

**MICROFICHE**



**✓ ACTUARIAL ANALYSIS OF THE  
POLICE AND FIREMEN'S RETIREMENT SYSTEM  
✓  
OF NEW JERSEY**

5/7/83

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DEPARTMENT OF FISCAL AFFAIRS  
COMMISSION ON PROGRAM ANALYSIS**

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The Law Revision and Legislative Services Commission authorized the release and publication of this program analysis in May, 1978.

ACTUARIAL ANALYSIS OF THE  
POLICE AND FIREMEN'S RETIREMENT SYSTEM  
OF NEW JERSEY

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May, 1978



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MEMORANDUM TO: Members of the Law Revision and Legislative  
Services Commission

The Office of Fiscal Affairs submits the attached Actuarial Analysis of the Police and Firemen's Retirement System of New Jersey, prepared pursuant to N.J.S.A. 52:11-47e. The report was prepared by OFA's Division of Program Analysis, directed by William R. Schmidt.

This actuarial analysis is part of an ongoing OFA project to report to the Legislature on various aspects of the State's public employee pension systems.

  
Thomas L. Bertone  
Acting Director  
Office of Fiscal Affairs

## TABLE OF CONTENTS

	<u>Page</u>
FOREWORD .....	i
SUMMARY OF FINDINGS AND RECOMMENDATIONS .....	S-1
INTRODUCTION: PURPOSE OF THIS STUDY .....	1
CHAPTER 1: DESCRIPTION OF THE POLICE AND FIREMEN'S RETIREMENT SYSTEM OF NEW JERSEY (PFRS) .....	3
Background .....	3
Membership .....	3
Administration .....	4
Benefit Provisions .....	4
Footnotes To Chapter 1 .....	6
CHAPTER 2: ACTUARIAL PROCEDURES USED IN THE ANALYSIS OF PFRS .....	7
Role of Actuarial Assumptions .....	7
Specific Assumptions .....	8
Actuarial Cost Method For PFRS .....	12
Liability Measures .....	15
Footnotes To Chapter 2 .....	18
CHAPTER 3: FINANCIAL FORECASTS OF PFRS .....	19
Forecast Under PFRS Actuary's Assumptions .....	19
Forecast Under OFA Best-Estimate Assumptions .....	22
Best-Estimate Forecast With Full Advance Funding Of All Costs .....	24
Graphic Illustration of Pension Forecasts .....	26
Footnotes To Chapter 3 .....	29
CHAPTER 4: CONCLUSIONS AND RECOMMENDATIONS .....	30
Actuarial Assumptions .....	30
PFRS Funding Policy .....	33
Measuring Plan Liabilities .....	35
Footnotes To Chapter 4 .....	38
APPENDICES	
A - Actuarial Tables Used In PFRS Forecasts .....	39
B - PFRS Benefit Provisions .....	51
C - Agency Response .....	58
Chairman, Board of Trustees, Police and Firemen's Retirement System of New Jersey .....	59
New Jersey Department of the Treasury (by George B. Buck Consulting Actuaries, Inc.) .....	60

TABLE OF CONTENTS  
(continued)

	<u>Page</u>
 <u>LIST OF TABLES</u>	
1-1 PFRS Benefit Provisions .....	5
2-1 Actuarial Assumptions for PFRS .....	9
3-1 Financial Forecast of PFRS Under PFRS Actuary's Assumptions .....	20
3-2 Financial Forecast of PFRS Under OFA Best-Estimate Assumptions .....	23
3-3 Financial Forecast of PFRS Under OFA Best-Estimate Assumptions with Advance Funding of COL Benefits .....	25
 <u>LIST OF FIGURES</u>	
3-A PFRS Employers' Costs as a Percentage of Payroll .....	27
3-B PFRS Funded Percentages (Assets to Plan Termination Liability) .....	28

## FOREWORD

This actuarial analysis of the Police and Firemen's Retirement System of New Jersey (PFRS) was conducted by the Office of Fiscal Affairs under authorization from the Law Revision and Legislative Services Commission of the New Jersey Legislature. The purpose of the analysis is to provide the Legislature and PFRS managers with information about future costs, funding obligations and cash flow of the pension system. The PFRS analysis is part of an ongoing OFA effort to report to the Legislature on various aspects of the State's public pension systems.

Preliminary work for this study was begun in early 1977; however, work was delayed several times by the need to redirect OFA staff and consultant resources to other projects. The long-range actuarial forecasts which form the basis for the study were produced during June and July of 1977, using the most recent actuarial data available to OFA at the time. These data were current as of June 30, 1975.

This report was prepared by OFA's Division of Program Analysis. Staff analysts assigned to the PFRS study were Alan Kooney and Eleanor Hanoka Seel. Gloria Hendrickson and Patricia Bogdziewicz typed the report and prepared it for publication. Actuarial forecasts and technical analysis were provided by Winklevoss & Associates, Inc., Philadelphia, Pennsylvania.

Under the program analysis procedures of the Office of Fiscal Affairs, the Board of Trustees of the Police and Firemen's Retirement System and the State Department of the Treasury were given the opportunity to review and comment upon a draft copy of this report. These comments are included in an Appendix to the report.

OFA would like to acknowledge the cooperation and assistance of the Division of Pensions, Department of the Treasury, in having the necessary data tapes transmitted for this study.

February, 1978



William R. Schmidt  
Director  
Division of Program Analysis

## SUMMARY OF FINDINGS AND RECOMMENDATIONS

### Purpose of the Study (Introduction)

This actuarial analysis of the Police and Firemen's Retirement System of New Jersey (PFRS) was undertaken to provide the Legislature and PFRS managers with information about the future costs, funding obligations and cash flow of the pension system. The analysis is not intended to substitute for the annual actuarial valuations of PFRS that certify in detail the following year's pension costs and required contributions. However, the actuarial forecasts presented in this study offer several insights not provided by a conventional actuarial valuation. These include the following:

- The forecasts take into account the financial implications of future new entrants and overall system growth. A conventional valuation is concerned only with the benefits of current plan members.
- Long-range trends in pension costs and funding levels are shown. A conventional valuation certifies costs and other financial information for one year at a time.
- Future annual costs and assets-to-liabilities ratios are based upon all benefits accruing to PFRS members, including post-retirement cost-of-living (COL) adjustments not treated in the annual report of the PFRS actuary.

### Description of PFRS (Chapter 1)

The Police and Firemen's Retirement System is one of seven pension plans administered by the State for State and local public employees. PFRS was created in 1944 to consolidate numerous locally-administered police and fire pension funds, many of which were in precarious financial condition.

Membership in PFRS is restricted to and compulsory for specific categories of employees cited in the statutes governing the system. For the most part, these are uniformed municipal police and fire officials. However, various categories of county and State employees whose duties are classified as relating to law enforcement (e.g., county sheriff's officers, State corrections officers and motor vehicle inspectors) have been brought into the system since its inception. As of June 30, 1976, there were 25,323 active and 2,147 retired members of PFRS.



PFRS is administered by a nine-member Board of Trustees, whose duties generally consist of oversight responsibilities, including the adoption of rules and regulations. Day-to-day administration is carried out by the Division of Pensions, while the Division of Investment is responsible for managing and investing the assets of the system. The State Treasurer designates a medical review board and a system actuary.

### Actuarial Procedures (Chapter 2)

OFA analyzed the long-term financial status of PFRS by means of 50-year actuarial forecasts of the system. The forecasts were generated from a detailed computer model of PFRS developed by OFA's actuarial consultants. The forecasts simulate the PFRS population characteristics and financial transactions occurring during each year of the forecast period. Three forecasts were run as part of this study, using different combinations of actuarial assumptions and funding approaches.

In constructing these long-range forecasts, various actuarial features of PFRS were reviewed.

1. Actuarial Assumptions. The role of the pension actuary is to determine what amounts of money must be set aside in a pension fund at the present time so that all future pension benefits can be paid as they come due. To do this, the actuary must make numerous assumptions about the future experience of the pension plan and its participants. Typical actuarial assumptions cover such factors as retirement and disability rates, mortality rates, employee termination rates, interest rates and salary growth projections.

OFA developed its own "best-estimate" actuarial assumptions for PFRS for use in this study. In doing so, OFA reviewed and evaluated the actuarial assumptions currently used by the PFRS actuary in preparing annual valuations of the system. Many of these assumptions were judged to be appropriate and were adopted by OFA as best-estimate assumptions. New salary and interest rate assumptions were developed since they were felt to predict future plan experience in a more realistic manner. In addition, several new best-estimate assumptions were established for forecasting purposes which are not required in the actuary's annual valuation.

To compare long-range cost and funding trends, OFA ran separate 50-year forecasts, one based on the PFRS actuary's assumptions and one on OFA's best-estimate assumptions.

2. Funding Policy. PFRS, like all of the State's major public-employee retirement systems, is an advance or reserve-funded pension plan; that is, regular contributions are made (by State and local employers and employees) to a pension reserve fund over the working lives of plan members. These contributions, together with investment earnings on the assets in the reserve fund, are designed to accumulate so that at the time of each worker's retirement there are sufficient reserves available to pay that worker's pension benefits over his remaining lifetime. One of the advantages of advance funding is that the investment income on accumulated plan assets significantly reduces the level of contributions that would otherwise be required to pay for pension benefits.

One exception to the advance funding of PFRS benefits is the annual post-retirement cost-of-living (COL) benefit adjustment, which increases the level of benefits in relation to changes in the Consumer Price Index. COL benefits are financed on a current disbursement, or pay-as-you-go basis. Neither the liability nor the costs associated with the COL provision are currently recognized in the annual valuations of the system performed by the PFRS actuary.

The financial forecasts contained in this study compare the long-term implications of continuing to finance COL benefits on a pay-as-you-go basis to the costs of advance funding these benefits in the same manner as other PFRS benefits.

3. Liability Measures. The study uses two measures of liability to assess the funded status of PFRS. Both liability measures are based on the value of accrued benefits at any specified time. One measure, entitled plan termination liability (PTL), shows the obligation of PFRS if it were to terminate in a given year. Under the PTL, the accrued benefits of active employees are calculated by applying the PFRS benefit formula to each employee's current salary and years of service as of the hypothetical termination date.

The other liability measure used in the study is the plan continuation liability (PCL). Under the PCL, benefit accruals for active employees include an allowance for anticipated future salary increases.

Both the plan termination and the plan continuation measures have been calculated to include the liability associated with future COL benefit increases.

### Results of the PFRS Financial Forecasts (Chapter 3)

Tables S-1, S-2, and S-3 summarize the results of the 50-year financial forecasts of PFRS. For each forecast, the tables show future employer contributions (expressed in dollars and as a percentage of total payroll) and funded levels (assets as a percentage of both PTL and PCL). All forecasts were prepared using the June 30, 1975 actuarial valuation of PFRS as a data base.

1. Forecast Under PFRS Actuary's Assumptions. Table S-1 shows future employer contributions and funded levels for PFRS in a forecast which uses the PFRS actuary's current actuarial assumptions to perform the annual valuations in each year of the forecast.

Table S-1: Financial Summary of PFRS Under PFRS Actuary's Assumptions

Year	Total Employer Contributions*		Funded Level	
	Dollars (Millions)	% of Pay	Assets as % of PTL	Assets as % of PCL
1975	56.9	16.48	82.0	79.6
1980	79.4	15.72	86.5	86.4
1990	157.9	15.63	95.6	90.5
2000	297.5	16.43	95.3	91.4
2025	1,113.7	18.04	90.7	89.3

\*Includes normal and supplemental liability contributions plus pay-as-you-go COL payments.

2. Forecast Under OFA Best-Estimate Assumptions. Table S-2 shows the identical information as Table S-1 except that the annual valuations during the forecast period are performed using OFA's best-estimate assumptions.

Table S-2: Financial Summary of PFRS Under OFA Best-Estimate Assumptions.

Year	Total Employer Contributions*		Funded Level	
	Dollars (Millions)	% of Pay	Assets as % of PTL	Assets as % of PCL
1975	53.6	15.53	82.0	79.6
1980	74.6	14.77	85.1	85.1
1990	151.5	15.00	92.6	87.7
2000	286.2	15.80	91.3	87.6
2025	1,120.8	18.16	84.7	83.4

\*Includes normal and supplemental liability contributions plus pay-as-you-go COL payments.

3. Best-Estimate Forecast with Full Advance Funding of All Costs. In Table S-3, PFRS finances are projected on the assumption that the COL provision is advance-funded along with all other employer costs.

Table S-3: Financial Summary of PFRS Under OFA Best-Estimate Assumptions with Advance Funding of COL Benefits

Year	Total Employer Contributions		Funded Level	
	Dollars (Millions)	% of Pay	Assets as % of PTL	Assets as % of PCL
1975	85.0	24.63	82.0	79.6
1980	110.0	21.79	97.5	97.4
1990	189.5	18.77	117.4	111.2
2000	317.3	17.52	120.0	115.1
2025	985.6	15.97	115.6	113.8



## Conclusions and Recommendations (Chapter 4)

1. Overall Assessment. The long-range financial forecasts presented in this study show that PFRS is a well-funded pension system as measured by the system's actuarial cost method and either the PFRS actuary's assumptions or OFA's best-estimate assumptions. Assets on hand are equal to approximately 80 percent of liabilities accrued to date, a funded level that is favorable in comparison to many other pension plans of equal age, whether public or private, and especially in comparison to most police and fire plans.

2. Actuarial Assumptions. The actuarial assumptions currently used by the PFRS actuary develop approximately the same annual costs as OFA's best-estimate assumptions selected for use in this study. Thus, from a financial standpoint there is no projected deterioration in the plan's funded status which would require a change in the current assumptions.

The general approach taken by the PFRS actuary is one which understates both salary and interest rates in relation to what may actually be expected to occur in future years. The actuary attempts to balance the degree of understatement in both assumptions so that they produce offsetting characteristics in terms of pension costs.

The use of actuarial assumptions that are individually unrealistic but balanced when combined is a fairly common actuarial practice that has become more noticeable as the effects of prolonged inflation show up in salary levels and interest rates. The practice is open to challenge on several grounds, including the potential inaccuracy of the balancing procedure at different absolute salary and interest levels.

From a legislative perspective, the use of implicit offsetting assumptions presents a problem in that non-actuaries find it virtually impossible to evaluate the appropriateness of the assumptions. This can make it extremely difficult for the Legislature to properly evaluate the fiscal impact of major pension legislation.

Since the salary and interest rate assumptions in particular have an extremely important influence on pension costs,

OFA recommends that the use of explicit best-estimate assumptions be considered by the State Treasurer and the PFRS actuary. (Recommendation No. 1)

To implement the above recommendation,

OFA recommends that the Legislature consider amending or repealing the provision of N.J.S.A. 43:16A-1(9) which limits the "regular interest" rate assumption to 105 percent of the actual percentage rate of earnings on investments. (Recommendation No. 2)

This section of the PFRS law is designed to insure that PFRS is conservatively funded by not allowing the anticipated income from the investment of pension fund assets to be overstated. However, in operation the PFRS actuary balances any conservatism in the interest rate assumption by constructing an artificially low salary level assumption, thereby cancelling out the law's intended effect.

3. PFRS Funding Policy. Presently, all benefits provided by PFRS are advance-funded, with the exception of COL adjustments. These are financed on a pay-as-you-go basis through annual appropriations.

Under the current financing policy, "full funding" (e.g., the complete amortization of the system's unfunded supplemental liability) will not be achieved if COL benefits are included in the system's liabilities but not advance-funded. The achievement of full funding is an implicit goal of PFRS and of the Legislature, since the Act governing PFRS (N.J.S.A. 43:16A) includes the provision for the 40-year unfunded liability amortization. Although the funded level of PFRS is quite favorable (80 to 90 percent) even without advance COL funding, the Legislature may wish to consider a policy to advance-fund the COL provision in light of this implicit goal.

As shown in the forecasts, full funding is achieved when the COL provision is advance-funded, but at the expense of quite burdensome employer contributions in initial years. Moreover, total advance funding at the rate shown actually builds up "redundant" assets rather quickly (assets in excess of the PCL) and maintains them throughout the forecast period.

It should be noted that there are ways to move toward full advance funding which produce a "flatter" funding pattern than illustrated in this study and which retain the implicit goal of reaching a 100 percent funded level. A funding schedule can easily be established that "phases in" advance-funded COL contributions so that full funding is reached later than shown here but with less immediate financial stress. Another possibility would be to amortize the remaining supplemental liability of the system as a level percentage of payroll rather than as a level dollar amount.

There are persuasive arguments in favor of the advance funding of pension benefits and they apply equally well to post-retirement COL adjustments. Among the financial advantages are the investment income generated on pension fund assets built up by regular contributions and the discipline imposed by requiring that a portion of the costs of any benefit liberalizations be paid immediately. In addition, there is an equity advantage to advance funding, in that it charges the costs of pension benefits to the present generation of taxpayers who presumably are receiving the services of those earning the benefits.

The Pension Adjustment Act (N.J.S.A. 43:3B) does not mandate the annual appropriation of funds for the purpose of providing COL benefit adjustments to retired employees. Despite this, the Legislature has chosen to appropriate the amount necessary each year to pay for these increased benefits and, in addition, has recently raised the COL benefit level. Should the Legislature interpret its commitment with respect to COL benefit payments as an ongoing and continual one, then

OFA recommends that the Legislature consider the advantages of adopting a policy which supports the advance funding of all PFRS pension benefits, including cost-of-living increases, on a schedule that is financially practicable. (Recommendation No. 3)

#### 4. Measuring Plan Liabilities

a. Method -- Since 1976 the PFRS actuary has been including in the annual valuation report a "Level of Funding" statement that compares the book value of assets to an accrued liability measure similar to the PCL used in this study. The actuary's statement is useful but could be made even more so, especially to active plan members, by breaking down the liability value (and the level of funding calculation) into separate categories for vested (both active and retired) and non-vested benefits. Such a breakdown would provide additional information on the status of the plan's benefit security, particularly as it covers those PFRS members who have already earned the right to a retirement pension. Therefore,

OFA recommends that the PFRS actuary show both vested (active and retired) and non-vested accrued benefit liabilities separately in the annual valuation report, along with the corresponding funded level for each category. (Recommendation No. 4)

b. Cost of Living (COL) Increases -- A basic concept of accounting for pension costs is that they be assigned to the period during which benefits are earned. COL benefits, since they are computed as a percentage of the retirement allowance, are earned over an employee's active career. The same factors (e.g., benefit liberalizations, salary increases) responsible for raising regular pension benefits are also responsible for raising future COL obligations. This relationship is not explicitly recognized under the current COL financing policy, with the result that the overall impact of plan changes is always understated, as are the total liabilities associated with providing retirement benefits to PFRS members.

Should the Legislature elect to advance-fund COL benefits, the costs associated with providing these benefits would automatically be treated as liabilities of the pension system. In addition,

OFA recommends, should the Legislature decide not to advance-fund COL benefits, that the PFRS actuary periodically calculate the system's liabilities to include the liability associated with COL benefits, so as to portray more accurately the total costs of all pension obligations currently being accrued, even though payment of a portion of these costs is being deferred to the future. (Recommendation No. 5)

Since almost all pension benefit changes carry a corollary fiscal impact associated with higher COL payments,

OFA recommends that fiscal notes and cost estimates on pension-related bills, whether prepared by the Division of Pensions or by OFA, include an estimate of the additional COL costs likely to result from the provisions of the bill. (Recommendation No. 6)



## INTRODUCTION: PURPOSE OF THIS STUDY

This actuarial analysis of the Police and Firemen's Retirement System (PFRS) of New Jersey was undertaken to provide the Legislature and PFRS managers with information about the future costs, funding obligations and cash flow of the pension system. Financial trends that may reasonably be anticipated under the State's current financing policy as well as under selected alternative policies are illustrated with long-range actuarial forecasts of PFRS.

The type of analysis presented in this study offers several insights that are not provided by a conventional actuarial valuation. One important difference is that a conventional valuation, such as the PFRS actuary prepares annually, is concerned only with the accrued and prospective benefits of current plan members. There is no recognition given in the present to the possible financial implications of future new entrants or overall system growth. The forecasts developed in this analysis give explicit recognition to these factors.

A second feature of these forecasts is that they give policy makers an idea of the incidence of costs likely to fall on taxpayers in future years under the pension plan's current financing method. In this respect, the forecasts may assist policy makers in evaluating whether the system's unfolding financial experience is coinciding with expectations. The forecasts also aid in evaluating the long-range effects of proposed pension benefit changes.

Finally, the forecasts presented in this analysis portray the future annual costs and assets-to-liabilities ratios associated with all benefits accruing to PFRS members, including post-retirement cost-of-living adjustments not treated in the annual valuation report of the PFRS actuary. This last point is discussed in greater detail in Chapter 2.

Having noted these features, it is equally important to recognize the limitations of this type of long-range actuarial analysis. The limitations are those inherent in any projection of future events; namely, the likelihood that the future will not unfold precisely as the analysis specifies. In fact, it is almost inevitable that it will not do so, despite the care taken to make these projections as realistic as possible. Such unforeseen but

possible future occurrences as a declining PFRS membership, prolonged severe inflationary pressures or significant plan benefit changes--to name but a few--would each necessitate a reevaluation of the system's financial status. However, the uncertainty of the future is not in itself a cogent argument against developing these forecasts but rather an argument for doing them more frequently.

It should also be made clear that the actuarial forecasts presented in this study are not meant to substitute for the annual actuarial valuations of PFRS that certify in detail the following year's costs and required contributions. The value of these long-range forecasts lies not in any claims of perfectly accurate dollar value predictions for a particular year but in the overall financial trends and patterns that emerge over the forecast period. As such, these forecasts are meant to complement the regular actuarial valuation process.

## CHAPTER 1: DESCRIPTION OF THE POLICE AND FIREMEN'S RETIREMENT SYSTEM OF NEW JERSEY

### Background

Municipal police and firemen were the first public employees in New Jersey to have pension funds established on their behalf. These early funds, some dating back to the 1880's, were established by municipalities as the need or demand arose. Operating with little guidance or supervision from the State, the various local funds provided widely varying pension benefits to their members and no attempt was made to place the funds on a sound financial base.

State legislation passed in 1920 (P.L. 1920, c. 160) placed all existing police and firemen's pension funds under uniform statutory provisions and established a single benefit structure. However, little was done to improve the financial status of the local funds, which were rapidly accruing sizeable liabilities to be passed on to future taxpayers.

In 1944, membership in these municipal pension funds was closed to all new employees. The Police and Firemen's Retirement System (PFRS) became effective on July 1, 1944 under the provisions of P.L. 1944, c. 255. The new system, administered by the State, was established on an actuarial reserve basis with costs shared between employing municipalities and their employees. Membership was made compulsory for all new police and fire employees in jurisdictions previously operating their own funds under the 1920 legislation, and for policemen and firemen in municipalities that elected to participate in PFRS by resolution or referendum.<sup>1</sup>

Amendatory legislation passed since 1944 has opened the membership of PFRS to various groups of employees previously ineligible, such as members of county police departments, county sheriff's officers, and certain categories of State employees (e.g., park rangers, corrections officers, motor vehicle inspectors) whose duties are classified as relating to law enforcement.

### Membership

As of June 30, 1976, there were 25,323 active and 2,147 retired members of PFRS.<sup>2</sup> Roughly 10 percent of the active membership are State employees with the remainder representing some 340 participating counties, municipalities, fire districts and commissions.

### Administration

PFRS is administered by a nine-member Board of Trustees consisting of the State Treasurer, four members appointed by the Governor for indefinite terms, and two policemen and two firemen elected by the active PFRS membership for four-year terms. A representative from the State Division of Pensions serves as secretary to the Board.

The powers and duties of the Board of Trustees are spelled out in N.J.S.A. 43:16A-13 and generally consist of oversight responsibilities related to the operation of the system, including the adoption of rules and regulations and the exercise of veto powers thereto. The day-to-day administration of PFRS is carried out by the Division of Pensions, while the Division of Investment is responsible for managing and investing the assets of the system. The State Treasurer designates a medical review board and a system actuary. The current actuary for PFRS is George B. Buck Consulting Actuaries, Inc., New York, New York.

### Benefit Provisions

Table 1-1 on the following page is a summary of the major benefit provisions available to members of PFRS. A more complete description of these benefits is contained in Appendix B of this report.

TABLE 1-1  
PFRS BENEFIT PROVISIONS

1. Retirement Age	Regular (service), 55. Early (special), 25 years service, no age requirement. Mandatory, 65. Deferred, 15 years service, payable at age 55.
2. Retirement Allowance	An annual allowance of 2% x final average salary (FAS)* x years of service up to 30 plus 1% x FAS x years of service over 30.
3. Ordinary Disability	After five years membership, annual allowance of $1\frac{1}{2}\%$ x FAS x years of service (minimum of 40% x FAS).
4. Accidental Disability	Annual allowance of $\frac{2}{3}$ salary at time of accident.
5. Nonservice-connected death before retirement	$3\frac{1}{2}$ x last year's salary (lump sum) plus return of member's contributions.
6. Service-connected death before retirement	Annual allowance of $\frac{1}{2}$ x last year's salary to dependent widow or widower or three children; for fewer children or dependent parents, a lesser pension; plus $3\frac{1}{2}$ x last year's salary (lump sum).
7. Death after retirement	Annual allowance of $\frac{1}{2}$ x FAS to dependent widow or widower and two children (minimum \$1,600 to widow); lesser pension for fewer children; plus (after 10 years service) $\frac{1}{2}$ x last year's salary (lump sum).
8. Termination (non-vested)	Return of member's contributions.

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\*Note: Final average salary refers to the average of the last or highest-paid three years of service upon which contributions are made.

## FOOTNOTES TO CHAPTER 1

1. A more complete history of the events preceding the Police and Firemen's Retirement System can be found on pages 10-39 of New Jersey's Contributory Public Employee Pension Programs: Program Analysis of the Public Employees' Retirement System, New Jersey State Legislature, Office of Fiscal Affairs, March, 1976.
2. Police and Firemen's Retirement System of New Jersey, 1976 Annual Report.

## CHAPTER 2: ACTUARIAL PROCEDURES USED IN THE ANALYSIS OF PFRS

As stated in the introduction to this report, the purpose of conducting this actuarial analysis is to provide the Legislature and those responsible for managing PFRS with information about the system's long-range financial outlook. The framework for the analysis is a scenario of PFRS for the 50-year period 1975-2025. The scenario was constructed with the aid of a detailed computer model of PFRS developed by OFA's actuarial consultants, Winklevoss & Associates, Inc. By generating 50 consecutive actuarial valuations, the model is designed to simulate the PFRS population and financial transactions occurring during each year of the forecast period according to predetermined actuarial assumptions. These assumptions are discussed in the following sections.

### Role of Actuarial Assumptions

An employee covered by a defined benefit pension plan such as PFRS earns pension benefit credits for each unit (usually a year) of eligible employment. At retirement, the accumulated value of these credits becomes payable by the plan sponsor according to one of several payment options available to the employee.

For the pension system as a whole, the accumulated value of all past, present and expected future benefit credits earned by its members represents a liability to the system in the form of future pension payment obligations that are being created. It is the responsibility of the pension system actuary to estimate the magnitude of these obligations, when they will become due, and to establish a schedule of regular employer (and, in New Jersey, employee) contributions into a pension reserve fund so that the assets of the fund are built up to where they are sufficient, together with future contributions, to meet projected system liabilities.

To project pension costs and fund those costs on a regular basis the actuary must make certain assumptions about the future experience of the plan and its participants. When appropriate, past experience of the particular plan or a similar one can be used to formulate assumptions about the future. However, it is not always possible or desirable to use past experience solely as a guide. In such instances the actuary must make his assumptions based

upon the best evidence and indicators available to him. Although it is extremely unlikely that actuarial assumptions will ever perfectly predict future plan experience, the degree to which they are realistic has an important bearing on how adequately a pension system is funding its liabilities.

The selection of actuarial assumptions for PFRS was therefore a significant part of developing the long-range financial forecasts which are presented in the following chapter. OFA and its consultants reviewed all of the assumptions currently used by the PFRS actuary in preparing annual valuations of the system. Many of these assumptions were judged to be appropriate for use in this analysis and were adopted. In other instances, different values were selected where they were felt to be more realistic in their depiction of plan experience. In addition several new assumptions were established for forecasting purposes which are not required in the actuary's regular annual valuation.

The assumptions used in this analysis to construct the 50-year PFRS scenario are labeled "best-estimate" assumptions to contrast them where necessary with the PFRS actuary's valuation assumptions. Best-estimate assumptions were used in all of the long-range forecasts to determine the future characteristics of the plan. However, as an experiment, one forecast was run which retained the PFRS actuary's assumptions to perform the annual valuations in each year of the forecast.

#### Specific Assumptions

Numerous actuarial assumptions must be made to value a pension plan's assets and liabilities. Basically, assumptions are needed for any factor or probability that could have an impact upon the plan's financial balance. Table 2-1 sets forth the major assumptions used in this study. The first column of Table 2-1 specifies the type of actuarial assumption. The second column lists the assumptions currently used by the PFRS actuary in performing the annual valuation of PFRS. The third column lists the best-estimate assumptions adopted by OFA and its actuarial consultants. For those assumptions which are tabular in nature, reference is made to the appropriate table in Appendix A.



TABLE 2-1  
ACTUARIAL ASSUMPTIONS FOR PFRS

<u>Type of Assumption</u>	<u>Assumptions Used by PFRS Actuary</u>	<u>OFA Best-Estimate Assumptions</u>
A. Decrement Assumptions		
1. Mortality Rates	Mortality Rates as given in Appendix Tables A-4, A-5, A-6, A-8	Same as PFRS actuary's assumptions
2. Disability Rates	Disability Rates as given in Appendix Table A-1	Same as PFRS actuary's assumptions
3. Termination (Withdrawal) Rates	Termination Rates as given in Appendix Table A-11	Same as PFRS actuary's assumptions
4. Retirement Rates	Retirement Rates as given in Appendix Table A-7	Same as PFRS actuary's assumptions
B. Increment Assumptions		
1. Population Growth Rate	Assumption not needed*	3% annual growth in 1975, scaling down to 0% (no growth) in 2000
2. Entry Age Rates	Assumption not needed*	Rates derived from 1975 PFRS census data, given in Appendix Table A-2
C. Economic Assumptions		
1. Inflation Rate	Not explicitly stated, but on the order of about 2%	4% per year
2. Salary Increase Rate	Rates varying from 9.6% to 2.6% per year depending on age, as given in Appendix Table A-10	Promotional scale derived from 1975 PFRS census data, as given in Appendix Table A-9, plus 4% inflation and 1% real wage increase per year
3. Future Entry Age Salaries	Assumption not needed*	Derived from 1975 PFRS census data, as given in Appendix Table A-3, with first-year base of \$10,530
4. Interest Rate (Return on Investment)	6% per year	Annual rate of 6.5% initially, grading up by 0.1% per year to an ultimate level of 7%

\*Assumptions not needed because valuation performed on a current fixed population group.

The assumptions are grouped into three categories which broadly describe their functions. Decrement assumptions are those which estimate the probabilities of various kinds of reductions in the active and retired PFRS population. They include mortality, disability, termination and retirement rates. These rates are usually presented in the form of actuarial probability tables.

The decrement assumptions currently used for PFRS were last reviewed by the system actuary in 1974 when they were checked against the plan's experience for the previous five years. Based on this review, changes were made in disability and service retirement tables and in mortality tables for disability and service pensioners. The revised assumptions were used in the 1975 actuarial valuation of PFRS.

The 1974 experience review and adjustments bring these decrement assumptions into conformance with recent plan experience and also recommend their use for future experience. Therefore, OFA has adopted the PFRS actuary's decrement assumptions as best-estimate assumptions and the data presented in this report are based on these assumptions.

Increment assumptions are developed for actuarial forecasting to simulate additions to PFRS membership. As Table 2-1 indicates, these assumptions are not used in a conventional actuarial valuation since a conventional valuation is based only on the population existing as of the valuation date.

The growth rate, which refers to the growth in the number of active employees, was specified for purposes of this research as 3 percent for the first year of the simulation, with this percentage scaling downward linearly to a zero growth rate after 25 years. This increases the active PFRS membership from 24,619 in 1975 to an eventual level of 36,200 members. The projection is designed to simulate a PFRS population that has recently experienced moderate growth but which is expected to experience a gradual decline in growth until a stable labor force size is reached in 2000. The ages at which newly-hired employees enter active service during the simulation were derived from the recent experience of the plan through 1975.

The economic assumptions outlined in Table 2-1 are extremely important since pension costs are highly sensitive to variations in assumed inflation, salary and interest rates.

The PFRS actuary's inflation assumption--which appears to be about 2 percent--is uncertain because it is not explicitly stated, although it presumably is a component of both the salary and interest assumptions. OFA's best-estimate inflation assumption rate (representing the assumed rise in the Consumer Price Index) is set at an annual rate of 4 percent. While this rate may appear to be low in terms of the experience of our economy in recent years, it is believed to represent a reasonable rate for the long-run average inflation rate in our economy. It is also the rate used in the 1976 OASDI [Social Security] Board of Trustees Annual Report for their "intermediate projection" of that system's liabilities.<sup>1</sup>

The PFRS actuary's annual salary increase rates vary from a high of 9.6 percent at age 20 to a low of 2.6 percent at age 65. OFA's best-estimate assumption was developed by first projecting annual across-the-board wage increases of 5 percent (composed of the 4 percent inflation factor and a 1 percent real wage or productivity gain component) and then adding, for each plan member, an annual percentage representing the employee's assumed career promotional advancement at various ages. (In New Jersey this component comprises actual job title promotions over an employee's working career plus the effect of regular merit or longevity increments.) The promotional scale, which is shown in Appendix Table A-9, was derived from the current year salary differences of active employees in different stages of their careers. The rates decline as an employee gets older, reflecting decreasing promotional advancement. Over the entire range of active ages (20 to 65) the promotional rate averages roughly 1.9 percent per year.

Taking into account all of the salary components discussed above, OFA's best-estimate salary increase rates exceed those of the PFRS actuary by approximately 2.4 percentage points per year.

In addition to the salary progression of active employees, it is also necessary to make an assumption as to the salaries of newly-hired employees during the forecast period. The new-entrant salary scale, which determines the salary differences for each entry age, was derived from the recent experience of the plan. The salary applicable to the first age in the scale is \$10,530 for the first year of the forecast, and is increased annually by 5 percent (the combined inflation and wage productivity rates) for future years.

The interest rate assumption refers to the rate of return earned on the investment of pension system assets. The current interest rate used by the PFRS actuary for annual valuations of the plan is 6 percent. This rate is not established by the actuary, but by the State Treasurer in consultation with the Directors of the Divisions of Pensions and Investment. N.J.S.A. 43:16A-1(9) limits the interest rate assumption to 105 percent of the actual "percentage rate of earnings on investments."

OFA's best-estimate interest assumption used in this study for PFRS increases from 6.5 percent in 1975 to an ultimate level of 7 percent after five years. The variable rate was selected because the investment portfolio, which consists primarily of bonds, has shown a steady improvement in its yield. The current yield is about 6.5 percent and is expected to increase to 7 percent. The ultimate rate of 7 percent corresponds roughly to a 4 percent inflation rate and an assumed 3 percent inflation-free rate of return on long-term corporate bonds.<sup>2</sup>

As shown in Chapter 3, the assumptions used by the PFRS actuary for valuation purposes generate approximately the same costs as the more explicit best-estimate assumptions developed for this study. This result occurs because the PFRS actuary's assumptions, some of which (e.g., salary and interest rates) are believed to be unrealistic on their own merits, do tend to have offsetting characteristics which produce a net effect almost equivalent to using best-estimate assumptions.

#### Actuarial Cost Method For PFRS

PFRS, like all of the State's major public-employee retirement systems, is an advance or reserve-funded pension plan; that is, regular contributions are made (by both State and local employers as well as employees) to a pension reserve fund over the working lives of plan members.<sup>3</sup> These contributions, together with investment earnings on the assets in the reserve fund, are designed to accumulate so that at the time of each worker's retirement there are sufficient reserves available to pay that worker's pension benefits as they come due over his remaining lifetime. As will be shown in the following chapter, one of the advantages of advance funding is that the investment income on accumulated plan assets significantly reduces the level of contributions that would otherwise be required to pay for pension benefits.

In an advance-funded system, the function of an actuarial cost method is to apportion or allocate the costs of pension credits being earned by workers to specific time periods and to establish a schedule of regular contributions to meet those costs. Depending on the funding goals of the system, there are various acceptable ways to account for these costs and, hence, there are various actuarial cost methods that may be used.

The actuarial cost method used by the State for PFRS is known as either the Aggregate Projected Benefit Cost Method with Supplemental Liability or as the Entry Age Normal Cost Method with Frozen Initial Liability.<sup>4</sup> Costs (and contributions) under this method have two components: a normal cost and a supplemental or accrued liability cost. The normal cost is determined as the amount which

- (1) if contributed each year as a level percentage of salary,
- (2) on behalf of each employee from the time he started earning pension benefit credits,
- and (3) assuming no changes are made in the benefit provisions of the plan,
- would (4) accumulate assets equivalent to each employee's expected pension by his retirement date.

The conditions stated above raise several points. First, the normal cost will remain a constant level percentage of salary only if all of the actuary's assumptions about the future are borne out. Should experience unfold differently than predicted--and in almost all cases it will to some degree--the resulting actuarial gains (favorable) and losses (unfavorable) are factored into the normal cost and spread over future years. Thus the normal cost will tend to fluctuate from year to year; however, the spreading mechanism for gains and losses should help keep the fluctuations from being severe.

The second point is that the conditions which define the normal cost also define the supplemental or accrued liability cost. A supplemental liability arises, for instance, when the pension system is opened to a group of new members who bring with them accrued pension credits from their previous years of employment. Such an event has occurred several times since PFRS was established, most notably in 1973 and 1976 when certain classes of

State and county employees were allowed to transfer into PFRS.<sup>5</sup> Since employers had not previously been making normal contributions to PFRS for these employees, their transfer carried with it an immediate unfunded accrued liability for prior service.

The same situation arises when the benefit provisions of the plan are liberalized. When this happens the new benefit level "costs more" per each year of service, including those years when lower contributions were made based on the old benefit level. Thus there is another immediate unfunded liability created. Recent examples of PFRS benefit liberalization occurred in 1971, when the employment base used to compute "average final salary" was reduced from five years to three years (P.L. 1971, c. 175), and in 1973, when early retirement at one-half of average final salary was permitted after 25 years of service (P.L. 1973, c. 109).

Under the cost method used with PFRS, these unfunded liabilities are supplemental in the sense that they are not amortized as part of future normal costs but as a separate "layer" of liability corresponding to past service credits already earned. The unfunded supplemental liability of PFRS was last recalculated in 1971 and is being amortized over a period of 40 years in level dollar amounts. Each year's amortization payment, or supplemental cost, represents interest on the amount yet to be amortized as well as a principal payment.

One exception to the advance funding of PFRS benefits is the annual post-retirement cost-of-living (COL) benefit adjustment, which increases the level of benefits in relation to changes in the Consumer Price Index.<sup>6</sup> COL benefits are financed on a current disbursement, or pay-as-you-go basis. Neither the liability nor the costs associated with the COL provision are currently recognized in the annual valuations of the system performed by the PFRS actuary.

The financial forecasts contained in Chapter 3 compare the long-term implications of continuing to finance COL benefits on a pay-as-you-go basis to the costs of advance funding these benefits in the same manner as other PFRS benefits.

### Liability Measures

An important purpose of this analysis is to show how, using specified actuarial assumptions, the assets of PFRS may be expected to grow in the future in relation to the plan's liabilities. One of the difficulties in making a meaningful statement about the funded level of a pension plan is that the liability value against which assets are usually measured is uniquely determined by the actuarial cost method in use. The result is that even with a given level of assets, the funded level of a plan would look better or worse depending upon which cost method was selected for the comparison. Conversely, two plans which are alike in every respect except for their actuarial cost method could both be "fully funded" with different amounts of accumulated assets.

It should, therefore, be useful to assess a plan's funded status by using a liability measure that has meaning in its own right regardless of the cost method in use. Two such measures are offered in this study. The first, entitled plan termination liability (PTL), shows the obligation of PFRS if it were to terminate in any given year. The PTL is equal to the present value of benefits due to retired employees plus the present value of benefits earned to date by active employees. The accrued benefits of active employees are calculated by applying the PFRS retirement benefit formula to each employee's current salary and years of service as of the hypothetical termination date.

The only actuarial assumptions needed in the PTL calculation are an interest assumption (for continued earnings on assets accumulated prior to the termination date) and a mortality assumption for beneficiaries and dependents (since only death will prevent the plan member from receiving his retirement benefits, provided sufficient assets exist). Actuarial assumptions concerning future probabilities for the active work force (e.g., salary progression, membership growth, disability rates) are irrelevant in the context of an assumed plan termination.

To avoid misunderstanding, it should be made clear that the calculation of plan termination liability in no way suggests or implies that PFRS will in fact terminate at some future date. The PTL measure simply provides a meaningful standard for assessing the plan's funded status over time.

The other liability measure used in this study is the plan continuation liability (PCL). For retired employees, the PCL is identical to the PTL and represents the present value of benefits currently due. For active em-

ployees, the PCL is based on a different way of calculating benefit accruals. In this case, future salary increases are accounted for by first projecting each employee's anticipated benefit to retirement and then taking a fraction of this benefit, the numerator of which is the sum of the employee's salary to date and the denominator of which is the sum of the employee's expected career salary. There are other technical differences between the PTL and the PCL, such as the inclusion of ancillary benefits (e.g., active service death, accidental and ordinary disability) in the PCL and the use of all actuarial assumptions but these are less important than the general notion that this liability is based on the concept of continuing the plan.

Both liability measures illustrated--PTL and PCL--are appropriate targets for measuring the funding progress of a pension plan. The PTL may be regarded as a minimum target level, even for a public plan that is assumed to have a "perpetual" existence. The PCL, which may reflect more accurately the ongoing nature of a public plan, is usually (although not always) larger than the PTL since it incorporates an element of future salary increases.

In calculating the liability values used in this study an important departure has been made from the current treatment of liabilities by the PFRS actuary. Both the plan termination and the plan continuation measures include the liability associated with future COL benefit increases. OFA is aware that this is not presently done for any of New Jersey's State-administered pension systems and that, in addition, there is a difference of opinion within the actuarial profession concerning this practice.

The argument against including the COL provision in the liability computation is usually based on the assertion that in the event of plan termination the payment of these additional benefits might not be a legally enforceable obligation, especially if they are still being appropriated on a pay-as-you-go basis.

In the strictest sense this assertion is probably correct, since the Pension Adjustment Act does not require that these appropriations be made in any year, even without the threat of plan termination. However, OFA finds no reason to believe that the Legislature's commitment to finance the State's share of these COL benefits is of a lesser degree or "enforceability" than the commitment to finance any other retirement benefits of the State's pension systems. Since the Pension Increase Program was first enacted in



1958, it has been significantly modified to cover all retiring employees and eligible survivors. Moreover, the benefit adjustment has been automatically linked to changes in the Consumer Price Index and the COL benefit level has recently been increased from 50 percent to 60 percent of the change in the CPI.<sup>7</sup> Thus, the Legislature has certainly demonstrated a strong commitment to the principle of maintaining retirement benefits at a level sufficient to offset some of the effects of inflation.

Given this situation and the sizeable financial impact of future COL payments (as shown in Tables 3-1, 3-2 and 3-3), it would seem logical to treat these obligations as liabilities of the pension system, regardless of how they are funded.<sup>8</sup> The fact is that every benefit or membership liberalization (or inflation-induced salary increase) which raises "regular" pension costs also raises future COL obligations. By recognizing this relationship explicitly, total pension liabilities are portrayed more realistically.

## FOOTNOTES TO CHAPTER 2

1. Board of Trustees of the Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds, 1976 Annual Report, p. 79.
2. See Federal Reserve Bank of St. Louis, Review 48 (August, 1966) and Review 51 (December, 1969). Also, Robert Tilove, Public Employee Pension Funds (New York, Columbia University Press, 1976), p. 141.
3. There is one retirement benefit provided to PFRS members that is not advance funded. This is the cost-of-living (COL) adjustment made to retirement benefits to offset some of the effects of inflation. The COL provision is discussed in more detail later in this chapter.
4. Unfortunately, the actuarial profession has not been able to agree upon standard pension terminology. The expression "Aggregate Projected Benefit Cost Method with Supplemental Liability" is preferred by the Pension Research Council while other pension managers and actuaries use the latter expression or some variation of it.
5. P.L. 1973, c. 156 and P.L. 1975, c. 303 (effective February 2, 1976).
6. N.J.S.A. 43:3B, the Pension Adjustment Act (P.L. 1958, c. 143), as amended.
7. P.L. 1977, c. 306.
8. The same conclusion was recently reached by the New Jersey Commission on Government Costs and Tax Policy appointed by the Governor pursuant to Executive Order No. 55 of 1977. On page xvii of their Summary Recommendations and Subcommittee Reports, the Commission recommends that "cost-of-living increases be considered in the annual actuarial calculation rather than making annual appropriations."

### CHAPTER 3: FINANCIAL FORECASTS OF PFRS

This chapter presents three long-range financial forecasts of PFRS under combinations of actuarial assumptions previously discussed. The first forecast uses the PFRS actuary's assumptions to perform the annual valuations during the 50-year forecast period. The second forecast uses OFA's best-estimate assumptions. The third forecast also uses best-estimate assumptions but is predicated upon full advance funding of the annual COL benefit increases.

#### Forecast Under PFRS Actuary's Assumptions

Table 3-1 shows the results of a 50-year financial forecast of PFRS which uses the PFRS actuary's current actuarial assumptions to perform the annual valuations. The first valuation year of the forecast is fiscal year 1975 and the last year is fiscal year 2025.<sup>1</sup> The numerical data presented in the table are given annually during the first ten years and on a quinquennial basis thereafter.

The population growth assumption, which scales down from 3 percent annually to zero after 25 years, increases the original group of active employees from 24,619 to an ultimate number of 36,200 by the year 2000. Total payroll rises both because of the growth in the number of active employees and because of the annual rise in employees' salaries. The payroll in 1975 totals \$345 million and escalates to \$1 billion by 1990 and to over \$6 billion by the year 2025. These dollar values are of little importance by themselves since they are expressed in terms of future inflated dollars; however, they are useful for measuring the trend in pension costs.

Table 3-1 shows that advance-funded employer contributions to PFRS are \$56.5 million in 1975 and are expected to nearly double by 1985. From 1985 to the end of the forecast period, employer contributions are expected to increase sevenfold to over \$700 million. However, employer contributions as a percentage of payroll are seen to decrease throughout the 50-year forecast period, beginning at 16.37 percent in 1975 and decreasing to a low of 11.95 percent by the year 2025.

TABLE 3-1

FINANCIAL FORECAST OF PFRS UNDER PFRS ACTUARY'S ASSUMPTIONS  
(Dollars in Millions)

Year	Number Active Members	Payroll	Employer Contributions					Employee Contributions	Invest- ment Earnings	Benefit Payments	Assets	Plan Termination Liability (PTL)			Plan Continuation Liability (PCL)				
			Funded Portion		Pay-as-you-go Portion		Total					Assets		Assets		Assets			
			\$	% of Payroll	\$	% of Payroll	% of Payroll					\$	% of Payroll	\$	% of Payroll	\$	% of Payroll	\$	% of Payroll
1975	24,619	345	56.5	16.37	.4	.11	16.48	26.0	7.54	45.9	21.0	6.08	693	845	82.02	871	79.59		
1976	25,358	373	60.1	16.12	.7	.17	16.29	28.1	7.52	53.5	26.6	7.13	800	968	82.73	982	81.54		
1977	26,088	403	63.9	15.87	1.0	.25	16.12	30.2	7.51	61.8	32.8	8.14	916	1,096	83.51	1,101	83.15		
1978	26,808	434	67.8	15.62	1.5	.35	15.97	32.6	7.49	70.9	39.4	9.07	1,039	1,231	84.39	1,229	84.48		
1979	27,516	468	72.0	15.37	2.2	.46	15.84	35.0	7.48	80.8	46.6	9.94	1,171	1,371	85.39	1,368	85.56		
1980	28,209	505	76.4	15.13	3.0	.58	15.72	37.6	7.46	91.5	54.5	10.79	1,312	1,517	86.48	1,518	86.42		
1981	28,886	543	80.8	14.89	3.9	.72	15.60	40.4	7.45	101.7	62.9	11.59	1,463	1,670	87.58	1,679	87.11		
1982	29,545	584	85.6	14.66	5.0	.86	15.52	43.4	7.44	112.6	72.0	12.33	1,623	1,829	88.73	1,850	87.70		
1983	30,183	627	90.7	14.46	6.3	1.01	15.47	46.6	7.43	124.1	81.5	12.99	1,792	1,994	89.90	2,032	88.22		
1984	30,799	673	96.2	14.28	7.8	1.16	15.45	49.9	7.42	136.2	91.5	13.59	1,972	2,168	90.99	2,224	88.68		
1985	31,390	722	101.9	14.12	9.5	1.32	15.44	53.5	7.42	149.2	101.8	14.11	2,163	2,352	91.97	2,428	89.10		
1990	33,916	1,010	136.8	13.55	21.1	2.09	15.63	74.7	7.39	227.6	160.7	15.91	3,317	3,471	95.57	3,664	90.53		
1995	35,575	1,373	181.9	13.25	37.8	2.75	16.00	101.3	7.38	335.9	237.0	17.26	4,907	5,112	96.00	5,380	91.21		
2000	36,220	1,811	237.3	13.10	60.2	3.33	16.43	133.6	7.38	482.6	339.7	18.76	7,066	7,417	95.26	7,728	91.43		
2005	36,220	2,338	304.0	13.00	89.6	3.83	16.83	171.8	7.35	677.7	484.0	20.70	9,944	10,548	94.27	10,924	91.03		
2010	36,220	2,988	382.4	12.80	130.4	4.36	17.16	219.2	7.33	924.7	690.6	23.11	13,617	14,732	92.43	15,058	90.43		
2015	36,220	3,806	469.6	12.34	189.0	4.97	17.30	278.8	7.33	1225.8	964.7	25.35	18,120	19,914	90.99	20,188	89.75		
2020	36,220	4,844	586.9	12.11	270.3	5.58	17.69	354.8	7.32	1590.7	1306.9	26.98	23,582	26,075	90.44	26,406	89.31		
2025	36,220	6,173	737.4	11.95	376.3	6.10	18.04	452.4	7.33	2260.0	1717.5	27.82	30,271	33,377	90.70	33,899	89.30		

Note: The number of active employees and their aggregate payroll are certified as of June 30 (the valuation date) in the year listed. Contributions, earnings, payments, assets and assets-to-liability percentages reflect the financial experience of the plan for the year beginning July 1.

Source: Winklevoss & Associates, Inc., from 1975 PFRS valuation data.

Two factors cause pension contributions to decrease as a percentage of salary. The primary factor is that level-dollar payments are being made to amortize the plan's unfunded supplemental liability over the remaining amortization period. The second factor is that net actuarial gains eventually develop during the forecast. It will be remembered that the actual yield on assets is projected to be 7 percent after the first five years, while the valuation rate of interest used by the PFRS actuary is 6 percent. This 1 percent difference, compounded annually on a large body of assets, causes an actuarial gain which exceeds the actuarial loss caused by actual salaries increasing faster than the valuation salary rate assumption.

The total of all employer obligations to PFRS, however, equals the regular advance-funded employer contributions plus the pay-as-you-go costs of the COL provision. When these two costs are added together, total costs decrease from 16.48 percent of salary in 1975 to a low of 15.44 percent after 10 years and then increase to a high of 18.04 percent by the year 2025, as the continually rising pay-as-you-go COL payments consume a larger proportion of total costs.

Aggregate employee contributions to the plan remain fairly level as a percentage of salary, beginning at 7.54 percent in 1975 and decreasing to a low of 7.32 percent near the end of the forecast period. These data indicate that employees are funding between one-fourth and one-third of the total cost of PFRS.

Investment earnings from PFRS assets help to offset a substantial portion of the total PFRS costs. In 1975 earnings are nearly as large as employer contributions and nearly double employee contributions. After 10 years they are expected to exceed employer contributions by about 50 percent and represent almost three times employee contributions in that year. As assets continue to grow during the forecast, the expected investment earnings are eventually more than double employer costs and five times larger than employee contributions.

The benefit payments from PFRS, which include such items as retirement and disability benefits, survivor benefits, insurance settlements, and the return of employee contributions, total \$21.0 million in 1975 or 6.08 percent of payroll. In future years these payments are expected to increase dramatically to \$1.7 billion by the end of the forecast period, an amount

equal to 27.82 percent of payroll. If PFRS were not advance funded, but rather financed entirely on a pay-as-you-go basis, total costs (benefit payments plus COL costs) would escalate to almost 34 percent of payroll by the year 2025. In fact, however, employer contributions are expected to be only about half of this amount -- a favorable consequence of the accumulation of assets under advance funding.

The dollar value of plan assets, as shown in Table 3-1, is \$693 million in 1975 and is expected to reach \$2.2 billion by 1985. From this point in time to the end of the forecast period, assets are expected to increase to over \$30 billion.

As is the case with the other values given in Table 3-1 absolute dollar amounts beyond a few years are less important than their relationship to some other dollar value. In the case of plan assets, the relevant standards are the liabilities of the plan. Table 3-1 includes the two liability measures previously discussed in Chapter 2. The first, plan termination liability (PTL), shows the liability associated with benefits accrued to date if the plan were to be terminated in a given year, while the second (PCL) shows an accrued liability based on continuation of the plan.

Viewing plan assets as a percentage of the PTL, the funded level of PFRS in 1975 is 82 percent, a value that increases gradually to 96 percent in 20 years and then tapers off to 91 percent by the year 2025. Funded levels based on the PCL start out at 80 percent, increase to a high of 91 percent and then decrease to 89 percent. Thus, the PCL shows a similar, although somewhat lower, funded status than the PTL.

Using either liability measure, one might expect the funded level of PFRS to reach, and even exceed, 100 percent, but this does not occur because the entire plan is not advance-funded; i.e., the COL benefit increases are financed on a pay-as-you-go basis.

#### Forecast Under OFA Best-Estimate Assumptions

Table 3-2 shows the results of a 50-year forecast of PFRS which is identical to that shown in Table 3-1 except that the annual valuations during the forecast period are performed using OFA's best-estimate assumptions. Thus, the number of employees, payroll, employee contributions, COL payments, benefit payments, and liability values are the same as in Table 3-1. The values that change are employer costs, investment earnings, assets, and funded levels.

TABLE 3-2

## FINANCIAL FORECAST OF PFRS UNDER OFA BEST-ESTIMATE ASSUMPTIONS

(Dollars in Millions)

Year	Number Active Members	Payroll	Employer Contributions					Employee Contributions		Invest- ment Earnings	Benefit Payments		Assets	Plan Termination Liability (PTL)		Plan Continuation Liability (PCL)	
			Funded Portion		Pay-as-you-go Portion		Total	\$	% of Payroll		\$	% of Payroll		\$	% Assets PTL	\$	% Assets PCL
			\$	% of Payroll	\$	% of Payroll											
1975	24,619	345	53.2	15.41	.4	.11	15.53	26.0	7.54	46.2	21.0	6.08	693	845	82.02	871	79.59
1976	25,358	373	56.4	15.13	.7	.17	15.30	28.1	7.52	53.6	26.6	7.13	797	968	82.42	982	81.23
1977	26,088	403	59.8	14.86	1.0	.25	15.11	30.2	7.51	61.7	32.8	8.14	909	1,096	82.90	1,101	82.55
1978	26,808	434	63.5	14.61	1.5	.35	14.97	32.6	7.49	70.5	39.4	9.07	1,028	1,231	83.51	1,229	83.60
1979	27,516	468	67.4	14.39	2.2	.46	14.85	35.0	7.48	80.1	46.6	9.94	1,155	1,371	84.26	1,368	84.43
1980	28,209	505	71.6	14.18	3.0	.58	14.77	37.6	7.46	90.5	54.5	10.79	1,291	1,517	85.11	1,518	85.05
1981	28,886	543	76.0	14.00	3.9	.72	14.72	40.4	7.45	100.4	62.9	11.59	1,436	1,670	85.99	1,679	85.53
1982	29,545	584	80.7	13.83	5.0	.86	14.69	43.4	7.44	110.8	72.0	12.33	1,590	1,829	86.94	1,850	85.93
1983	30,183	627	85.7	13.67	6.3	1.01	14.68	46.6	7.43	121.9	81.5	12.99	1,753	1,994	87.93	2,032	86.29
1984	30,799	673	91.1	13.53	7.8	1.16	14.69	49.9	7.42	133.7	91.5	13.59	1,926	2,168	88.85	2,224	86.59
1985	31,390	722	96.7	13.40	9.5	1.32	14.72	53.5	7.42	146.1	101.8	14.11	2,109	2,352	89.67	2,428	86.87
1990	33,916	1,010	130.4	12.91	21.1	2.09	15.00	74.7	7.39	221.6	160.7	15.91	3,215	3,471	92.61	3,664	87.73
1995	35,575	1,373	173.4	12.63	37.8	2.75	15.38	101.3	7.38	325.1	237.0	17.26	4,730	5,112	92.53	5,380	87.92
2000	36,220	1,811	226.0	12.48	60.2	3.33	15.80	133.6	7.38	464.4	339.7	18.76	6,773	7,417	91.31	7,728	87.64
2005	36,220	2,338	290.0	12.40	89.6	3.83	16.24	171.8	7.35	648.0	484.0	20.70	9,476	10,548	89.83	10,924	86.74
2010	36,220	2,988	369.2	12.36	130.4	4.36	16.72	219.2	7.33	878.7	690.6	23.11	12,900	14,732	87.56	15,058	85.67
2015	36,220	3,806	454.1	11.93	189.0	4.97	16.90	278.8	7.33	1160.7	964.7	25.35	17,106	19,914	85.90	20,188	84.73
2020	36,220	4,844	581.3	12.00	270.3	5.58	17.58	354.8	7.32	1496.8	1306.9	26.98	22,129	26,075	84.87	26,406	83.80
2025	36,220	6,173	744.5	12.06	376.3	6.10	18.16	452.4	7.33	2140.4	1717.5	27.82	28,267	33,377	84.69	33,899	83.39

Note: The number of active employees and their aggregate payroll are certified as of June 30 (the valuation date) in the year listed. Contributions, earnings, payments, assets and assets-to-liability percentages reflect the financial experience of the plan for the year beginning July 1.

Source: Winklevoss & Associates, Inc., from 1975 PFRS valuation data.

Using best-estimate assumptions, employer contributions in 1975 would have been somewhat smaller (\$53.2 million) than they actually were under the PFRS actuary's current assumptions (\$56.5 million) and would remain smaller until just before the end of the forecast period. Costs as a percentage of salary are 15.41 percent in 1975, scaling down over 40 years to 11.93 percent and then rising slightly to 12.06 percent by 2025. The latter percentage is slightly larger than the 11.95 percent obtained when the PFRS actuary's assumptions are used, illustrating a basic principle of pension costs that lower contributions made initially result in higher contributions at some later date.

As a result of initially lower employer contributions, the asset buildup and, hence, the dollar investment earnings, are somewhat smaller. This in turn causes the funded levels to be lower beyond the first year of the forecast period under best-estimate assumptions than under the PFRS actuary's assumptions. The PTL and PCL both follow an increasing and then decreasing pattern, ending at 85 percent and 83 percent, respectively. Again, failure to achieve 100 percent is caused by not funding in advance the COL benefit increases.

#### Best-Estimate Forecast with Full Advance Funding of All Costs

Table 3-3 shows a 50-year forecast which is identical to that presented in Table 3-2 except for the fact that the COL provision is now assumed to be advance-funded. This assumption produces changes in employer contributions, investment earnings, assets and funded levels. In addition, the amount of benefit payments, while not changing, now includes COL payments previously listed in a separate column.

Full advance funding would have caused employer contributions to increase to 24.63 percent of payroll in 1975, a substantial increase over the previous two forecasts which showed total costs of 16.48 percent and 15.53 percent. This immediate jump in contributions is a consequence of recognizing, and funding now, the liabilities associated with COL benefits which are currently being earned but not paid for under the present pay-as-you-go policy. However, as Table 3-3 illustrates, costs under full advance funding decrease steadily in future years and eventually reach 15.97 percent in the year 2025. This is in contrast to total ultimate costs (employer contributions plus pay-as-you-go costs) of 18.04 percent and 18.16 percent from the



TABLE 3-3

FINANCIAL FORECAST OF PFRS UNDER OFA BEST-ESTIMATE  
ASSUMPTIONS WITH ADVANCE FUNDING OF COL BENEFITS

(Dollars in Millions)

Year	Number Active Members	Payroll \$	Employer Contributions		Employee Contributions		Invest- ment Earnings \$	Benefit Payments		Assets \$	Plan Termination Liability (PTL)			Plan Continuation Liability (PCL)		
			\$	% of Payroll	\$	% of Payroll		\$	% of Payroll		\$	%	Assets PTL	\$	%	Assets PCL
1975	24,619	345	85.0	24.63	26.0	7.54	46.0	21.4	6.19	693	845	82.02		871	79.59	
1976	25,358	373	89.4	23.97	28.1	7.52	55.5	27.2	7.30	829	968	85.65		982	84.42	
1977	26,088	403	94.0	23.35	30.2	7.51	65.8	33.8	8.40	974	1,096	88.88		1,101	88.50	
1978	26,808	434	99.0	22.79	32.6	7.49	77.1	40.9	9.43	1,131	1,231	91.86		1,229	91.96	
1979	27,516	468	104.3	22.27	35.0	7.48	89.4	48.7	10.40	1,298	1,371	94.71		1,368	94.90	
1980	28,209	505	110.0	21.79	37.6	7.46	103.0	57.4	11.38	1,478	1,517	97.46		1,518	97.40	
1981	28,886	543	115.9	21.35	40.4	7.45	116.0	66.8	12.31	1,672	1,670	100.07		1,679	99.53	
1982	29,545	584	122.3	20.96	43.4	7.44	129.9	77.0	13.19	1,877	1,829	102.63		1,850	101.44	
1983	30,183	627	129.1	20.59	46.6	7.43	144.7	87.8	14.00	2,096	1,994	105.11		2,032	103.15	
1984	30,799	673	136.4	20.26	49.9	7.42	160.4	99.3	14.76	2,328	2,168	107.41		2,224	104.69	
1985	31,390	722	144.0	19.95	53.5	7.42	177.1	111.4	15.43	2,576	2,352	109.50		2,428	106.08	
1990	33,916	1,010	189.5	18.77	74.7	7.39	278.6	181.7	18.00	4,075	3,471	117.40		3,664	111.20	
1995	35,575	1,373	247.3	18.01	101.3	7.38	417.8	274.8	20.01	6,130	5,112	119.91		5,380	113.93	
2000	36,220	1,811	317.3	17.52	133.6	7.38	605.0	400.0	22.09	8,899	7,417	119.97		7,728	115.14	
2005	36,220	2,338	402.0	17.19	171.8	7.35	852.3	573.6	24.53	12,565	10,548	119.12		10,924	115.02	
2010	36,220	2,988	505.9	16.93	219.2	7.33	1165.8	821.0	27.47	17,251	14,732	117.10		15,058	114.56	
2015	36,220	3,806	604.6	15.89	278.8	7.33	1553.5	1153.6	30.31	23,076	19,914	115.88		20,188	114.30	
2020	36,220	4,844	771.3	15.92	354.8	7.32	2014.6	1577.2	32.56	30,032	26,075	115.18		26,406	113.73	
2025	36,220	6,173	985.6	15.97	452.4	7.33	2778.4	2093.8	33.92	38,581	33,377	115.59		33,899	113.81	

Note: The number of active employees and their aggregate payroll are certified as of June 30 (the valuation date) in the year listed. Contributions, earnings, payments, assets and assets-to-liability percentages reflect the financial experience of the plan for the year beginning July 1.

Source: Winklevoss & Associates, Inc., from 1975 PFRS valuation data.

previous forecasts. Thus full advance funding is considerably more costly initially but eventually (around the year 2011) becomes less costly than the current funding policy for PFRS.

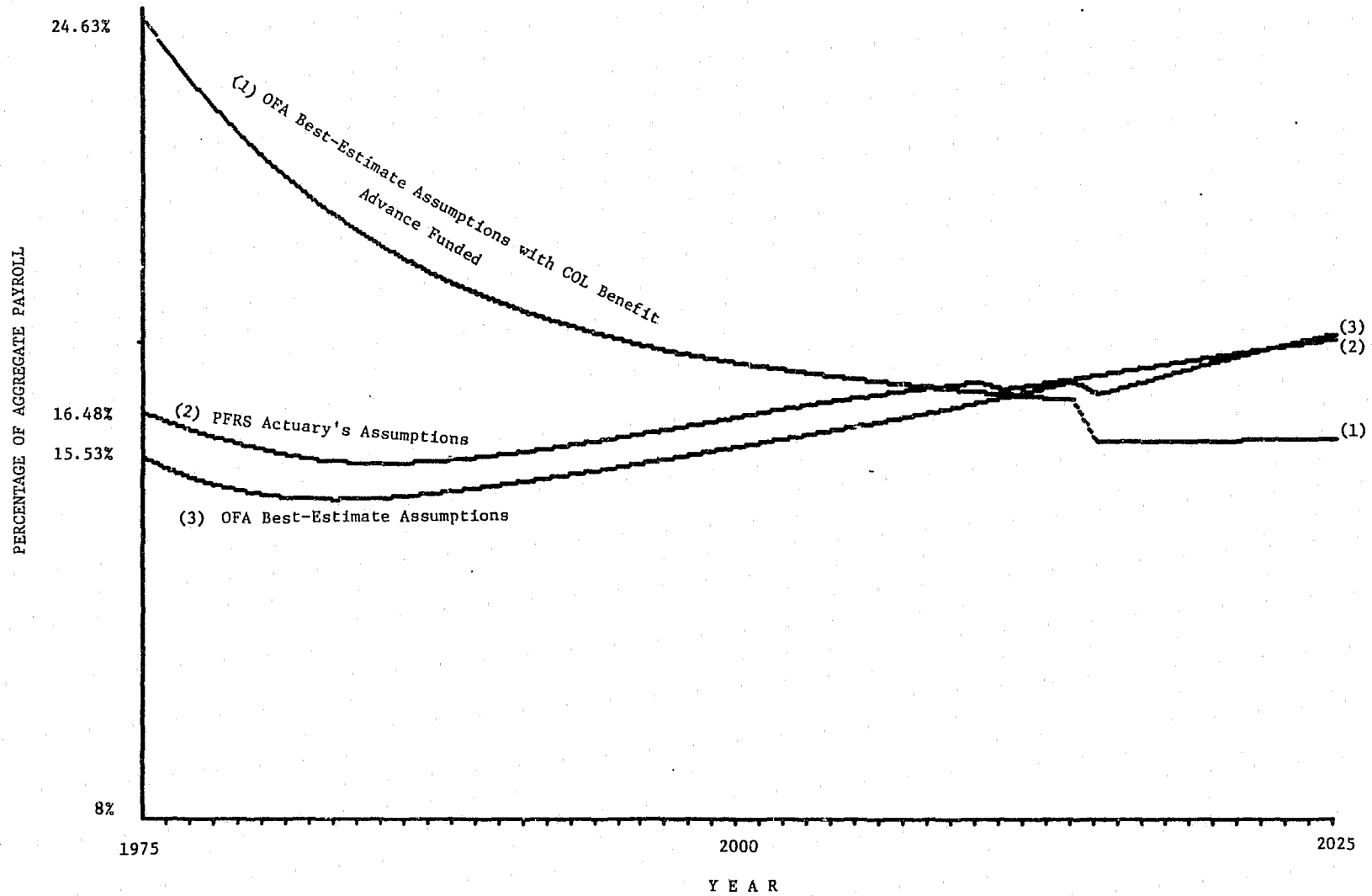
The increase in employer costs in early years causes the assets and, hence, investment earnings, to increase more rapidly than in the two previous forecasts. As a result, the PTL and PCL funded levels reach 100 percent by 1981 and 1982, respectively. By the end of the forecast period, assets have built up to approximately 115 percent of both liability measures.

From a budgetary standpoint, the steeply decreasing cost curve which characterizes full advance funding of all pension benefits may not be desirable since it calls for an immediate and large increase in employer contributions to PFRS. The same might be said for the rapid buildup of "redundant" assets (e.g., assets exceeding PTL and PCL) over the next 10 to 15 years. Both situations would be alleviated somewhat by a "flatter" funding pattern than is indicated in Table 3-3. One possibility for achieving this, while retaining full advance funding of benefits, is to amortize the remaining supplemental liability of the system as a level percentage of salary (as is done with the normal cost) rather than as a level dollar amount. While this option has not been tested as a part of this study, it should be considered if a change is contemplated to advance funding of COL benefits. Since the method of amortizing the current unfunded supplemental liability is specified by law,<sup>2</sup> legislation would be required to reamortize the liability on a different basis.

#### Graphic Illustration of Pension Forecasts

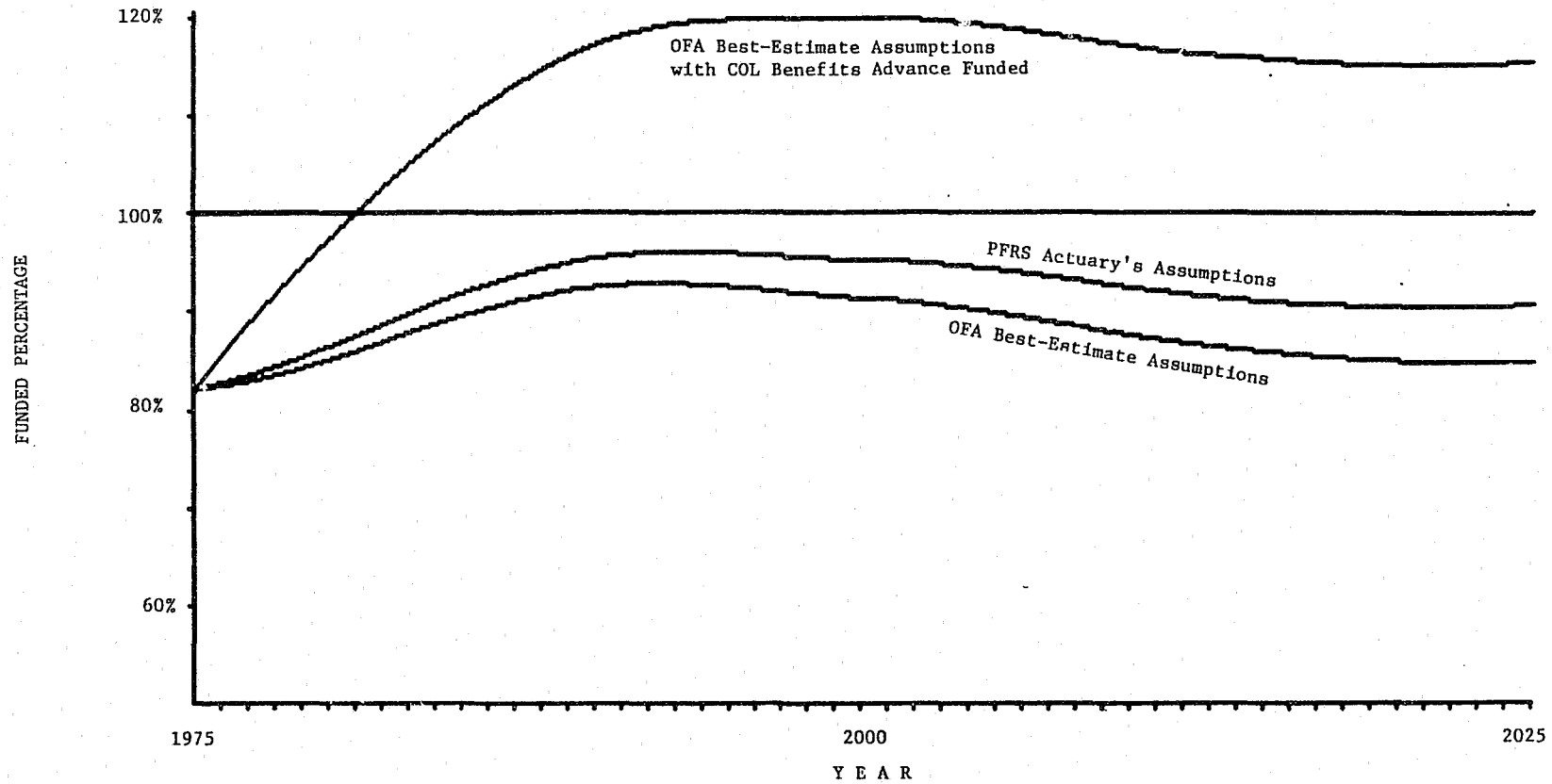
Figures 3-A and 3-B are computer-generated graphs which summarize the more important information contained in the three pension cost forecasts. Figure 3-A shows the pattern of employer costs (as a percentage of payroll) during the 50-year forecast period under the three combinations of assumptions used. Figure 3-B shows the percentage of assets to plan termination liability for the same combinations.

FIGURE 3-A: PFRS EMPLOYERS' COSTS AS A PERCENTAGE OF PAYROLL



Source: Winklevoss & Associates, Inc.

FIGURE 3-B: PFRS FUNDED PERCENTAGES  
(ASSETS TO PLAN TERMINATION LIABILITY)



Source: Winklevoss & Associates, Inc.

### FOOTNOTES TO CHAPTER 3

1. The June 30, 1975 actuarial valuation of PFRS was used as the base for all projections made in this study. This was the most recent valuation report available at the time. As noted in the Tables in this chapter, the financial data listed refer to the experience of the plan in the fiscal year beginning July 1.
2. N.J.S.A. 43:16A-15(9).

## CHAPTER 4: CONCLUSIONS AND RECOMMENDATIONS

This study has simulated the future financial status of PFRS under alternative funding conditions. The long-range financial forecasts presented in this study show that PFRS is a well-funded pension system as measured by the system's actuarial cost method and either the PFRS actuary's assumptions or OFA's best-estimate assumptions. Assets on hand are equal to approximately 80 percent of liabilities accrued to date, a funded level that is favorable in comparison to many other pension plans of equal age, whether public or private, and especially in comparison to most police and fire plans. Of course, the maintenance of PFRS at this funded level or at a higher one is dependent upon continued recognition by all concerned of any additional liabilities associated with future benefit liberalizations or possible unfavorable actuarial experience.

Specific conclusions and recommendations related to the financial status of PFRS are discussed in the following sections.

### Actuarial Assumptions

The actuarial assumptions currently used by the PFRS actuary develop approximately the same annual costs as OFA's best-estimate assumptions selected for use in this study. Thus, from a financial standpoint there is no projected deterioration in the plan's funded status which would require a change in the current assumptions.

The general approach taken by the PFRS actuary is one which understates both salary and interest rates in relation to what may actually be expected to occur in future years. The actuary attempts to balance the degree of understatement in both assumptions so that they produce offsetting characteristics in terms of pension costs.

The use of actuarial assumptions that are individually unrealistic but balanced when combined is a fairly common actuarial practice that has become more noticeable as the effects of prolonged inflation show up in salary levels and interest rates. Actuaries have traditionally been reluctant to give explicit recognition to inflationary influences in calculating pension costs. They have preferred to "factor out" inflation by assuming that there

exists, over the long run, a constant differential or "spread" (say, 2 to 3 percent) between interest rates and general salary increases, and that both components move up or down in tandem. It is held that this characteristic makes it unnecessary for the actuary to project either interest rates or general salary increases independently, at levels thought to be realistic, since the effect of the spread is to keep costs in balance regardless of the absolute values of either component.

As shown in this study, it is possible to create the same annual cost patterns by using offsetting assumptions as by using assumptions selected individually on an explicit best-estimate basis. However, this practice is open to challenge on several grounds. Some financial analysts question the rationale of assuming--even for actuarial purposes--that there is a constant spread between interest rates and salary levels, especially in light of recent economic experience during the 1974-75 recession. In addition, it has been demonstrated that even if the spread between interest and salary rates is held constant, the cost implications of this relationship are different depending upon the absolute values of both components.<sup>1</sup> For example, using a 7 percent interest rate and a 5 percent salary rate does not produce the same effect (all other things being equal) as using a 5 percent interest rate and a 3 percent salary rate, even though a 2 percent difference is maintained between the two.

An inherent and persistent problem in the use of offsetting assumptions is that non-actuaries find it virtually impossible to evaluate the appropriateness of the assumptions. When differences among actuaries center around the correct "offset" between two assumptions, rather than on how those assumptions were developed and whether they have some relation to reality, confusion among non-actuaries is unnecessarily compounded. In this atmosphere it is extremely difficult for the Legislature to properly evaluate the fiscal impact of major pension legislation.

This situation became apparent during 1977 hearings before the Assembly Municipal Government Committee on legislation that would have liberalized PFRS benefits.<sup>2</sup> During these hearings, a representative of the actuarial firm retained by police and fire employee groups testified on the estimated cost of the proposed legislation. The main difference (which was considerable) between this firm's cost estimate and the one submitted by the PFRS actuary, through the Division of Pensions, centered around which salary

scale assumption was more "consistent" with the 6 percent interest rate assumption specified for PFRS by the State Treasurer. Since the interest assumption itself was understated, the difference of opinion had little to do with how fast either salaries or interest rates were actually expected to rise; rather, it concerned the proper "spread" or "offset" between the two. Committee members and others present at the hearing were essentially nonparticipants in this technical process.

Since the salary and interest rate assumptions in particular have an extremely important influence on pension costs,

OFA recommends that the use of explicit best-estimate actuarial assumptions be considered by the State Treasurer and the PFRS actuary. (Recommendation No. 1)

In making this recommendation, OFA is not necessarily recommending that the specific assumption values used in this study be adopted but rather that the process used to develop those values be made clear, as illustrated in Chapter 2. Once this is done disagreements about specific assumption values (e.g. a 6 percent vs. a 7 percent interest rate) are easier to understand.

To implement the above recommendation,

OFA recommends that the Legislature consider amending or repealing the provision of N.J.S.A. 43:16A-1(9) which limits the "regular interest" rate assumption to 105 percent of the actual percentage rate of earnings on investments. (Recommendation No. 2)

This section of the PFRS law is designed to insure that PFRS is conservatively funded by not allowing the anticipated income from the investment of pension fund assets to be overstated. However, in operation the PFRS actuary balances any conservatism in the interest rate assumption by constructing an artificially low salary level assumption, thereby cancelling out the law's intended effect. What remains are two assumptions which may be "in balance" but neither of which can reasonably be said to represent best estimates of future experience.

These recommendations would become even more relevant should another OFA recommendation--that the actuary periodically calculate PFRS liabilities to include the liability associated with COL benefit increases--be adopted. Since COL benefits are automatically linked to changes in the Consumer Price Index, it will be necessary to give explicit recognition to the rate of inflation anticipated in future years.



### PFRS Funding Policy

Presently, all benefits provided by PFRS are advance-funded, with the exception of COL adjustments. These are financed on a pay-as-you-go basis through annual appropriations.

One of the purposes of this study has been to compare the financial implications of continuing the current funding policy with one that advance-funds the COL provision along with all other benefits. The results of this comparison were presented in Chapter 3. Briefly, they are as follows:<sup>3</sup>

- (1) If the Legislature chooses not to advance-fund the COL provision, but rather to continue financing it on a pay-as-you-go basis, then
  - (a) Total employer contributions (normal, supplemental and pay-as-you-go COL) will decline as a percentage of payroll from roughly 16 percent to 15 percent over the next 10 years, and will increase thereafter to 18 percent by the end of the 50-year forecast period. The total cost percentage will continue to increase indefinitely under the current financing pattern.
  - (b) The funded level of PFRS (assets to plan continuation liability) will increase from 80 percent to roughly 90 percent over the next 25 years and will slowly decline thereafter. The plan's unfunded accrued liabilities will not be completely amortized during the forecast period.
- (2) If the Legislature chooses to advance-fund the COL provision, then
  - (a) Total employer contributions would initially be much higher than they are under the current financing policy. Costs are almost 25 percent of payroll, or more than 50 percent higher than they now are (in dollar terms, roughly \$30-35 million more). This is caused by the initially high (as a percentage of payroll) costs of amortizing the large unfunded liability associated with already earned COL benefits.

However, total contributions steadily decline as a percentage of payroll and, at the end of the amortization period (around the year 2012), become lower than under the current policy. Thereafter, the annual costs under full advance funding will always be lower, and by a continually increasing amount.

- (b) The funded level of PFRS will increase from 80 percent to 100 percent ("full funding") over the next six years and will continue to increase to 115 percent around the year 2000. The funded level will average out at about 114 percent of plan continuation liability.

Thus, there is a tradeoff observed between the timing of pension contributions and the achievement of "full funding" in PFRS. As defined in this study, "full funding" occurs when all pension benefit credits earned to date by PFRS members have been funded; i.e., when the system's unfunded supplemental liability is completely amortized. Under the current financing policy, full funding is not achieved if COL benefits are included in the system's liabilities but not advance-funded. The achievement of full funding is an implicit goal of PFRS and of the Legislature, since the Act governing PFRS (N.J.S.A. 43:16A) includes the provision for the 40-year unfunded liability amortization. Although the funded level of PFRS is quite favorable (80 to 90 percent) even without advance COL funding, the Legislature may wish to consider a policy to advance-fund the COL provision in light of this implicit goal.

As shown in the forecasts, full funding is achieved when the COL provision is advance-funded, but at the expense of quite burdensome employer contributions in initial years. Moreover, total advance funding at the rate shown actually builds up "redundant" assets rather quickly (assets in excess of the PCL) and maintains them throughout the forecast period.

It should be noted that there are ways to move toward full advance funding which produce a "flatter" funding pattern than illustrated in this study and which retain the implicit goal of reaching a 100 percent funded

level. A funding schedule can easily be established that "phases in" advance-funded COL contributions so that full funding is reached later than shown here but with less immediate financial stress. Another possibility would be to amortize the remaining supplemental liability of the system as a level percentage of payroll rather than as a level dollar amount.

Apart from their specific application to PFRS, the arguments in favor of advance funding are persuasive ones. From a financial standpoint, the investment income earned on pension fund assets built up by regular employer contributions can reduce the ultimate cost of benefit payments by up to 50 percent.<sup>4</sup> Over the long run, the inflationary advantage of paying in tomorrow's "cheap" dollars instead of today's "expensive" ones has almost always been overcome by the yield on invested assets.

There are other more abstract advantages to advance funding. For one thing, it charges the costs of pension benefits to the present generation of taxpayers who presumably are receiving the services of those earning the benefits. In addition, the accumulation of assets in a fund serves to reassure members of a pension plan that their promised benefits will be paid. Finally, a policy of advance funding has the important effect of forcing recognition of the true costs of a benefit change by requiring that a portion of those costs be paid immediately.

As noted in Chapter 2, the Pension Adjustment Act does not mandate the annual appropriation of funds for the purpose of providing COL benefit adjustments to retired employees. Despite this, the Legislature has chosen to appropriate the amount necessary each year to pay for these increased benefits and, in addition, has recently raised the COL benefit level. Should the Legislature interpret its commitment with respect to COL benefit payments as an ongoing and continual one, then

OFA recommends that the Legislature consider the advantages of adopting a policy which supports the advance funding of all PFRS pension benefits, including cost-of-living increases, on a schedule that is financially practicable. (Recommendation No. 3)

### Measuring Plan Liabilities

1. Method -- It was noted earlier in this report that the total actuarial liability of a pension plan is determined by the actuarial cost method used to finance the plan, and that this liability value has little

meaning when viewed out of context. Therefore, it was suggested that in assessing the level of employee benefit security at any point in time, more meaningful measures of liability should be considered. Two such measures were demonstrated in this study, one based on plan termination (PTL) and one on plan continuation (PCL). The rationale for both approaches is that they measure the accrued value of members' benefits earned to date, by applying the plan's benefit formula to each member's current salary and years of service.

Until recently the PFRS actuary did not include either of these values in the annual valuation report of the system. Since 1976 the actuary has been including a "Level of Funding" statement that compares the book value of assets (adjusted for employer contributions receivable) to a liability measure similar to the PCL. This is a useful statement but could be made even more so, especially to active plan members, by breaking down the liability value (and the level of funding calculation) into separate categories for vested (both active and retired) and non-vested benefits. Such a breakdown would provide additional information on the status of the plan's benefit security, particularly as it covers those PFRS members who have already earned the right to a retirement pension. Therefore,

OFA recommends that the PFRS actuary show both vested (active and retired) and non-vested accrued benefit liabilities separately in the annual valuation report, along with the corresponding funded level for each category. (Recommendation No. 4)

While we would prefer that the actuary calculate and include the PTL as well as the PCL as an additional indicator of accrued benefit security, we recognize that the assumed perpetual nature of a public plan sponsor might make the concept of plan termination liability less relevant than it would be in the private sector. Based on this, and on the actuary's inclusion of the PCL in the valuation, OFA makes no recommendation on adoption of the PTL measure.

2. Cost-of-Living (COL) Increases -- A basic concept of accounting for pension costs is that they be assigned to the period during which benefits are earned. COL benefits, since they are computed as a percentage of the retirement allowance, are earned over an employee's active career. The same factors (e.g., benefit liberalizations, salary increases) responsible for raising regular pension benefits are also responsible for raising future COL

obligations. This relationship is not explicitly recognized under the current COL financing policy, with the result that the overall impact of plan changes is always understated, as are the total liabilities associated with providing retirement benefits to PFRS members.

Should the Legislature elect to advance-fund COL benefits, the costs associated with providing these benefits would automatically be treated as liabilities of the pension system. In addition,

OFA recommends, should the Legislature decide not to advance fund COL benefits, that the PFRS actuary periodically calculate the system's liabilities to include the liability associated with COL benefits, so as to portray more accurately the total costs of all pension obligations currently being accrued, even though payment of a portion of these costs is being deferred to the future. (Recommendation No. 5)

Since almost all pension benefit changes carry a corollary fiscal impact associated with higher COL payments,

OFA recommends that fiscal notes and cost estimates on pension-related bills, whether prepared by the Division of Pensions or by OFA, include an estimate of the additional COL costs likely to result from the provisions of the bill. (Recommendation No.6)

#### FOOTNOTES TO CHAPTER 4

1. Glenn D. Allison and Howard E. Winklevoss, "The Interrelationship Among Inflation Rates, Salary Rates, Interest Rates, and Pension Costs," Transactions of the Society of Actuaries, Volume 27, 1975, pp. 197-209.
2. Public Hearing before the Assembly Municipal Government Committee on Assembly No. 658, Trenton, April 20, 1977.
3. The cost percentages and dollar values illustrated are, of course, projected on the basis of "all other things being equal." In this case, this means no changes in the PFRS benefit formula and a future plan experience similar to assumptions. If these conditions do not occur, the exact percentages and costs will vary, but the overall cost patterns between the two financing methods will remain as illustrated.
4. Tilove, p. 140.

APPENDIX A: ACTUARIAL TABLES  
USED IN PFRS FORECASTS

Table A-1

## PFRS

## Disability Rates

Age	Ordinary	Accidental
20	.00080	.00022
21	.00080	.00022
22	.00090	.00030
23	.00090	.00030
24	.00090	.00038
25	.00100	.00045
26	.00100	.00052
27	.00120	.00060
28	.00120	.00068
29	.00120	.00075
30	.00130	.00097
31	.00130	.00112
32	.00140	.00127
33	.00140	.00150
34	.00150	.00172
35	.00160	.00195
36	.00160	.00210
37	.00170	.00217
38	.00180	.00225
39	.00200	.00225
40	.00220	.00225
41	.00240	.00217
42	.00260	.00210
43	.00290	.00203
44	.00310	.00195
45	.00350	.00203
46	.00380	.00217
47	.00410	.00247
48	.00460	.00270
49	.00520	.00300
50	.00590	.00330
51	.00670	.00360
52	.00760	.00390
53	.00860	.00412
54	.00980	.00427
55		.00442
56		.00450
57		.00465
58		.00472
59		.00480
60		.00487
61		.00495
62		.00502
63		.00510
64		.00517

Source: George B. Buck Consulting Actuaries,  
Inc.



Table A-2

PFRS

Entry Age Distribution

Age	Rate
20	.118
22	.199
24	.212
26	.168
28	.125
30	.072
32	.051
34	.028
36	.016
38	.004
40	.003
42	.002
44	.001
46	.001
48	.001
50	.001

Source: Winklevoss & Associates,  
Inc. from 1975 PFRS  
valuation data.

Table A-3

PFRS

Entry Age Salary Scale

Age	Scale
20	1.00000
22	1.00520
24	1.01020
26	1.01480
28	1.01880
30	1.02170
32	1.02280
34	1.02110
36	1.01610
38	1.00710
40	.99367
42	.97544
44	.95216
46	.92369
48	.88995
50	.85092

Source: Winklevoss & Associates,  
Inc., from 1975 PFRS  
valuation data.

Table A-4

PFRS

## Disabled Lives Mortality Rates

Age	Rate	Age	Rate
20	.00605	62	.02929
21	.00612	63	.03155
22	.00616	64	.03402
23	.00622	65	.03672
24	.00628	66	.03969
25	.00635	67	.04291
26	.00643	68	.04644
27	.00651	69	.05029
28	.00661	70	.05450
29	.00670	71	.05909
30	.00682	72	.06410
31	.00694	73	.06956
32	.00707	74	.07554
33	.00722	75	.08199
34	.00738	76	.08906
35	.00756	77	.09673
36	.00774	78	.10507
37	.00796	79	.11413
38	.00818	80	.12398
39	.00845	81	.13458
40	.00872	82	.14614
41	.00902	83	.15861
42	.00936	84	.17203
43	.00972	85	.18655
44	.01012	86	.20220
45	.01056	87	.21901
46	.01104	88	.23688
47	.01158	89	.25628
48	.01215	90	.27672
49	.01279	91	.29873
50	.01348	92	.32191
51	.01424	93	.34633
52	.01507	94	.37232
53	.01599	95	.39963
54	.01698	96	.42841
55	.01809	97	.45775
56	.01929	98	.48870
57	.02060	99	.52064
58	.02204	100	.55303
59	.02362	101	.58628
60	.02534	102	.61984
61	.02722	103	1.00000

Source: George B. Buck Consulting Actuaries, Inc.

Table A-5

## PFRS

## Active Lives Mortality Rates

Age	Ordinary	Accidental
20	.00153	.00030
21	.00162	.00030
22	.00162	.00030
23	.00162	.00030
24	.00162	.00030
25	.00162	.00030
26	.00171	.00030
27	.00171	.00030
28	.00171	.00030
29	.00171	.00030
30	.00180	.00030
31	.00198	.00030
32	.00216	.00030
33	.00234	.00030
34	.00252	.00030
35	.00270	.00030
36	.00288	.00030
37	.00306	.00030
38	.00333	.00030
39	.00360	.00040
40	.00387	.00040
41	.00405	.00050
42	.00423	.00050
43	.00441	.00060
44	.00468	.00070
45	.00495	.00060
46	.00531	.00050
47	.00567	.00040
48	.00603	.00040
49	.00648	.00030
50	.00693	.00030
51	.00738	.00030
52	.00792	.00030
53	.00855	.00030
54	.00927	.00030
55	.01026	.00030
56	.01089	.00020
57	.01197	.00020
58	.01323	.00020
59	.01458	.00020
60	.01602	.00020
61	.01764	.00010
62	.01944	.00010
63	.02151	.00010
64	.02376	.00010

Source: George B. Buck Consulting Actuaries, Inc.

Table A-6

## PFRS

## Retired Lives Mortality Rates

Age	Rates	Age	Rates
20	.00057	66	.02649
21	.00059	67	.02901
22	.00061	68	.03176
23	.00064	69	.03477
24	.00067	70	.03806
25	.00070	71	.04165
26	.00074	72	.04558
27	.00078	73	.04987
28	.00083	74	.05454
29	.00089	75	.05964
30	.00097	76	.06521
31	.00107	77	.07127
32	.00117	78	.07787
33	.00128	79	.08505
34	.00141	80	.09287
35	.00155	81	.10136
36	.00169	82	.11058
37	.00186	83	.12058
38	.00203	84	.13141
39	.00223	85	.14314
40	.00245	86	.15581
41	.00267	87	.16949
42	.00294	88	.18424
43	.00322	89	.20011
44	.00353	90	.21716
45	.00387	91	.23543
46	.00425	92	.25498
47	.00465	93	.27584
48	.00510	94	.29804
49	.00559	95	.32160
50	.00613	96	.34653
51	.00672	97	.37281
52	.00737	98	.40041
53	.00807	99	.42928
54	.00885	100	.45935
55	.00970	101	.49049
56	.01063	102	.52258
57	.01165	103	.55545
58	.01277	104	.58890
59	.01399	105	.62268
60	.01534	106	.65764
61	.01680	107	.69444
62	.01840	108	.75057
63	.02016	109	.77302
64	.02208	110	1.00000
65	.02419		

Source: George B. Buck Consulting Actuaries, Inc.

Table A-7

PFRS	
Retirement Rates *	
Age	Rate
40	.08400
41	.08400
42	.08500
43	.08500
44	.08600
45	.08600
46	.08700
47	.08800
48	.08900
49	.09000
50	.09100
51	.09200
52	.09300
53	.09400
54	.09600
55	.09900
56	.10200
57	.10700
58	.11100
59	.11600
60	.12200
61	.12900
62	.13900
63	.15200
64	.16800
65	1.00000

\* 15 percent added to rates in first year of eligibility

Source: George B. Buck Consulting Actuaries, Inc.

Table A-8

## PFRS

## Mortality Rates for Dependents

Age	Male	Female	Age	Male	Female
20	.00057	.00033	66	.02649	.01622
21	.00059	.00035	67	.02901	.01777
22	.00061	.00037	68	.03176	.01946
23	.00064	.00039	69	.03477	.02133
24	.00067	.00041	70	.03806	.02336
25	.00070	.00044	71	.04165	.02558
26	.00074	.00046	72	.04558	.02802
27	.00078	.00048	73	.04987	.03068
28	.00083	.00051	74	.05454	.03359
29	.00089	.00055	75	.05964	.03677
30	.00097	.00059	76	.06521	.04024
31	.00107	.00065	77	.07127	.04404
32	.00117	.00071	78	.07787	.04818
33	.00128	.00078	79	.08505	.05271
34	.00141	.00086	80	.09287	.05764
35	.00155	.00094	81	.10136	.06303
36	.00169	.00103	82	.11058	.06889
37	.00186	.00113	83	.12058	.07528
38	.00203	.00124	84	.13141	.08224
39	.00223	.00136	85	.14314	.08981
40	.00245	.00149	86	.15581	.09802
41	.00267	.00163	87	.16949	.10697
42	.00294	.00179	88	.18424	.11666
43	.00322	.00196	89	.20011	.12717
44	.00353	.00215	90	.21716	.13855
45	.00387	.00236	91	.23543	.15085
46	.00425	.00259	92	.25498	.16413
47	.00465	.00284	93	.27584	.17848
48	.00510	.00311	94	.29804	.19391
49	.00559	.00341	95	.32160	.21051
50	.00613	.00374	96	.34653	.22830
51	.00672	.00410	97	.37281	.24736
52	.00737	.00450	98	.40041	.26772
53	.00807	.00493	99	.42928	.28940
54	.00885	.00540	100	.45935	.31244
55	.00970	.00592	101	.49049	.33685
56	.01063	.00649	102	.52258	.36261
57	.01165	.00711	103	.55545	.38972
58	.01277	.00780	104	.58890	.41811
59	.01399	.00855	105	.62268	.44773
60	.01534	.00937	106	.65764	.49889
61	.01680	.01027	107	.69444	.55276
62	.01840	.01125	108	.75057	.63492
63	.02016	.01233	109	.77302	.66777
64	.02208	.01351	110	1.00000	1.00000
65	.02419	.01480			

Source: George B. Buck Consulting Actuaries, Inc.

Table A-9

## PFRS

## Best-Estimate Promotional Salary Scale

Age	Promotional Scale	Age	Promotional Scale
20	1.00000	43	2.06340
21	1.07340	44	2.08240
22	1.14710	45	2.10150
23	1.22150	46	2.12130
24	1.29590	47	2.14200
25	1.36880	48	2.16330
26	1.43810	49	2.18560
27	1.50190	50	2.20900
28	1.55850	51	2.23380
29	1.60860	52	2.25770
30	1.65300	53	2.27910
31	1.69280	54	2.29640
32	1.72900	55	2.30830
33	1.76390	56	2.31600
34	1.79870	57	2.32140
35	1.83420	58	2.32630
36	1.86950	59	2.33170
37	1.90340	60	2.33830
38	1.93570	61	2.34670
39	1.96660	62	2.35670
40	1.99510	63	2.36800
41	2.02110	64	2.37980
42	2.04350	65	2.39170

Source: Winklevoss & Associates, Inc., from 1975 PFRS valuation data.



Table A-10

## PFRS

## Actuary's Assumed Total Salary Increase Rates

Age	Percent Increase	Age	Percent Increase
20	1.09600	43	1.04030
21	1.09200	44	1.04110
22	1.08800	45	1.04220
23	1.08400	46	1.04300
24	1.07960	47	1.04360
25	1.07320	48	1.04410
26	1.06780	49	1.04480
27	1.06290	50	1.04500
28	1.05830	51	1.04510
29	1.05480	52	1.04520
30	1.05030	53	1.04530
31	1.04680	54	1.04530
32	1.04320	55	1.04520
33	1.04000	56	1.04500
34	1.03700	57	1.04470
35	1.03610	58	1.04000
36	1.03580	59	1.04300
37	1.03560	60	1.04100
38	1.03570	61	1.03850
39	1.03630	62	1.03590
40	1.03730	63	1.03280
41	1.03820	64	1.02920
42	1.03920	65	1.02610

Source: George B. Buck Consulting Actuaries, Inc.

**CONTINUED**

**1 OF 2**

Table A-11

## PFRS

## Withdrawal Rates

Age	Rate
20	.05780
21	.05460
22	.05150
23	.04850
24	.04460
25	.04190
26	.03930
27	.03680
28	.03440
29	.03210
30	.02990
31	.02780
32	.02570
33	.02370
34	.02170
35	.01980
36	.01800
37	.01640
38	.01490
39	.01350
40	.01220
41	.01100
42	.01000
43	.00900
44	.00800
45	.00700
46	.00600
47	.00500
48	.00400
49	.00300
50	.00200
51	.00100
52	.00100
53	.00100
54	.00100

Source: George B. Buck  
Consulting Actuaries, Inc.

## APPENDIX B: PFRS BENEFIT PROVISIONS

## APPENDIX B: PFRS BENEFIT PROVISIONS

A summary of the main benefit and contribution provisions of the retirement system as interpreted for the purposes of the valuation is presented in the following digest.

The term "average final compensation" is used to denote the average annual salary upon which contributions are made for the three years of creditable service immediately preceding retirement or for any three fiscal years of membership providing the largest possible benefit to the member or his beneficiary. The term "final compensation" means the compensation upon which contributions by the member to the Annuity Savings Fund were based in the last year of creditable service. The term "creditable service" means service as a member of the retirement system plus service, if any, covered by a prior service liability. The maximum credit for prior service is 30 years. The term "employer" refers to the State of New Jersey, the county, municipality, or political subdivision thereof, by which the member is paid. The term "aggregate contributions" means the sum of all the amounts deducted from the compensation of the member or contributed by him or on his behalf, standing to his credit in the Annuity Savings Fund. Any unpaid balance of a loan at the time any benefit becomes payable is deducted from the benefit otherwise payable. In accordance with the directive of the State Treasurer issued in 1975 under the terms of Chapter 57, P.L. 1970, for the purpose of computing actuarial equivalent benefits under the system regular interest is

GEORGE B. BUCK CONSULTING ACTUARIES, INC.

at the rate of 6 per cent per annum compounded annually. To be eligible for survivorship benefits a widow or widower must have been married to the member or retirant at date of death or the accident causing death and, except in the case of accidental death, for at least five years prior thereto. A widower or parent must have received at least one half of his support from the member or retirant in the twelve month period immediately preceding the member's or retirant's death or the accident causing death. A child, to be entitled to a benefit, must be unmarried, under age 18, or mentally or physically disabled at the member's or retirant's death, and such disability must have lasted or be expected to last not less than twelve months. Benefits to survivors are terminated at death or marriage, or, if payable to a child, upon the attainment of age 18 unless disabled.

## BENEFITS

### Service Retirement Allowance

#### Condition for Allowance

Any member who has attained age 55 is entitled to a service retirement allowance at his own request. Retirement is compulsory at age 65.

#### Amount of Allowance

The service retirement allowance consists of:

(a) An annuity which is the actuarial equivalent of the member's aggregate contributions, and

(b) A pension, provided by the employer's contributions, equal to the amount which when added to the member's annuity will provide a total retirement allowance of  $1/60$  of his average final compensation multiplied by the number of years of his creditable service, or 2% of his average final compensation multiplied by the number of years of his creditable service up to 30 plus 1% of such compensation multiplied by the number of years of his creditable service over 30, if greater.

Ordinary Disability  
Retirement Allowance

Condition for Allowance

An ordinary disability retirement allowance is payable to any member under age 55 who becomes permanently incapacitated, mentally or physically, for the performance of duty due to ordinary causes after 5 or more years of creditable service.

Amount of Allowance

The ordinary disability retirement allowance consists of:

(a) An annuity which is the actuarial equivalent of the member's aggregate contributions, and

(b) A pension, provided by the employer's contributions, equal to the amount which when added to the member's annuity will provide a total retirement allowance of 1-1/2% of his average final compensation multiplied by the number of years of his creditable service, or 40% of such compensation, if greater.

Accidental Disability  
Retirement Allowance

Condition for Allowance

An accidental disability retirement allowance is payable to any member who is permanently incapacitated, mentally or physically, for the further performance of duty as a direct result of a traumatic event occurring during and as a result of the performance of duty.

Amount of Allowance

The accidental disability retirement allowance consists of:

(a) An annuity which is the actuarial equivalent of the member's aggregate contributions, and

(b) A pension, provided by the employer's contributions, equal to the amount which when added to the member's annuity will provide a total retirement allowance of 2/3 of the member's actual annual compensation for which contributions were being made at the time of the accident.

## Withdrawal Benefit

### Lump Sum

Upon the separation of a member from service other than by death or retirement the amount of his aggregate contributions, reduced by any loan outstanding, is returned to him.

### Vesting Benefit

If a member has established 15 years of creditable service and is separated from service prior to age 55 either voluntarily or involuntarily, but not for misconduct or delinquency, he may receive in lieu of the lump sum payment provided for above a deferred retirement allowance commencing at age 55, which consists of:

(a) An annuity which is the actuarial equivalent of the member's aggregate contributions at the time of his severance from service, and

(b) A pension, provided by the employer's contributions, equal to the amount which when added to the member's annuity will provide a total retirement allowance of 2% of his average final compensation multiplied by the number of years of his creditable service up to 30 plus 1% of such compensation multiplied by the number of years of his creditable service over 30.

### Special Retirement Allowance

If a member who resigns prior to age 55 has established 25 years of creditable service, he may receive in lieu of the vesting benefit provided for above an immediate retirement allowance which is calculated in the same manner as the vesting benefit.

## Ordinary Death Benefit

### Lump Sum

Upon the death of a member in active service on account of which no accidental death benefit is payable, the amount of his aggregate contributions is paid to his beneficiary; and in addition an amount is paid from the employer's contributions equal to three and one-half times final compensation. Upon the death of a member prior to age 55 after election of a vesting benefit, the amount of his aggregate contributions is paid to his beneficiary.



If a member dies after retirement on a service, special, ordinary disability or accidental disability retirement allowance or after a vesting benefit has become payable, an amount is paid to his beneficiary equal to 1/2 of final compensation, except that for members enrolling on or after July 1, 1971 and retiring for other than disability 10 years of service credit are required to be eligible for this benefit. If death occurs prior to age 55 after retirement on an ordinary or accidental disability retirement allowance, the amount payable is 3-1/2 times such compensation.

The lump sum ordinary death benefits paid from the employer's contributions are provided through the purchase of group insurance coverage from The Prudential Insurance Company of America. At the request of the member or the beneficiary the amount payable at death may be paid in installments or as a life annuity instead of in a lump sum or in such other manner as may be made available by the insurance company.

#### Survivorship

Upon the death of a member after retirement on or after December 18, 1967 a pension is paid to the widow or widower equal to 25% of the member's average final compensation plus 15% of such compensation if there is one surviving child or 25% of such compensation if there are two or more children. If there is no eligible spouse, 20% of average final compensation is paid to one surviving child, 35% of such compensation to 2 surviving children in equal shares and 50% of such compensation to 3 or more children in equal shares.

Upon the death of a member who retired prior to December 18, 1967 on an accidental disability retirement allowance, a pension of \$1,600 a year is paid to his widow, if he leaves a widow to whom he was married at the time he became so disabled, or, if the member leaves no widow but children under age 18, a pension of \$600 a year if one such child; a pension of \$960 a year if two such children; a pension of \$1,500 a year if three or more such children.

## Accidental Death Benefit

### Condition For Benefit

An accidental death benefit is payable upon the death of a member in active service as a result of an accident in the actual performance of duty at some definite time and place.

### Amount of Benefit

If the member leaves a widow or widower, a pension is paid equal to 50% of final compensation. If there is no eligible spouse, 20% of such compensation is paid to one surviving child, 35% to 2 children in equal shares and 50% to 3 or more children in equal shares. If there is no eligible spouse or child, 25% of such compensation is payable to one surviving parent or 40% to 2 parents in equal shares. The survivorship benefits paid shall in no case total less than the member's aggregate contributions.

If there is no beneficiary eligible for a survivorship benefit, the member's aggregate contributions are paid to any other beneficiary.

In addition a cash sum equal to the lump sum benefit payable from the employer's contributions upon ordinary death is paid to the member's designated beneficiary or estate.

### Special Options Upon Retirement Prior To December 18, 1967

In lieu of the full retirement allowance, any member who retired prior to December 18, 1967 was permitted to receive an equivalent reduced allowance with provision for some benefit payable to his beneficiary on his death, in accordance with the options set forth in the retirement act.

Source: George B. Buck Consulting Actuaries, Inc., Police and Firemen's Retirement System of New Jersey, Thirty-First Annual Report of the Actuary, prepared as of June 30, 1975.

## APPENDIX C: AGENCY RESPONSE



State of New Jersey

DEPARTMENT OF THE TREASURY  
DIVISION OF PENSIONS

WILLIAM J. JOSEPH  
DIRECTOR

March 21, 1978

20 WEST FRONT STREET  
P. O. BOX 2058  
TRENTON, NEW JERSEY 08625

Mr. William R. Schmidt  
Director  
Division of Program Analysis  
Office of Fiscal Affairs  
State House Suite 232  
Trenton, New Jersey 08625

Dear Mr. Schmidt:

This will acknowledge receipt of the draft report of an actuarial analysis of the Police and Firemen's Retirement System of New Jersey prepared by the Division of Program Analysis, Office of Fiscal Affairs.

This is a most impressive study, enlightening in many respects and the recommendations are convincing. I must confess, however, that much of the report deals with material that could best be evaluated by someone skilled in the science of actuarial planning. I am conveying the confidential report to the members of the Board of Trustees, who I am sure will share with me the interest created by this report.

Much of this report deals with functions that the Board no longer performs, as much of the Board's original authority and responsibility has been redirected to the Division of Pensions and other State Divisions. The naming of an Actuary for instance, is now with the State Treasurer as is certain other functions. Rates of interest for actuarial purpose and regular rates are no longer established by the Board. Investment and various other functions have been legislated to other authorities.

Thus, while the report contains much significant material and obvious worthwhile recommendations, the technical knowledge and response would probably be forthcoming from other than our Board of Trustees.

Very truly yours,

PATRICK F. MCGANN  
CHAIRMAN, BOARD OF TRUSTEES  
POLICE & FIREMEN'S RETIREMENT  
SYSTEM OF NEW JERSEY

GEORGE B. BUCK CONSULTING ACTUARIES, INC.

EMPLOYEE BENEFIT PLAN CONSULTANTS

TWO PENNSYLVANIA PLAZA, NEW YORK, NEW YORK 10001

212-695-2800

April 7, 1978

Mr. William J. Joseph, Director  
Division of Pensions  
State of New Jersey  
P. O. Box 2058  
Trenton, New Jersey 08625

Dear Mr. Joseph:

You have asked that we comment on the "Actuarial Analysis of the Police and Firemen's Retirement System of New Jersey" prepared by the Office of Fiscal Affairs. Since, on page S-6 of the report, the OFA indicates that the "funded level...is favorable in comparison to many other pension plans of equal age, whether public or private, and especially in comparison to most police and fire plans" and that "from a financial standpoint there is no projected deterioration in the plan's funded status which would require a change in the current assumptions", our response will be relatively brief. In general, our discussion is limited to the recommendations made by OFA; it should be noted that we have not attempted to check the results presented in the report.

Recommendation No. 1 suggests use of "best-estimate" assumptions although admittedly this would make little difference in the level of current costs, if OFA "best-estimate" assumptions were utilized. In general, we agree that "best-estimates" are desirable but believe that it should be stressed that there can be substantial disagreement as to what constitutes best estimates. For example, OFA's assumptions utilize an increasing interest rate over the short-term; if interest rates are varied in actuarial valuations it is traditional to have long-term decreasing rates to reflect the greater uncertainty inherent in future events. In short, use of a "best-estimate" concept does not avoid controversy as to the particular assumptions employed.

Recommendation No. 2 would simply permit implementation of this suggestion that higher interest rates be assumed through use of "best-estimates". The OFA notes that the definition of "regular interest" under the PFRS law is designed to insure conservative funding which is cancelled out by the PFRS actuary's use of an artificially low salary scale. It should be noted that the PFRS actuary's level of contribution is higher (more conservative) than that based on the OFA "best estimate" assumptions. The inference could be drawn that the PFRS actuary's "artificially low salary level assumption" is not low enough to match the level of contribution derived on the basis of the OFA "best estimate" assumptions. Since conservative funding is a stated objective and there is a lack of agreement as to what constitutes the "best estimate", we see no need to change to explicit best-estimate assumptions at the present time.

Recommendations No. 3, No. 5 and No. 6 deal with the need to understand and recognize better the implications of the present "pay-as-you-go" cost-of-living adjustments. We agree that these potential liabilities in the cost-of-living area must be understood and concur with both No. 5 and No. 6. However, we believe that the OFA projections argue relatively strongly against full advance funding, because of the extremely large immediate cost increases and the fact that advanced funding would fairly quickly result in overfunding of accrued liabilities.

The final recommendation (No. 4) is that vested and non-vested liabilities be shown in the annual valuation report, along with the funding level of each. We are not sure how the funding level of each category would be determined and doubt that this information is of particular interest to participants. We feel that it could be somewhat misleading. The liabilities cited are on an "on-going" plan basis and do not reflect liabilities if the plan were terminated. Yet, almost invariably, these figures would be used to suggest the funding level of benefits if the plan terminated.

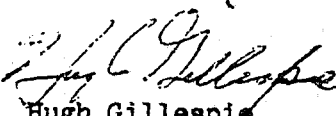
We have one technical comment with regard to the Analysis. The Analysis develops a number of liability measures based upon a plan termination liability concept. We believe this concept should not be introduced in a soundly funded, on-going public plan since it is of only limited theoretical interest. To suggest that funding of this liability is a possible goal or bench mark is to introduce irrelevancies in a plan such as PFRS.

In conclusion, the Analysis supports the financial soundness of the present plan, and the six recommendations would not appear to be of major significance.

Sincerely yours,

GEORGE B. BUCK CONSULTING ACTUARIES, INC.

By

  
Hugh Gillespie  
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| 76-1  | New Jersey's Contributory Public Employee Pension Programs: Program Analysis of the Public Employees' Retirement System, March, 1976                                      |        |  |
|       | - Synopsis  |        |  |
|       | - Recommendation-Implementation Program   |        |  |
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|       | New Jersey's Contributory Public Employee Pension Programs: Program Analysis of the Public Employees' Retirement System, March, 1976                                      |        |  |
|       | New Jersey's Contributory Public Employee Pension Programs: Actuarial Analysis and Pension Cost Forecast of the Teachers' Pension and Annuity Fund, March, 1976           |        |  |

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