II

Review of Recent PERS Experience Studies

In response to the Society's request, 60 experience studies covering 101 separate public plans were submitted. All plan types and sizes are represented. The studies vary greatly in methodology, depth, and duration; data analyzed in the studies were gleaned from periods ranging from one to six years.

As a whole, the collection of studies provides a vast wealth of data on the demographic and economic experience of PERS in America. We have gathered certain key results from the studies, and a compilation of that effort can be found in the appendixes. Note that measures of expected rates of mortality, withdrawal, and so on in this section are based on each plan's specific assumptions.

We present in this section a summary of the core results of those studies. Note that only a subset of the 101 plans is represented in each table presented; not all studies cover every assumption, and some of the presented conclusions do not lend themselves to compilation. Results are broken down by plan type:
- General employees' plans
- Police and fire plans
- Teachers and school plans.

The classifications are not as exact as desired; certain miscellaneous plans are combined with one of the categories listed above in the interest of conciseness. For instance, "hazardous" classifications for plans or correctional officer plans are included in police and fire, and nonteaching school employee plans are included with the teacher plans. There are also a few elected official or judge plans, which would be interesting samples on their own but are too small as a group to yield a meaningful result on their own. They are included in the general employees group. Also, any study covering a range of employee types but without distinct plan divisions is considered to be a general employees plan.

We have attempted to draw basic conclusions based on overall statistics; however, we have shied away from "overanalyzing" the data. That would be inappropriate for a survey of this broad scope. For those interested in drawing precise conclusions on specific topics, we recommend a thorough review of detailed aspects of selected studies. Note that the term "expected rates" refers to each plan's assumptions.

In addition, to provide an introduction to contrasts between study methodology and depth, we have selected five studies to review in more detail. The studies selected provide diversity in geographic location, participant type, plan size, complexity, and interpretative methodologies. They are:
- The California State Teachers' Retirement System 1988–1991 study
- The State of Mississippi Retirement Systems study for the two-year period ending June 30, 1992 (covering three PERS)
- The New York State and Local Retirement Systems study for April 1, 1986 through March 31, 1991 (covering two PERS)
- The Ohio State Highway Patrol Retirement System study for January 1, 1985 through December 31, 1989
- The Employees Retirement System of Texas study for 1985–1989 (covering three PERS and four employee groups, three groups of which are reviewed in this presentation).

The most recent valuation report of each system has been reviewed to determine whether recommendations were adopted.

A. Active Mortality Rates

Of all noneconomic assumptions reviewed in PERS experience studies, active mortality displayed the greatest overall variance from expectations (Table 1). For all studies reporting numbers of actual and expected deaths, there

were about 32,000 actual deaths compared with 45,000 expected occurrences, yielding an overall active mortality ratio of about 71%.

Active mortality does not have a major impact on the calculation of plan liabilities and costs. The occurrence of a preretirement death may or may not reduce plan liabilities, depending on PERS plan design. Furthermore, if a spread gain actuarial cost method (like frozen initial liability or aggregate) is used, any gain is muted by the loss of future payroll (and future contribution base) for the deceased. Nevertheless, a large number of the experience studies recommended decreases in assumed active mortality rates.

B. Disablement Rates

Disablement rates are difficult to assess *en masse* because of drastic differences in the definition of disability from plan to plan, system to system, duty-related

versus non-duty-related. Actual occurrences of disablement also vary greatly during the economic cycle; many systems experience spikes in disabled retirement during tough economic times.

Nevertheless, on the whole, PERS disablement assumptions seem to be rather accurate, according to recent experience studies. Only 14 of 73 PERS in Table 2 had actual-to-expected disablement ratios of less than 40% or greater than 160%, a surprising result for such a volatile event. In addition, the overall ratio was strikingly accurate, with about 37,100 actual disablements compared with about 40,300 expected—a 92% ratio.

C. Termination Rates

Actual termination rates for PERS in most recent available experience studies were close to expectations. Overall, there were approximately 864,000 actual separations from service prior to retirement, compared

TABLE 1
ACTIVE MORTALITY RATES

Ratio of Actual to Expected Mortality	No. of PERS by Type			
	General Employees	Police/Fire	Teachers/School	Total
<40%	3	2	2	7
40%–60%	9	4	4	17
60%–80%	5	3	7	15
80%–120%	5	3	7	15
120%–140%	0	1	0	1
140%–160%	0	0	1	1
>160%	1	1	0	2
Overall Ratio	67%	108%	79%	71%

TABLE 2
DISABLEMENT RATES

Ratio of Actual to Expected Disablement	No. of PERS by Type			
	General Employees	Police/Fire	Teachers/School	Total
<40%	1	2	3	6
40%–60%	7	6	2	15
60%–80%	6	5	6	17
80%–120%	9	2	7	18
120%–140%	3	1	2	6
140%–160%	0	2	1	3
>160%	4	2	2	8
Overall Ratio	93%	69%	93%	92%

with about 915,900 expected withdrawals. This is a PERS-wide ratio of more than 94%. Only five PERS of 72 in Table 3 fell in the boundary groups of less than 40% or more than 160%.

Turnover is an important assumption in PERS valuations. Vested benefits for terminating participants carry very little liability compared to retirement benefits. This is especially true since, as with private employers, vested benefits are generally payable at normal retirement and are *not* generally protected against inflation. In addition, terminating employees often take a refund of their contributions in lieu of a more valuable deferred benefit. Unfortunately, historical experience is not always a reliable indicator of future withdrawal patterns because withdrawal is highly sensitive to socio-economic conditions.

D. Retirement Rates

Retirement expectations are a crucial assumption in PERS valuations. Because many systems offer highly subsidized early retirement (especially for police and fire plans), there can be large swings in plan liabilities. For instance, if an individual were eligible for unreduced retirement at age 55 after 30 years of service but continued to work until age 65, even though no further credit were given for service accruals in excess of 30 years, the savings to the PERS could be in the neighborhood of 50–70% of the individual's total retirement liability.

PERS retirement ratios in Table 4 indicate a high level of accuracy in assumptions on an aggregated basis. Not only were 53 of 60 PERS within the 60–140% ratio corridor, but also the overall ratio for all PERS was about 94%: 337,000 actual retirements versus 359,600

expected. However, the key statistic is not really the number of retirements, it is the average age at retirement. Further study in that direction might yield a different conclusion.

E. Retiree Mortality

Mortality among retirees was accurately reflected in PERS assumptions. Overall, 184,300 deaths were recorded against 188,000 expected for a ratio of about 98%. In addition, 62 of 68 PERS fell in the 60–140% corridor (Table 5).

Retiree mortality is always an important actuarial assumption, with possible variations in liability between well-known tables in excess of 10%. Still greater variations are possible in PERS, because a large number of PERS offer automatic cost-of-living increases to retirees, thereby significantly increasing the value and duration of retired liabilities. Cost-of-living increases are not uncommon in the private sector but are rarely automatic.

The accuracy of the overall mortality ratio of 98% is somewhat diluted by the fact that the assumption must also reflect future mortality improvements. A static table accurately reflecting improvements would be expected to yield current mortality ratios in excess of 100%. Therefore, a 98% ratio is slightly aggressive.

F. Disabled Mortality

The PERS experience studies yielded comparatively sparse data on disabled mortality. Only 47 studies reported disabled mortality ratios. The overall result, however, was quite reasonable, with 15,900 recorded

TABLE 3
TERMINATION RATES

Ratio of Actual to Expected Termination	No. of PERS by Type			
	General Employees	Police/Fire	Teachers/School	Total
<40%	1	1	1	3
40%–60%	4	4	1	9
60%–80%	4	9	4	17
80%–120%	19	4	13	36
120%–140%	2	0	0	2
140%–160%	1	1	1	3
>160%	0	0	2	2
Overall Ratio	89%	65%	104%	94%

deaths compared to 14,900 expected—a ratio of about 107% (Table 6).

Conclusions about the accuracy of PERS disability assumptions would be hard to draw, because of relatively thin data, wide variations in the definition of disability, and the quality of disabled retiree data. In many systems, disabled data postretirement were either unavailable as a separate category or were of questionable accuracy. Many PERS combine disabled retirees with healthy retirees and use a single retired mortality assumption.

TABLE 4
RETIREMENT RATES

Ratio of Actual to Expected Retirement	No. of PERS by Type			
	General Employees	Police/Fire	Teachers/School	Total
<40%	0	0	0	0
40%–60%	2	0	0	2
60%–80%	6	2	1	9
80%–120%	15	9	18	42
120%–140%	1	0	1	2
140%–160%	0	1	0	1
>160%	2	2	0	4
Overall Ratio	87%	123%	103%	94%

TABLE 5
RETIREE MORTALITY

Ratio of Actual to Expected Mortality	No. of PERS by Type			
	General Employees	Police/Fire	Teachers/School	Total
<40%	0	0	0	0
40%–60%	0	2	0	2
60%–80%	3	3	1	7
80%–120%	23	6	22	51
120%–140%	2	1	1	4
140%–160%	0	2	0	2
>160%	0	2	0	2
Overall Ratio	103%	88%	94%	98%

TABLE 6
DISABLED MORTALITY

Ratio of Actual to Expected Mortality	No. of PERS by Type			
	General Employees	Police/Fire	Teachers/School	Total
<40%	1	0	0	1
40%–60%	1	0	1	2
60%–80%	1	3	1	5
80%–120%	10	3	13	26
120%–140%	3	0	1	4
140%–160%	1	0	0	1
>160%	3	3	2	8
Overall Ratio	105%	78%	110%	107%

G. Interest Rates

The validity of current economic assumptions, like the interest rate and salary increase assumption, has relatively little to do with historical data. Expected returns on PERS assets are most directly related to the current asset allocation and to experts' assessments of real rates of return possible in the capital markets. Since salary increases are directly influenced by interaction between the sponsors of the plan and by employee representatives, the best indicators of future increases are negotiated and/or published salary tables. The administration's intentions and the current employment market must also be considered in setting salary assumptions.

If recommendations in recent PERS experience studies are any indication, the perceived trend toward more aggressive interest assumptions has abated with the drop in bond rates during 1993. In Table 7, the number of studies recommending significant interest rate increases is negligible.

H. Salary Scales

In the experience studies, recommended decreases in salary escalation were twice as common as increases in interest rates (Table 8). Salary scale decreases serve to lower plan costs like interest rate hikes but to a lesser extent, since the rate alteration only affects present values during an employee's working career. Interest rates affect benefit values from hire to death.

Most likely, these reductions in salary scales reflect the change in the public employment market. The public sector appears to be changing from a high-security arena with relatively generous, quasi-guaranteed raises to a somewhat "leaner and meaner" employment source. It will be interesting to see the results of experience studies in the late 1990s and early 2000s to evaluate this theory and to analyze reommended salary assumptions as public employment enters the 21st century.

TABLE 7
RECOMMENDED CHANGE IN PLAN INTEREST RATE

Recommended Change	No. of PERS by Type			
	General Employees	Police/Fire	Teachers/School	Total
Lower >0.5%	1	1	1	3
Lower up to 0.5%	2	2	0	4
No Real Change	21	11	15	47
Raise up to 0.5%	3	3	3	9
Raise >0.5%	1	0	2	3

TABLE 8
RECOMMENDED CHANGE IN SALARY SCALE

Recommended Change	No. of PERS by Type			
	General Employees	Police/Fire	Teachers/School	Total
Lower >0.5%	5	7	4	16
Lower up to 0.5%	6	0	3	9
No Real Change	22	15	16	53
Raise up to 0.5%	1	1	2	4
Raise >0.5%	1	0	1	2