

SCHOOL EMPLOYEES RETIREMENT SYSTEM OF OHIO

**The Report of the
ANNUAL ACTUARIAL VALUATION
June 30, 1990**

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Report of Annual Actuarial Valuation of Ohio SERS

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Translated to actuarial terminology, this level-cost objective means that the contribution rates must total at least the following:

Current Cost (the cost of members' service being rendered this year)

... plus ...

Interest on Unfunded Accrued Liabilities (unfunded accrued liabilities are the difference between: liabilities for service already rendered; and the accrued assets of SERS).

Computing Contributions to Support Fund Benefits. From a given schedule of benefits and from the employee data and asset data furnished him, the actuary determines the contribution rates to support the benefits, by means of an actuarial valuation and a funding method.

An actuarial valuation has a number of ingredients such as: the rate of investment return which plan assets will earn; the rates of withdrawal of active members who leave covered employment before qualifying for any monthly benefit; the rates of mortality; the rates of disability; the rates of pay increases; and the assumed age or ages at actual retirement.

In making an actuarial valuation, assumptions must be made as to what the above rates will be, for the next year and for decades in the future. The assumptions are established by the Retirement Board after consulting with the actuary.

Reconciling Differences Between Assumed Experience and Actual Experience. Once actual experience has occurred and been observed, it will not coincide exactly with assumed experience, regardless of the wisdom of the assumptions or the skill of the actuary and the millions of calculations he made. The future can be predicted with considerable but not 100% precision, except for inflation which defies reliable prediction.

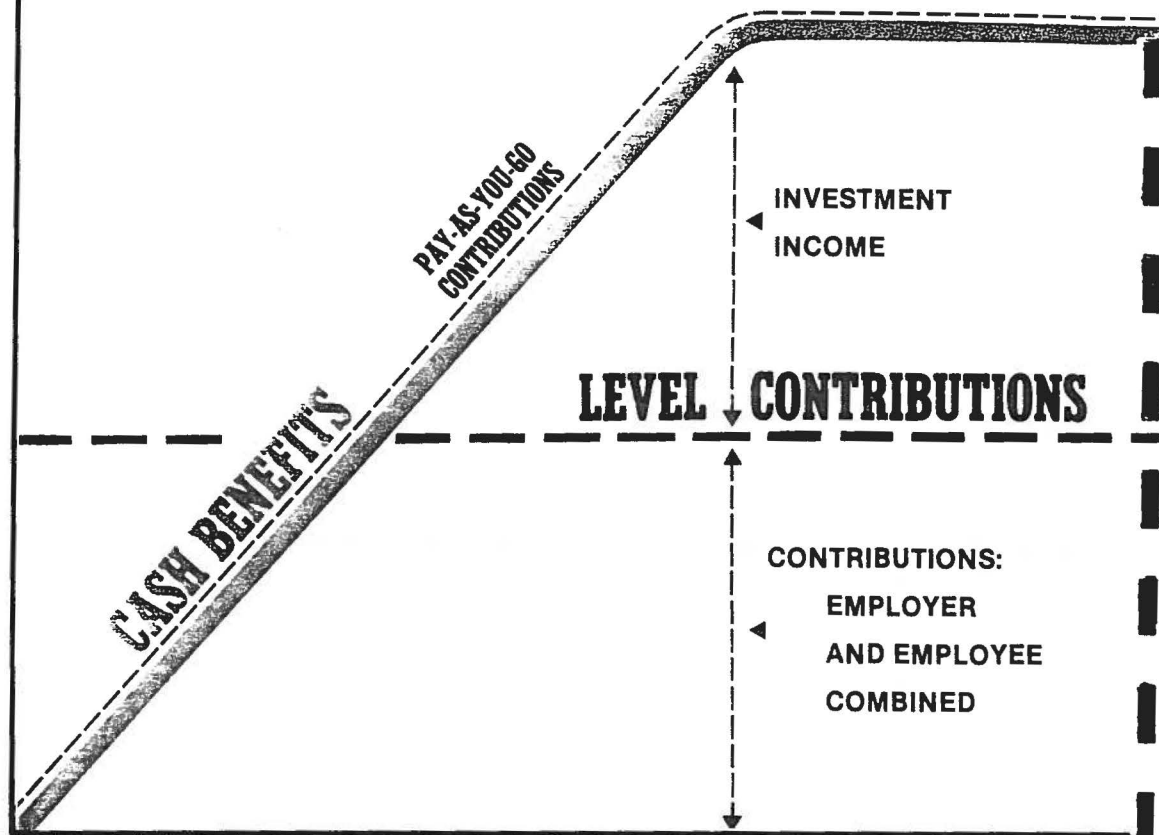
SERS copes with these continually changing differences by having annual actuarial valuations. Each actuarial valuation is a complete recalculation of assumed future experience, taking into account all past differences between assumed and actual experience. The result is continuing adjustments in financial position.

**% OF
ACTIVE
EMPLOYEE
PAYS**

START

50 ±

YEARS OF TIME



CASH BENEFITS LINE. This relentlessly increasing line is the fundamental reality of retirement plan financing. It happens each time a new benefit is added for future retirements (and happens regardless of the design for contributing for benefits).

LEVEL CONTRIBUTION LINE. Determining the level contribution line requires detailed assumptions concerning a variety of experiences in future decades, including:

Economic Risk Areas

- Rates of investment return
- Rates of pay increase
- Changes in active member group size

Non-Economic Risk Areas

- Ages at actual retirement
- Rates of mortality
- Rates of withdrawal of active members (turnover)
- Rates of disability

December 12, 1990

The Board of Trustees
School Employees Retirement System of Ohio
Columbus, Ohio

Ladies and Gentlemen:

Submitted in this report are the results of the June 30, 1990 actuarial valuation of the School Employees Retirement System of Ohio, as amended.

The necessary statistical data on which the valuation was based was furnished by your Director and his staff. Their cooperation in furnishing the materials needed for this valuation is acknowledged with appreciation.

The financial assumptions used in making the actuarial valuation are shown in the Appendix of this report. The financial assumptions for Basic Benefits were revised for the June 30, 1986 valuation; the assumed premiums for Health Care coverages are changed annually as premiums are changed by health care providers (pages 42 & 43).

Your attention is directed particularly to:

COMMENTS on pages 3A - 3B.
Financial Principles on pages 4-5;
Computed Employer Contribution Rates on pages 25 & 31;
Short Condition Tests on pages 26 & 33;

Respectfully submitted,


Thomas J. Cavanaugh Richard G. Roeder

TJC/kq

COMMENTS

General Financial Objective. A sound general financial objective for any public employee retirement plan is to establish and receive contributions which, expressed as percents of active member payroll, will remain approximately level from generation to generation of citizens.

In order to determine SERS present financial position and level contribution rates for the future, annual actuarial valuations are made.

Assumptions concerning future financial experiences are needed for an actuarial valuation. These assumptions are established by the Board after consulting with the actuary.

A program of annual actuarial gain/loss analysis is in operation; these analyses determine the relationship between assumed financial experience and actual experience, for each major risk area.

Statutory Employer Contribution Rate. The 14% of pay rate is now being allocated by SERS policy decision as follows: to Basic Benefits, the rate which will amortize unfunded actuarial accrued liabilities over 40 years, and to Health Care Benefits, the remainder of employer contributions.

BASIC BENEFITS

On the basis of the 1990 valuation and the Basic Benefits and allocated contribution rates then in effect, it is our opinion that the Basic Benefits portion of SERS is in sound condition in accordance with actuarial principles of level cost financing.

Supporting information is on page 25 and on page 26.

HEALTH CARE BENEFITS

Act 290 of 1988. A program was established to determine a minimum annual pay for use in calculating employer contribution dollars - - - a health care surcharge. This program recognizes that the percent-of-payroll costs of full health care benefits are significantly higher for SERS because SERS member pays are significantly lower than the member pays in other major Ohio retirement systems. Minimum annual pay for each future year is to be determined by actuarial valuation.

By SERS policy decision such minimum annual pay is to be calculated (1) using the minimum level percent funding method and (2) using for future health care inflation the same inflation assumption used for valuing Basic Benefits.

For the year beginning July 1, 1990 such minimum annual pay has been calculated to be \$9,100.

The financial development of Health Care Benefits has been cause for continuing concern.

Initially, beginning in 1974, 0.75% was the contribution rate established for Health Care Benefits, and included in a total Employer Rate then 12.50%. Health Care contribution rates have been increased at various times since 1974. The increases in health care costs have been substantially more than inflation increases (see pages 42 & 43).

The employer contributions now being allocated to health care benefits are sufficient to provide level cost financing of the Health Care Benefits if future health care cost inflation does not exceed general price inflation. Page 31 has supporting information.

FINANCIAL PRINCIPLES

Promises Made, and To Be Paid For. As each year is completed, SERS in effect hands an "IOU" to each member then acquiring a year of service credit -- the "IOU" says: "The School Employees Retirement System of Ohio owes you one year's worth of retirement benefits, payments in cash commencing when you qualify for retirement."

The related key financial questions are:

Which generation of taxpayers contributes the money to cover the IOU?

The present taxpayers, who receive the benefit of the member's present year of service?

Or the future taxpayers, who happen to be in Ohio at the time the IOU becomes a cash demand, years and often decades later?

The law governing SERS financing intends that this year's taxpayers contribute the money to cover the IOUs being handed out this year. By following this principle, the employer contribution rate will remain approximately level from generation to generation --- our children and our grandchildren will contribute the same percents of active payroll we contribute now.

(There are systems which have a design for deferring contributions to future taxpayers, lured by a lower contribution rate now and putting aside the consequence that the contribution rate must then relentlessly grow much greater over decades of time -- consume now and let your children face your financial pollution after you retire.)

An inevitable by-product of the level-cost design is the accumulation of reserve assets for decades and the income produced when the assets are invested. Invested assets are a by-product and not the objective. Investment income becomes in effect the 3rd contributor for benefits to employees and is interlocked with the contribution amounts required from employees and employers.

PENSION BENEFIT OBLIGATION

- BASIC BENEFITS -

The amount shown below as the "pension benefit obligation" is a standardized disclosure measure of the present value of pension benefits, adjusted for the effects of projected salary increases, estimated to be payable in the future as a result of employee service to date. The measure is the actuarial present value of credited projected benefits and is intended to (i) help users assess the plan's funding status on a going-concern basis, (ii) assess progress being made in accumulating sufficient assets to pay benefits when due, and (iii) allow for comparisons among public employee retirement plans. The measure is independent of the actuarial funding method used to determine contributions to the plan.

The pension benefit obligation was determined as part of an actuarial valuation of the plan as of June 30, 1990. Significant actuarial assumptions used in determining the pension benefit obligation include (a) a rate of return on the investment of present and future assets of 9.5% per year compounded annually for the period July 1, 1990 through June 30, 1991 and 7.5% per year thereafter, (b) projected salary increases of 4.5% per year compounded annually, attributable to inflation, (c) additional projected salary increases ranging from 0.0% to 3.0% per year attributable to seniority/merit, varying by age, and (d) the assumption that retirement benefits will increase 3% per year after retirement.

At June 30, 1990, the pension benefit obligation was \$3,662,231,300, determined as follows:

Pension Benefit Obligation:

Retirees	\$1,790,858,192
Survivors currently receiving benefits	80,792,509
Terminated employees not yet receiving benefits	55,330,435
Current employees --	
Accumulated employee contributions including allocated investment income	683,812,888
Employer financed - Vested	996,967,870
Employer financed - Non-vested	<u>54,469,406</u>
Total Pension Benefit Obligation	3,662,231,300

During the year ended June 30, 1990 the plan experienced a net change of \$315,668,474 in the basic benefits pension benefit obligation. Of that change, \$0 was attributable to amendments and \$0 was attributable to changes in assumptions.

CONTRIBUTIONS REQUIRED AND CONTRIBUTIONS MADE

- BASIC BENEFITS -

Employer contribution rates are set by Act of the State Legislature.

The adequacy of these rates is checked annually by actuarial valuation. The actuarial funding method used in making these actuarial valuations is the entry age actuarial method; unfunded actuarial accrued liabilities are amortized as a level percent of the active member payroll, over the period of future years which produces the statutory employer contribution rate. Assuming the amortization period is reasonable, the employer contribution rate so computed, expressed as a percent of active member payroll, is designed to accumulate sufficient assets to pay benefits when due. The most recent completed actuarial valuation was based upon data as of June 30, 1990.

During the year ended June 30, 1990 contributions totaling \$218,581,320 -- \$113,492,877 employer, \$104,105,361 employee and \$983,082 from the State -- were made in accordance with contributions determined by State Statute. The employer contributions consisted of \$51,609,964 for normal cost and \$61,882,913 for amortization of the unfunded actuarial accrued liability. Employer contributions represented 10.75% of covered payroll.

Significant actuarial assumptions used to compute contribution requirements were the same as those used to compute the standardized measure of the pension benefit obligation.

Employer Contribution Comparative Schedule

<u>Fiscal Year</u> <u>6/30</u>	<u>Valuation Date</u> <u>6/30</u>	<u>Contribution Rates</u> <u>As Percents of</u> <u>Valuation Payroll</u>	<u>Valuation</u> <u>Payroll</u>	<u>Dollar Contribution</u> <u>For Fiscal Year</u>
1985	1984	8.12%	\$ 737,375,080	\$ 75,682,790
1986	1985	8.13	804,230,073	87,450,445
1987	1986	9.00	869,111,274	84,047,360
1988	1987	9.00	931,385,997	96,793,157
1989	1988	9.58	981,837,995	104,772,920
1990	1989	9.72	1,055,418,490	113,492,877

HEALTH CARE BENEFITS

School Employees Retirement System of Ohio
Outline of Benefit Eligibility and Amounts
HEALTH CARE BENEFITS

(outline last changed 6/30/90)

Health Care Insurance. 10 years of service credit required. Health insurance premiums are paid on behalf of each qualified individual receiving a monthly allowance from SERS, qualified survivor of deceased retirant or qualified survivor of deceased employee. Beginning for members retiring August 1, 1989 and later the member will pay a portion of the medical premiums.

<u>Years of Service at Retirement</u>	<u>Member Portion</u>
10-14	75%
15-19	50
20-24	25
25 +	0

This provision will be phased-in over 5 years and will not change once a member has retired. If the retirant or survivor elects to cover his dependents, the monthly retirement allowance is reduced by 50% of the insurance premiums for the dependents. The retired member's reduction will increase from 50% to 70% during a 5 year phase-in period beginning August 1, 1989.

The premiums provide coverages which may be changed from time to time. Effective January 1, 1983 an annual deductible was introduced. The deductible was increased effective January 1, 1985 and January 1, 1988. Second opinion and pre-certification requirements went into effect January 1, 1987. Effective January 1, 1987 health care is provided to a beneficiary of a deceased retirant only if the beneficiary was the retirant's spouse or dependent child.

Medicare Part B. Each retirant or survivor is reimbursed \$24.80 per month for Part B Medicare premiums.

Mail Order Prescriptions. Health benefits include mail order prescription service with SERS paying the excess of the cost of each prescription over the base fee paid by the benefit recipient. The copayment was increased from \$1 to \$2 effective January 1, 1985 and to \$6 effective March 1, 1988. Effective April 1, 1989 the copayment was increased to \$8. Effective April 1, 1990 the copayment for brand name drugs is \$10; for generic drugs, \$0.

Schedule 13.

HEALTH CARE BENEFITS

Actuarial Accrued Liabilities June 30, 1990

Allocations Using Entry Age Actuarial Cost Method

<u>Present Value Of</u>	<u>Entry Age Actuarial Accrued Liabilities</u>
Future health benefits to present retirants and survivors	\$ 685,985,364
-----	-----
Health benefits to present inactive members	37,135,448
-----	-----
Health benefits to present active members anticipated to retire with service allowances	463,809,439
Health benefits to present active members anticipated to retire with disability allowances	6,094,563
Health benefits to survivors of present active members who die before retiring	<u>12,402,456</u>
Benefits for present active members	482,306,458
-----	-----
Entry Age Liabilities For Present Covered Persons	1,205,427,270
-----	-----
Valuation Assets	158,330,970
-----	-----
Liabilities to be Covered By Future Contributions	1,047,096,300

The Employer Contribution Rate for Health Care Benefits has been established by the Board as the remainder of employer contributions after providing for contributions for Basic Benefits. Including the health care surcharge contribution, the allocated Health Care contribution is 5.57% of payroll. The contribution amount toward unfunded accrued liabilities is sufficient to provide level cost financing.

Schedule 14.

HEALTH CARE BENEFITS
 COMPOSITION OF EMPLOYER CONTRIBUTION RATE
 Established By Statute & Board Action
 June 30, 1990

<u>Contributions For</u>	<u>Contributions Expressed as Percents of Payroll</u>
Normal cost:	
Service allowances	2.72%
Disability allowances	0.09
Survivor benefits (SB Fund)	<u>0.11</u>
Total	2.92

EMPLOYER CONTRIBUTION RATE ALLOCATED TO HEALTH CARE BENEFITS:	
Without Surcharge	4.22
Surcharge	<u>1.35</u>
Total	5.57

Unfunded Accrued Liabilities: Total	2.65
Minimum level % financing	<u>2.65</u>
Margin for adverse experience	0.00

Schedule 15.

HEALTH CARE BENEFITS
A RELATIVE LEVEL COST INDEX*
Comparative Statement

<u>Valuation As of 6/30</u>	<u>Cost Index*</u>
1983	5.07%
1984	5.43
1985	5.40
1986	6.76
1987	7.69
1988#	6.48
1989	6.37
1990	6.42

* Index equals normal cost plus 50 year amortization of unfunded accrued liability (the 50 year period is subjective judgement; there are many other reasonable periods, as illustrated by the graph on page 46).

Benefit changes.

SHORT CONDITION TEST

If the contributions to SERS are level in concept and soundly executed, the System will pay all promised benefits when due --- the ultimate test of financial soundness. Testing for level contribution rates is the long-term test.

A short condition test is one means of checking a system's progress under its funding program. In a short condition test, the plan's present assets (cash and investments) are compared with:

- 1) The liabilities for future benefits to present retired lives;
- 2) The liabilities for service already rendered by active members.

In a system that has been following the discipline of level percent of payroll financing, the liabilities for future benefits to present retired lives (liability 1) will be fully covered by present assets (except in rare circumstances). In addition, the liabilities for service already rendered by active members (liability 2) will be partially covered by the remainder of present assets. The larger the funded portion of liability 2, the stronger the condition of the System. Liability 2 being fully funded is rare.

Schedule 16.

HEALTH CARE BENEFITS
Short Condition Test

<u>June 30</u>	<u>Computed Actuarial Accrued Liabilities</u>		<u>Valuation Assets</u>	<u>Portion of Accrued Liabilities Covered by Assets</u>	
	<u>(1) Retired Lives</u>	<u>(2) Present Members</u>		<u>(1)</u>	<u>(2)</u>
	(\$ in Millions)				
1982	\$243	\$193	\$86	35%	0%
1983	304	235	103	34	0
1984	361	266	108	30	0
1985	386	295	120	31	0
1985*	391	369	120	31	0
1986	461	404	131	28	0
1987	562	489	137	24	0
1988	623	569	139	22	0
1988#	584	467	139	24	0
1989*	640	488	152	24	0
1990	686	519	158	23	0

* Revised financial assumptions.

Benefit changes.

Schedule 17.

Composition of Health Care Costs

June 30, 1990

<u>Benefit</u>	<u>Age</u>	<u>Recipient</u>		<u>Combined</u>
		<u>Retiree</u>	<u>Other</u>	
Medical	Under 65	20%	4%	24%
Medical	65 Plus	25	5	30
Medicare B	Under 65	--	--	--
Medicare B	65 Plus	16	2	18
Prescription	Under 65	4	0	4
Prescription	65 Plus	21	3	24
Combined	Under 65	24	4	28
Combined	65 Plus	62	10	72
Combined	All	86	14	100

PENSION BENEFIT OBLIGATION
- HEALTH CARE BENEFITS -

The amount shown below as the "pension benefit obligation" is a standardized disclosure measure of the present value of pension benefits, adjusted for the effects of projected salary increases, estimated to be payable in the future as a result of employee service to date. The measure is the actuarial present value of credited projected benefits and is intended to (i) help users assess the plan's funding status on a going-concern basis, (ii) assess progress being made in accumulating sufficient assets to pay benefits when due, and (iii) allow for comparisons among public employee retirement plans. The measure is independent of the actuarial funding method used to determine contributions to the plan.

The pension benefit obligation was determined as part of an actuarial valuation of the plan as of June 30, 1990. Significant actuarial assumptions used in determining the pension benefit obligation include (a) a rate of return on the investment of present and future assets of 9.5% per year compounded annually for the period July 1, 1990 through June 30, 1991 and 7.5% per year thereafter, (b) the assumption that increases in the cost of health insurance will average 4.5% per year indefinitely.

At June 30, 1990, the pension benefit obligation was \$1,134,977,510, determined as follows:

Pension Benefit Obligation:

Retirees	\$ 632,502,149
Survivors currently receiving benefits	53,483,215
Terminated employees not yet receiving benefits	37,135,448
Current employees --	
Accumulated employee contributions including allocated investment income	--
Employer financed - Vested	397,084,384
Employer financed - Non-vested	<u>14,772,314</u>
Total Pension Benefit Obligation	1,134,977,510

During the year ended June 30, 1990 the plan experienced a net change of \$70,270,525 in the basic benefits pension benefit obligation. Of that change, \$0 was attributable to amendments and \$0 was attributable to changes in assumptions.

CONTRIBUTIONS REQUIRED AND CONTRIBUTIONS MADE
- HEALTH CARE BENEFITS -

Employer contribution rates are set by Act of the State Legislature.

The adequacy of these rates is checked annually by actuarial valuation. The actuarial funding method used in making these actuarial valuations is the entry age actuarial method; unfunded actuarial accrued liabilities are amortized as a level percent of the active member payroll, over the period of future years which produces the statutory employer contribution rate. Assuming the amortization period is reasonable, the employer contribution rate so computed, expressed as a percent of active member payroll, is designed to accumulate sufficient assets to pay benefits when due. The most recent completed actuarial valuation was based upon data as of June 30, 1990.

During the year ended June 30, 1990 contributions totaling \$67,051,494 -- \$67,051,494 employer, \$0 employee -- were made in accordance with contributions determined by State Statute. The employer contributions consisted of \$30,712,678 for normal cost and \$36,338,816 for amortization of the unfunded actuarial accrued liability. Employer contributions represented 6.35% of covered payroll.

Significant actuarial assumptions used to compute contribution requirements were the same as those used to compute the standardized measure of the pension benefit obligation.

Employer Contribution Comparative Schedule

<u>Fiscal Year</u> <u>6/30</u>	<u>Valuation Date</u> <u>6/30</u>	<u>Contribution Rates</u> <u>As Percents of</u> <u>Valuation Payroll</u>	<u>Valuation</u> <u>Payroll</u>	<u>Dollar Contribution</u> <u>For Fiscal Year</u>
1985	1984	5.88%	\$ 737,375,080	\$39,066,642
1986	1985	5.87	804,230,073	43,057,551
1987	1986	5.00	869,111,274	50,986,665
1988	1987	5.00	931,385,997	48,991,823
1989	1988	5.81	981,837,995	65,567,976
1990	1989	5.53	1,055,418,490	67,051,494

APPENDIX

APPENDIX

SUMMARY OF

ASSUMPTIONS USED FOR SERS ACTUARIAL VALUATIONS

Assumptions Adopted by Board of Trustees After Consulting With Actuary

The actuarial assumptions used in making the valuation are shown in this Appendix of the report. The assumptions were revised as set forth in the Gabriel, Roeder, Smith and Company Investigation Report dated July 9, 1986.

ECONOMIC ASSUMPTIONS

The investment return rate used in making the valuations was 7.5% per year, compounded annually (net after administrative expenses), except that the SERS is assumed to earn 9.5% per year for the period from July 1, 1990 through June 30, 1991. The real rate of return is the portion of total investment return which is more than the inflation rate. Based upon an assumed inflation rate of 4.5%, the 7.5% investment return rate translates to an assumed real rate of return of 3% (5% for the period from July 1, 1990 through June 30, 1991).

Pay increase assumptions for individual active members are shown for sample ages in Schedule 18. Part of the assumption for each age is for merit and/or seniority increase, and the other 4.5% recognizes inflation.

The number of active members is assumed to continue at the present number.

Total active member payroll is assumed to increase 4.5% annually, which is the portion of the individual pay increase assumptions attributable to inflation.

Special assumptions for Health Care Coverages are shown in Schedule 22.

NON-ECONOMIC ASSUMPTIONS

The mortality table used in evaluating allowances to be paid and death before retirement benefits was the 1971 Group Annuity Mortality Table projected to 1984 unadjusted for men and set back 1 year for women. Related values are shown in Schedule 21.

The probabilities of retirement with an age and service allowance are shown in Schedule 20.

Eligibility for age and service retirement was assumed to be: age 50 with 30 or more years of service; or age 55 with 25 or more years of service, or age 60 with 5 or more years of service.

The probabilities of withdrawal from service, disablement and death-in-service are shown for sample ages in Schedule 19.

The entry age normal actuarial cost method of valuation was used in determining liabilities and normal cost.

Differences in the past between assumed experience and actual experience ("actuarial gains and losses") become part of actuarial accrued liabilities.

Unfunded actuarial accrued liabilities are amortized to produce payments (principal & interest) which are level percent of payroll contributions.

Employer contribution dollars were assumed to be paid in equal installments throughout the System fiscal year. Surcharge contributions are assumed to be paid during the calendar year following the end of the applicable plan year.

Present assets were valued on a market related basis, recognizing 20% of previously unrecognized gains and losses each year. See page 19 for detail.

The data about persons now covered and about present assets were furnished by the System's administrative staff. Although examined for general reasonableness, the data was not audited by the Actuary.

The actuarial valuation computations were made by or under the supervision of a Member of the American Academy of Actuaries (M.A.A.A.).

Schedule 18.

Pay Increase Assumptions for an Individual Member

<u>Sample Ages</u>	<u>Increase Next Year</u>		
	<u>Merit & Seniority</u>	<u>Base (Economy)</u>	<u>Total</u>
20	3.0%	4.5%	7.5%
25	2.7	4.5	7.2
30	2.3	4.5	6.8
35	2.1	4.5	6.6
40	1.8	4.5	6.3
45	1.5	4.5	6.0
50	1.0	4.5	5.5
55	0.5	4.5	5.0
60	0.0	4.5	4.5
65	0.0	4.5	4.5

Schedule 19.

Separations From Active Employment Before Age & Service Retirement

<u>Sample Ages</u>	<u>Percent of Active Members Separating Within the Next Year</u>					
	<u>Men</u>			<u>Women</u>		
	<u>Death</u>	<u>Disability</u>	<u>Other</u>	<u>Death</u>	<u>Disability</u>	<u>Other</u>
20	0.05%	0.00%	13.91%	0.02%	0.00%	11.57%
25	0.06	0.00	10.67	0.03	0.00	8.94
30	0.07	0.01	6.55	0.04	0.00	6.59
35	0.10	0.04	5.43	0.05	0.01	5.82
40	0.15	0.10	4.64	0.07	0.05	5.07
45	0.27	0.18	3.84	0.11	0.08	4.31
50	0.49	0.33	3.06	0.17	0.15	3.55
55	0.78	0.63	2.27	0.25	0.47	2.79
60	1.21	--	2.02	0.41	--	2.46
65	1.95	--	2.02	0.73	--	2.46

Schedule 20.

Probabilities of Age & Service Retirement

<u>Sample Ages</u>	<u>Percent of Eligible Active Members Retiring Within Next Year</u> <u>Men</u>
50	15%
55	10
60	10
65	40
70	50
75	100

<u>Sample Ages</u>	<u>Percent of Eligible Active Members Retiring Within Next Year</u> <u>Women</u>
50	12%
55	18
60	25
65	35
70	50
75	100

Schedule 21.

Single Life Retirement Values

<u>Sample Attained Ages</u>	<u>Present Value of \$1 Monthly For Life Increasing 3.0% Annually (1st Increase After 1 Year)</u>		<u>Future Life Expectancy (Years)</u>		<u>Expected Total Lifetime</u>	
	<u>Men</u>	<u>Women</u>	<u>Men</u>	<u>Women</u>	<u>Men</u>	<u>Women</u>
	50	\$171.18	\$191.98	27.53	34.60	77.53
55	156.74	180.48	23.28	29.92	78.28	84.92
60	140.21	166.28	19.27	25.34	79.27	85.34
65	121.85	149.39	15.55	20.94	80.55	85.94
70	102.90	129.87	12.25	16.79	82.25	86.79
75	84.92	108.66	9.50	13.02	84.50	88.02
80	67.78	88.12	7.17	9.85	87.17	89.85
85	53.37	69.03	5.43	7.24	90.43	92.24

<u>Sample Attained Ages</u>	<u>Portion of Age 60 Lives Still Alive</u>		<u>\$1,000 Benefit Beginning at Age 60, Increasing 3% Annually</u>
	<u>Men</u>	<u>Women</u>	
60	100%	100%	\$1,000
65	93	97	1,150
70	82	93	1,300
75	67	86	1,450
80	48	73	1,600
85	28	55	1,750

Schedule 22.

Additional Assumptions for Health Care Coverages

Aetna conventional premium rates:

<u>Status</u>	<u>Monthly Rates Reported</u>	
	<u>1990</u>	<u>1989</u>
Benefit Recipient below age 65	\$248.10	\$222.98
Spouse below age 65*	47.23	48.24
Benefit recipient above age 65 and eligible for Medicare	44.88	45.02
Spouse above age 65 and eligible for Medicare*	13.97	14.79

* SERS portion - figures represent 30% ultimate SERS subsidy.

Availability of Medicare Coverage: All benefit recipients were assumed to be eligible for Medicare on attainment of age 65, or immediately if retired for disability.

Election of Joint and Survivor Benefits: 25% of eligible women and 60% of eligible men are assumed to elect a joint and survivor form of payment. Survivors of these retirants will receive fully paid health care for the remainder of their lives.

Election of Spouse Health Care Coverage: 25% of women retirants and 50% of men retirants are assumed to elect to cover spouses for health care. The System will pay the premium for dependents less a deduction during the life of the retirant.

Medicare Part B Premium Reimbursement: \$24.80 per month.

Mail Order Prescription Service: \$29.61 per month effective July 1, 1990 from \$27.08.

Premium Increases: Premiums and spouse coverage deductions (except for the fixed reimbursement for the Medicare Part B Premium) are assumed to increase 4.5% annually, which is the inflation rate assumed for other actuarial valuation computations.

Schedule 23.

Health Insurance Premiums

Monthly \$ Reported For Annual Actuarial Valuations

Valuation Date 6/30	Benefit Recipient		Spouse*		Mail Order Prescription	Medicare B Premiums
	Under 65	65+	Under 65	65+		
1980	\$105.36	\$31.02	\$ 8.13	\$ 2.51	\$ N.A.	\$ 9.60
1981	123.69	36.42	17.87	5.44	N.A.	11.00
1982#	117.82	25.97	57.34	7.74	3.05	12.20
1983@	148.10	35.63	81.09	11.03	6.27	14.60
1984#	148.10	35.63	81.09	11.03	8.83	15.50
1985#	148.10	35.63	81.09	11.03	11.24	15.50
1986#	169.86	35.33	83.38	19.35	14.55	17.90
1987@	202.13	42.04	109.67	26.07	19.40	24.80
1988#@	208.00	42.00	45.00	13.80	24.29	24.80
1989	222.98	45.02	48.24	14.79	27.08	24.80
1990	248.10	44.88	47.23	13.97	29.61	24.80

COMPOUND ANNUAL RATES OF INCREASE:

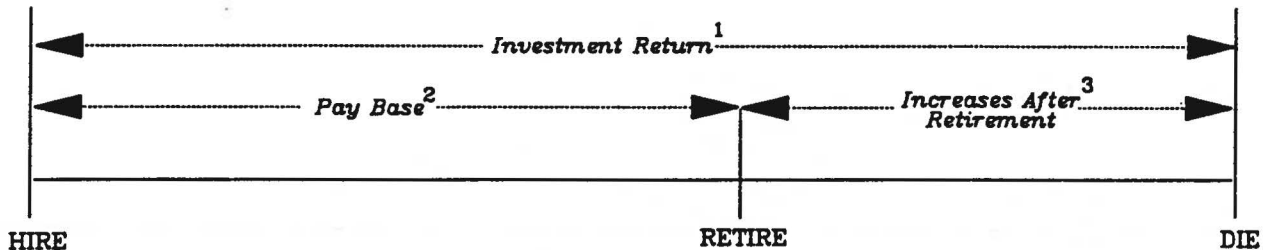
Last Year	11%	0%	(2)%	(6)%	9%	0%
Last 5 Years	11	5	(10)	5	21	10
Since 6/30/80	9	4	19	19	-	10

* Employer portion.

Changes in deductible, hospital surcharge or cost containment measures.

@ Changes in deduction for dependent coverage.

Relationship of Economic Assumptions In Computing Contributions to a Retirement System



1. *Investment Return*

An increase in this assumption reduces computed contributions. The assumption operates over all parts of an employee's lifetime.

2. *Pay Base*

An increase in this assumption increases computed contributions. A 1% increase in this assumption, however, does not increase contributions by as much as a 1% increase in Investment Return reduces computed contributions, because the Pay Base assumption operates only over an employee's lifetime to retirement.

3. *Increases After Retirement*

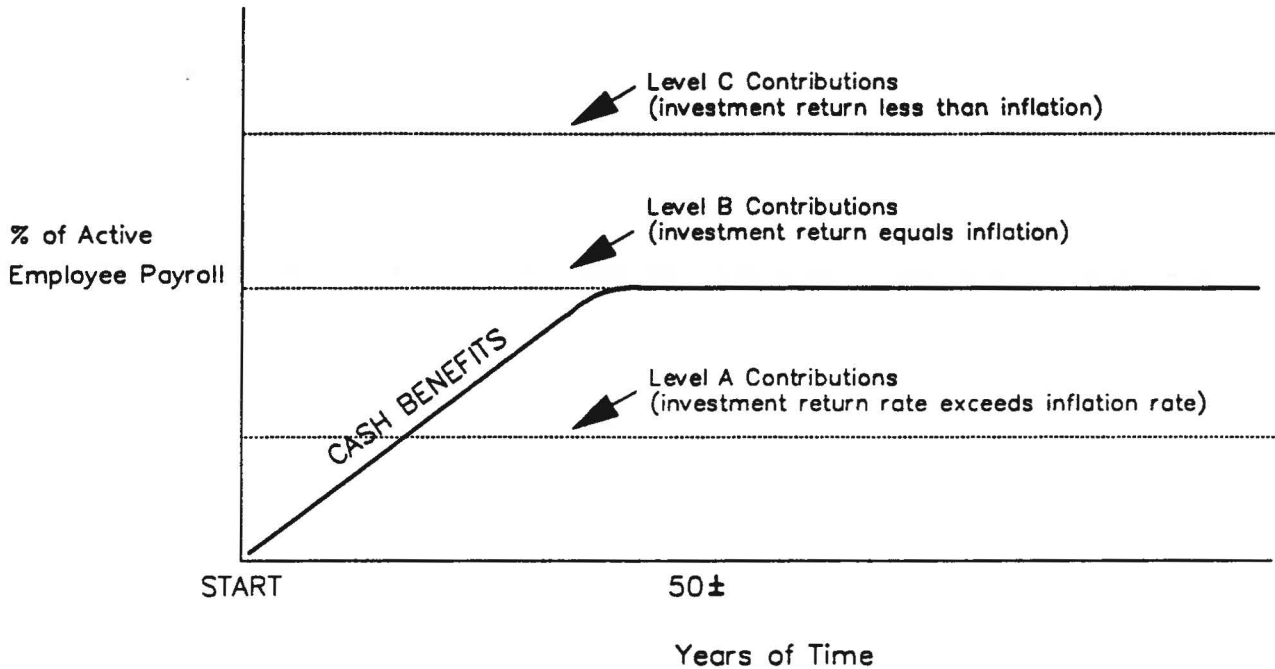
An increase in this element increases computed contributions.

If Investment Return, Pay Base, and Increases After Retirement are each increased by equal amounts, computed contributions remain the same (except in plans using Final Average Pay as a factor in computing benefits; the multi-year average used for Final Average Pay causes computed contributions to decrease slightly).

If Investment Return and Pay Base are increased by equal amounts, with no change in Increases After Retirement, computed contributions decrease significantly.

Where benefits are fixed dollar amounts, computed contributions are significantly reduced if Investment Return is increased.

The Importance of the Investment Return Rate Being More Than the Inflation Rate In Order to Achieve Practical Level Contribution Rates



"LEVEL A CONTRIBUTIONS" occur mathematically when the investment return rate from plan assets exceeds the inflation rate. The greater the excess, the lower the Level A line will be.

Historically, it is this assumed condition that has led to the development of and use of "actuarially sound" or "actuarial reserve" financing methods.

"Level B Contributions" occur mathematically when the investment return rate from plan assets equals the inflation rate.

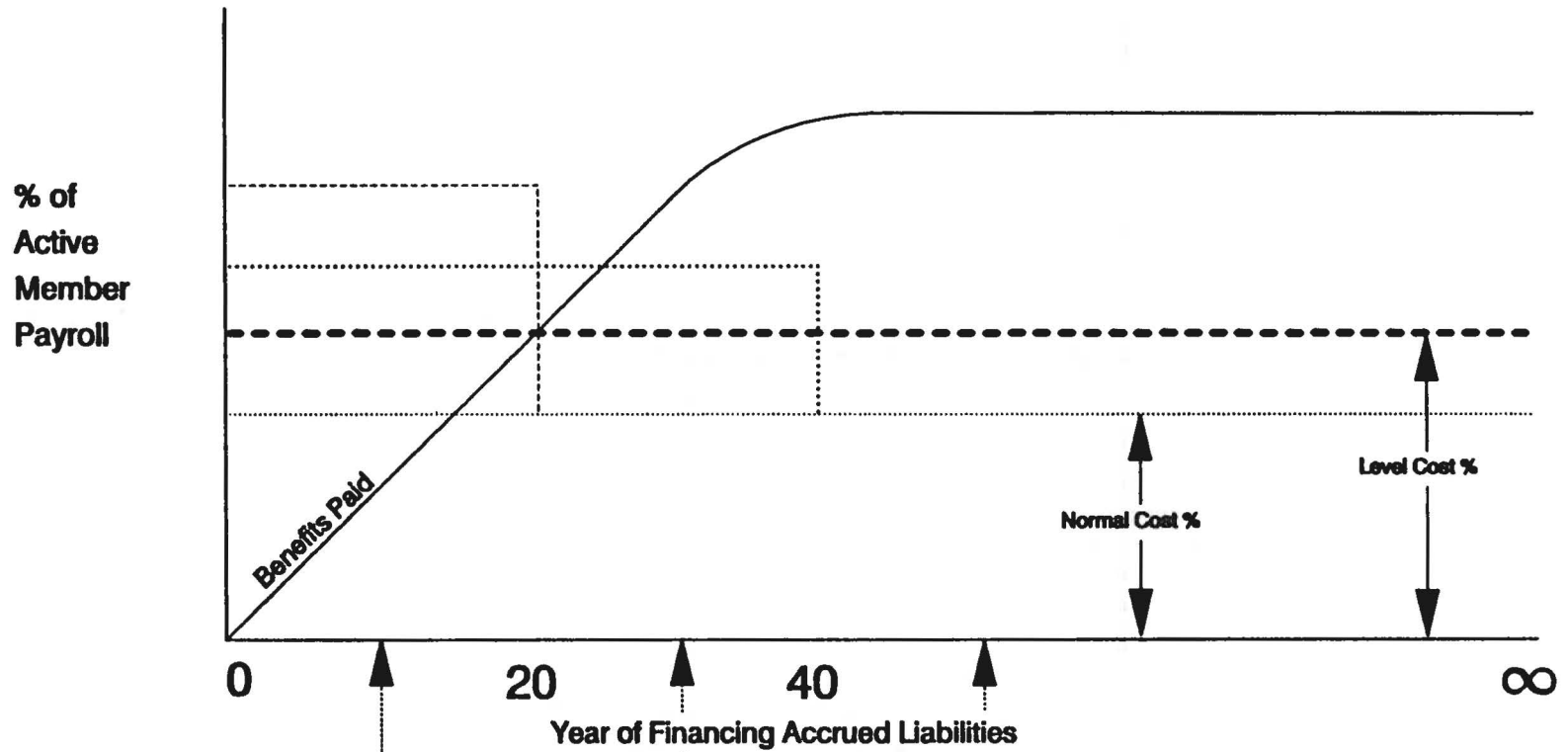
Who would contribute a level rate which is the same as the ultimate contribution rate of "pay-as-you-go" financing?

"Level C Contributions" occur mathematically when the investment return rate from plan assets is less than the inflation rate. The greater the difference, the higher the Level C line would be.

Who would contribute at a rate always more than the benefits paid?

**TOTAL CONTRIBUTIONS FOR RETIREMENT BENEFITS
USING ALTERNATE FINANCING FOR ACCRUED LIABILITIES:**

- LEVEL % OF PAYROLL**
- FULL AMORTIZATION OF UAAL OVER 40 YEARS**
- FULL AMORTIZATION OF UAAL OVER 20 YEARS**



Total Contributions	
LEVEL PERCENT	7.0%
UAAL Over 20 Years	9.7
UAAL Over 40 Years	8.0

Year of Financing Accrued Liabilities	
20	40
7.0%	7.0%
5.0	5.0
8.0	5.0

Red means a REAL Return less than 3%

[3% > (Total - Inflation)]

Year	Common Stocks	Small Company Stocks	Long-Term Corporate Bonds	Long-Term Government Bonds	Intermed-iate-Term Government Bonds	U.S. Treasury Bills	Consumer Price Index
1926	0.1182	0.0028	0.0737	0.0777	0.0538	0.0327	-0.0149
1927	0.3749	0.2210	0.0744	0.0893	0.0452	0.0312	-0.0208
1928	0.4361	0.3969	0.0284	0.0010	0.0092	0.0356	-0.0097
1929	-0.0842	-0.5136	0.0327	0.0342	0.0601	0.0475	0.0019
1930	-0.2490	-0.3815	0.0798	0.0468	0.0671	0.0241	-0.0603
1931	-0.4334	-0.4975	-0.0185	-0.0531	-0.0232	0.0107	-0.0952
1932	-0.0819	-0.0539	0.1082	0.1884	0.0881	0.0098	-0.1030
1933	0.5399	1.4287	0.1038	-0.0008	0.0182	0.0030	0.0051
1934	-0.0144	0.2422	0.1384	0.1002	0.0900	0.0016	0.0203
1935	0.4767	0.4019	0.0961	0.0498	0.0701	0.0017	0.0299
1936	0.3392	0.6480	0.0674	0.0751	0.0306	0.0018	0.0121
1937	-0.3503	-0.5801	0.0275	0.0023	0.0156	0.0031	0.0310
1938	0.3112	0.3280	0.0613	0.0553	0.0623	-0.0002	-0.0278
1939	-0.0041	0.0035	0.0397	0.0594	0.0452	0.0002	-0.0048
1940	-0.0978	-0.0516	0.0339	0.0609	0.0296	0.0000	0.0096
1941	-0.1159	-0.0900	0.0273	0.0093	0.0049	0.0006	0.0972
1942	0.2034	0.4451	0.0260	0.0322	0.0194	0.0027	0.0929
1943	0.2590	0.8837	0.0283	0.0208	0.0281	0.0035	0.0316
1944	0.1975	0.5372	0.0473	0.0281	0.0180	0.0033	0.0211
1945	0.3644	0.7361	0.0408	0.1073	0.0222	0.0033	0.0225
1946	-0.0807	-0.1163	0.0172	-0.0010	0.0100	0.0035	0.1817
1947	0.0571	0.0092	-0.0234	-0.0263	0.0091	0.0050	0.0901
1948	0.0550	-0.0211	0.0414	0.0340	0.0185	0.0081	0.0271
1949	0.1879	0.1975	0.0331	0.0645	0.0232	0.0110	-0.0180
1950	0.3171	0.3875	0.0212	0.0006	0.0070	0.0120	0.0579
1951	0.2402	0.0780	-0.0269	-0.0394	0.0036	0.0149	0.0587
1952	0.1837	0.0303	0.0352	0.0116	0.0163	0.0166	0.0088
1953	-0.0099	-0.0649	0.0341	0.0363	0.0323	0.0182	0.0063
1954	0.5262	0.8058	0.0539	0.0719	0.0268	0.0086	-0.0050
1955	0.3156	0.2044	0.0048	-0.0130	-0.0065	0.0157	0.0037
1956	0.0856	0.0428	-0.0681	-0.0559	-0.0042	0.0246	0.0286
1957	-0.1078	-0.1457	0.0871	0.0745	0.0784	0.0314	0.0302
1958	0.4336	0.6489	-0.0222	-0.0610	-0.0129	0.0154	0.0176
1959	0.1198	0.1640	-0.0097	-0.0226	-0.0039	0.0295	0.0150
1960	0.0047	-0.0329	0.0607	0.1378	0.1175	0.0266	0.0148
1961	0.2689	0.3209	0.0482	0.0097	0.0185	0.0213	0.0067
1962	-0.0873	-0.1190	0.0795	0.0689	0.0558	0.0273	0.0122
1963	0.2280	0.2357	0.0219	0.0121	0.0164	0.0312	0.0165
1964	0.1648	0.2352	0.0477	0.0351	0.0404	0.0354	0.0119
1965	0.1245	0.4175	-0.0046	0.0071	0.0102	0.0393	0.0192
1966	-0.1006	-0.0701	0.0020	0.0365	0.0468	0.0476	0.0335
1967	0.2398	0.8357	-0.0495	-0.0919	0.0101	0.0421	0.0304
1968	0.1106	0.3597	0.0257	-0.0026	0.0453	0.0521	0.0472
1969	-0.0850	-0.2505	-0.0809	-0.0508	-0.0074	0.0658	0.0611
1970	0.0401	-0.1743	0.1837	0.1210	0.1886	0.0653	0.0549
1971	0.1431	0.1650	0.1101	0.1323	0.0872	0.0439	0.0336
1972	0.1898	0.0443	0.0726	0.0568	0.0516	0.0384	0.0341
1973	-0.1466	-0.3090	0.0114	-0.0111	0.0460	0.0693	0.0880
1974	-0.2647	-0.1995	-0.0306	0.0435	0.0569	0.0800	0.1220
1975	0.3720	0.5282	0.1484	0.0919	0.0783	0.0580	0.0701
1976	0.2384	0.5738	0.1865	0.1675	0.1287	0.0508	0.0481
1977	-0.0718	0.2538	0.0171	-0.0067	0.0140	0.0512	0.0677
1978	0.0656	0.2346	-0.0007	-0.0116	0.0348	0.0718	0.0903
1979	0.1844	0.4346	-0.0418	-0.0122	0.0409	0.1038	0.1331
1980	0.3242	0.3988	-0.0262	-0.0395	0.0391	0.1124	0.1240
1981	-0.0491	0.1388	-0.0096	0.0185	0.0945	0.1471	0.0894
1982	0.2141	0.2801	0.4379	0.4035	0.2910	0.1054	0.0387
1983	0.2251	0.3967	0.0470	0.0068	0.0741	0.0880	0.0380
1984	0.0627	-0.0667	0.1639	0.1543	0.1402	0.0985	0.0395
1985	0.3216	0.2486	0.3090	0.3097	0.2033	0.0772	0.0377
1986	0.1847	0.0885	0.1985	0.2444	0.1514	0.0816	0.0113
1987	0.0523	-0.0930	-0.0027	-0.0269	0.0290	0.0547	0.0441
1988	0.1681	0.2287	0.1070	0.0967	0.0610	0.0635	0.0442
1989	0.3149	0.1018	0.1623	0.1811	0.1329	0.0837	0.0465

Investment Return and Inflation: Past and Future

Inflation Distortions

Inflation's impact on investment return is not even from year to year. A common expectation for Real Investment Return (Total Return minus Inflation) is in the area of 3% to 4% annually.

In the last 25 years Real Return was not only short of that mark, it was actually negative for parts of that period.

No. Years/ Ended December	Inflation (CPI)	Annual Investment Return (including income) -- REAL RETURN (Total after inflation) --				
		<u>Bonds (Long Term)</u>		<u>Cash</u>	<u>Stocks</u> (S&P 500)	<u>A</u> <u>SAMPLE</u> <u>FUND*</u>
		<u>US</u> <u>Treasury</u>	<u>Corporate</u> <u>(Sal. Bro.)</u>	<u>Equivalents</u> <u>(T-Bills)</u>		
5/1964	1.2	4.0	4.4	1.6	9.4	6.7
5/1969	3.8	-5.6	-5.7	1.1	1.2	-1.8
5/1974	6.6	0.1	0.1	-0.7	-8.3	-3.6
5/1979	8.1	-3.5	-2.1	-1.3	6.2	1.9
5/1984	6.5	3.1	4.3	4.2	7.8	6.3
5/1989	3.7	11.4	10.9	3.0	16.1	12.5
1/1985	3.8	26.2	26.1	3.8	27.4	24.4
1/1986	1.1	23.0	18.6	5.0	17.2	16.6
1/1987	4.4	-6.7	-4.4	1.1	0.8	-1.5
1/1988	4.4	5.1	6.0	1.9	11.9	8.2
1/1989	4.7	12.8	11.0	3.5	25.6	16.8
25/1989	5.7	0.9	1.3	1.3	4.3	2.9

* 10% Cash Equivalents + 45% Fixed Income + 45% Stocks (only one of many reasonable samples).

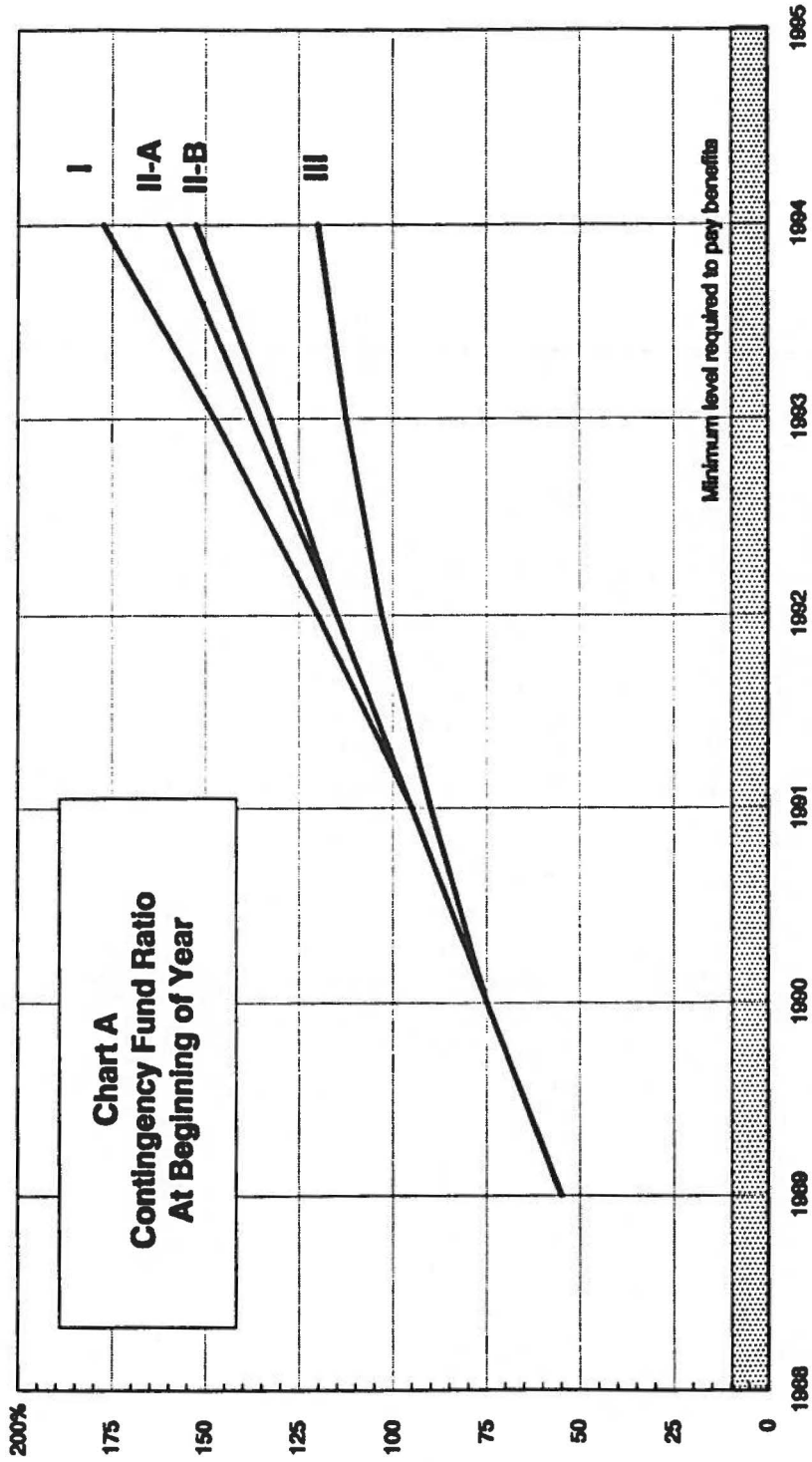
For most pension plans, Benefit Increases After Retirement have fallen short of keeping up with inflation. The retired life group has been hurt more than the active life group. The investment return necessary for the indexing of benefits after retirement has not been realized (and probably cannot be realized during a period of large inflation).

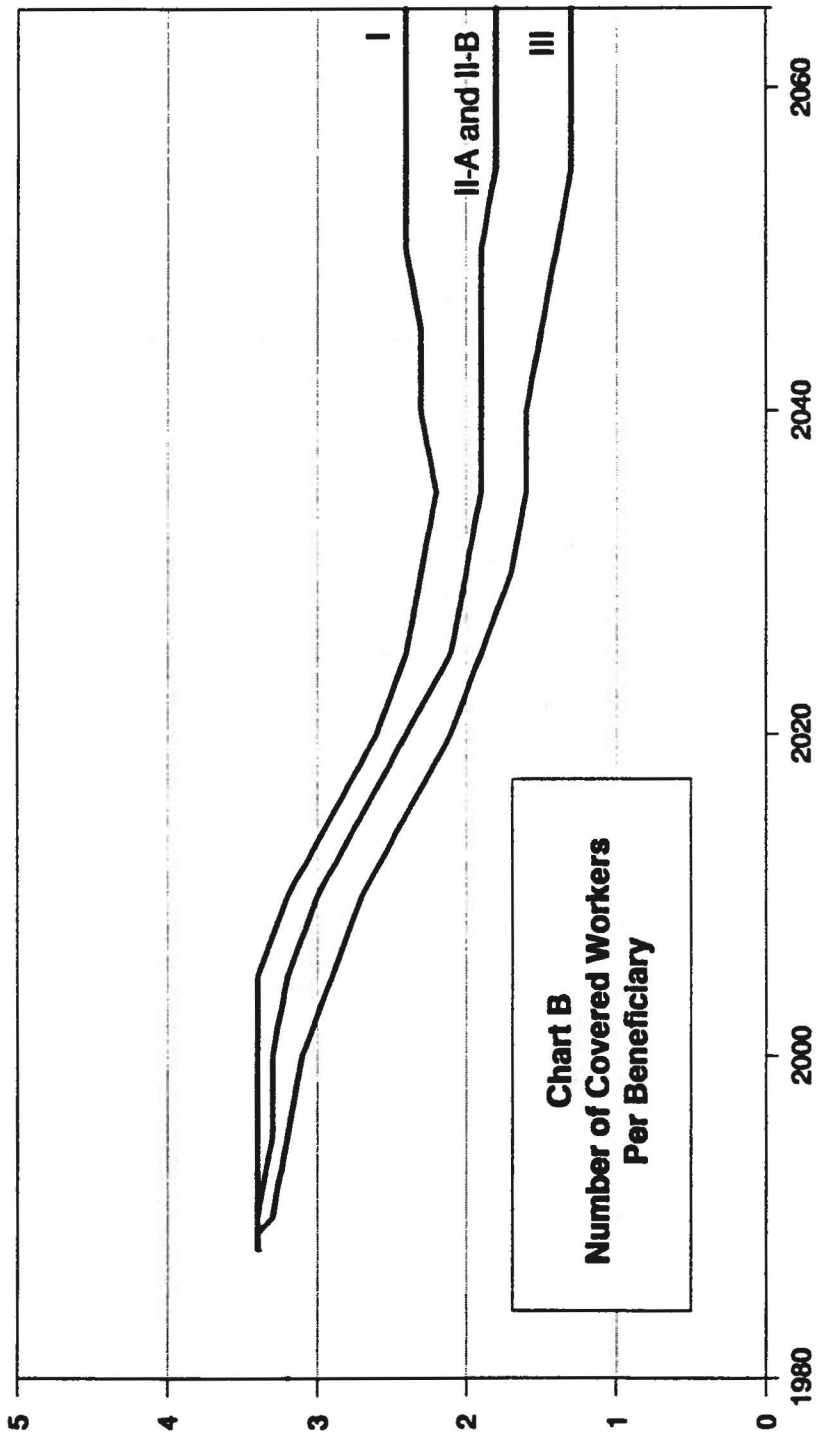
Changes In Economic Assumptions Within An Economic Environment of Inflation

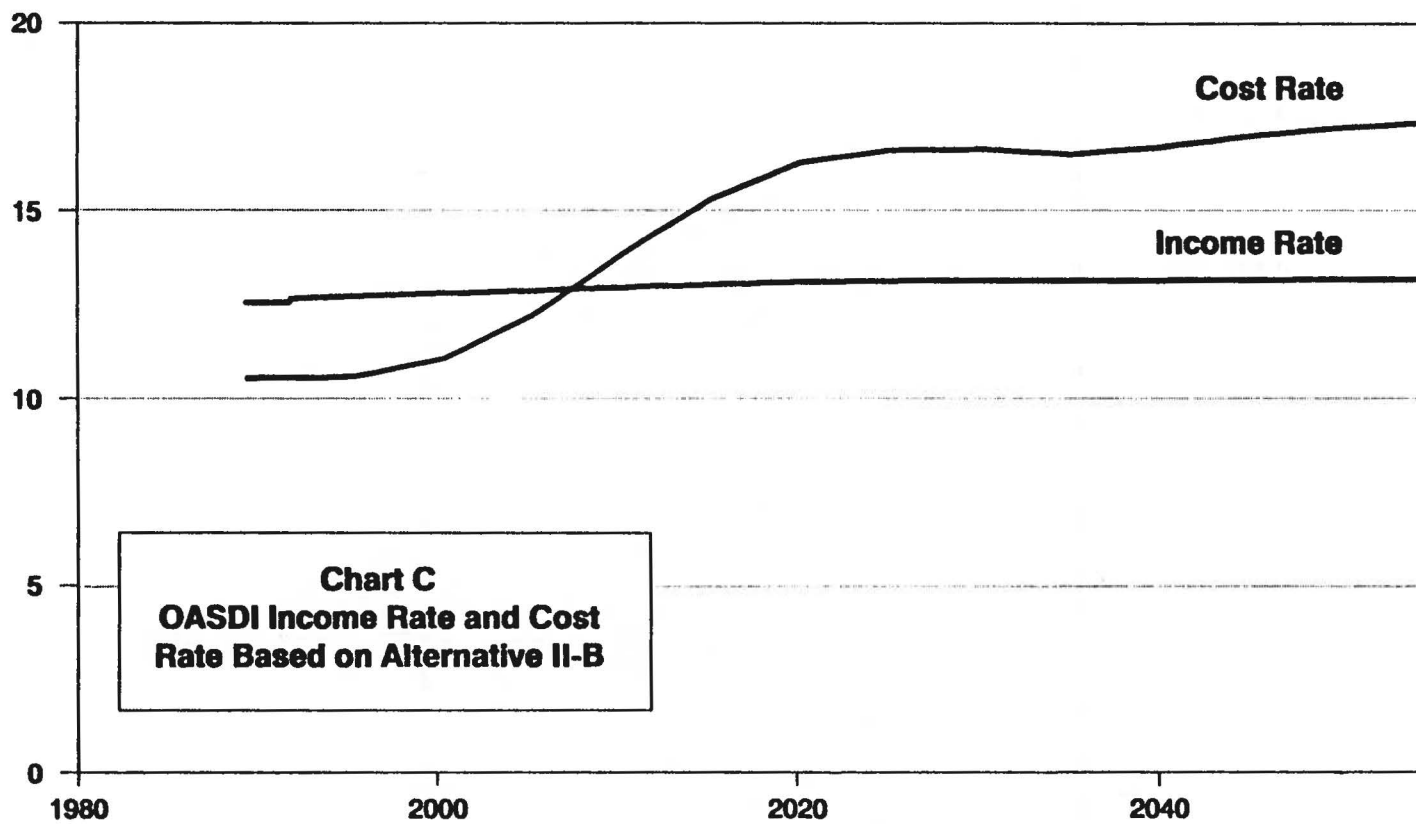
There is powerful motivation to increase assumed Investment Return used in actuarial calculations, with or without a related increase in Employee Pay Base, because such an assumption change decreases computed contributions. A contribution rate decrease (i) offers relief for employer budget problems and/or (ii) offers a "no-cost" way to provide benefit increases.

The wisdom of Investment Return assumed for the future can be determined only by future events. Will the investment record of the next 25 years be the same as the last 25 years? Better? Worse?









**Table 10. Selected Economic Assumptions by Alternative
Calendar Years 1960 - 2065**

Calendar Year	Average annual percentage increase in -				Average annual interest rate ⁴ (percent)	Average annual unemployment rate ⁵ (percent)	Average annual percentage increase in labor force ⁶
	Real GNP ¹	Average annual wage in covered employment	Consumer Price Index ²	Real-wage differential ³ (percent)			
Past Experiences:							
1960-64.....	3.9	3.4	1.3	2.1	3.7	5.7	1.3
1965-69.....	4.4	5.4	3.4	2.0	5.2	3.8	2.1
1970-74.....	2.4	6.3	6.1	0.1	6.7	5.4	2.3
1975.....	-1.3	6.7	9.2	-2.5	7.4	8.5	1.9
1976.....	4.9	8.7	5.7	3.0	7.1	7.7	2.4
1977.....	4.7	7.3	6.5	0.8	7.1	7.1	2.9
1978.....	5.3	9.7	7.6	2.1	8.2	6.1	3.2
1979.....	2.5	9.8	11.4	-1.6	9.1	5.8	2.6
1980.....	-0.2	9.0	13.5	-4.5	11.0	7.1	1.9
1981.....	1.9	9.7	10.2	-0.6	13.3	7.6	1.6
1982.....	-2.5	6.5	6.0	0.5	12.8	9.7	1.4
1983.....	3.6	⁷ 5.0	3.0	2.0	11.0	9.6	1.2
1984.....	6.4	⁷ 7.2	3.4	3.8	12.4	7.5	1.8
1985.....	3.0	⁷ 4.3	3.5	0.8	10.8	7.2	1.7
1986.....	3.4	⁷ 4.3	1.6	2.8	8.0	7.0	2.0
1987.....	3.7	⁷ 5.0	3.6	1.4	8.4	6.2	1.7
1988.....	4.4	⁷ 5.1	4.0	1.1	8.8	5.5	1.4
1989.....	2.9	⁷ 6.3	4.8	1.5	8.7	5.3	1.8
Alternative II-B							
1990.....	1.9	5.6	4.4	1.2	8.3	5.5	1.0
1991.....	2.4	5.5	4.5	1.0	8.2	5.6	1.1
1992.....	2.4	5.5	4.5	1.0	7.9	5.6	1.0
1993.....	2.1	5.4	4.3	1.1	7.6	5.6	0.9
1994.....	2.2	5.5	4.2	1.4	7.3	5.7	0.9
1995.....	2.3	5.4	4.0	1.4	6.9	5.7	0.9
1996.....	2.3	5.4	4.0	1.4	6.5	5.7	0.9
1997.....	2.3	5.5	4.0	1.5	6.4	5.8	0.9
1998.....	2.3	5.4	4.0	1.4	6.3	5.8	0.8
1999.....	2.3	5.4	4.0	1.4	6.1	5.8	0.8
2020.....	1.8	5.4	4.0	1.3	6.0	6.0	0.6
2010 & later.....	⁸ 1.8	5.3	4.0	1.3	6.0	6.0	0.3

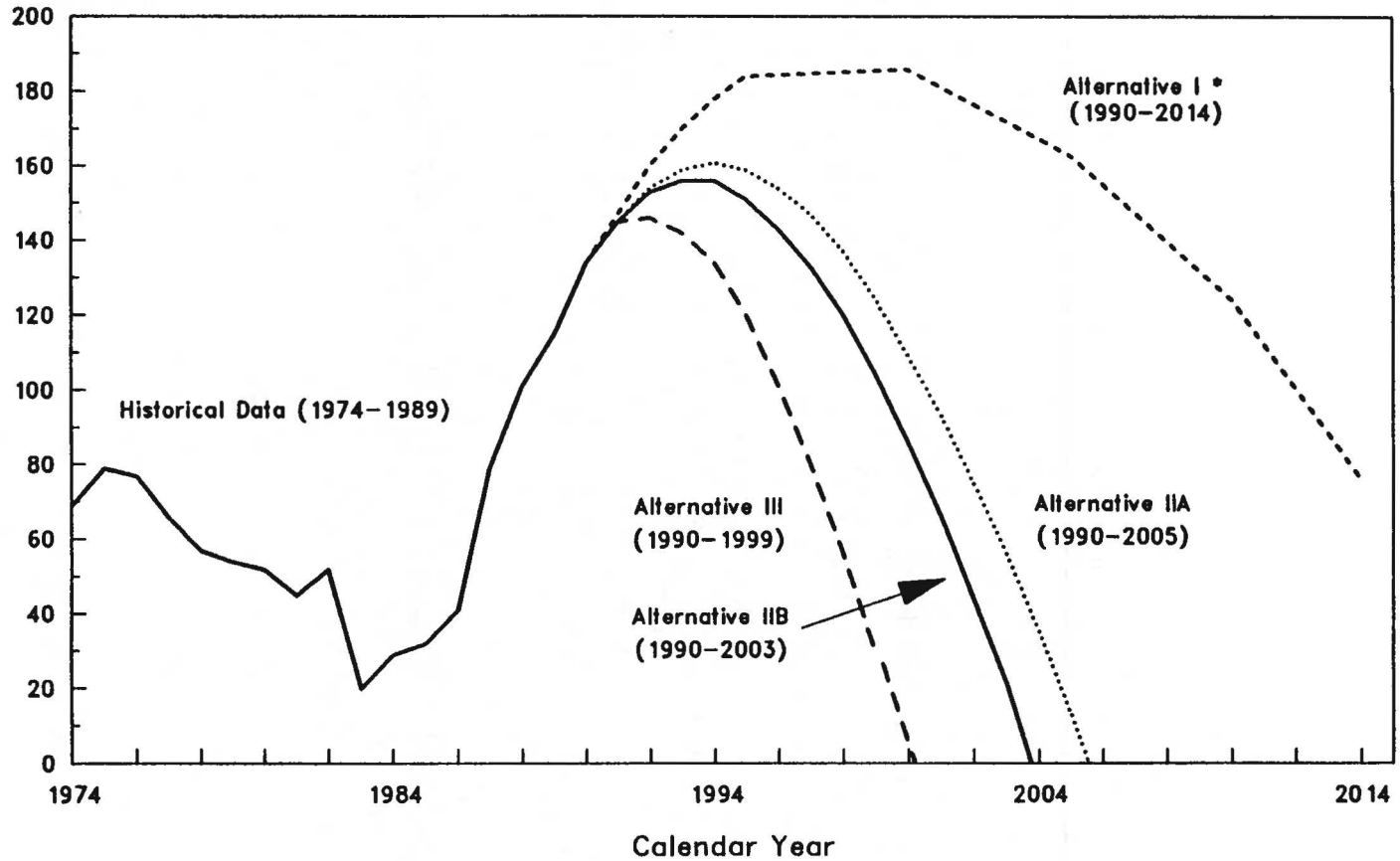
- 1 The real GNP (gross national product) is the value of total output of goods and services, expressed in 1982 dollars.
- 2 The Consumer Price Index is the average of the 12 monthly values of the Consumer Price Index for Urban Wage Earners and Clerical Workers (CPI-W).
- 3 The real-wage differential is the difference between the percentage increases, before rounding, in (1) the average annual wage in covered employment, and (2) the average annual Consumer Price Index.
- 4 The average annual interest rate is the average of the nominal interest rates, which, in practice, are compounded semiannually, for special public-debt obligations issuable to the trust funds in each of the 12 months of the year.
- 5 Through 1999, the rates shown are unadjusted civilian unemployment rates. After 1999, the rates are total rates (including military personnel), adjusted by age and sex based on the estimated total labor force on July 1, 1989.
- 6 Labor force is the total for the U.S. (including military personnel) and reflects the average of the monthly numbers of persons on the labor force for each year.
- 7 Preliminary
- 8 This value is for 2010. The annual percentage increase in labor force and real GNP is assumed to continue to change after 2010 for each alternative to reflect the dependence of labor force growth on the size and age-sex distribution of the population. The increases in real GNP for 2065 are 2.7, 1.8, 1.5, and 0.5 percent for alternatives I, II-A, II-B, and III, respectively. The changes in total labor force for 2065 are 0.5, 0.0, 0.0, and -0.6 percent for alternatives I, II-A, II-B, and III, respectively.

**Table 11. Selected Demographic Assumptions by Alternative
Calendar Years 1940 - 2065**

Calendar Year	Total fertility rate	Age-sex-adjusted death rate (per 100,000)	Life expectancy			
			At birth		At age 65	
			Male	Female	Male	Female
Past Experience:						
1940.....	2.23	1,532.8	61.4	65.7	11.9	13.4
1945.....	2.42	1,366.4	62.9	68.4	12.6	14.4
1950.....	3.03	1,225.3	65.6	71.1	12.8	15.1
1955.....	3.50	1,134.2	66.7	72.8	13.1	15.6
1960.....	3.61	1,128.6	66.7	73.2	12.9	15.9
1965.....	2.88	1,103.6	66.8	73.8	12.9	16.3
1970.....	2.43	1,041.8	67.1	74.9	13.1	17.1
1975.....	1.77	934.0	68.7	76.6	13.7	18.0
1976.....	1.74	923.2	69.1	76.8	13.7	18.1
1977.....	1.80	898.0	69.4	77.2	13.9	18.3
1978.....	1.76	892.4	69.6	77.3	13.9	18.3
1979.....	1.82	864.2	70.0	77.7	14.2	18.6
1980.....	1.85	878.0	69.9	77.5	14.0	18.4
1981.....	1.83	853.4	70.4	77.9	14.2	18.6
1982.....	1.83	827.8	70.8	78.2	14.5	18.8
1983.....	1.81	835.0	70.9	78.1	14.3	18.6
1984.....	1.80	828.2	71.1	78.2	14.4	18.7
1985.....	1.84	830.0	71.1	78.2	14.4	18.6
1986.....	1.84	821.8	71.2	78.3	14.5	18.7
1987.....	1.88	808.5	71.5	78.4	14.9	18.7
1988.....	1.91	801.1	71.6	78.6	14.9	18.8
Alternative II-A and II-B						
1989.....	1.91	801.9	71.7	78.7	15.0	18.9
1990.....	1.91	794.5	71.8	78.9	15.1	19.0
1995.....	1.91	756.3	72.1	79.5	15.4	19.3
2000.....	1.91	725.1	72.7	80.1	15.6	19.6
2005.....	1.91	694.5	73.5	80.5	15.8	19.8
2010.....	1.90	673.2	74.1	80.8	16.0	20.1
2015.....	1.90	656.6	74.4	81.1	16.2	20.3
2020.....	1.90	641.1	74.6	81.4	16.4	20.5
2025.....	1.90	626.3	74.9	81.7	16.6	20.7
2030.....	1.90	611.9	75.2	82.0	16.8	20.9
2035.....	1.90	598.1	75.5	82.3	16.9	21.1
2040.....	1.90	584.8	75.7	82.6	17.1	21.4
2045.....	1.90	571.9	76.0	82.8	17.3	21.6
2050.....	1.90	559.5	76.3	83.1	17.5	21.8
2055.....	1.90	547.5	76.5	83.4	17.7	22.0
2060.....	1.90	536.0	76.8	83.6	17.8	22.2
2065.....	1.90	524.8	77.0	83.9	18.0	22.4

Figure 1
Short Term HI Trust Fund Ratios

Ratios (as a percent)

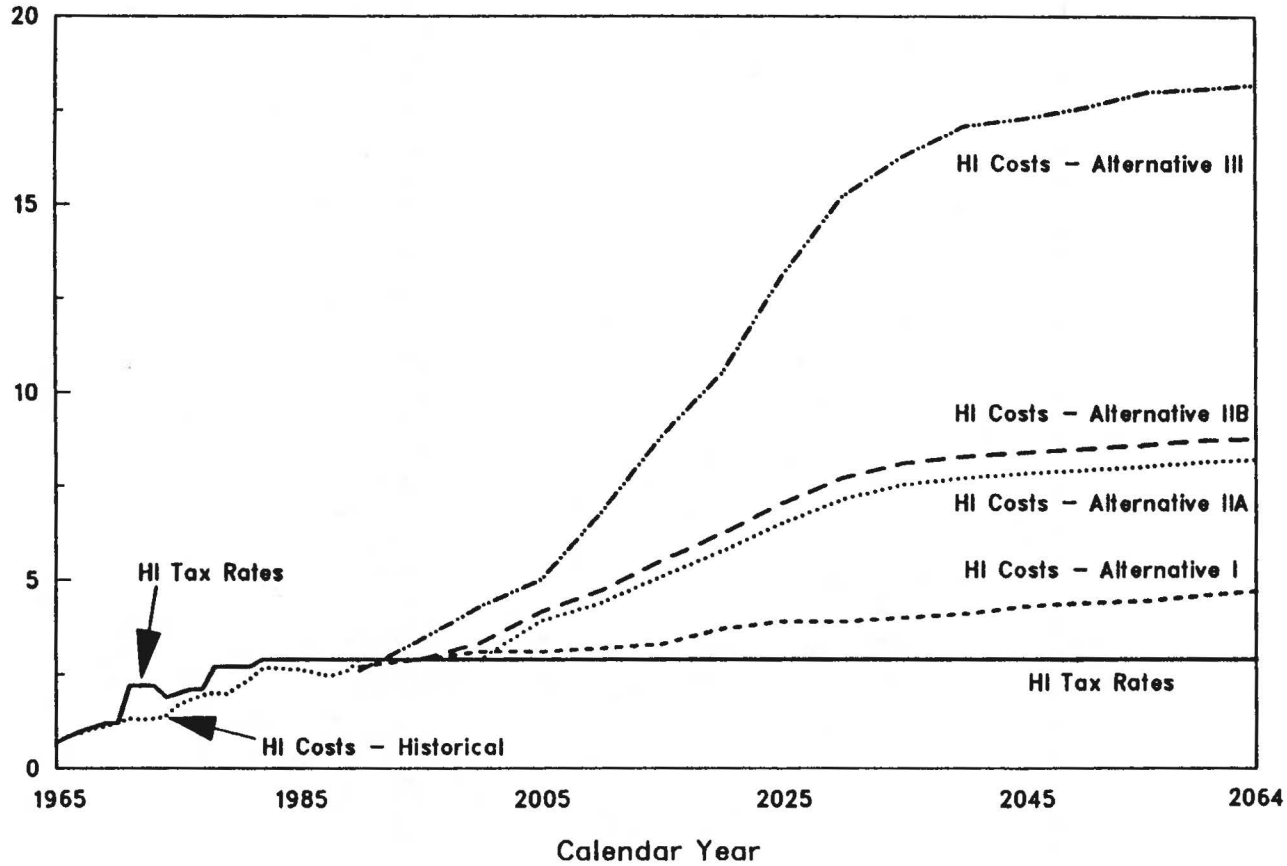


* The trust fund is depleted in 2018 under Alternative I.
 Note: The trust fund ratio is defined as the ratio of assets at the beginning of the year to disbursements during the year.

Figure 2

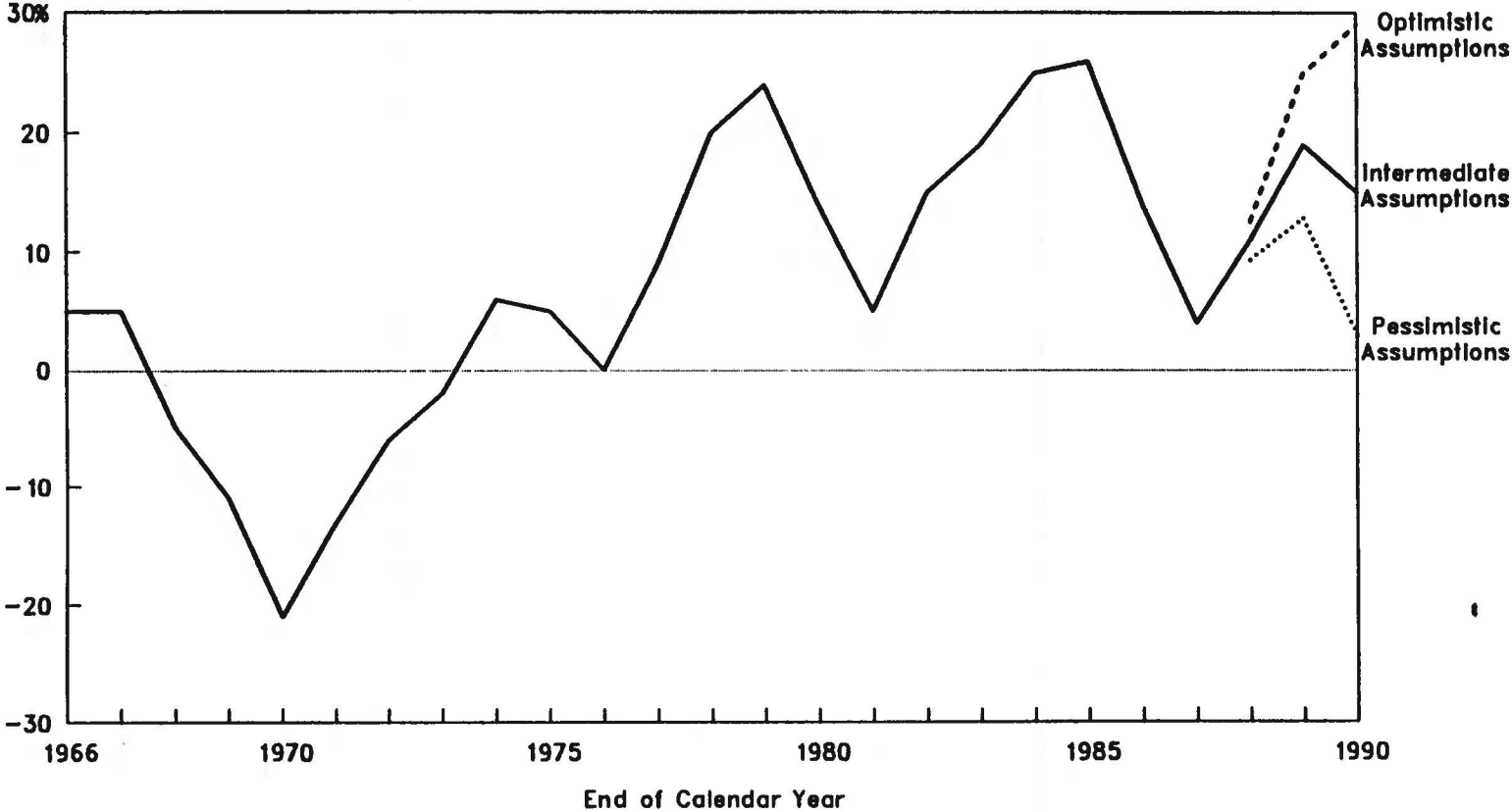
Estimated HI Costs and Tax Rates

% of Taxable Payroll



Note: HI projected costs shown are expenditures attributable to insured beneficiaries only, on an incurred basis, without an allowance for building and maintaining the trust fund balance at the level of at least a half-year's outgo.

Figure 2
Actuarial Status of the SMI Trust Fund



Note: The actuarial status of the SMI Trust Fund is measured by the ratio of the end of year surplus or deficit to the following year incurred expenses.

Computed actuarial accrued liabilities are one of the results of the actuarial valuation.

Schedule 10.

BASIC BENEFITS

Actuarial Accrued Liabilities June 30, 1990
 Allocations Using Entry Age Actuarial Cost Method

<u>Present Value Of</u>	<u>Entry Age Actuarial Accrued Liabilities</u>
Future monthly benefits and death benefits to present retirants and survivors	\$1,871,650,701

Monthly benefits and refunds to present inactive members	55,330,435

Service allowances to present active members	1,931,671,378
Disability allowances to present active members	53,972,457
Death-after-retirement benefit (\$500) on behalf of present active members	1,532,489
Survivor benefits on behalf of present active members who die before retiring	52,685,464
Refunds of member contributions of present active members	<u>36,426,869</u>
Benefits for present active members	2,076,288,657

Entry Age Liabilities For Present Covered Persons	4,003,269,793

Valuation Assets	2,685,726,610

Liabilities to be Covered By Future Contributions	1,317,543,183

The Employer Contribution Rate for Basic Benefits has been established by the Board as normal cost plus a 40 year amortization of unfunded actuarial accrued liabilities. Please see page 46 for a graph showing the relationship between level cost financing and amortization periods.

Schedule 11.

BASIC BENEFITS

COMPOSITION OF EMPLOYER CONTRIBUTION RATE

Established By Statute & Board Action

June 30, 1990

<u>Contributions For</u>	<u>Contributions Expressed as Percents of Payroll</u>
Normal cost:	
Service allowances	10.29%
Disability allowances	0.78
Survivor benefits (SB Fund)	0.55
\$500 death benefit	<u>0.02</u>
Total	11.64
Member contributions:	9.00
Less: Future refunds	<u>2.22</u>
Available for allowances	6.78
	<hr/>
Employer Normal Cost	4.86
Unfunded Accrued Liabilities	
Minimum level % financing	3.33
Additional amount to fund over 40 years	<u>1.59</u>
Total	4.92

EMPLOYER CONTRIBUTION RATE ALLOCATED TO BASIC BENEFITS	9.78

THE ACTUARIAL VALUATION PROCESS

The financing diagram on the opposite page shows the relationship between the two fundamentally different philosophies of paying for retirement benefits: the method where contributions match cash benefit payments (or barely exceed cash benefit payments, as in the Federal Social Security program) and is thus an increasing contribution method; and the level contribution method, which equalizes contributions between the generations.

The actuarial valuation is the mathematical process by which the level contribution rate is determined, and the flow of activity constituting the valuation may be summarized as follows:

- A. Covered Person Data, furnished by plan administrator
 - Retired lives now receiving benefits
 - Former employees with vested benefits not yet payable
 - Active employees

- B. + Asset data (cash & investments), furnished by plan administrator

- C. + Assumptions concerning future financial experiences in various risk areas, which assumptions are established by the Board of Trustees after consulting with the actuary

- D. + The funding method for employer contributions (the long-term planned pattern for employer contributions)

- E. + Mathematically combining the assumptions, the funding method, and the data

- F. = Determination of:
 - Plan financial position and/or
 - New Employer Contribution Rate

DATA FURNISHED

Retired members and survivors included in the valuation totaled 47,317. The 44,205 retirants and survivors of retirants as of June 30, 1990 were receiving annual benefits totaling \$172,789,279 from the Annuity and Pension Reserve Fund. The 3,112 survivors of deceased active members as of June 30, 1990 were receiving annual benefits totaling \$10,320,536 from the Survivor Benefit Fund.

Schedule 1.

Annuity and Pension Reserve Fund
Retirants and Beneficiaries June 30, 1990
Type of Benefit, Annual Amount
and Basic Benefit Actuarial Liabilities

<u>Group</u>	<u>Number</u>	<u>% of Current Total \$</u>			<u>Current Total \$</u>	<u>Actuarial Liabilities*</u>
		<u>Base Allowances</u>	<u>H.B. 204 and 284</u>	<u>Post-Retire. Increases</u>		
<u>SUPERANNUATION RETIREMENT</u>						
Straight Life Allowance - Benefit Terminating at Death						
Men	4,875	82.9%	0.6%	16.5%	\$22,880,708	\$178,192,176
Women	<u>20,429</u>	84.4	0.6	15.0	<u>63,716,564</u>	<u>643,348,585</u>
Totals	25,304				86,597,272	821,540,761
Option II Allowance - Joint and Survivor Benefits						
Men	6,317	87.3	0.2	12.5	39,065,518	460,327,605
Women	<u>4,757</u>	88.7	0.1	11.2	<u>15,889,136</u>	<u>193,628,591</u>
Totals	11,074				54,954,654	653,956,196
Option III Allowance - Life Benefits With Guaranteed Periods						
Men	738	80.3	0.7	19.0	3,103,224	24,398,164
Women	<u>971</u>	81.6	0.7	17.7	<u>2,724,970</u>	<u>27,396,603</u>
Totals	1,709				5,828,194	51,794,767
Allowance to Survivor Beneficiary of Deceased Superannuation Retirant Who Elected Option II - Life Benefit						
Men	338	80.3	1.4	18.3	647,294	5,059,951
Women	<u>2,306</u>	77.7	1.8	20.5	<u>6,817,486</u>	<u>62,032,727</u>
Totals	2,644				7,464,780	67,092,678
Allowance to Survivor Beneficiary of Deceased Superannuation Retirant Who Elected Option III - Guaranteed Period Only						
Men	33	83.7	0.0	16.3	100,848	447,353
Women	<u>92</u>	79.9	0.1	20.0	<u>378,884</u>	<u>1,366,114</u>
Totals	125				479,732	1,813,467

* Includes allowance and lump sum death benefit.

Schedule 1. - completed

Annuity and Pension Reserve Fund
Retirants and Beneficiaries June 30, 1990

Type of Benefit, Annual Amount
and Basic Benefit Actuarial Liabilities

<u>Group</u>	<u>Number</u>	<u>% of Current Total \$</u>			<u>Current Total \$</u>	<u>Actuarial Liabilities*</u>
		<u>Base Allowances</u>	<u>H.B. 204 and 284</u>	<u>Post-Retire. Increases</u>		
Total for Superannuation Allowances Being Paid						
Men	12,301	85.4%	0.4%	14.2%	\$ 65,797,592	\$ 668,425,249
Women	28,555	84.5	0.6	14.9	89,527,040	927,772,620
Totals	40,856				155,324,632	1,596,197,869

DISABILITY RETIREMENT

Straight Life Allowance - Benefit Terminating at Death

Men	1,244	85.6	0.4	14.0	9,233,545	96,228,535
Women	2,105	85.5	0.5	14.0	8,231,102	98,431,788
Totals	3,349				17,464,647	194,660,323

TOTAL BENEFITS BEING PAID FROM ANNUITY AND PENSION RESERVE FUND

Men	13,545	85.4	0.4	14.2	75,031,137	764,653,784
Women	30,660	84.6	0.6	14.8	97,758,142	1,026,204,408
Totals	44,205				172,789,279	1,790,858,192

* Includes allowance and lump sum death benefit.

Schedule 2.

Annuity and Pension Reserve Fund

Retirants June 30, 1990

Current Annual Total \$ By Attained Ages

Attained Ages	Superannuation		Disability		Totals	
	No.	Annual Total \$	No.	Annual Total \$	No.	Annual Total \$
25-29		\$	2	\$ 26,890	2	\$ 26,890
30-34			20	193,495	20	193,495
35-39			45	539,710	45	539,710
40-44			107	1,020,509	107	1,020,509
45-49	6	92,942	191	1,372,009	197	1,464,951
50-54	109	1,852,398	388	2,559,390	497	4,411,788
55-59	435	5,484,976	610	3,436,997	1,045	8,921,973
60-64	5,578	25,709,266	793	3,884,545	6,371	29,593,811
65-69	10,183	43,075,837	600	2,616,733	10,783	45,692,570
70-74	9,323	33,990,466	404	1,313,058	9,727	35,303,524
75-79	6,767	20,945,899	131	333,807	6,898	21,279,706
80-84	3,591	10,262,086	47	127,636	3,638	10,389,722
85-89	1,465	4,099,247	10	29,570	1,475	4,128,817
90-94	474	1,395,865	1	10,298	475	1,406,163
95-99	123	358,831			123	358,831
100	8	26,737			8	26,737
101	7	27,885			7	27,885
102	3	8,484			3	8,484
103	2	8,978			2	8,978
104	2	3,709			2	3,709
105	3	10,618			3	10,618
106	3	13,176			3	13,176
108	3	7,632			3	7,632
109	2	5,088			2	5,088
Totals	38,087	\$147,380,120	3,349	\$17,464,647	41,436	\$164,844,767

Schedule 3.

Annuity and Pension Reserve Fund
Survivors of Retirants June 30, 1990
Current Annual Total \$ By Attained Ages

Attained Ages	Life Annuities		Periods Certain		Totals	
	No.	Annual Total \$	No.	Annual Total \$	No.	Annual Total \$
Under 20	1	\$ 769	2	\$ 5,801	3	\$ 6,570
20-24	3	24,165	1	5,582	4	29,747
25-29	2	3,144	2	8,086	4	11,230
30-34	3	1,219	1	1,342	4	2,561
35-39	12	32,968	4	11,037	16	44,005
40-44	9	13,384	6	19,577	15	32,961
45-49	14	39,453	3	2,304	17	41,757
50-54	15	32,135	4	6,426	19	38,561
55-59	59	274,825	6	15,174	65	289,999
60-64	169	688,431	12	37,358	181	725,789
65-69	401	1,299,305	29	111,218	430	1,410,523
70-74	603	1,686,942	36	165,860	639	1,852,802
75-79	625	1,562,259	16	73,127	641	1,635,386
80-84	427	994,428	1	13,551	428	1,007,979
85-89	202	524,655			202	524,655
90-94	69	200,895	2	3,289	71	204,184
95-99	26	78,609			26	78,609
100	2	3,534			2	3,534
101	1	974			1	974
102	1	2,686			1	2,686
Totals	2,644	\$7,464,780	125	\$479,732	2,769	\$7,944,512

Schedule 4.

Survivor Benefit Fund

Beneficiaries June 30, 1990

Annual Amounts and
Basic Benefit Actuarial Liabilities

<u>Group</u>	<u>Number</u>	<u>% of Current Total \$</u>			<u>Current Total \$</u>	<u>Actuarial Liabilities*</u>
		<u>Basic Allowances</u>	<u>H.B. 204 and 284</u>	<u>Post-Retire. Increases</u>		

Benefits Being Paid From Survivor Benefit Fund

Men	803	87.5%	0.1%	12.4%	\$ 2,089,797	\$17,280,311
Women	<u>2,309</u>	81.6	0.6	17.8	<u>8,230,739</u>	<u>63,512,198</u>
Totals	<u>3,112</u>				<u>10,320,536</u>	<u>80,792,509</u>

* Includes allowance only. Also includes liabilities for beneficiaries in blackout who are not represented in other statistics on this page.

Schedule 5.

Survivor Benefit Fund

Survivors of Deceased Active Members June 30, 1990

Current Annual Total \$ By Attained Ages

<u>Attained Ages</u>	<u>No.</u>	<u>Annual Total \$</u>
Under 20	23	\$ 87,889
20-24	16	67,716
25-29	6	37,735
30-34	17	148,339
35-39	26	134,917
40-44	59	326,363
45-49	66	336,425
50-54	123	573,509
55-59	210	902,767
60-64	435	1,553,778
65-69	624	1,935,729
70-74	592	1,760,159
75-79	459	1,205,873
80-84	287	723,549
85-89	124	354,686
90-94	36	134,954
95-99	<u>9</u>	<u>36,148</u>
Totals	3,112	\$10,320,536

Active members included in the valuation totaled 93,147, involving an annual payroll totaling \$1,118,677,047. The schedules below and on the following 4 pages provide some detail from the data on active members.

Active Members in Valuation June 30, 1990

<u>Groups</u>	<u>Number</u>	<u>Annual Payroll</u>	<u>Average Pay</u>
Men	24,520	\$ 429,232,381	\$17,505
Women	68,627	689,444,666	10,046
Totals	93,147	\$1,118,677,047	\$12,010

Reporting of active members. The persons included as active members in this June 30, 1990 valuation are those who had 4 or more months of credit during the year and were listed as active in SERS records. These 93,403 persons are a reasonable approximation of the persons covered during the year ended June 30; excluding the summer months of July and August. The SERS active members contributing during a month (ignoring July and August) ranged from a high of 93,344 (March) to a low of 88,305 (September). Members who SERS expects to retire from another Ohio System were excluded, reducing the active group to 93,147.

Also included in the valuation were 6,939 inactive members eligible for deferred retirement allowances (including 299 whose retirement applications were pending at June 30), and inactive members eligible for a contribution refund only (including 16,516 who had completed 1 or more years of employment before terminating).

Schedule 6.

School Employees Retirement System of Ohio

TOTAL Active Members as of June 30, 1990

By Attained Age and Years of Service

Attained Age	Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	No.	Valuation Payroll
Under 20	96							96	\$ 443,042
20-24	1,685	78						1,763	14,580,948
25-29	3,733	1,190	124					5,047	57,721,297
30-34	6,175	2,139	1,419	93				9,826	113,837,944
35-39	8,126	3,109	1,762	668	75			13,740	148,936,588
40-44	7,090	4,170	2,997	844	347	15		15,463	178,080,220
45-49	3,720	3,218	3,556	1,953	574	116	19	13,156	160,855,125
50-54	2,681	2,270	3,187	2,977	1,346	238	94	12,793	164,848,075
55-59	1,956	1,669	2,244	2,604	2,283	391	142	11,289	148,298,769
60	344	308	377	455	446	133	36	2,099	28,393,714
61	302	268	285	328	359	83	30	1,655	23,078,293
62	207	263	219	338	248	123	28	1,426	19,951,112
63	185	185	203	167	247	90	40	1,117	15,373,581
64	160	163	152	147	204	63	33	922	12,476,890
65	165	110	137	100	173	53	15	753	9,571,082
66	109	91	65	98	89	59	12	523	6,635,155
67	101	66	54	59	97	25	15	417	4,885,353
68	90	32	34	42	45	20	14	277	2,847,780
69	56	33	41	46	29	27	12	244	2,498,763
70 & Over	143	110	61	69	80	32	46	541	5,363,316
Totals	37,124	19,472	16,917	10,988	6,642	1,468	536	93,147	\$1,118,677,047

While not used in the financial computations, the following group averages are computed and shown because of their general interest.

Age: 45.2 years.

Service: 8.5 years.

Annual Pay: \$12,010.

Schedule 7.

School Employees Retirement System of Ohio

MALE Active Members as of June 30, 1990

By Attained Age and Years of Service

Attained Age	Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	No.	Valuation Payroll
Under 20	36							36	\$ 201,958
20-24	707	41						748	6,939,781
25-29	1,386	662	41					2,089	29,964,442
30-34	1,570	928	757	55				3,310	58,064,817
35-39	1,443	915	720	407	33			3,518	64,509,985
40-44	1,156	848	586	419	182	6		3,197	62,496,014
45-49	893	603	461	292	239	69	9	2,566	48,839,659
50-54	926	565	436	309	275	167	59	2,737	50,754,850
55-59	786	657	471	330	268	178	93	2,783	50,472,712
60	188	161	94	100	59	40	26	668	11,794,334
61	164	140	97	68	58	22	24	573	10,536,143
62	109	149	58	60	51	36	16	479	8,535,836
63	105	99	74	39	36	28	23	404	6,741,747
64	87	96	55	33	39	17	10	337	5,549,711
65	106	67	50	20	36	10	11	300	4,380,827
66	63	52	35	11	12	10	5	188	2,714,017
67	58	35	20	12	12	9	5	151	2,100,273
68	47	15	12	7	6	5	7	99	1,115,645
69	33	17	7	8	6	3	6	80	863,903
70 & Over	87	70	31	24	20	11	14	257	2,655,727
Totals	9,950	6,120	4,005	2,194	1,332	611	308	24,520	\$429,232,381

While not used in the financial computations, the following group averages are computed and shown because of their general interest.

Age: 44.5 years.

Service: 8.3 years.

Annual Pay: \$17,505.

Schedule 8.

School Employees Retirement System of Ohio
 FEMALE Active Members as of June 30, 1990
 By Attained Age and Years of Service

Attained Age	Years of Service to Valuation Date							Totals	
	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	No.	Valuation Payroll
Under 20	60							60	\$ 241,084
20-24	978	37						1,015	7,641,167
25-29	2,347	528	83					2,958	27,756,855
30-34	4,605	1,211	662	38				6,516	55,773,127
35-39	6,683	2,194	1,042	261	42			10,222	84,426,603
40-44	5,934	3,322	2,411	425	165	9		12,266	115,584,206
45-49	2,827	2,615	3,095	1,661	335	47	10	10,590	112,015,466
50-54	1,755	1,705	2,751	2,668	1,071	71	35	10,056	114,093,225
55-59	1,170	1,012	1,773	2,274	2,015	213	49	8,506	97,826,057
60	156	147	283	355	387	93	10	1,431	16,599,380
61	138	128	188	260	301	61	6	1,082	12,542,150
62	98	114	161	278	197	87	12	947	11,415,276
63	80	86	129	128	211	62	17	713	8,631,834
64	73	67	97	114	165	46	23	585	6,927,179
65	59	43	87	80	137	43	4	453	5,190,255
66	46	39	30	87	77	49	7	335	3,921,138
67	43	31	34	47	85	16	10	266	2,785,080
68	43	17	22	35	39	15	7	178	1,732,135
69	23	16	34	38	23	24	6	164	1,634,860
70 & Over	56	40	30	45	60	21	32	284	2,707,589
Totals	27,174	13,352	12,912	8,794	5,310	857	228	68,627	\$689,444,666

While not used in the financial computations, the following group averages are computed and shown because of their general interest.

Age: 45.5 years.

Service: 8.6 years.

Annual Pay: \$10,046.

Schedule 9.

School Employees Retirement System of Ohio
Active Members as of June 30, 1990 by Annual Pay

<u>Annual Pay</u>	<u>Number of Active Members</u>			<u>Portion of Total Number</u>	
	<u>Men</u>	<u>Women</u>	<u>Total</u>	<u>This Group</u>	<u>Cumulative</u>
Less than \$1,000	697	2,882	3,579	4%	4%
\$ 1,000 - \$ 1,999	685	3,146	3,831	4	8
2,000 - 2,999	649	4,286	4,935	5	13
3,000 - 3,999	637	3,804	4,441	5	18
4,000 - 4,999	751	3,791	4,542	5	23
5,000 - 5,999	694	3,537	4,231	5	28
6,000 - 6,999	749	3,639	4,388	5	33
7,000 - 7,999	817	4,571	5,388	6	39
8,000 - 8,999	783	4,621	5,404	6	45
9,000 - 9,999	760	4,866	5,626	6	51
10,000 - 11,999	1,236	7,687	8,923	10	61
12,000 - 13,999	956	5,034	5,990	6	67
14,000 - 15,999	994	4,116	5,110	5	72
16,000 - 17,999	1,657	3,715	5,372	6	78
18,000 - 19,999	2,414	2,870	5,284	5	83
20,000 - 24,999	5,085	4,171	9,256	10	93
25,000 - 29,999	2,529	1,085	3,614	4	97
30,000 and over	<u>2,427</u>	<u>806</u>	<u>3,233</u>	3	100
Totals	24,520	68,627	93,147		

REPORTED ASSETS

The accrued assets at June 30, 1990 were reported to be \$2,661,597,552 (cost basis).

Fund	Amount
Annuity and Pension Reserve Fund	\$2,423,360,341
Survivors Benefit Fund	134,275,724
Employees Savings Fund	683,812,888
Employers Trust Fund	<u>(579,851,401)</u>
Total	\$2,661,597,552

VALUATION ASSETS

The value of accrued assets (cash & investments) as of June 30, 1990 was determined on a market related basis. The method used recognizes 20% of the previously unrecognized gains and losses (both realized and unrealized). The present value of expected future payments for House Bills 284 and 204, \$4,595,472, is added to obtain valuation assets.

Derivation of Valuation Assets

(a) Cost value June 1989	\$2,455,595,491
(b) Cost value June 1990	2,661,597,552
(c) Realized gains(losses)	16,144,030
(d) Change in cost value net of (c): (b) - (a) - (c)	189,858,031
(e) Valuation assets June 1989	2,584,175,503
(f) Preliminary valuation assets June 1990: (d) + (e)	2,774,033,534
(g) Market value June 1990	3,101,176,403
(h) Unrecognized gains(losses): (g) - (f)	327,142,869
(i) Adjustment toward market value: (.20) times (h)	65,428,574
(j) Total valuation assets: (f) + (i)	2,839,462,108
(k) Health reserve as % of cost value assets	5.5761%
(l) Health care valuation assets: (j) x (k)	158,330,970
(m) Present value of HB284 and 204 contributions	4,595,472
(n) Basic benefits valuation assets: (j) + (m) - (l)	2,685,726,610

BASIC BENEFITS

School Employees Retirement System of Ohio
 Outline of Benefit Eligibility and Amounts
BASIC BENEFITS

(outline last changed 6/30/90)

Service retirement. A member who (i) has attained age 60 years and has 5 or more years of total service credit, or (ii) has attained age 55 years and has 25 or more years of total service credit, or (iii) has 30 or more years of total service credit, may retire with a service retirement allowance.

Final average salary ("FAS") means the average of the annual earnings for the 3 highest years of compensation.

Service retirement allowance. A retiring member's service allowance is equal to total Ohio service credit times the greater of \$86, or 2.1% of FAS (effective October 1, 1988). The allowance is then adjusted by factors based on attained age or years of service as determined in the following schedule:

<u>Attained Birthday</u>	OR	<u>Years of Total Service Credit</u>	<u>Percentage of Base Amount</u>
58		25	75%
59		26	80
60		27	85
61		28	88
62		28	90
63		28	91
63		29	94
64		29	95
65		29	97
65		30 or more	100

Maximum allowance is 90% of FAS.

Disability retirement. Upon becoming permanently disabled, after completion of at least 5 years of total service credit, but before attaining age 60, a member will receive a disability allowance computed in the same manner as a service allowance for a 65 year old, based upon the service the member would have had if he remained in employment to age 60. Maximum allowance is 75% of FAS, minimum allowance is 30% of FAS.

Death while eligible to retire. If a member dies in service after becoming eligible to retire with a service allowance and leaves a surviving spouse or other sole dependent beneficiary, the survivor receives the same amount that would have been paid had the member retired the last day of the month of death and elected the 100% joint and survivor form of payment.

Survivor (death-in-service) allowances. Upon the death of a member with at least 1 1/2 years of Ohio service credit and with at least 1/4 year of Ohio contributing service credit within the 2 1/2 years prior to the date of death, the following allowances are payable:

(a) Spouse without dependent child: A monthly allowance, commencing at age 62, or age 50 if the deceased member had 10 or more years of Ohio service credit. Allowance equals 25% of the deceased member's FAS. Minimum monthly allowance is \$96, or \$106 if deceased member had 10 or more years of Ohio service credit. Allowance terminates upon remarriage before age 62.

(b) Spouse with dependent child: An allowance of 40% of FAS is payable to the spouse of a deceased member while caring for 1 dependent child, with a minimum monthly allowance of \$186. Allowance is 50% of FAS if 2 dependent children, or 55% of FAS if 3 dependent children, or 60% of FAS if 4 or more dependent children. Minimum monthly allowance is \$236 for 2 or more children. A dependent child is defined to be an unmarried child under the age of 18, or 22 if attending an approved school.

(c) Orphans: A monthly allowance payable to each orphan child of the deceased member who is unmarried and under the age of 18, or 22 if attending an approved school. Allowances equal 25% of the deceased member's FAS for 1 child, an equal share of 40% of FAS if there are 2 children, an equal share of 50% of FAS if there are 3 children, an equal share of 55% of FAS if there are 4 children, or an equal share of 60% of final average salary if there are 5 or more children. Minimum monthly allowance is \$96 for 1 child, \$186 for 2 children, and \$236 for 3 or more children.

(d) **Dependent parent's allowance:** A monthly allowance is payable to a dependent parent age 65 or more (earlier if mentally or physically incompetent) who received at least one-half support from the member during the 12 month period immediately preceding the member's death. Allowance equals 25% of FAS for 1 parent with a minimum monthly allowance of \$96, and 40% of FAS shared equally for 2 parents with minimum monthly allowances totaling \$186. If there are other qualified beneficiaries, a dependent parent receives a share of a total allowance indicated as in (b) above counting all qualified beneficiaries.

Death after retirement benefit. A \$500 benefit is paid upon the death of each retiree. Upon the death of a disability retiree, a survivor allowance (described earlier) is paid.

Post-retirement increases.

Annual. Each July after June 30, 1971 or the annual anniversary established 12 months after the initial date of retirement, each allowance is increased to be equal to the initial allowance increased by 3.0% for each completed year of retirement; provided, the increased allowance cannot exceed the initial allowance adjusted for increases in the Consumers Price Index.

One time. Effective October 1, 1988 members who retired prior to February 1, 1983 will receive a 2% increase and members who retired from February 1, 1983 to September 1988 will receive a 5% increase.

Deferred benefits. If a member with at least 5 calendar years of contributing service credit leaves service before being eligible for an immediate monthly allowance and does not withdraw any part of his accumulated contributions, he will be entitled to a deferred allowance at age 60. The amount of the allowance is based on his credited service and final average salary at termination of employment.

Member contributions. Each member contributes 9% of his pay by payroll deductions. This rate was established by the Board of Trustees effective July 1, 1989. The maximum statutory rate is 10%.

Refund of members' accumulated contributions. In the event a member leaves service before any monthly benefits are payable on his behalf, his accumulated contributions are refunded upon application.

Employer contributions. Employer contributions are expressed as percents of member covered payroll. The maximum statutory rate is 14%. In addition, effective July 1, 1988, employers will pay a health care surcharge for any member whose annual pay is less than a minimum pay, determined by actuarial valuation. The surcharge is equal to 14% of the difference between the minimum pay and the member's pay, and then subject to pro-rate for partial service credit. For the year beginning July 1, 1990 the minimum annual pay is \$9,100.