



Review of Individual Reports

A. The California State Teachers' Retirement System 1988–1991 Study

Period covered: 7/1/88–6/30/91
Most recent valuation: 6/30/93
Group size: 314,000 actives; 188,000 inactives
Group type: Teachers

1. Demographic Assumptions

a. Active Mortality Review

The old mortality basis was the 1983 Group Annuity Mortality (GAM–83) table, sex distinct. The table was set back five years for men and three years for women. The original intent was to maintain 5% margins for future mortality improvement. The experience study yielded mortality ratios of 104% for men and 102% for women (103% overall). These results were deemed to be adequate, and no change was recommended.

The valuation indicates no change, in accordance with the study.

b. Disablement Rate Review

A total of 1,104 disablements had been expected, based on then-current assumptions. The problem in this case was that the exact number of actual disablements could not be ascertained. The estimated number was in the 1,100 to 1,200 range. Considering the limited credibility of the data, the assumption was considered to be close enough, and no change was recommended.

The recommendation was honored in the valuation, but a new disability coverage with enhanced benefits ("Coverage B") had been introduced into the system after the experience study. An increase in disabilities, especially for short-service employees over age 50, was experienced for those with Coverage B, and separate

assumptions were derived for each coverage (A and B). Coverage A assumptions remained at the levels upheld by the experience study.

c. Withdrawal Rate Review

The prior study had found withdrawal rates well in excess of expectations. At that time, partial credibility had been given to the data in setting new assumptions. In this study, ratios again came in high: 118% for males (11,789 actual versus 9,997 expected) and 114% for females (28,996 versus 25,540). This time, full credibility was granted to the data. Increases in table rates were recommended, especially for short-service durations, to bring the ratios (based on the new table) down to 101% for both sexes. The study also covered an assumption as to the number of terminating employees who would take a refund of contributions in lieu of a deferred benefit.

The valuation reflects these recommended changes.

d. Retirement Rate Review

Ratios found in the study were 102% for males (11,028 versus 10,862) and 96% for females (13,072 versus 13,548). Recognizing that age of retirement is at least as important as number, the actuaries used a rule of thumb of adjusting any individual rates outside a 90–105% ratio corridor. This had little effect on the overall ratio, but the recommended changes produced a better fit.

The valuation reflected the recommendations. For Coverage B employees (see Section III-A-1-b, Disablement Review), the rates were adjusted down to reflect the subtle shift of retirements for that group into the disablement category.

e. Retired Mortality Review

Initial results showed mortality ratios of 98% for men and 106% for women. The actuary felt that, on

the face of it, these margins were a bit thin. However, data for 1989 deaths were unusually low. Considering that there had been a database change that year, all involved suspected that the data were inaccurate. In all likelihood, the real 1989 mortality ratios were higher than reported. Based on this, the recommendation was not to change from GAM-83, sex distinct, with a three-year setback for men and a one-year setback for women. Mortality for beneficiaries (the same as for retirees, but with a one-year setback for men) was also studied, and there was no recommendation to alter those tables either. These recommendations were accepted in the valuation.

f. Disabled Mortality Review

The system uses a modified mortality table to reflect any cessation of disablement, be it death, recovery to membership, or recovery to other employment. The study reviewed the experience and concluded that the old tables (loaded versions of GAM-51 tables) were a bad fit with the phenomenon being modeled. The GAM-83 table, sex distinct, with minimum "cessation" rates of 3% for men and 2% for women, was recommended for future valuations. There was also an assumption for a closed group of pre-1972 disabled retirees (setback versions of GAM-51 tables) that was reviewed and unaltered. Again, the valuation reflected these recommendations.

2. Economic Assumptions

a. Inflation Review

The study discussed post-World War II inflation nationally, which averaged about 4.6%. It then contrasted inflation in California, which, especially in the last 20 years, has been somewhat higher. As a result, no change to the 5.0% inflation assumption was recommended.

The valuation used a 5.0% inflation assumption.

b. Salary Scale Review

Increases in national average wages were reviewed. For the last 50 years, the average has been about 6.1%, which is 1.5% in excess of the 4.6% inflation rate. Thus, the existing 6.5% base salary increase rate (5.0% inflation plus 1.5% real increases) was not questioned.

The merit table, with additional increases ranging from 9.8% to 0.3% (generally declining with age and service), was also reviewed and left unaltered. Separate merit tables for men and women were left intact.

The valuation reflects these decisions.

c. Interest Rate Review

The actuaries calculated hypothetical returns over the last 50 years based on the plan's current asset allocation. The result was average real returns over the period of 3.5%. Adding this to the inflation assumption yielded an interest rate recommendation of 8.5%—no change from before.

The valuation uses an 8.5% rate of interest.

B. The State of Mississippi Retirement Systems Study for the Two-Year Period Ending June 30, 1992

Period covered: 7/1/90–6/30/92

Most recent valuations: 6/30/93 (General Employees and Highway Patrol), 9/30/93 (Municipal)

Group sizes: 135,000 actives and 38,000 inactive for General; 530 actives and 435 inactive for Highway; 761 actives and 1,988 inactive for Municipal

Group types: General Employees, Police, and Municipal Employees

General and Municipal Employees are covered in the discussions that follow. The result of the Highway Patrol study was that every assumption came in with actual results lower than expected. However, due to the paucity of data available for the group, little credibility was given to the results. Only active mortality was recommended for change—to significantly lower rates. The recommendation was reflected in the valuation.

Note that the Municipal plan is a closed plan: no future employees will join.

1. Demographic Assumptions

a. Active Mortality Review

General. The mortality ratios for the plan came in extremely low: 137 actual deaths to 401 expected for men, 33 to 79 for nonteaching women, and 48 to 128

for female teachers. The recommendation: lower the rates sharply. Preferred rates were reduced uniformly by 50% for men and nonteaching women, and apparently, the teacher/nonteacher split for women was removed.

The valuation reflected the recommendations.

Municipal. There was only one active death compared with 11 expectations. The recommended new table was the same as recommended for Highway Patrol—a drastic reduction from previous assumptions.

The valuation accepted the recommendation, apportioning the new rates into duty (1/3 of rate) and non-duty (2/3) rates.

TABLE 9
MUNICIPAL
RETIREMENT RATES
IN THE MISSISSIPPI
RETIREMENT
SYSTEMS STUDY

Service	Old	New
20	25.0%	35.0%
21-29	3.0	17.5
30	75.0	25.0
31+	10.0	25.0
Age 65	100.0	100.0

b. Disablement Rate Review

General. There were 284 disablements compared to 400 expected. No change was recommended, however; the data were considered to be too sparse for such a conclusion. Data from the next study would be reviewed to determine whether the trend continued.

Municipal. Twelve disablements occurred compared with seven expectations. Again, thin data warranted no recommended alteration in rates.

It is uncertain whether any changes were made in the valuations.

c. Withdrawal Rate Review

General. Based on an overall withdrawal ratio of 21,307 terminations versus 21,498 expected, no change was recommended.

Municipal. There were 15 withdrawals compared with 12 expected. No change was recommended.

It could not be determined whether any changes were made in the valuations.

d. Retirement Rate Review

General. Some 5,147 employees retired over the period, compared with 4,601 expected events. A total of 807 of 1,009 expected retired at first eligibility, while 4,340 of 3,592 expected retired in later years. Based on these proportions, no changes in the tables were recommended.

It was not possible to determine whether no change occurred in the valuation.

Municipal. Some 184 retirements occurred compared with 76 expectations. As a result, new rates were recommended (Table 9).

The new rates were used in the valuation.

e. Retired Mortality Review

General. As for active mortality, three ratios were reported: 1,293 actual deaths versus 1,043 expected for men; 492 versus 458 for nonteaching women; and 839 versus 712 for women teachers. It appears that the recommendation was to leave the current tables in place but to use the current nonteaching women's table for all women in the future.

Municipal. A total of 75 deaths were reported, compared with an expectation of 106. Recommended rates brought the ratio near 100%.

The new tables appear to have been used in the valuations.

f. Disabled Mortality Review

General. For males, a ratio of 93 deaths against 139 expected was reported. For females, the ratio was 58 deaths versus 97 expected. Recommended rates were a uniform 25% reduction of the old rates.

Municipal. With only eight actual deaths compared with the 25 generated from tables, the recommendation was a drastic reduction in valuation rates, especially at lower ages.

The valuations appeared to have reflected these rates.

2. Economic Assumptions

a. Inflation Review

Inflation was not reviewed in this study.

b. Salary Scale Review

General. Average salary increases for the period came in lower than expected for both sexes: 2.1%

lower for men, and 3.2% lower for women. Data were not considered to be plentiful enough for a recommendation to change the scales, however.

Municipal. Actual increases overall lagged expectations by 1.4%. But again, sparse data caused the actuary to hold off on recommending any change.

It could not be verified whether the scales had been changed in the valuations.

c. Interest Rate Review

Interest rates were not reviewed in this study.

C. The New York State and Local Retirement Systems Study for April 1, 1986 to March 31, 1991

Period covered: 4/1/86–3/31/91

Most recent valuation: for fiscal year ending 3/31/94

Group sizes: 567,000 actives and 237,000 inactives for General; 35,000 actives and 21,000 inactives for Police and Fire

Group types: General Employees, Police and Fire

This study and the subsequent valuation were performed by the system's internal actuarial staff. The valuation states that all recommendations in the study were adopted effective April 1, 1992.

1. Demographic Assumptions

a. Active Mortality Review

General. Mortality ratios (actual over expected) were 83.7% for accidental death and 87.2% for ordinary death. Tables were recommended that would bring these ratios to 103.4% and 100.2%, respectively.

Police and Fire. Study ratios of 55.7% for accidental death and 78.5% for ordinary death prompted recommendations of tables that improved those ratios to 98.2% and 100.7%.

b. Disablement Rate Review

General. Overall disablement ratios of 158.8% for accidental disablement and 151.7% for ordinary disablement led to rate changes that brought the ratios to 98.9% and 100.6%.

Police and Fire. Ratios for this group were strikingly high: 187.3% for accidental disability and 288.8% for ordinary disability. New rates reflected the high incidence in the study period, bringing the ratios down to 112.8% and 101.2%. Interestingly, the study confirmed the widely held belief that disability benefits in public safety plans are often used as enhanced retirement vehicles; 30% of all retirements in the 1991 portion of the study data were recorded as disability retirements.

c. Withdrawal Rate Review

General. A withdrawal ratio of 81.3% was reported for nonvested withdrawals, while a 100.9% ratio was reported for vested terminations. New tables were recommended, yielding ratios of 99.8% and 99.9%.

Police and Fire. Actual terminations were only 65% of the expected number for nonvested participants; the ratio rose to 79.6% for vested. New tables brought the percentages to 99.9% and 99.1%, respectively.

For both groups, the actuary commented on the need to consider select and ultimate withdrawal tables in conjunction with the next study, citing actuarial losses due to service-indifferent tables.

d. Retirement Rate Review

General. Four different tiers of retirement eligibility are possible in the system, with three different sets of assumptions (Tier 1 & 2, Tier 3, and Tier 4). The Tier 1&2 ratio was 103.3%, with Tier 3 coming in at 80.0% and Tier 4 at 43.7%. Rates were changed so that the Tier 1&2 ratio became 100.0%. The Tier 3 and Tier 4 assumptions were revised and combined to a single assumption, resulting in a revised combined ratio of 97.5%.

Police and Fire. With retirement eligibilities of 20 years, 25 years, and age 55, three sets of assumptions pertain here as well. The 20-year assumption came in at a 107.0% ratio; 25 years was 129.4%; the age 55 version was 129.2%. New tables improved the ratios to 98.9%, 100.6%, and 127.1%, respectively.

e. Retired Mortality Review

General. Mortality ratios were 113.9% for men and 129.6% for women. New tables brought both ratios to 125.0%.

Police and Fire. The ratio here was also adjusted by table changes to 125.0%, in this case from study results of 103.8%.

It is clear that the actuary believes there should be a 25% margin in the tables for future mortality improvements.

f. Disabled Mortality Review

Disabled mortality was not reviewed in this study.

2. Economic Assumptions

a. Inflation Review

Both plans. A review of historical inflation data in the U.S. indicated to the actuary that the reasonable range was 4.5% to 5.0%, prompting a recommendation not to change the current rate of 5.0%.

b. Salary Scale Review

General. A general presentation and review of historical national and system increases persuaded the actuary that the current average total rate of increase—7.3%, consisting of 5.0% inflation and 2.3% merit and productivity—should be kept, but that the age distribution of increases should be altered modestly to produce a better fit.

Police and Fire. The same rationale led to the reaffirmation of the 7.0% rate for this group, with minor refitting of individual age rates.

The study did warn that, if current downward trends in salary increases continued (in line with the 1992 wage freeze), the assumption would need to be revised in the future for both groups.

c. Interest Rate Review

General historical asset return information was displayed and discussed, and the current investment environment was reviewed. Finding the current rate of 8.75% to be within the boundaries of the parameters of the discussion, the actuary recommended no change.

D. The Ohio State Highway Patrol Retirement System Study for January 1, 1985 to December 31, 1989

Period covered: 1/1/85–12/31/89
Most recent valuation: 12/31/93

Group size: 1,467 actives and 735 inactive

Group type: Police

This plan was chosen as a contrast to the larger studies in the selected group.

1. Demographic Assumptions

a. Active Mortality Review

Six deaths were reported, compared with 13 expected. No change was recommended due to the lack of credibility of active mortality data in a small system. The actuary believed that “the present table contains a reasonable margin for adverse fluctuations. . . .”

It does not appear the table was changed in the valuation, although a separate table for females may have been instituted.

b. Disablement Rate Review

Seven actual disablements occurred, compared with 12 expectations. The previous study had shown four disablements against 20 expected and had lowered the rates, giving partial credibility to the data. Further credibility was granted this time, and a rate change shown in Table 10 was recommended.

**TABLE 10
DISABLEMENT RATES
IN THE OHIO STATE
HIGHWAY PATROL
RETIREMENT
SYSTEM STUDY**

Age	Old	New
25	0.09%	0.04%
30	0.10	0.06
35	0.14	0.08
40	0.21	0.16
45	0.32	0.22

This change was reflected in the valuation.

c. Withdrawal Rate Review

A total of 134 terminations occurred, versus 184 expected withdrawals. The biggest variance was in the 25–35 age bracket. A very modest rate reduction was recommended.

The rate changes were followed in the valuation.

d. Retirement Rate Review

A total of 90 participants retired, compared with 75 expected to retire. The ratio was fairly accurate, but the average age of actual retirements was significantly higher than expected. However, the system had recently been amended to allow unreduced retirement at age 48 with 25 years of service, which was likely to lower the average retirement age. The actuary recommended no change because of inadequate experience under the new provision.

e. Retired Mortality Review

A total of 48 retirees died compared with table rates of 57. The actuary recommended no change, but warned, "However, if present trends continue, it is likely that this assumption will be revised in connection with the next experience study."

It appears that the old table (GAM-71 projected to 1984) was kept, but that a female version of the table was also instituted.

f. Disabled Mortality Review

Disabled mortality was not reviewed in this study. The valuation does not appear to have a separate disabled mortality rate.

2. Economic Assumptions

a. Inflation Review

A rate of 5.5% was recommended, based on a general review of historical and current inflation measures. This was followed in the valuation.

b. Salary Scale Review

It was noted that average pay increased for the study period at an average rate of 6.0%, compared with 3.7% inflation. Across-the-board increases of 5.5% were upheld as a recommendation, as was the existing merit table, which assumed additional increases of 4.2% to 0.0%, descending by age. The study showed actual merit increases during the study period to be reasonably aligned with the table, except at very young ages. The recommendations were followed in the valuation.

c. Interest Rate Review

Returns during the period averaged more than 10%, but the actuary noted that "the investment results of the 1980s nationwide are unusual by historical standards." As a result, no change in the then-current rate of return of 7.75% was recommended.

The valuation used 7.75%.

E. The Employees Retirement System of Texas Study for 1985-1989

Period covered: 9/1/85-8/31/89

Most recent valuation: 10/1/93

Plan size: 146,000 actives and 43,000 inactives in total

Group types: General Employees, Police/Custodial Officers, Elected Officials

There are several plans covered by the study, including a supplemental plan for police/custodial and two plans for judges. Only the portion of the study covering the main PERS is reviewed. The valuation received was for that plan only. It appears, however, that the same assumptions are used for police/custodial Officers in both the PERS and supplemental police/custodial plan valuations.

1. Demographic Assumptions

a. Active Mortality Review

General. Mortality rates are separated into occupational and nonoccupational. Data for occupational deaths were sparse—9 deaths versus 12 expected for men and one versus none expected for women. Non-occupational death yielded more credible data, with ratios of 92.0% for men and 76.4% for women. The occupational tables were left alone, but altered tables were recommended for regular mortality. The old male table had declining rates from 20 to 29, which ran against plan experience. The rates were adjusted to proceed smoothly upward. The whole female table was adjusted downward. The resulting nonoccupational ratios were 101% for men and 100.9% for women.

Police/Custodial Officers. Occupational deaths were as expected: four actual, four expected for men. No change was recommended. The regular tables were found to be less accurate, with a male ratio of 114.1% and a female ratio of 169.1%. The recommended tables yielded revised ratios of 103.6% for men and 112.7% for women. The female results were given less credibility due to the small female plan population.

Elected Officials. The group was considered to be too small to yield credible data. General employees nonoccupational rates were recommended.

All recommendations for active mortality were used in the valuation.

b. Disablement Rate Review

General. Disablement rates were also separated into occupational and nonoccupational tables. Occupational ratios were 115% for men and 104.2% for women. The female table was considered to be accurate, while a decrease in male rates was recommended, bringing the ratio down to 98.6%. Nonoccupational ratios were rather low: 77.8% for men and 67.6% for women. Significantly lower rates were recommended, raising the ratios to 100.7% for men and 97.4% for women.

Police/Custodial Officers. Occupational ratios for this group were starkly out of range: 273.9% for men and 439.3% for women. Nonoccupational ratios were 40.5% and 0.0% for women (zero actual to 12 expected). All rates were adjusted except for the nonoccupational female rate. The new ratios were 97.1% male occupational, 154.1% female occupational, and 80.3% male nonoccupational. The actuary stated that full credibility had not been accorded to the data due to the size of the sample.

Elected Officials. The group was again considered to be too small to yield useful data. General Employees nonoccupational rates were recommended for active mortality.

All disability rate recommendations were reflected in the valuation.

c. Withdrawal Rate Review

General. No changes were recommended due to accurate results: a 95% withdrawal ratio for males, 106% for females, and 101% overall.

Police/Custodial Officers. Ratios for this group were also considered to be adequate, with ratios of 93% for men, 112% for women, and 96% overall.

Elected Officials. The study showed erratic turnover patterns for this group, with large spikes in the 35–39 and 50–54 age brackets. Overall, turnover was 6% for nonvested and 15% for vested officials. The actuary recommended a flat 8% rate of turnover regardless of age or vested status. Again, all recommendations were used in the valuation.

d. Retirement Rate Review

General. Due to an early retirement window during 1987–89, the only usable data for the study were for 1986. The ratios were 90% male, 100% female, and 94% total. Because of the distortion caused by the window, the actuary drew no conclusion from the sparse data and recommended no change.

Police/Custodial Officers. Ratios were rather low for police/custodial, with men at 69%, women at 66%, and 69% aggregated. However, the system had just put in place unreduced retirement at age 50 with 10 years of service. This provision was expected to produce more early retirements; in fact, data from the first two months of the new plan provision showed rates of retirement well in excess of current expectations. The actuary believed that the retirement binge would level off to rates close to current assumptions, and so no change in rates was recommended.

Elected Officials. The available data showed retirement spikes at ages 50 and 60, the first eligibility ages, and higher actual rates after age 60 than before. Based on this experience, the rates in Table 11 were recommended. All recommendations were incorporated in the valuation.

TABLE 11
ELECTED OFFICIALS RETIREMENT
RATES IN THE EMPLOYEES
RETIREMENT SYSTEM
OF TEXAS STUDY

Age	Rate
50	60%
51–59	20
60	60
61–67	30
68–69	50
70	100

e. Retired Mortality Review

All groups. Retired mortality was evaluated on a plan-wide basis. The old tables (Unisex Pension Table 1984 with setbacks) produced mortality ratios of 100.2% for men and 111.6% for women. These ratios were not thought to contain enough margin for future mortality improvements. Therefore, the GAM-83 table, sex distinct, was recommended. This increased the ratios significantly to 111.1% for men and 119.2% for women.

The valuation used the GAM-83 tables.

f. Disabled Mortality Review

All groups. Mortality ratios for disabled retirees were low for men (87.3%) and accurate for women (99.3%). Much higher ratios of mortality in the first year of disability were exhibited: 168.4% for men and 209.3% for women. The actuary believed that this was probably the result of stricter standards in recent disability claims. Expecting that continuing strict disability provisions would cause higher mortality rates over the long haul, the actuary recommended that the current tables not be altered.

The valuation used 83% of the 1965 Railroad Retirement Board table for men and 53% of the table for women. The study shows the old table as 85%/55%. Whether this was just a typographical error could not be ascertained from the documents.

2. Economic Assumptions

a. Inflation Review

All groups. Relying mainly on the opinion that the Federal Reserve Board would move aggressively to

contain any inflationary trend threatening to break the 5% barrier, the actuary believed that long-term future inflation would be 4% to 5% per annum. The rate of 4.5% was selected as the recommended inflation rate.

This rate was reflected in the valuation.

b. Salary Scale Review

All groups. Underlying salary growth was anticipated at 5.0%–4.5% for inflation plus 0.5% due to anticipated future labor shortages. A single merit table for all participants was recommended to replace all old merit assumptions. The old set of assumptions had included separate male and female tables, as well as separate tables for employment classifications. The new tables, when combined with the underlying 5.0% increase assumption, reflected about a 1.25% decrease for general employees and a 1.40% decrease for police/custodial officers from the previous assumptions. No increases were assumed for elected officials.

The valuation incorporated the 5.0% assumption, as well as the new tables.

c. Interest Rate Review

All groups. After reviewing historical return data and discussing current economic conditions, the actuary estimated real rates of return was 6.0% for equities, 3.5% as a blended rate for a diversified bond portfolio, and 2.0% for cash and short-term instruments. Applying these forecasts to the then-current asset allocation of 68% bonds, 27% stocks, and 5% cash, the actuary recommended an interest rate of 8.5%, with a real rate of return of 4.0%.

The interest rate in the valuation was 8.5%.