington, D.C. 1975), Table 5a.

and state-local governments, the ratio has been increasing and considerable arbitrariness was involved in deciding how fast this ratio would continue to rise and where it would level off.

It is important to emphasize that these baseline projections are speculative because they play a crucial role in determining the impact of funding. For instance, if the forecasts of contributions are overestimated, then a comparison with contributions of fully funded programs will understate the impact of funding. On the other hand, if these contribution schedules are too low, the additional saving resulting from full funding will be exaggerated.

III. Funding the Systems

This section is devoted to determining the amount of contributions required to meet the ultimate cost of fully funding the civil service, military, and state and local retirement systems. Comparing these costs to the baseline projections will reveal the increase in saving and capital accumulation from changing the financing schemes. Full funding of these systems should not necessarily be viewed as a policy goal since other financial arrangements would also be fiscally responsible but rather as the maximum increase in capital accumulation to be derived from this form of financing.

The contributions required to fully fund each of these systems must cover two components: an amortization payment to eliminate the existing unfunded liability and a payment to cover the normal cost. The accrued liability is equivalent to the present value of all future benefit payments based solely on prior years of service and is calculated taking into account life expectancies and withdrawal rates for all current employees and retirees. The accrued unfunded liability is simply the amount by which the liability exceeds current assets. The amortization payment is the annual cost of eliminating the unfunded liability over a number of years and can be calculated either as a level dollar amount or as an amount that will be a level percent of covered payroll. Finally, the normal cost is the amount which must be contributed in a given year to cover the cost of benefits earned in that year.

Three independent estimation techniques were employed to determine the costs of fully funding each system. These methods include 1) trend extrapolation to calculate the present value of benefits (accrued to date and future accruals) to current system members less the present value of contributions from current members calculated at normal cost, 2) estimation of unfunded liability based on a hypothetical mature trust fund, and 3) quasi-actuarial analysis to estimate directly the unfunded liability and normal cost.

1. Trend Extrapolation

This method consists of estimating the present value of future benefit payments to all members of the system and current retirees as well as the present value of the contributions of current members calculated at a rate

which covers normal cost (calculated under method 3). The difference between these two calculations will yield a value of the accrued liability which less current assets will equal the unfunded liability.

The methodology is very similar to that used for the baseline projections except 1) beneficiaries include only those individuals who were members of the system in 1975, 2) contributors include only current covered workers, and 3) the contribution rate is set at a level which will cover the cost of additional benefits earned in each year.

Future benefits were projected to the year 2025 by estimating the ratio of benefits to average earnings and the total number of beneficiaries, then the total benefit figure for each year was discounted back to the present. Therefore, the present value of benefits was equal to

$$PVB^I = \sum_{t=1}^{50} \frac{BN^I_t \left(\frac{P}{N}\right)_{1975} (1+g)^t \cdot \beta_t}{(1+d)^t}$$

where PVB^I = present value of future benefits to current members of the system and current retirees

BN^I_t = number of beneficiaries in year t who were members of the system in 1975

$\left(\frac{P}{N}\right)_{1975}$ = average earnings in 1975

β_t = ratio of benefits to average earnings

d = interest rate by which future benefits are discounted

g = rate of growth of average earnings

Members of the system in 1975 were presumed to comprise a declining portion of total beneficiaries in each year. In the near future, present members continue to make up most of the beneficiary group; however, after 1985 the proportion of beneficiaries represented by current members declines more rapidly due to mortality and the typically high withdrawal rates of younger workers.¹² (See Appendix Table A-3.)

¹²Beneficiaries were fit to a third order polynomial: Construction of the specific curve was quite arbitrary since only two of the required four points were known, i.e., the number in 1975 and 0 in 2025. The intermediate points were estimated from recent retirement trends and rate of decrement.

Future contributions from current members of the three systems were projected to the year 2015 by the following equation.

$$PVC' = \sum_{t=1}^{40} \frac{N'_t \cdot \left(\frac{P}{N}\right) 1975 (1 + G)^t \cdot a_t}{(1 + d)^t}$$

where N'_t = number of workers in year t who were employed in 1975

PVC' = present value of future contributions from current members of the system

a_t = contribution rate set to cover normal cost

A very crude approximation was made of the annual decline in contributors from the current group due to death, disability and retirement.¹³ By 2010, only a small number of contributors from the original group remained and these individuals were assumed to retire or die in the next five years leaving no contributors in the year 2015.

The contribution rate was set at the normal cost so that contributions in any future year exactly cover the value of benefits accruing in that year which prevents any accumulation of additional unfunded liability. Therefore, once it is assumed all future contributions will cover normal cost, it is possible to calculate the value of the liability (L) accrued to date by subtracting the present value of future contributions from the present value of future benefits.

$$L = PVB' - PVC'$$

The unfunded liability (UFL) is then found by simply subtracting the value of current assets (CA) from the accrued liability.

$$UFL = L - CA$$

The results of the trend extrapolation are presented in Table 17. This methodology is extremely sensitive to the rate of decline of beneficiaries and contributors, indicating that a more detailed type of actuarial analysis is required to derive the future flow of benefits and contributions.

¹³The number of contributors were assumed to decline at a constant rate of approximately 7 percent.

Table 17

ESTIMATES OF UNFUNDED LIABILITY
 BY TREND EXTRAPOLATION METHOD
 FOR STATE-LOCAL, CIVIL SERVICE AND
 MILITARY RETIREMENT SYSTEMS, 1975
 (billions of dollars)

	State-Local	Civil Service	Military
Present Value			
Benefits	\$437	\$280	\$277
Contributions	162	75	42
Assets	98	38	0
Unfunded Liability	177	167	235

Source: Authors' estimates.

2. Mature Trust Fund Model

This model was developed by J. Richard Aronson¹⁴ to estimate the unfunded liability and amortization costs for state and local pension plans. The assets required for full funding of a retirement system are estimated by placing static constraints on the system which assures that the trust fund reaches a calculable maximum. A system is defined as mature if the following conditions hold:

number of employees hired = number retiring
 number of employees dying = number retiring
 total payroll is constant

For such a system there exists a hypothetical maximum trust fund (called Mature Trust Fund) which would be sufficient to meet all the plan's obligations even if membership in the system declined or no new members were accepted. The mature system is fully funded when the value of the mature trust fund is equal to the present value of the pension payments to all members of the system until the last member has died less the present value of contributions until the last employee retires.

$$\text{MTF} = \sum_{n=1}^d \frac{B_n}{(1+i)^n} - \sum_{n=1}^R \frac{C_n}{(1+i)^n}$$

where B_n = benefits in year n

C_n = contributions in year n

i = interest rate

d = year last retiree dies

R = year last employee retires

¹⁴J. Richard Aronson, "Projections of State and Local Trust Fund Financing," with David J. Ott and others, *State-Local Finances in the Last Half of the 1970s* (American Enterprise Institute for Public Policy Research, 1975), pp. 63-90.

Since contributions can be expressed as a percent of covered payroll

$$C_n = a PR_n$$

where a = constant percent of covered payroll

PR_n = covered payroll in year n

The expression for MTF may then be rewritten as

$$MTF = \sum_{n=1}^d \frac{B_n}{(1+i)^n} - \sum_{n=1}^R \frac{aPR_n}{(1+i)^n}$$

As long as the system is mature, MTF remains unchanged since membership, payroll and annual benefits and contributions are constant. During this period, the interest on the MTF does not accumulate but rather is used to pay that portion of benefits not met by current contributions. Therefore,

$$iMTF + a\bar{P} = B_c$$

solving for the contribution rate

$$a = B_c/\bar{P} - iMTF/\bar{P}$$

However, since both B_c and P are constant, $B_c/P = b$ and

$$a = b - \frac{iMTF}{\bar{P}}$$

Substituting this into the MTF equation gives

$$MTF = \sum_{n=1}^d \frac{B_n}{(1+i)^n} - \sum_{n=1}^R \frac{\left(b - \frac{iMTF}{\bar{P}} \right)}{(1+i)^n} PR_n$$

and rearranging gives a solution for MTF.

$$\text{MTF} = \frac{\sum_{n=1}^d \frac{B_n}{(1+i)^n} - \sum_{n=1}^R \frac{b \text{ PR}_n}{(1+i)^n}}{1 - \frac{i}{P} \cdot \sum_{n=1}^R \frac{\text{PR}_n}{(1+i)^n}}$$

Since the mature trust fund is the value of assets which must be accumulated if the system is to be fully funded, the accumulation of these assets requires the elimination of the unfunded balance. According to Aronson, the unfunded balance may be calculated as

$$\text{UB} = \text{MTF} - \text{CA} (1+i)^y$$

where CA = current assets

y = amortization period

However, this calculation will underestimate the value of UB because MTF is treated as earning no interest while CA accumulates interest for y years. Thus, UB shrinks over time rather than growing annually by the amount of foregone interest. In order to calculate the correct value for UB, all factors must be treated as present values. Thus

$$\text{UB} = \text{MTF} - \text{CA}$$

Calculating the mature trust fund and unfunded balance for each system required estimates for \bar{P} , B_n , d , b , PR_n , R and i . The model was run with $i = 6$ and $i = 7$ and the values of the remaining variables were set as follows:

The maximum covered payroll P was determined by allowing the actual 1975 payrolls to grow at a constant rate for a number of years until the system is assumed to have matured. These growth rates were set at 5 percent for the military, 5.6 percent for civil service and 7.7 percent for state and local reflecting the expected growth from the baseline projections. Payrolls were allowed to grow for either 10 or 15 years and results for both assumptions will be presented below.

To estimate B_n , the stream of future pension benefits after the plan stops accepting new members, an estimate must be made for d , the number of years until the last member dies. For civil service and state-local, d was set equal to 50 which consisted of a working life of 37 years and 13 years of retirement. For the military, the value of d was increased to 54 since these workers were assumed to enter the system at age 21.

The constant $b = \frac{B_c}{P}$ is the maximum annual pension payment as a

percent of the maximum payroll. This constant is equivalent to the expected ratio of beneficiaries to workers multiplied by the ratio of average benefit to average payroll. Using the baseline projections, b was set equal to 0.600 for the military, 0.282 for civil service and 0.202 for state-local systems.

The annual covered payroll (PR_n) starts to decline as soon as the plan stops accepting new members. The number of years over which the decline occurs depends on the estimated working life. For civil service and state-local systems, working life was assumed to extend from age 25 to age 62 or 37 years. For the military, the working life was calculated from age 21 to age 40 which amounted to 19 years. The model assumes that the covered payroll diminishes in equal decrements over the designated time period.

Estimates for the value of the mature trust fund (MTF) and unfunded balance (UB) are presented in Table 18. The value of UB for civil service and military are consistent with the value of unfunded liability calculated by the quasi-actuarial analysis in the next section. The results for the state-local systems are much too high. The unfunded liability for Massachusetts amounted to approximately \$7-8 billion in 1974¹⁵ and probably was close to \$10 billion by the end of 1975. Assuming that all other states also ran their systems on a pay-as-you-go basis, that employees of other state-local governments were also not covered by Social Security and that their plans were as large and generous as Massachusetts would yield a maximum value for all state-local systems of \$500 billion. However, since all other states at least partially fund their retirement systems, employees of most other state and local plans are also covered by Social Security and few plans are as large and generous as Massachusetts, a more reasonable expectation for the value of aggregate state-local liability is about \$200-300 billion.

This model seems to yield good results for systems that are, in effect, mature. Both civil service and the military anticipate a reasonably steady level of employment and expect a stabilization of the ratio of beneficiaries to workers. In contrast, the state-local systems will experience a significant increase in the ratio of beneficiaries to workers due to a slowing of

¹⁵Massachusetts Retirement Law Commission, *Actuarial Valuation Report of the Contributory Retirement Systems of Massachusetts* (January 5, 1976).

Table 18

ESTIMATES OF MATURE TRUST FUND (MTF)
AND UNFUNDED BALANCE (UB) FOR STATE-LOCAL,
CIVIL SERVICE AND MILITARY RETIREMENT SYSTEMS, 1975

System	Interest Rate	Number of Years of Payroll Growth			
		MTF (billions)	UB (billions)	MTF (billions)	UB (billions)
State-Local	6	\$647.4	\$549.3	\$938.1	\$840.0
	7	590.8	492.7	856.1	758.0
Civil Service	6	275.4	237.1	361.7	323.3
	7	251.3	213.0	330.0	291.7
Military	6	190.1	190.1	242.6	242.6
	7	172.8	172.8	220.6	220.6

Source: Authors' estimates.

the rapid growth in employment during the sixties. The next section will develop a more direct method of estimating the unfunded liability for state-local systems.

3. Quasi-actuarial

This estimation technique provides a crude actuarial valuation for each system. The present value of future benefits (accrued to date and future accruals) for current employees and retirees is calculated on the basis of detailed age, sex, and earnings data. Normal cost is estimated by dividing the present value of benefits by the present value of simulated lifetime earnings for all current employees. The normal cost rate is then applied to the present value of future earnings of current employees to arrive at the present value of contributions. The present value of benefits less the present value of future contributions calculated to cover normal cost less current assets yields the unfunded liability for each system. Amortizing the unfunded liability as a level percent of pay provides the contribution rate required to eliminate the liability which together with the normal cost rate yields the total contribution as the percent of pay necessary to fully fund each system. The projections to the year 2000 are reestimated using these full funding contributions to yield new asset accumulation for each year and these funded projections are compared with the baseline projections estimated in Section II to determine the impact of funding the retirement programs.

Present Value of Benefits

The present value of current employees' benefits is simply the sum of the discounted benefits for each employee. For any employee, the value of the retirement benefit expected in the first year of retirement is some fraction of average salary multiplied by the probability that the employee will remain in the system until retirement age.

$$PV B_F = [\beta \cdot W (1 + g)^{r-1-a} \cdot P_{r_a}] / (1 + d)^{(r-1-a)}$$

W = employee's current salary

$(1 + g)^{(r-1-a)}$ = the growth of the employee's salary through his last working year. If benefits are based on high three years, salary is grown to two years prior to retirement and similarly salary is grown to three years prior to retirement for systems with benefits based on high five.

P_{r_a} = probability employee will remain in the system to retirement (r) given he is in the system at age a . This probability is constructed from multiple decrements of mortality, disability, and withdrawal.

$(1 + d)^{(r-1-a)}$ = discount factor to discount the benefit back to the present

β = ratio of benefit to preretirement earnings

The present value of an employee's total benefits until death must take into account life expectancy after retirement and cost-of-living adjustments to his benefit.

$$PVB_D = \left[\beta \cdot W \left(\frac{1+g}{1+d} \right)^{r-1-a} \right] \sum_{n=r+1}^{110} \left[P_{r_a} + P_{n+1_n} \left(\frac{1+c}{1+d} \right)^{n-r} \right]$$

where PVB_D = total value of benefits until death discounted to the present

P_{n+1_n} = Probability of living to age $n+1$, given that the employee lived to age n

$(1 + c)^{n-r}$ = Factor to adjust benefits after retirement for increases in the cost of living

$(1 + d)^{n-r}$ = Factor to discount benefits after retirement back to value at retirement age

Given an age, sex, salary distribution of employees in each system and data on life expectancies, disability and retirement rates, an estimate for each age-sex group can be found by multiplying the benefits in each year by the number of individuals expected to receive them. Therefore, the present value of benefits for a particular age-sex group is as follows:

$$PVB_s = \left[\beta \cdot W_s \left(\frac{1+g}{1+d} \right)^{r-1-a} \right] \left[N_s \cdot P_{r_a} + \sum_{n=r+1}^{110} N_n P_{n+1_n} \left(\frac{1+c}{1+d} \right)^{n-r} \right]$$

where PVB_s = present value of benefits for a particular age-sex group

W_s = average earnings for age-sex group

N_s = number of employees originally in age-sex group

Summing the values of PVB_s for each age-sex group gives the total expected benefits for employees of a given system. To obtain the present value of total expected benefits, the future benefits for each age group of current retirees must also be estimated.

$$PVB_R = B_R \left[N_R + \sum_{n=r+1}^{110} N_n P_{n+1_n} \left(\frac{1+c}{1+d} \right)^{n-r} \right]$$

where B_R = the existing average benefit for a particular age group of retirees

N_R = number of beneficiaries originally in age-sex group

The total present value of future benefits to current employees and retirees is the sum of all the age group values.

$$PVB_T = \sum_{s=1}^b PVB_s + \sum_{R=1}^f PVB_R$$

Normal Cost

The accrued liability for a system can be calculated by subtracting from the present value of future benefits the present value of future contributions calculated at a rate which covers normal cost. An entry age normal cost can be calculated as the ratio of the present value of future

benefits for current employees to the present value of total covered payroll for those employees. Total covered payroll can be calculated by simulating an earnings history from age of entry into the system to retirement for all current employees.

Since the entry age for each employee is not known, age 30 is assumed to be the entry age for all persons 30 and over while for those under 30 the current age is taken as age of entry.¹⁶ For persons over 30, entry age salary is calculated by reducing the worker's current salary by the assumed growth in wages for each year from his current age back to age 30. To calculate the present value of lifetime payroll for a given age-sex group, the shrunken salaries are multiplied by the number of individuals in the age group until the summation reaches the actual age, after which point the number of individuals is reduced by the decrement factor for withdrawal, disability or death. Therefore,

$$PVP_s = W_c \left[N_s + \sum_{n=c}^{a-1} (1+g)^{n-c} (1+d)^{a-n} \cdot N_s \right] + W_s \left[N_s + \sum_{n=a+1}^{r-1} \left(\frac{1+g}{1+d} \right)^{n-a} \cdot P_{n+1} N_n \right]$$

where W_e = earnings at entry age calculated by reducing current salary for the age-sex group by the growth rate of wages, i.e.,
 $W_e = W_s / (1+g)^{a-c}$

Earnings histories are simulated for each age-sex group and summed to achieve the total payroll from entry age to retirement for each system.

$$PVP_T = \sum_{s=1}^b PVP_s$$

Since a normal cost contribution exactly covers the cost of benefits earned

$$PVB_T = PVP_T \cdot x$$

where x = normal cost

Rearranging to solve for normal cost

$$x = \frac{PVB_T}{PVP_T}$$

¹⁶For the military, an entry age of 19 was assumed for enlisted men and age 23 for officers.

Unfunded Liability

Once the normal cost is estimated, the accrued liability is calculated by subtracting the present value of normal cost contributions from the present value of total future benefits for current members of the system and present retirees. The present value of future earnings of current workers is as follows:

$$PVE_s = W_s \left[N_s + \sum_{n=a+1}^{r-1} \left(\frac{1+g}{1+d} \right)^{n-a} \cdot P_{n+1} \cdot N_n \right] \text{ and } PVE_T = \sum_{s=1}^b PVE_s$$

Future contributions of these workers calculated on the basis of entry age normal cost equal

$$PVC_T = x \cdot PVE_T$$

The accrued liability is then equal to

$$L = PVB_T - PVC_T$$

As before, the unfunded liability is found by subtracting the value of current assets (CA) from the accrued liability (L).

$$UFL = L - CA$$

The unfunded liability is amortized, both as a level dollar amount and as a percent of pay, to determine the rates of contribution required to eliminate the liability over a period of 40 years. The amortization payment as a level dollar amount is

$$A_n = \frac{UFL(1 - 1/(1+d)^y)}{1 - \left(\frac{1}{1+d} \right)^y}$$

where y = the period over which UFL is amortized

As a level percent of pay, the amortization payment is calculated using an alternative formula.

$$A_n = \frac{\text{UFL} \left[1 - \left(\frac{1}{1+d'} \right)^y \right]}{1 - \left(\frac{1}{1+d'} \right)^y}$$

$$\text{where } d' = \left(\frac{1+d}{1+g} \right) - 1$$

The amortization rate and the normal cost accrual rate together represent the percent of payroll that must be contributed to fund the system.

Applying the Model

The quasi-actuarial model was tested using data for civil service for 1972. These results were then compared with those published in the Report of the Board of Actuaries of the Civil Service Retirement System. The comparison is presented in Table 19 under two sets of assumptions for inflation, interest rate, and wage growth. Although the model is considerably cruder than the techniques used by the civil service actuaries, the results are quite close. On the basis of these results, the model was used to estimate the unfunded liability for 1974 for the military, civil service and aggregate state-local systems. The 1975 liability was calculated by adding the difference between the sum of foregone interest and normal cost for 1975 and actual 1975 contributions.

For the civil service valuation, the following data were provided by the system's actuaries: age-sex earnings distribution for current employees, withdrawal and disability rates which combined with mortality rates from a group annuity table were used to construct a multiple decrement table, and finally an age-sex benefit distribution for disability, age-service and survivor beneficiaries. For simplicity, it was assumed that all survivors were widows.

The Department of Defense provided age-service-earnings data for military personnel all of whom were assumed to be male. Also supplied was the multiple decrement table for withdrawal, disability and death used

Table 19

VALUATION OF CIVIL SERVICE RETIREMENT SYSTEM,
ANNUAL REPORT AND MODEL, 1972

	Static		Dynamic	
	Civil Service	Model	Civil Service	Model
I. Actuarial Assumptions				
1. Interest Rate	5	5	6	6
2. Inflation Rate	0	0	4	4
3. CPI plus 1% Bonus	0	0	5	5
4. Wage Growth	2.25	2.25	5.25	5.25
			(Percent)	
II. Valuation Results				
1. Present Value of Future Benefits			(Millions of Dollars)	
a. Retired Employees	38,572	37,615	57,136	57,272
b. Active Employees	111,782	112,002	224,292	202,691
Total	150,354	149,617	281,428	259,963
2. Entry Age Normal Cost Accrual Rate	13.64	12.98	28.74	26.86
(Percent)				
3. Present Value of Future Normal Cost Contributions	36,145	30,501	88,415	71,610
4. Gross Accrued Liability	114,209	119,116	193,013	188,353
5. Assets	27,990	27,990	27,990	27,990
6. Net Accrued Liability	86,219	91,126	165,023	160,363

Source: *Board of Actuaries of the Civil Service Retirement System Fifty-Second Annual Report*, July 8, 1975, Table 6, p. 9 and authors' estimates.

in the official valuations of the military retirement system.¹⁷ In addition, the Department of Defense provided an age-sex-benefit distribution of disability, service and survivor beneficiaries.

For state-local systems, no comparable data were readily available. Dale Jorgenson, professor at Harvard University, supplied an age-sex earnings distribution for state-local employees which he has constructed on the basis of employment totals from the BLS.¹⁸ State-local beneficiaries were assumed to be distributed in the same manner as civil service beneficiaries. Withdrawal, disability and mortality rates were also based on civil service data.

The normal costs and unfunded liabilities for each system under three sets of assumptions are presented in Table 20. In addition, the table includes the costs of amortizing the unfunded liability over 40 years both as a level percent of pay and a level dollar amount. The magnitudes of the unfunded liabilities seem reasonable and are consistent with published estimates for 1972 from civil service and for 1975 from the military.¹⁹ The state-local figure is also close to the predicted value, although there are no published estimates with which to compare. The relationship between the three calculations seems reasonable. Comparing the first two sets of estimates for civil service and the military reveals the substantial impact on unfunded liability and normal cost of eliminating the additional 1 percent "bonus" for cost-of-living increases after retirement. A comparison of the second and third sets of estimates indicates the sensitivity of the calculations to a 1 percentage point increase in the interest rate.

Since the earlier baseline projections were calculated on an assumed wage growth of 5 percent and interest rate of 6 percent, the first set of estimates in Table 20 were used to derive the impact of funding. These normal costs and amortization rates (as level percents of pay) were applied to projected payrolls and the flow of benefits, contributions and earnings on investment were recalculated for each system (see Tables 21-23). The

¹⁷The decrement table used for official valuations of the military retirement system is a 1965 multiple decrement table with Department of Defense composites adjusted to June 30, 1973 force structure.

¹⁸Jorgenson's methodology for allocating workers by age, sex and earnings is described in F. Gollop and D. W. Jorgenson, "U.S. Total Factor Productivity by Industry, 1947-1973," paper delivered at Conference on New Developments in Productivity Measurement, Williamsburg, Va., Nov. 13-14, 1975.

¹⁹The estimate for the military is in line with the General Accounting Office estimate of an unfunded liability of \$194 billion based on 5.5 percent wage growth, 7 percent interest rate and 5 percent cost-of-living adjustment. The higher interest rate assumption for the GAO estimate offsets most of the higher wage growth and cost-of-living assumption. Moreover, the published valuation was based on considerably higher post-retirement mortality rates (1937 Standard Annuity Table versus 1971 Group Annuity Table) which explains the balance of the difference. For further detail see *A Contributory Retirement System for the Military Personnel*, Report to the Chairman of the Task Force on National Defense, Senate Budget Committee by Comptroller General of the United States, (Washington, D.C., March 4, 1976).

Table 20

ESTIMATES OF UNFUNDED LIABILITY AND NORMAL COST FOR STATE-LOCAL,
CIVIL SERVICE AND MILITARY RETIREMENT SYSTEMS
BY QUASI ACTUARIAL METHOD, 1975

	Unfunded Liability (billions)	Amortization Payment				Normal Cost			Total Cost (Level Percent)
		Level Dollar Amount		Level Percent of Payroll		Dollar Payment in 1975 (billions)		Percent of Payroll	
		Dollar Payment (billions)	Percent of Payroll	Percent of Payroll	Dollar Payment in 1975 (billions)	Dollar Payment in 1975 (billions)			
			Wage Growth = 5%	Interest = 6%	Cost-of-Living = 3%				
State-Local	\$270.3	\$17.0	14.6	7.0	\$8.1	\$19.0	16.4	23.3	
Civil Service	164.3	10.3	24.0	11.4	4.9	8.9	20.6	32.1	
Military	195.0	12.2	78.9	37.6	5.8	6.7	43.5	81.1	
			Wage Growth = 5%	Interest = 6%	Cost-of-Living = 4%				
State-Local	310.3	19.5	16.8	8.0	9.3	21.0	18.1	26.1	
Civil Service	186.4	11.7	27.2	13.0	5.6	9.8	22.8	35.7	
Military	224.7	14.1	90.9	43.4	6.7	7.9	50.9	94.3	
			Wage Growth = 5%	Interest = 7%	Cost-of-Living = 4%				
State-Local	271.3	19.0	16.4	8.3	9.6	16.7	14.4	22.7	
Civil Service	164.8	11.6	26.9	13.5	5.8	7.8	18.1	31.6	
Military	195.7	13.7	88.5	44.5	6.9	6.0	38.8	83.3	

NOTE: Numbers may not add due to rounding.

Source: Authors' estimates.

Table 21
**BENEFITS, RECEIPTS AND ASSETS OF STATE AND LOCAL GOVERNMENT
 RETIREMENT SYSTEMS WITH FULL FUNDING, FISCAL YEARS 1975-2000**
 (millions of dollars)

Year	Benefits \$	Total	Receipts		Earnings on Investment \$	Assets \$
			Contributions			
1975	7,490	18,898	13,604	5,294	5,294	98,064
1976	8,629	35,050	29,166	5,884	5,884	124,485
1977	9,942	38,994	31,525	7,469	7,469	153,537
1978	11,454	43,287	34,075	9,212	9,212	185,370
1979	13,197	47,953	36,831	11,122	11,122	220,126
1980	15,204	53,019	39,811	13,208	13,208	257,941
1981	17,241	58,345	42,869	15,476	15,476	299,045
1982	19,552	64,105	46,162	17,943	17,943	343,598
1983	22,172	70,324	49,708	20,616	20,616	391,750
1984	25,142	77,032	53,527	23,505	23,505	443,640
1985	28,549	84,257	57,639	26,618	26,618	499,348
1986	32,032	92,050	62,089	29,961	29,961	559,366
1987	35,940	100,445	66,883	33,562	33,562	623,871
1988	40,324	109,480	72,048	37,432	37,432	693,027
1989	45,244	119,193	77,611	41,582	41,582	766,976
1990	50,684	129,622	83,603	46,019	46,019	845,914
1991	56,462	140,730	89,975	50,755	50,755	930,182
1992	62,899	152,644	96,833	55,811	55,811	1,019,930
1993	70,069	165,409	104,213	61,196	61,196	1,115,270
1994	78,057	179,072	112,156	66,916	66,916	1,216,285
1995	86,971	193,681	120,704	72,977	72,977	1,322,995
1996	96,886	208,976	129,596	79,380	79,380	1,435,085
1997	107,931	225,248	139,143	86,105	86,105	1,552,402
1998	120,235	242,537	149,393	93,144	93,144	1,674,704
1999	133,942	260,881	160,399	100,482	100,482	1,801,643
2000	149,251	280,314	172,215	108,099	108,099	1,932,706

Source: Author's estimates. See Text.

Table 22

**BENEFITS, RECEIPTS AND ASSETS OF CIVIL SERVICE RETIREMENT SYSTEM
WITH FULL FUNDING, FISCAL YEARS 1975-2000**
(millions of dollars)

Year	Benefits	Total	Receipts		Earnings on Investment	Assets
			Contributions			
1975	\$ 7,207	\$11,377	\$ 9,241	\$ 2,136	\$ 38,351	
1976	7,948	16,892	14,591	2,301	47,295	
1977	8,765	18,251	15,413	2,838	56,781	
1978	9,666	19,688	16,281	3,407	66,803	
1979	10,660	21,206	17,198	4,008	77,349	
1980	11,756	22,807	18,166	4,641	88,400	
1981	12,827	24,570	19,266	5,304	100,143	
1982	13,995	26,441	20,432	6,009	112,589	
1983	15,270	28,423	21,668	6,755	125,742	
1984	16,661	30,524	22,979	7,545	139,604	
1985	18,179	32,746	24,370	8,376	154,171	
1986	19,456	34,966	25,716	9,250	169,681	
1987	20,824	37,318	27,137	10,181	186,175	
1988	22,287	39,806	28,636	11,170	203,694	
1989	23,853	42,440	30,218	12,222	222,281	
1990	25,529	45,225	31,888	13,337	241,977	
1991	27,119	48,168	33,649	14,519	263,026	
1992	28,807	51,290	35,508	15,782	285,509	
1993	30,601	54,601	37,470	17,131	309,509	
1994	32,506	58,111	39,540	18,571	335,114	
1995	34,530	61,832	41,725	20,107	362,416	
1996	36,524	65,686	43,941	21,745	391,578	
1997	38,632	69,769	46,274	23,495	422,715	
1998	40,863	74,095	48,732	25,363	455,947	
1999	43,222	78,677	51,320	27,357	491,402	
2000	45,717	83,530	54,046	29,484	529,215	

Source: Author's estimates. See Text.

Table 23
**BENEFITS, RECEIPTS AND ASSETS OF MILITARY RETIREMENT SYSTEMS
 WITH FULL FUNDING, FISCAL YEARS 1975-2000**
 (millions of dollars)

Year	Benefits	Total	Receipts		Earnings on Investment	Assets
			Contributions			
1975	\$ 6,149	\$ 6,149	\$ 6,149	\$ 0	\$ 0	\$ 6,451
1976	6,708	13,159	13,159	387	13,301	13,301
1977	7,317	14,167	13,780	798	20,546	20,546
1978	7,982	15,227	14,429	1,233	28,180	28,180
1979	8,708	16,342	15,109	1,691	36,193	36,193
1980	9,499	17,512	15,821	2,172	44,781	44,781
1981	10,196	18,784	16,612	2,687	53,966	53,966
1982	10,944	20,129	17,442	3,238	63,771	63,771
1983	11,747	21,552	18,314	3,826	74,218	74,218
1984	12,609	23,056	19,230	4,453	85,329	85,329
1985	13,534	24,645	20,192	5,120	97,255	97,255
1986	14,396	26,322	22,262	5,835	110,038	110,038
1987	15,314	28,097	23,375	6,602	123,726	123,726
1988	16,289	29,977	23,375	7,424	138,367	138,367
1989	17,327	31,968	24,544	8,302	154,008	154,008
1990	18,431	34,072	25,770	9,240	170,806	170,806
1991	19,501	36,299	27,059	9,248	188,833	188,833
1992	20,633	38,660	28,412	10,248	208,165	208,165
1993	21,831	41,163	29,833	11,330	228,880	228,880
1994	23,099	43,814	31,324	12,490	251,063	251,063
1995	24,440	46,623	32,890	13,733	274,992	274,992
1996	25,669	49,599	34,535	15,064	300,794	300,794
1997	26,959	52,761	36,261	16,500	328,603	328,603
1998	28,314	56,123	38,075	18,048	359,064	359,064
2000	31,232	61,693	41,977	19,716		

Source: Author's estimates. See Text.

Table 24

ASSETS OF STATE-LOCAL, CIVIL SERVICE AND MILITARY
RETIREMENT SYSTEMS UNDER CURRENT FINANCIAL ARRANGEMENTS
AND UNDER FULL FUNDING,
SELECTED FISCAL YEARS, 1975-2000

	1975	1980	1985	1990	1995	2000
	(billions of dollars)					
State-Local						
Base Line	\$ 98.1	\$ 169.0	\$ 261.1	\$ 364.6	\$ 458.4	\$ 481.1
Funded	98.1 ^a	257.9	499.3	845.9	1,323.0	1,932.7
Civil Service						
Base Line	38.4	69.3	115.0	174.2	254.3	368.7
Funded	38.4 ^a	88.4	154.2	242.0	362.4	529.2
Military						
Base Line	0	0	0	0	0	0
Funded	0	36.2	85.3	154.0	251.1	359.1
Total						
Base Line	136.5	238.3	376.1	538.8	712.7	849.8
Funded	136.5 ^a	382.5	738.8	1,241.9	1,936.5	2,821.0
Increase	0	144.2	362.7	703.1	1,223.8	1,971.2

^aFunding is assumed to begin in 1976.

Source: Tables 14-16 and 21-23.

Table 25

CONTRIBUTIONS TO STATE-LOCAL, CIVIL SERVICE
AND MILITARY RETIREMENT SYSTEMS
UNDER CURRENT FINANCIAL ARRANGEMENTS
AND UNDER FULL FUNDING,
SELECTED FISCAL YEARS, 1975-2000

	1975	1980	1985	1990	1995	2000
	(billions of dollars)					
State-Local						
Base Line	\$ 13.6	\$ 22.2	\$ 33.7	\$ 50.8	\$ 76.5	\$ 113.6
Funded	13.6 ^a	39.8	57.6	83.6	120.7	172.2
Civil Service						
Base Line	9.2	16.0	21.8	29.0	38.6	51.5
Funded	9.2 ^a	18.2	24.4	31.9	41.7	54.0
Military						
Base Line	6.1	9.5	13.5	18.4	24.4	31.2
Funded	6.1 ^a	15.8	20.2	25.8	32.9	42.0
Total						
Base Line	28.9	47.7	69.0	98.2	139.5	196.3
Funded	28.9 ^a	73.8	102.2	141.3	195.3	268.2
Increase	—	26.1	33.2	43.1	55.8	71.9
GNP ^a	1,452.3	1,989.8	2,726.2	3,735.1	5,117.4	7,011.3
DI ^b	1,031.5	1,412.8	1,935.6	2,651.9	3,633.3	4,978.0
Increase as Percent of						
GNP	—	1.3	1.2	1.2	1.1	1.0
DI	—	1.8	1.7	1.6	1.5	1.4

^aFunding is assumed to begin in 1976.

^bGNP is assumed to grow at 6.5 percent — 3 percent inflation, 2 percent productivity and 1.5 percent labor force growth.

^cDisposable income is assumed to be a constant (.71) proportion of GNP.

funding projections were then compared with the projections based on current financial arrangements (Tables 14-16) to determine the impact of funding on annual contributions and net assets.

Table 24 summarizes the asset accumulation of the system under the present financing and full funding. Table 25 presents the annual contributions for selected years under the two financing schemes. The additional contributions to fully fund these retirement systems would amount to approximately 1.2 percent of GNP or 1.6 percent of disposable income.

IV. Conclusions

Of the three methods employed to derive the unfunded liability and normal cost for the state-local, civil service and military retirement systems, only the quasi-actuarial analysis produced consistently reasonable results. On the basis of these results, the benefits, contributions, and interest income for a fully funded system were projected to the year 2000.

The projections indicate that if the state-local systems, the military and civil service were to change their current financing plans to full funding, there would be a substantial increase in contributions and accumulation of assets. The greatest proportional increase in contributions would occur in the state-local systems; a smaller percentage increase would be required for funding the military program, and civil service contributions would have to increase only slightly. The relative required increases reflect the differences in the current financing plans of the three systems. The civil service system is in transition to a financing scheme close to full funding and, therefore, the baseline projections reflect a rapid increase in the contribution rate between 1975 and 1980 and a high contribution rate thereafter. With these rates, civil service more than meets benefit payments in each year and can use the surplus revenues for asset accumulation. In short, since civil service is the closest of the three systems to full funding, the required additional contributions are the smallest.

Paradoxically, it is not true that the partially funded state-local systems require a proportionally smaller increase in contributions than the military plan which is financed completely on a pay-as-you-go basis. This paradox can be explained by the nature of the two systems. The state-local systems are relatively immature and therefore the ratio of beneficiaries to workers is presently quite low. This low ratio means that a low contribution rate yields sufficient revenues for benefit payments as well as some accumulation of assets. However, the ratio of beneficiaries to workers will rise significantly in coming years due to a tapering of the rapid growth in state-local employment experienced during the sixties. The full impact of the increasing rate however was not reflected in the baseline contribution rates since interest income and accumulated assets were assumed to meet a portion of the benefit payments after 1990. Therefore,

the contribution rates incorporated in the baseline projection are significantly below the normal cost rate (in 1975 11.8 percent versus 16.4 percent) and a substantial increase in contributions is required to cover normal costs as well as to amortize the existing liability. In contrast, the more mature military retirement system has already experienced a rapid increase in the beneficiary-worker ratio and has a significantly higher ratio which requires a large percent of payroll simply to meet annual benefit payments. Therefore, the scheduled tax rates under the military are high relative to the normal costs of the program. In short, although the state-local systems are closer to full funding than the military, the increase in contributions for the military is less relative to the high rates required to finance annual benefits.

The net impact on asset accumulation from funding the three systems will depend on the source of the increased contributions. For the civil service and state-local systems, the additional contributions would probably come from the appropriate government which in turn would be derived from higher taxes — most probably higher personal taxes.²⁰ The impact on total saving will depend on whether the taxes come from income that would have been used for consumption or from income that would have been saved. The most reasonable assumption is that increased taxes to fund a pension system are very similar to increased taxes to finance any other government expenditure and therefore the reduction in disposable income would come partly from saving and partly from consumption. Since the fraction of disposable income saved is relatively small (less than 10 percent), most of the increased revenues for funding would come from consumption and represent a net increase in saving.

For the military, a portion of the increased receipts would probably be financed by some contribution from employees and the remainder through tax revenues. Since there would be no change in benefits, the increased contributions from employees would most likely be viewed simply as a reduction in disposable income and therefore would come mostly from consumption. Assuming the increased government contributions

²⁰To really fund the retirement programs, it is essential that total government taxes be increased or expenditures reduced by the amount required for the funding payment; otherwise, the funding scheme will involve nothing more than a paper transaction (at the Federal level) between the Treasury and the Civil Service or Military Retirement Fund. For instance, if an annual contribution of \$10 billion were required to fund civil service, the CSR account could be credited every year with \$10 billion and the Treasury account debited for the same amount. This intragovernmental transfer would not show up in the budget which is completely appropriate since no accumulation of government funds has occurred. After 40 years, the CSR fund would appear to have accumulated \$400 billion. Assume a decision is made at that time to pay off all accrued benefits. An expenditure of \$400 billion would appear in the budget which would then have to be financed either by increased taxes or increased debt since no government fund had actually been accumulated (CSR assets are offset by Treasury liabilities). In other words, it is not sufficient to run a surplus in the CSR account; funding requires a larger surplus or smaller deficit in the total Federal budget.

were derived primarily from personal taxes, these revenues would also come mainly from consumption. As in the case of civil service and state-local systems, the increased contributions to fund the military system will serve to increase aggregate saving.

Some caveats are required for the results presented above. First, any estimate of unfunded liability is extremely sensitive to the ratio of assumed growth in wages to the rate of interest. This analysis has been based upon a 6 percent interest rate and 5 percent wage growth; other combinations of rates might be applied. Second, the impact of funding was measured against a baseline projection which incorporates many judgmental factors and therefore the baseline itself may not be correct. Finally, since all the models are sensitive to the assumed replacement rates, retirement ages and rate of contributor and beneficiary growth, other researchers might derive different estimates.

Nevertheless, the conclusion that funding the state-local, military and civil service retirement system would significantly increase the rate of savings seems inescapable.

Appendix Table A-1
DATA FOR BASELINE PROJECTIONS
STATE-LOCAL

I. Contributions	Employment (thousands)	Annual Payroll (millions)	Average Earnings	Total Contributions (millions)	Contributions as Percent of Payrolls
1950	4,285	\$ 10,980	\$ 2,562	N.A.	N.A.
1952	4,522	13,484	2,982	\$ 737	5.5
1955	5,054	17,026	3,369	N.A.	N.A.
1960	6,387	26,580	4,162	2,792	10.5
1965	8,001	40,804	5,100	4,044	9.9
1970	10,147	70,877	6,985	7,388	10.4
1971	10,444	76,586	7,333	8,400	11.0
1972	10,964	86,880	8,039	8,850	10.2
1973	11,352	96,179	8,472	10,815	11.2
1974	11,794	105,988	8,975	12,027	11.3
1975	12,097	115,907	9,581	13,604	11.8
1980	13,985	171,009	12,228	22,164	12.9
1985	15,913	247,589	15,606	33,673	13.6
1990	18,030	359,122	19,918	50,843	14.2
1995	20,396	518,487	25,421	76,507	14.8
2000	22,801	739,756	32,444	113,584	15.4

II. Benefits	Beneficiaries (thousands)	Total Benefit (millions)	Average Benefit	Ratio of Average Benefit to Average Earnings
1950	294	\$ 320	\$ 1,088	.42
1952	N.A.	530	N.A.	N.A.
1955	427	722	1,691	.50
1960	660	1,265	1,917	.46
1965	886	2,008	2,266	.44
1970	1,291	3,638	2,816	.40
1971	1,379	4,155	3,013	.41
1972	1,463	4,768	3,259	.41
1973	1,550	5,812	3,750	.44
1974	1,635	6,639	4,061	.45
1975	1,730	7,490	4,329	.45
1980	2,346	15,204	6,481	.53
1985	3,154	28,549	9,052	.58
1990	4,241	50,684	11,951	.60
1995	5,702	86,971	15,253	.60
2000	7,667	149,251	19,467	.60

Appendix Table A-1 (Cont'd)
 DATA FOR BASELINE PROJECTIONS
 MILITARY

I. Contributions ^a					
	Employment (thousands)	Annual Payroll ^b (millions)	Average Earnings	Total Contributions (millions)	Contributions as Percent of Payrolls
1950	1,451	\$ 2,869	\$ 1,977	\$ 331	
1955	2,923	6,821	2,334	442	11.5
1960	2,466	6,207	2,517	693	6.5
1965	2,644	7,702	2,913	1,386	11.2
1970	3,053	13,809	4,523	2,853	18.0
1971	2,701	13,718	5,079	3,389	20.7
1972	2,311	14,230	6,158	3,889	24.7
1973	2,242	14,758	6,583	4,392	27.3
1974	2,152	15,116	7,024	5,137	29.8
1975	2,117	15,497	7,320	6,239	34.0
					40.3
1980	2,088	19,508	9,342	9,499	48.7
1985	2,088	24,898	11,923	13,534	54.4
1990	2,088	31,776	15,217	18,431	58.0
1995	2,088	40,555	19,421	24,440	60.3
2000	2,088	51,760	24,787	31,232	60.3

II. Benefits				
	Beneficiaries (thousands)	Total Benefit (millions)	Average Benefit	Ratio of Average Benefit to Average Earnings
1952	138	\$ 331	\$ 2,399	N.A.
1955	174	442	2,540	1.09
1960	243	693	2,852	1.13
1965	462	1,386	3,000	1.03
1970	750	2,853	3,804	.84
1971	806	3,389	4,205	.83
1972	867	3,889	4,486	.73
1973	924	4,392	4,753	.72
1974	984	5,137	5,221	.74
1975	1,050	6,239	5,942	.81
1980	1,271	9,499	7,474	.80
1985	1,419	13,534	9,538	.80
1990	1,514	18,431	12,174	.80
1995	1,573	24,440	15,537	.80
2000	1,575	31,232	19,830	.80

^aContributions were simply set equal to benefit payments; the following data are presented merely to show the implications as a percent of payroll of this type of financing.

^bBasic pay only.

Appendix Table A-1 (Cont'd)
 DATA FOR BASELINE PROJECTIONS
 CIVIL SERVICE

I. Contributions	Employment (thousands)	Annual Payroll (millions)	Average Earnings	Total Contributions (millions)	Contributions as Percent of Payrolls ^a
1950	2,117	\$ 7,361	\$ 3,477	\$ 661	9.0
1955	2,378	10,148	4,268	473 ^b	4.7
1960	2,421	13,414	5,541	1,509	11.2
1965	2,588	17,804	6,880	2,182	12.3
1970	2,881	29,135	10,113	3,692	12.7 ^c
1971	2,872	30,344	10,566	4,583	15.1 ^c
1972	2,795	32,515	11,633	5,279	16.2 ^c
1973	2,786	36,144	12,973	6,042	16.7 ^c
1974	2,874	39,532	13,755	7,150	18.1 ^c
1975	2,890	43,006	14,881	9,241	21.5 ^c
1980	2,978	56,558	18,992	15,989	28.3 ^c
1985	3,130	75,871	24,240	21,805	28.7
1990	3,209	99,277	30,937	29,008	29.2
1995	3,290	129,902	39,484	38,568	29.7
2000	3,339	168,262	50,393	51,539	30.6

II. Benefits	Beneficiaries (thousands)	Total Benefit (millions)	Average Benefit	Ratio Average Benefit to Average Earnings
1950	172	\$ 266	\$ 1,547	.44
1955	297	428	1,441	.34
1960	515	893	1,734	.31
1965	729	1,438	1,973	.29
1970	959	2,752	2,867	.28
1971	1,027	3,231	3,145	.28
1972	1,091	3,748	3,435	.30
1973	1,193	4,588	3,846	.30
1974	1,307	5,785	4,426	.32
1975	1,372	7,207	5,253	.35
1980	1,673	11,756	7,027	.37
1985	1,923	18,179	9,454	.39
1990	2,063	25,529	12,375	.40
1995	2,133	34,530	16,188	.41
2000	2,160	45,717	21,165	.42

^aBased on Census fiscal year payroll rather than civil service payroll data used in Table 11 of text.

^bCongress failed to make full appropriations in 1955.

^c1970-1980 is a period of transition to fuller funding.

Appendix Table A-2

PROJECTION OF STATE-LOCAL EMPLOYMENT, 1975-2000
(thousands)

	Population		Education		State-Local Employment Noneducation		Total
	Age 5-24	Age 25 and Over	Number of Employees	Ratio to Population Age 5-24	Number of Employees	Ratio to Population Age 25 and Over	
Actual							
1950	46,942	88,919	1,723	.037	2,562	.029	4,285
1955	52,140	95,227	2,169	.042	2,886	.030	5,055
1960	60,312	100,018	2,918	.048	3,469	.035	6,387
1965	70,200	104,279	3,960	.056	4,041	.039	8,001
1970	77,221	110,494	5,297	.069	4,850	.044	10,147
1971	78,161	111,709	5,481	.070	4,963	.044	10,444
1972	77,913	113,922	5,626	.072	5,183	.045	10,809
1973	77,866	115,825	5,901	.076	5,451	.047	11,352
1974	77,868	117,736	6,202	.080	5,592	.047	11,794
Projection							
1975	77,961	119,579	6,393	.082	5,740	.048	12,133
1980	75,440	130,069	7,091	.094	6,894	.053	13,985
1985	72,602	141,680	7,696	.106	8,217	.058	15,913
1990	72,746	152,232	8,439	.116	9,591	.063	18,030
1995	75,757	159,576	9,545	.126	10,851	.068	20,396
2000	79,043	165,088	10,750	.136	12,051	.073	22,801

Source: U.S. Bureau of the Census, *Current Population Reports*, Series P-25, No. 601 (October 1975) and No. 519 (June 1974); U.S. Bureau of the Census, *Public Employment*, CE75, No. 1 and earlier issues.

Appendix Table A-3

**ESTIMATES OF BENEFICIARIES AND CONTRIBUTORS 1975-2000
USED IN CALCULATION OF UNFUNDED LIABILITY
BY TREND EXTRAPOLATION METHOD**

STATE-LOCAL

	Beneficiaries	Contributors
1975	1,745	12,097
1980	2,680	7,258
1985	3,119	4,355
1990	3,157	2,613
1995	2,885	1,568
2000	2,399	941
2005	1,788	564
2010	1,150	339
2015	575	0
2020	160	0
2025	0	0

CIVIL SERVICE

	Beneficiaries	Contributors
1975	1,372	2,890
1980	1,604	1,734
1985	1,702	1,040
1990	1,681	624
1995	1,565	373
2000	1,380	225
2005	1,125	135
2010	841	81
2015	541	0
2020	245	0
2025	0	0

MILITARY

	Beneficiaries	Contributors
1975	1,050	2,117
1980	1,317	1,164
1985	1,490	640
1990	1,574	352
1995	1,573	194
2000	1,491	107
2005	1,331	0
2010	1,098	0
2015	795	0
2020	428	0
2025	0	0

Source: Authors' estimates.

SOURCES: Appendix A-1

STATE-LOCAL

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II. Beneficiaries

Beneficiaries: 1950-1974, Social Security Administration, *Social Security Bulletin, Annual Statistical Supplement* 1974, p. 47, 1975 figure from 1975 Research and Statistics Note No. 17 (August 20, 1976) p. 4, 1980-2000, Authors' estimates; Total Benefits: 1950-1975 Bureau of the Census, *Finances of Employee Retirement Systems of State and Local Governments* 1960, 1961, 1963-64, 1964-65, 1965-66, 1967-68, 1968-69, 1970-71, 1972-73, 1973-74, 1974-75. 1980-2000, Authors' estimates.

CIVIL SERVICE

I. Contributions

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II. Beneficiaries

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Discussion

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The paper presented by Munnell and Connolly lends strength to the contention that nonfunding or underfunding of pension liabilities depresses private savings. More importantly, it seeks to estimate the extent of the underfunding in a particularly significant pension area: the governmental plans established for state, local, civil service and military employees. My comments on Munnell and Connolly's estimating methods will be brief. I would like to devote most of my time today to a more general line of thought on a closely related subject.

Three estimating methods were used in this paper to quantify the unfunded liabilities of the pension plans considered. That only one of the three produced consistently sensible results should come as no surprise.

Any attempt to measure unfunded liabilities requires knowledge about the age distribution of both the working and retired participants in the system. The first two approaches tried by Munnell and Connolly assume stability in the age distributions, an attribute not present in plans covering rapidly changing work forces. Only the third method, called the quasi-actuarial method by the authors, does not make that assumption. My only criticism of the Munnell-Connolly paper is that it takes the reader through too much empirical material employing the two doomed methods. They should have been dismissed on logical grounds rather than used and then dismissed for their unsatisfactory results.

The quasi-actuarial method is a good one. While the authors correctly note that its treatment of the age distribution issue could be improved with more complete data, I frankly doubt that further precision is worthwhile. Given massive uncertainties about future benefit adjustments and work force changes, it is of questionable value to seek a high degree of exactitude in liability measurement. I can accept the Munnell-Connolly estimates of unfunded liabilities as the best available and the best that need be generated for any practical purpose.

My stronger interest lies with a related subject which lurks between the lines of this paper. I am firmly convinced that the issues surrounding control of pension fund assets are destined to generate one of the major

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economic policy debates of the next decade. Let us assume that we are about to see increasing participant pressure for the funding of public pension liabilities. Add to that pressure the power of the economists' lobby, which seems to be lending its support to the concept of funding for entirely different reasons. The result will most certainly be an increase in funding, at least at the state level. It is curious, therefore, that no one is yet asking how the money is going to be used. The question will not be an easy one to answer. Munnell and Connolly project that fully funded state and local pension funds would hold \$2 trillion by the year 2000. That is an immense number for state and local governments to deal with. The unspoken assumption of all the economists here today seems to be investments of the funds will be essentially passive commitments to government obligations or traditional institutional choices in a diversified portfolio. Let me go on record as saying unambiguously that the assumption will prove false. It will be simply irresistible for state governments to influence the shape of capital formation. First may come an encouragement of mortgage investments, then perhaps a capital market break for domestic businesses. Anyone who doubts what I am saying should look at how easily the municipal crises of 1975 led to the conclusions that city and state pension funds should invest in their own securities. Last year my office had to issue an order preventing a Massachusetts municipality from overcommitting its assets in its own bonds.

There is a good economic argument for thinking that government intervention in the direction of investment assets might be a positive force when viewed in its most abstract terms. I spoke loosely when I described investments in bills or institutional market baskets of securities as passive investments. Neither is truly passive or neutral in economic impact. As soon as one acknowledges the institutional barriers to the social efficiency of all large fund investments, the concept of passivity becomes elusive. There are strong arguments that at least two such barriers exist. Certain economists have contended for many years that there is an inherent market bias in the United States which causes funds to be overcommitted to private purposes and undercommitted to public purposes. It is certainly not demonstrable that our society is allocating a proper share of its investment capital to such public goods as education, scientific research, transportation, or housing. If the returns to those investments are difficult for an investor to measure or capture, there is likely to be a distortion in our pattern of capital formation. A second bias results from the fact that large investment institutions are prone to confine their asset purchases to the largest issues of the largest issuers. This malady follows directly from the tight concentration of investable assets in the United States. A large private or public investor may well think it efficient to study only a small number of situations. Only the most substantial investment opportunities attract large investors' attention. Moreover, if they wish to remain fairly liquid, their opportunities are narrowed still further to large investment opportunities which are small fractions of even larger investment opportunities.

I am inclined to believe that both of the biases just described are real. Investments by government pension funds in Treasury bills or in traditional institutional market baskets will merely perpetuate the biases. It is for this reason that a truly passive investment strategy is hard to find. Commitments to the mix of public and private purposes in an investment portfolio and the mix of large and small issues should be viewed as conscious decisions. As the public role in controlling investment flow expands, so will the realization that this is the case.

My conclusions at this point are twofold. Firstly, the now theoretical debate over the social efficiency of private investment will become a heated practical debate as the accumulation of government pension assets grows. Until now, government involvement in capital formation could only have come through mandatory controls. Controls over private capital would be so difficult to bring about in the current political environment that their proponents have been paid little heed. But the balance of force quickly changes as we begin to fund government pension liabilities. When governments hold the funds, governments must make the investment decisions themselves. It is far easier for government to exert control over money in someone else's possession.

Secondly, I would point out that the issue of pension fund investment policy forms the tip of the iceberg of a still larger issue. One can not address the control of public pension funds without simultaneously touching on the issue of central planning. Government control of billions of investment dollars is central planning. Should the Social Security system, with liabilities in the trillions of dollars, ever be funded it could exert a near monopoly on capital formation planning. It is simply unrealistic to talk of pension liability funding without talking about it in these terms.

Should the pressures for funding continue to grow, public pension systems will provide the catalyst for the paramount economic debate of the next decade. To whatever extent this conference leads to the cementing of an economists' lobby in support of funding, it is simultaneously foreordaining the convening of a future conference on the investment of the funded assets. The magnitude of the issue is almost universally underestimated.