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ABSTRACT

The California State University and Colleges' (CSUC) Early Retirement Incentive (ERI) Program is described, and information is presented of those who retire during a three-month period with an incentive bonus of two additional years of (unearned) retirement service credit. During the eligibility period 1,047 CSUC employees retired, and it appears that from 865 to 925 of these retirements would not have occurred in the absence of the ERI program. Of the 1,047 employees who retired under the ERI program, faculty members constituted the single largest occupational group, with 415 retirees. The 169 secretarial employee retirees were the next largest group, followed by service employees and technical employees. While white males represented 49.1 percent of all full-time CSUC employees in 1979, they comprised 59.9 percent of the ERI program participants. Most of those who retired under the ERI program indicated that the two years' additional service credit bonus was significant factor in their decisions to retire. A statistical model of retirement behavior identified four factors as the primary determinants of retirement on 1978-79 and 1979-80: age, final compensation, the value of the retirement annuity, and whether the ERI program was in effect. The total cost of funding the two years' additional service credit bonuses was $11.1 million, with $6.6 million attributable to faculty and $4.5 million to nonfaculty retirements. Questionnaires are appended. (SW)

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# AN ANALYSIS OF THE CALIFORNIA STATE UNIVERSITY AND COLLEGES' EARLY RETIREMENT INCENTIVE PROGRAM

A REPORT PURSUANT TO CHAPTER 656 OF THE STATUTES OF 1979



AUGUST 1981

LEGISLATIVE ANALYST
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## SUMMARY AND RECOMMENDATION

### SUMMARY OF FINDINGS

#### Introduction

1. Chapter 656, Statutes of 1979 (AB 876) authorized the creation of an Early Retirement Incentive (ERI) program for employees of the California State University and Colleges (CSUC).

2. The passage of AB 876 resulted primarily from the Legislature's concern that layoffs be averted, should the CSUC face budgetary stringencies which could result in "...an impending curtailment of, or change in the manner of providing services."

3. The CSUC Early Retirement Incentive program was approved by the Governor in March 1980, in response to concerns expressed by CSUC that layoffs might result if Proposition 9 (the Jarvis income tax initiative) were approved by the electorate. Because Proposition 9 was defeated, no layoffs occurred within CSUC and, consequently, the issue of the ERI program's effectiveness in preventing layoffs was rendered moot.

#### Chapter I: Description of the CSUC Early Retirement Incentive Program

1. The CSUC Early Retirement Incentive program provided qualified CSUC employees who retired during a specified eligibility period with an incentive bonus of two additional years of (unearned) retirement service credit.

#### Chapter II: Those Who Retired

1. During the three-month period that the ERI program was in effect, 1,047 CSUC employees retired. Even after allowing for normal

retirement activity and the fact that some employees postponed their retirements to take advantage of the program, it appears that from 865 to 925 of these retirements would not have occurred in the absence of the ERI program.

2. Of the 1,047 CSUC employees who retired under the ERI program, faculty members constituted the single largest occupational group, with [illegible] retirees. Secretarial employees, with 169 retirees, constituted the next largest group, followed by service employees and technical employees.

3. Whites comprised the single largest racial group of retirees, accounting for 963 (92.0 percent) of the 1,047 participants in the ERI program. Black retirees placed a distant second, with 3.4 percent of the total, followed by Asians and Hispanics.

4. White males retired in numbers disproportionate to their share of total employment in the CSUC system. While white males represented 49.1 percent of all full-time CSUC employees in 1979, they comprised 59.9 percent of the ERI program participants.

5. By inducing many employees to retire earlier than they would have otherwise, the ERI program has created additional opportunities for CSUC to address affirmative action goals. At the same time, however, CSUC's ability to achieve dramatic changes in the percentage distribution of employment by race and sex is limited by the small number of positions vacated relative to the total number of positions in the CSUC system.

6. Our analysis indicates that, while the ERI program may be viewed as a useful adjunct to an existing affirmative action program, it is doubtful whether the program could be justified on this basis alone, absent a demonstration that is the most cost-effective means to achieve affirmative action goals.

## Chapter III: Why Employees Retired

1. Most of those who retired under the ERI program did not retire significantly earlier than they would have otherwise. A survey of CSUC employees eligible for the program indicates that 65.4 percent of the non-faculty and 97.4 percent of the faculty retirees would have retired within three years, had the ERI program not been available.

2. Participants in the ERI program indicated that the two years' additional service credit bonus was a significant factor in their decisions to retire. Fully 82.3 percent of the faculty and 87.8 percent of the non-faculty retirees felt that the bonus was "important" or "very important" in their decisions to retire under the program. These retirees also rated the potential impacts of Proposition 9 as of much less importance in their retirement decisions.

3. A statistical model of retirement behavior, developed for this report, identifies four factors -- an employee's age, his final compensation, the value of his retirement annuity, and whether the ERI program was in effect -- as the primary determinants of retirement behavior among CSUC employees in 1978-79 and 1979-80. Using these factors, the model accurately predicts retirement behavior in 94 percent of the cases on which it is based.

4. Results of the retirement behavior model indicate that the ERI program had a dual impact on the retirement behavior of CSUC employees. First, by offering an employee an increase in the value of his retirement annuity, the program increased the probability that the employee would retire. Second, because the ERI program was offered for a limited time only, the program caused an increase in the employee's probability of

retirement, apart from that which might normally have been expected due to the increase in the value of the annuity.

5. Results of the retirement behavior model further indicate that the high level of participation in the ERI program is largely attributable to the fact that the program was offered for a limited time only, on a "now or never," "take it or leave it" basis. Thus, it would clearly be incorrect to conclude that, if the ERI program were adopted on a permanent basis, or even offered with predictable frequency, participation rates similar to those of the original program could be sustained.

Chapter IV: Fiscal Impact of the ERI Program

1. The total cost of funding the two years' additional service credit bonuses provided to ERI program retirees amounted to $11.1 million, with $6.6 million attributable to faculty and $4.5 million to non-faculty retirements. The average cost per retirement of funding the bonuses was approximately $13,600 for faculty and $8,000 for non-faculty.

2. Our analysis indicates that, for faculty, the CSUC Early Retirement Incentive program pays for itself, in that net compensation savings resulting from the program more than offset the cost of the bonuses. A comparison of projected costs with and without the ERI program, based on a computer simulation model of 329 faculty positions vacated during the program, indicates that the program will result in net savings of up to $6.8 million in the first seven years.

3. Based on the fiscal impacts projected by the faculty simulation model, our analysis also indicates that, if similarly high levels of participation and cost savings are to be achieved in future ERI-type programs

offered CSUC faculty, the next such program should not be offered until 1986-87 at the earliest.

4. Our analysis indicates that the ERI program is not a cost-effective means of inducing non-faculty employees to retire. This is because the potential savings associated with each non-faculty position vacated is greatly outweighed by the cost of funding the two years' additional service credit bonus. This conclusion would also apply to other ERI-type programs covering employees in occupations that do not have broad salary scales.

RECOMMENDATION

We recommend that, if the Legislature decides to offer an Early Retirement Incentive-type program to CSUC employees in the future, (1) such a program include as one of its elements a limited eligibility period, similar to that of the original program (three months) and (2) such a program not be offered until 1986-87, at the earliest, because our analysis indicates that:

- The high level of participation in the original program (and the consequent cost savings for faculty) is largely attributable to the fact that the ERI program was offered for a limited time only; and
- The optimal frequency of offering an ERI-type program to CSUC faculty is no more than every seven to eight years.

Chapter 65, Statutes of 1979 (AB [illegible]) authorized the [illegible] of an Early Retirement Incentive (ERI) program for employees of the California State University and Colleges (CSUC) subject to the approval of the Governor and the CSUC Board of Trustees. Under the terms of the ERI, CSUC employees were offered the opportunity to receive two years of credit under the state's retirement service credit towards their retirement annuities if they

(1) retired during a 90- to 120-day eligibility period specified by the Governor, and

(2) at the time of retirement, (a) were age 50 or older and (b) possessed five or more years of service credited to the Public Employees' Retirement System (PERS) or the State Teachers' Retirement System (STRS).

In practice, this meant that an eligible employee could increase his annual retirement annuity by from 2.1% to 4.4 percent of his final compensation (defined as the average salary paid the employee during the three years immediately preceding retirement) by electing to retire under the ERI program.

AB 370 further specified that the cost of the additional two years' service credit would be financed by the CSUC Board of Trustees. Specifically, the act required the board to transmit to PERS or STRS an amount equivalent to the actuarial present value of the additional retirement benefits created. (The actuarial present value is that amount which, if deposited at the time of an employee's retirement, would be sufficient to pay that employee's retirement benefits over the [illegible] expected lifetime -- allowing for such factors as [illegible]

increases in the annual level of benefit payments and the expected rate of return earned on the deposit.):

In discussions with staff of the Legislative Analyst's Office and in testimony before the Legislature at the time AB 876 was under consideration, CSUC representatives maintained that the bill would "pay for itself." Specifically, they stated that the costs of the ERI program would be fully funded out of salary savings resulting from either or both of the following: (1) holding vacated positions open, or (2) filling vacated positions with employees at a lower salary level. Consequently, the Legislature approved AB 876 with the understanding that any costs would be absorbed within the regular CSUC support budget, and no appropriation was provided.

Finally, AB 876 directed the Legislative Analyst to "...evaluate the results of the early retirement incentive program...and its effectiveness in preventing layoffs." The legislation was repealed by force of its own provisions on June 30, 1980.

Layoffs Primary Concern

The passage of AB 876 resulted primarily from the Legislature's desire to avoid layoffs, should the California State University and Colleges face budgetary stringencies that threatened "...an impending curtailment of, or change in the manner of performing services." Not mentioned in the authorizing legislation, but expressed by the CSUC Trustees, was the additional belief that, shou budgetary reductions fail to materialize, the ERI program would present significant opportunities for: (1) hiring and promoting younger professors in the faculty ranks and (2) hiring women and members of ethnic minorities in all employee classfications.

The Early Retirement Incentive program was approved by the Governor and the Board of Trustees in late March 1980. At that time, there was a great deal of concern within the CSUC system that the electorate would approve Proposition 9 (the Jarvis income tax initiative). This concern ultimately proved unwarranted, as the initiative was not approved. Thus, because Proposition 9 was not enacted, the effectiveness of the ERI program in preventing layoffs became a moot issue; simply put, there were no layoffs to prevent.

Although the Early Retirement Incentive program's effectiveness in preventing layoffs was not tested, other important aspects of the program remain to be evaluated: Who retired under the ERI program? Why did they retire? How much of an incentive was provided by the two years of additional retirement service credit? How did the program affect CSUC's affirmative action efforts? Did the ERI program, in fact, pay for itself? The analysis of these issues is the task of this report, which is divided into four parts as follows:

I. Description of the CSUC Early Retirement Incentive Program

II. Those Who Retired

III. Why Employees Retired

IV. Fiscal Impact of the ERI Program

Readers interested in the more technical aspects of how the analysis was conducted may profit from reading Appendix D, "A Note on Research Methodology," prior to embarking on the main body of the report. It is by no means necessary, however, that the general reader do so in order to understand the analysis and conclusions developed below.

This report was prepared by Raymond M. Reinhard under the supervision of Hal Geiogue. Assistance in the development of the computer-produced graphics was prov[redacted] Peter Schaafsma.

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# I. DESCRIPTION OF THE CSUC EARLY RETIREMENT INCENTIVE PROGRAM

## A. ELEMENTS OF THE ERI PROGRAM

The CSUC Early Retirement Incentive program, as created by AB 876, provided that qualified CSUC employees who retired during a specified eligibility period would receive an incentive bonus of two additional years of (unearned) retirement service credit.

### Qualified CSUC Employees

The ERI program was available to all CSUC employees (faculty and non-faculty) who, as of June 29, 1980: (1) were at least 50 years of age and (2) possessed a total of at least five years of service credited to either the Public Employees' Retirement System (PERS) or the State Teachers' Retirement System (STRS), or both.

### Eligibility Period

The eligibility period for participation in the ERI program encompassed three months, from March 27 to June 29, 1980. To participate in the program, an employee's effective retirement date had to fall within this three-month period.

### Incentive Bonus

As an incentive to induce qualified CSUC employees to retire early, the ERI program offered a bonus of two years of additional, unearned retirement service credit.

In order to discuss the value to the employee of this bonus, it is necessary to understand how the retirement annuity is determined. For members

of the Public Employees Retirement System (PERS), who constituted the vast majority of those eligible for the ERI program, the basic retirement annuity is based on three factors: (1) the employee's final compensation (defined as the average salary paid the employee during the three years immediately preceding retirement), (2) the years of service in PERS-covered employment credited to the employee, and (3) the percentage of final compensation to which the employee is entitled for each year of credited service. These three factors are related by the so-called "2 percent at 60 formula."

Table 1

PUBLIC EMPLOYEES' RETIREMENT SYSTEM

MISCELLANEOUS SERVICE RETIREMENT

EFFECTIVE JANUARY 1, 1977

**2% AT 60 Formula**

Exact Age and Percentage of Final Compensation

| Years of Service | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63+ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1.092 | 1.156 | 1.224 | 1.296 | 1.376 | 1.460 | 1.552 | 1.650 | 1.758 | 1.874 | 2.000 | 2.134 | 2.272 | 2.418 |
| 5 | 5.46% | 5.78% | 6.12% | 6.48% | 6.88% | 7.30% | 7.76% | 8.25% | 8.79% | 9.37% | 10.00% | 10.67% | 11.36% | 12.09% |
| 6 | 6.55% | 6.94% | 7.34% | 7.78% | 8.26% | 8.76% | 9.31% | 9.90% | 10.55% | 11.24% | 12.00% | 12.80% | 13.63% | 14.51% |
| 7 | 7.64% | 8.09% | 8.57% | 9.07% | 9.63% | 10.22% | 10.86% | 11.55% | 12.31% | 13.12% | 14.00% | 14.94% | 15.90% | 16.93% |
| 8 | 8.74% | 9.25% | 9.79% | 10.37% | 11.01% | 11.68% | 12.42% | 13.20% | 14.06% | 14.99% | 16.00% | 17.07% | 18.18% | 19.34% |
| 9 | 9.81% | 10.40% | 11.02% | 11.66% | 12.38% | 13.14% | 13.97% | 14.85% | 15.82% | 16.87% | 18.00% | 19.21% | 20.45% | 21.76% |
| 10 | 10.92% | 11.56% | 12.24% | 12.96% | 13.76% | 14.60% | 15.52% | 16.50% | 17.58% | 18.74% | 20.00% | 21.34% | 22.72% | 24.18% |
| 11 | 12.01% | 12.72% | 13.46% | 14.26% | 15.14% | 16.06% | 17.07% | 18.15% | 19.34% | 20.61% | 22.00% | 23.47% | 24.99% | 26.60% |
| 12 | 13.10% | 13.87% | 14.69% | 15.55% | 16.51% | 17.52% | 18.62% | 19.80% | 21.10% | 22.49% | 24.00% | 25.61% | 27.26% | 29.02% |
| 13 | 14.20% | 15.03% | 15.91% | 16.85% | 17.89% | 18.98% | 20.18% | 21.45% | 22.85% | 24.36% | 26.00% | 27.74% | 29.54% | 31.43% |
| 14 | 15.29% | 16.18% | 17.14% | 18.14% | 19.26% | 20.44% | 21.73% | 23.10% | 24.61% | 26.24% | 28.00% | 29.88% | 31.81% | 33.85% |
| 15 | 16.38% | 17.34% | 18.36% | 19.44% | 20.64% | 21.90% | 23.28% | 24.75% | 26.37% | 28.11% | 30.00% | 32.01% | 34.08% | 36.27% |
| 16 | 17.47% | 18.50% | 19.58% | 20.74% | 22.02% | 23.36% | 24.83% | 26.40% | 28.13% | 29.98% | 32.00% | 34.14% | 36.35% | 38.69% |
| 17 | 18.56% | 19.65% | 20.81% | 22.03% | 23.39% | 24.82% | 26.38% | 28.05% | 29.89% | 31.86% | 34.00% | 36.28% | 38.62% | 41.11% |
| 18 | 19.66% | 20.81% | 22.03% | 23.33% | 24.77% | 26.28% | 27.94% | 29.70% | 31.64% | 33.73% | 36.00% | 38.41% | 40.90% | 43.52% |
| 19 | 20.75% | 21.96% | 23.26% | 24.62% | 26.14% | 27.74% | 29.49% | 31.35% | 33.40% | 35.61% | 38.00% | 40.55% | 43.17% | 45.94% |
| 20 | 21.84% | 23.12% | 24.48% | 25.92% | 27.52% | 29.20% | 31.04% | 33.00% | 35.16% | 37.48% | 40.00% | 42.68% | 45.44% | 48.36% |
| 21 | 22.93% | 24.28% | 25.70% | 27.22% | 28.90% | 30.66% | 32.59% | 34.65% | 36.92% | 39.35% | 42.00% | 44.81% | 47.71% | 50.78% |
| 22 | 24.02% | 25.43% | 26.93% | 28.51% | 30.27% | 32.12% | 34.14% | 36.30% | 38.68% | 41.23% | 44.00% | 46.95% | 49.98% | 53.20% |
| 23 | 25.12% | 26.59% | 28.15% | 29.81% | 31.65% | 33.58% | 35.70% | 37.95% | 40.43% | 43.10% | 46.00% | 49.08% | 52.26% | 55.61% |
| 24 | 26.21% | 27.74% | 29.38% | 31.10% | 33.02% | 35.04% | 37.25% | 39.60% | 42.19% | 44.98% | 48.00% | 51.22% | 54.53% | 58.03% |
| 25 | 27.30% | 28.90% | 30.60% | 32.40% | 34.40% | 36.50% | 38.80% | 41.25% | 43.95% | 46.85% | 50.00% | 53.35% | 56.80% | 60.45% |
| 26 | 28.39% | 30.05% | 31.82% | 33.70% | 35.78% | 37.96% | 40.33% | 42.90% | 45.71% | 48.72% | 52.00% | 55.48% | 59.07% | 62.87% |
| 27 | 29.48% | 31.21% | 33.05% | 34.99% | 37.13% | 39.42% | 41.90% | 44.55% | 47.47% | 50.60% | 54.00% | 57.62% | 61.34% | 65.29% |
| 28 | 30.58% | 32.37% | 34.27% | 36.29% | 38.53% | 40.88% | 43.46% | 46.20% | 49.22% | 52.47% | 56.00% | 59.73% | 63.62% | 67.70% |
| 29 | 31.67% | 33.52% | 35.50% | 37.58% | 39.90% | 42.34% | 45.01% | 47.85% | 50.98% | 54.35% | 58.00% | 61.89% | 65.89% | 70.12% |
| 30 | 32.76% | 34.68% | 36.73% | 38.88% | 41.28% | 43.80% | 46.56% | 49.50% | 52.74% | 56.22% | 60.00% | 64.02% | 68.16% | 72.54% |
| 31 | 33.85% | 35.84% | 37.94% | 40.18% | 42.66% | 45.26% | 48.11% | 51.15% | 54.50% | 58.09% | 62.00% | 66.15% | 70.43% | 74.96% |
| 32 | 34.94% | 36.99% | 39.17% | 41.47% | 44.03% | 46.72% | 49.66% | 52.80% | 56.26% | 59.97% | 64.00% | 68.29% | 72.70% | 77.38% |
| 33 | 36.04% | 38.15% | 40.39% | 42.77% | 45.41% | 48.18% | 51.22% | 54.45% | 58.01% | 61.84% | 66.00% | 70.42% | 74.98% | 79.79% |
| 34 | - | 39.30% | 41.62% | 44.06% | 46.78% | 49.64% | 52.77% | 56.10% | 59.77% | 63.72% | 68.00% | 72.56% | 77.25% | 82.21% |
| 35 | - | - | 42.84% | 45.36% | 48.16% | 51.10% | 54.32% | 57.75% | 61.53% | 65.59% | 70.00% | 74.69% | 79.52% | 84.63% |
| 36 | - | - | - | 46.66% | 49.54% | 52.56% | 55.87% | 59.40% | 63.29% | 67.46% | 72.00% | 76.82% | 81.79% | 87.05% |
| 37 | - | - | - | - | 50.91% | 54.02% | 57.42% | 61.05% | 65.05% | 69.34% | 74.00% | 78.96% | 84.06% | 89.47% |
| 38 | - | - | - | - | - | 55.48% | 58.98% | 62.70% | 66.80% | 71.21% | 76.00% | 81.09% | 86.34% | 91.89% |
| 39 | - | - | - | - | - | - | 60.53% | 64.35% | 68.56% | 73.09% | 78.00% | 83.23% | 88.61% | 94.30% |
| 40 | - | - | - | - | - | - | - | 66.00% | 70.32% | 74.96% | 80.00% | 85.36% | 90.88% | 96.72% |
| | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63+ |

Source: PERS, "PERS Benefits for State Miscellaneous Members," (Sacramento), January 1979, pp. 30-1.

Table 1 shows the percentage of final compensation to which an employee eligible for retirement is entitled under the "2 percent at 60 formula", for various ages and years of service credited to PERS. As the table illustrates, the percentage of final compensation per year of service to which the employee is entitled increases as the employee's age of retirement increases from age 50 to age 63. Thus, an employee retiring at age 50 would be entitled to 1.092 percent of his final compensation per year of service credited, while an employee retiring at age 63 would receive 2.418 percent of his final compensation per year of service credited. Beyond age 63, the percentage of final compensation per year of service remains constant at 2.418 percent.

To take a specific example, the table shows that an employee retiring at age 55 with 30 years' service credited t. PERS would be entitled to a retirement annuity of 43.8 percent of his final compensation. If this same employee were to retire instead at age 63, with 38 years of service credit, his annuity would equal 91.88 percent of his final compensation.

In the example just presented, it is tempting to conclude that the employee would be "better off" if he were to wait until age 63 to retire, since an annuity equal to 92 percent of final compensation is worth more per year than an annuity equal to 44 percent of final compensation. In addition, the employee's final compensation calculated at age 63 is likely to be greater than that calculated at age 55, further enhancing the annual value of the annuity received by retiring later.

Despite these factors, however, it would not be correct to conclude that the employee is unequivocally "better off" by retiring later, for two

reasons. First, the later the employee retires, the fewer years he will have to receive his retirement annuity. So, while he will be receiving more per year, he will also be receiving fewer years of retirement payments. Second, in order to know if one employee is "better off" by retiring later, it is necessary to know how much a dollar of retirement annuity, received one year from now, is worth to the employee at the present time. This is referred to as the employee's "rate of time preference." Because both of these factors -- the remaining expected lifetime of the retiree and his rate of time preference -- are unique for each employee, there is no satisfactory way to compare the values of the various annuities to which the employee is entitled by retiring at different times. By using the concept of an actuarial present value, however, it is possible to approximate in a single number the value of a given annuity, thus facilitating valid comparisons.

B. THE CONCEPT OF ACTUARIAL PRESENT VALUE

The Actuarial Present Value (APV) translates a stream of future annuity payments into a single dollar amount, expressed in current dollars. Simply stated, it is that amount which, if deposited at the time of an employee's retirement, would be just sufficient to pay that employee's retirement benefits over his remaining expected lifetime (allowing for such factors as expected statutory increases in the annual level of benefit payments and the expected rate of return earned by the deposit).

The APV may also be viewed as the lump sum payment which the employee would be willing to accept in lieu of a stream of annuity payments, if: (1) the employee's expected future life span equalled the

average for all employees in his age and sex cohort, as determined by the retirement system's actuaries and (2) the employee's rate of time preference equalled the rate of return on invested funds assumed by the retirement system's actuaries. In this sense, then, the APV of the future stream of annuity payments represents an approximation of their value to the employee.

Table 2

Actuarial Present Value
Of Two Years Additional Service Credit,
By Age at Retirement and Final Compensation[a]
(increment to annual annuity payment in parentheses)

| Final Compensation | Age at Retirement | | | | |
|---|---|---|---|---|---|
| | 50 | 55 | 60 | 65 | 70 |
| $ 5,000 | $ 1,145 ($109) | $ 1,391 ($146) | $ 1,702 ($200) | $ 1,793 ($242) | $ 1,516 ($242) |
| 10,000 | 2,830 (218) | 3,436 (292) | 4,203 (400) | 4,429 (484) | 3,746 (484) |
| 15,000 | 4,514 (328) | 5,481 (438) | 6,703 (600) | 7,066 (725) | 5,975 (725) |
| 20,000 | 6,199 (437) | 7,525 (584) | 9,204 (800) | 9,703 (967) | 8,205 (967) |
| 25,000 | 7,883 (546) | 9,570 (730) | 11,705 (1,000) | 12,339 (1,209) | 10,434 (1,209) |
| 30,000 | 9,568 (655) | 11,615 (876) | 14,206 (1,200) | 14,976 (1,451) | 12,663 (1,451) |
| 35,000 | 11,252 (764) | 13,660 (1,022) | 16,707 (1,400) | 17,613 (1,693) | 14,893 (1,693) |
| 40,000 | 12,936 (874) | 15,705 (1,168) | 19,208 (1,600) | 20,249 (1,934) | 17,122 (1,934) |
| 45,000 | 14,621 (983) | 17,750 (1,314) | 21,709 (1,800) | 22,886 (2,176) | 19,351 (2,176) |

a. Figures presented are for a married, male employee, covered by Social Security.

Table 2 presents the value of the two years of additional retirement service credit, both in Actuarial Present Value terms and as an increment to the employee's annual retirement annuity, for a married, male employee who is covered by Social Security.[1] For example, the table shows that the additional service credit increases the annuity to an employee, age 60, having final compensation equal to $35,000, by $1,400. This increase is equivalent to a lump sum grant of $16,707 to the retiring employee.

The table shows that the value of the retirement annuity (in either APV or annual dollar terms) for an employee of a given age is greater, the greater is his final compensation. A similar, positive relationship exists between the employee's age and the value of his annuity, but only up to age 63. This is because, as Table 1 shows, the percentage of final compensation per year of service credit which is provided by the annuity levels off at age 63, at 2.418 percent per year. Therefore, at age 63 and beyond, the annual increment to the retirement annuity provided by the two years of additional retirement service credit is constant at any given level of compensation. As a result, the APV of the bonus, and the incentive to retire early which it provides, declines from age 63 onward, as shown in Table 2.

Table 2 also shows how the relationship between the APV of the incentive bonus and its value in annual dollar terms varies as the age of retirement increases. For example, consider the case of two employees whose final compensation is $25,000 per year, one of whom is age 50 and the other of whom is 65. For the 50-year-old employee, the APV of the bonus

1. Because of such factors as continuance allowances for spouses, sexual differences in average life spans, and provisions for coordination with Social Security benefits, the actual values of annuities received by employees of given age and years of service vary slightly.

equals $7,883, and the annual increment to his annuity is $546 -- a ratio of over 14 to 1. For the 65-year-old employee, in contrast, the APV of the bonus equals $12,339, and the annual increment to his annuity is $1,209 -- a ratio of about 10 to 1. The lower ratio, of course, is a direct consequence of the fact that the older employee is expected to receive fewer annuity payments over his remaining life span.

To put the values of the two years' service credit bonus, cited in Table 2, in some perspective, figures for the total value of the retirement annuity (excluding the bonus) at various ages and years of service credited are presented in Table 3. The example shown in the table is for a married, male employee, covered by Social Security, whose final compensation of $28,765[2] is that of a full professor at the top step in 1980.

2. The salary of a full-time, full professor at the top step in 1979-80 was $31,416, while in 1977-78 and 1978-79 it was $27,438; the average salary for these three years (the employee's final compensation) is $28,765.

Table 3

Actuarial Present Value of
Retirement Annuity, by Age at Retirement
and Years of Service Credit
(annual annuity payment in parentheses)[a]

| Years of Service | Age at Retirement | | | | |
|---|---|---|---|---|---|
| | 50 | 55 | 60 | 65 | 70 |
| 5 | $ 22,878<br>($1,571) | $ 27,774<br>($2,100) | $ 33,970<br>($2,876) | $ 35,811<br>($3,478) | $30,280<br>($3,478) |
| 10 | 45,756<br>(3,141) | 55,548<br>(4,200) | 67,940<br>(5,753) | 71,621<br>(6,955) | 60,561<br>(6,955) |
| 15 | 68,634<br>(4,712) | 83,323<br>(6,299) | 101,910<br>(8,629) | 107,432<br>(10,433) | 90,841<br>(10,433) |
| 20 | 91,512<br>(6,282) | 111,097<br>(8,399) | 135,880<br>(11,506) | 143,242<br>(13,910) | 121,122<br>(13,910) |
| 25 | 114,390<br>(7,853) | 138,871<br>(10,499) | 169,850<br>(14,382) | 179,053<br>(17,388) | 151,402<br>(17,388) |
| 30 | | 166,645<br>(12,599) | 203,820<br>(17,258) | 214,864<br>(20,865) | 181,683<br>(20,865) |
| 35 | | | 237,790<br>(20,135) | 250,674<br>(24,343) | 211,963<br>(24,343) |
| 40 | | | | 286,485<br>(27,821) | 242,244<br>(27,821) |
| 45 | | | | | 272,524<br>(31,298) |

a. Figures presented are for a married, male employee, covered by Social Security, with final compensation of $28,765 per year (full professor, top step in 1980). Figures do not include value of two years additional service credit provided by ERI program.

Table 3, like Table 2, also shows the positive relationship between an employee's age and the value of his annuity, from age 50 to age 65, holding constant the employee's final compensation and years of service. Unlike Table 2, in which the number of years of service credit is held constant (at two) throughout, Table 3 holds the employee's final compensation at $28,765 and shows the effects on the value of the total annuity of varying years of service from 5 to 45. As the table indicates, depending on an employee's age at retirement and his years of service, the APV of his annuity may vary widely, from a low of $22,878 at age 50 with 5 years' service, to a high (as shown in the table) of $286,485 at age 65 with 40 years' service.

By combining the information reported in Table 3 with that of Table 2, it is possible to see how the value of the incentive bonus compares with the value of an employee's total annuity (excluding the bonus) at various combinations of age and years of service. For example, Table 2 indicates that the APV of the two years additional service credit is approximately $13,588[3] for a 60-year-old employee whose final compensation is $28,765. Referring to Table 3, it may be seen that this amount represents an increase of 40 percent (2/5) over the APV of the total annuity that such an employee would otherwise receive if he retired with 5 years of service credit ($33,970) and an increase of about 7 percent (2/30) over the APV of the annuity he would receive if he retired with 30 years' service ($203,820).

3. This figure is obtained by interpolating between the values shown for the APV of the bonus at age 60, with final compensation levels of $25,000 and $30,000.

## II. THOSE WHO RETIRED

There can be little doubt that, as a result of the Early Retirement Incentive program, a significant number of CSUC employees retired who would not have done so otherwise. During the three-month period that the ERI program was in effect, 1,047 employees retired. Even after allowing for normal retirement activity and the fact that some employees postponed their retirement dates to take advantage of the ERI program, it appears that from 865 to 925 of these represent retirements which would not have occurred in the absence of the ERI program. As a result of the ERI program, then, retirement activity during the eligibility period increased by from 475 to 760 percent, compared to what might have been expected without the program.

During the three-month period that the ERI program was in operation, there were 9,052 CSUC employees who were age 50 or older. Based on a survey of these employees, we estimate that between 634 and 1,050[1] were ineligible for the ERI program because they lacked the requisite five years of retirement service credit. Consequently, between 8,002 and 8,418 CSUC employees were eligible for the program. Thus, the 1,047 participants in the ERI program represent 12-to-13 percent of the estimated pool of eligible employees.

### A. RECENT RETIREMENT TRENDS

Figure 1 shows the trend in average quarterly CSUC retirements over the past five years. The figure shows that, during the three months in which

1. 95 percent confidence interval.

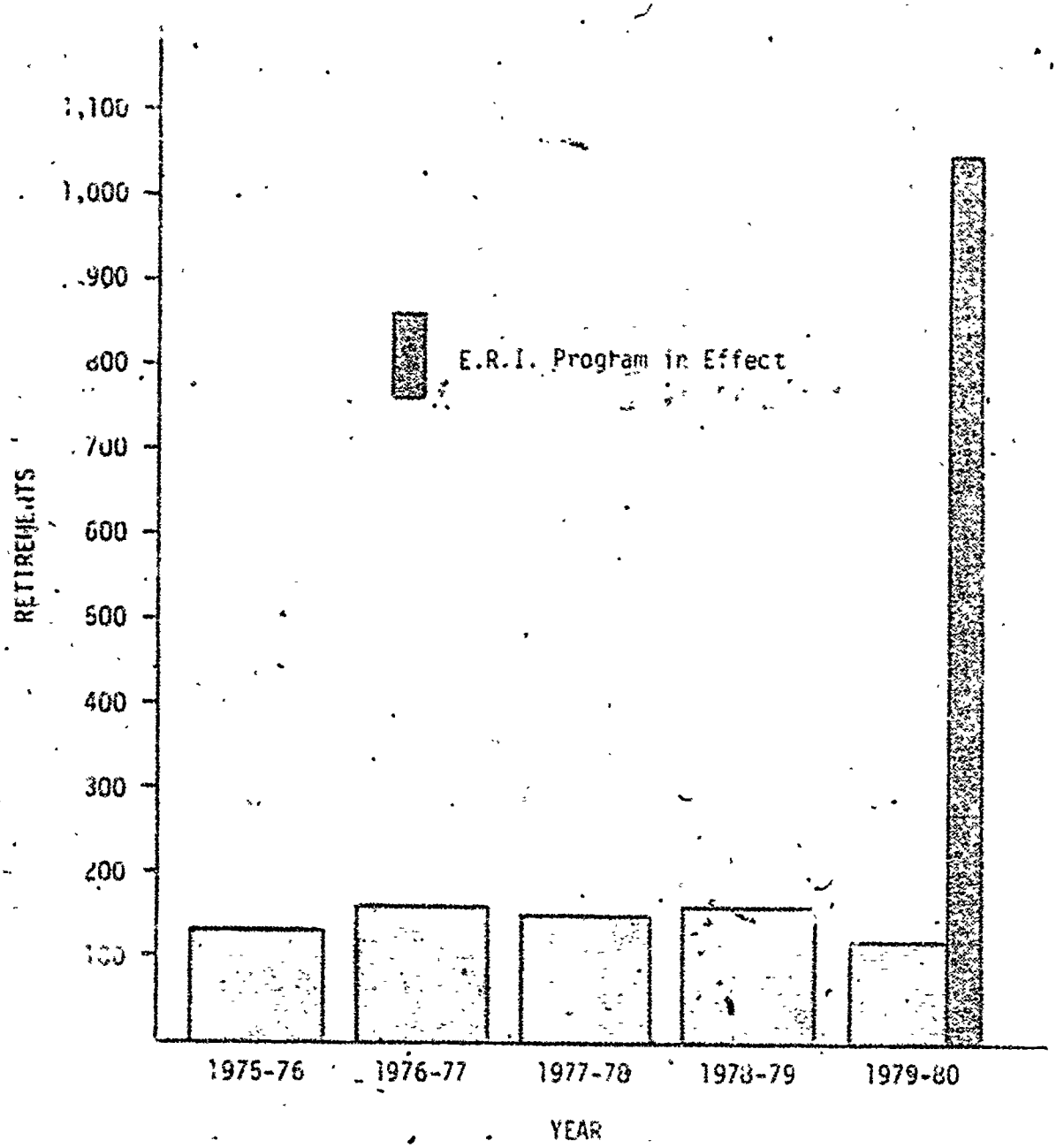



Figure 1

Average Quarterly Retirements
of CSUC Employees
1975-76 to 1979-80

the ERI program was available (March 27 to June 29, 1980), retirement activity increased dramatically over that in previous years. As indicated in the figure, from 1975-76 through 1978-79, retirements averaged 130 to 165 per quarter. During the first nine months of 1979-80, average quarterly retirements dropped slightly, to about 120 per quarter, reflecting the fact that some employees delayed their retirements in order to take advantage of the ERI program. Finally, the figure shows the explosive increase in retirements that occurred during the period of the ERI program, when 1,047 CSUC employees retired.

B. OCCUPATIONAL AND RACIAL/ETHNIC COMPOSITION

Of the 1,047 CSUC employees who retired under the ERI program, faculty members represented the largest single occupational group, with 486 retirees. Secretarial employees, with 169 retirees, constituted the next largest group, followed by service employees (119) and technical employees (102). The numbers of retirees in the three remaining occupational categories of professional, skilled crafts, and executive, administrative, and managerial employees were 69, 55, and 47, respectively.

Whites comprised the single largest racial group of retirees, accounting for 963 (92.0 percent) of the 1,047 participants in the ERI program. Of these 963 retirees, about two-thirds were males and one-third females. Black retirees placed a distant second, accounting for 3.4 percent of the total, followed by Asians (2.1 percent), Hispanics (2.0 percent), and Native Americans (0.5 percent).

Table 4 presents information on the occupation, sex, and racial/ethnic characteristics of the CSUC employees retiring under the ERI

Table 4

Occupational, Sexual, and Racial/Ethnic Characteristics of CSUC Employees Who Retired Under the Early Retirement Incentive Program

| Occupational Classification | Total All Retirees | MALE | | | | | | FEMALE | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total Male | White | Black | Hispanic | Asian | Native American | Total Female | White | Black | Hispanic | Asian | Native American |
| 1. Faculty | 46.4% (486) | 38.4% (402) | 37.2% (390) | 0.1% (1) | 0.3% (3) | 0.7% (7) | 0.1% (1) | 8.0% (84) | 7.9% (83) | 0.0% (0) | 0.1% (1) | 0.0% (0) | 0.0% (0) |
| 2. Secretarial/ Clerical | 16.1 (169) | 2.0 (21) | 1.6 (17) | 0.2 (2) | 0.1 (1) | 0.1 (1) | 0.0 (0) | 14.1 (148) | 13.2 (138) | 0.2 (2) | 0.5 (5) | 0.1 (1) | 0.2 (2) |
| 3. Service/ Maintenance | 11.4 (119) | 9.5 (99) | 6.5 (68) | 1.7 (18) | 0.6 (6) | 0.7 (7) | 0.0 (0) | 1.9 (20) | 1.2 (13) | 0.5 (5) | 0.1 (1) | 0.1 (1) | 0.0 (0) |
| 4. Technical/ Paraprofessional | 9.7 (102) | 3.9 (41) | 3.6 (38) | 0.1 (1) | 0.1 (1) | 0.1 (1) | 0.0 (0) | 5.8 (61) | 5.4 (57) | 0.2 (2) | 0.0 (0) | 0.1 (1) | 0.1 (1) |
| 5. Professional | 6.6 (69) | 2.9 (30) | 2.6 (27) | 0.2 (2) | 0.0 (0) | 0.1 (1) | 0.0 (0) | 3.7 (39) | 3.6 (38) | 0.1 (1) | 0.0 (0) | 0.0 (0) | 0.0 (0) |
| 6. Skilled Crafts | 5.3 (55) | 5.0 (52) | 4.4 (46) | 0.2 (2) | 0.2 (2) | 0.1 (1) | 0.1 (1) | 0.3 (3) | 0.3 (3) | 0.0 (0) | 0.0 (0) | 0.0 (0) | 0.0 (0) |
| 7. Executive/Administrative/Managerial | 4.5 (47) | 4.1 (43) | 3.9 (41) | 0.0 (0) | 0.1 (1) | 0.1 (1) | 0.0 (0) | 0.4 (4) | 0.4 (4) | 0.0 (0) | 0.0 (0) | 0.0 (0) | 0.0 ( ) |
| TOTALS | 100.0% (1,047) | 65.7% (688) | 59.9% (627) | 2.5% (26) | 1.3% (14) | 1.8% (19) | 0.2% (2) | 34.3% (359) | 32.1% (336) | 1.0% (10) | 0.7% (7) | 0.3% (3) | 0.3% (3) |

program. The table shows that, among faculty, virtually all of the 486 retirees were white, comprising fully 97.3 percent of this group. Over four-fifths of these white retirees were males. Whites also comprised the vast majority of the 160 secretarial employees who retired; of this group, 91.7 percent were white. In contrast to faculty retirees, 87.6 percent of all secretarial employees who retired were female.

In the remaining five occupational classifications, whites constituted 94.8 percent of retirees in the professional or executive, administrative, and managerial categories, and 81.5 percent of those in the service, technical, or skilled crafts categories. In addition, the table shows that 61.8 percent of white retirees in the former two categories were male, as were 67.6 percent of those retirees in the latter three categories.

C. AFFIRMATIVE ACTION IMPLICATIONS

Table 5 presents the same information shown in Table 4, but for all full-time CSUC employees in 1979. A comparison of this table with Table 4 illustrates the additional opportunities created by the ERI program for achieving affirmative action goals.

The tables show that, in general, white males retired in numbers disproportionate to their share of CSUC employment in 1979, reflecting the fact that the proportion of white males is greater among older employees. Thus, the tables show that, while white males represented 49.1 percent of all full-time CSUC employees in 1979, they comprised 59.9 percent of the ERI program participants. The tables also show that the extent to which white male retirees are over-represented in the ERI program varies by occupational classification.

Table 5

Occupational, Sexual, and Racial/Ethnic Characteristics of Full-Time CSUC Employees, 1979a

| Occupational Classification | Total All Employees | MALE | | | | | | FEMALE | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total Male | White | Black | Hispanic | Asian | Native American | Total Female | White | Black | Hispanic | Asian | Native American |
| 1. Faculty | 43.8% (11,491) | 34.6% (9,072) | 30.7% (8,055) | 0.8% (207) | 0.9% (249) | 2.0% (523) | 0.1% (38) | 9.2% (2,419) | 8.1% (2,133) | 0.4% (94) | 0.3% (85) | 0.4% (95) | 0.0% (11) |
| 2. Secretarial/ Clerical | 18.9 (4,953) | 1.4 (376) | 0.9 (245) | 0.2 (44) | 0.2 (54) | 0.1 (28) | 0.0 (5) | 17.4 (4,577) | 13.0 (3,419) | 1.4 (358) | 1.9 (499) | 1.0 (261) | 0.2 (40) |
| 3. Service/ Maintenance | 10.3 (2,713) | 8.3 (2,177) | 4.1 (1,089) | 1.7 (437) | 1.6 (409) | 0.8 (221) | 0.1 (21) | 2.0 (536) | 1.0 (252) | 0.7 (187) | 0.2 (61) | 0.1 (30) | 0.0 (6) |
| 4. Technical/Para-professional | 8.7 (2,290) | 4.3 (1,127) | 3.6 (936) | 0.2 (59) | 0.3 (67) | 0.2 (62) | 0.0 (3) | 4.4 (1,163) | 3.6 (943) | 0.3 (66) | 0.2 (62) | 0.3 (85) | 0.0 (7) |
| 5. Professional | 10.4 (2,741) | 5.2 (1,373) | 4.0 (1,054) | 0.4 (104) | 0.3 (87) | 0.4 (109) | 0.1 (19) | 5.2 (1,363) | 4.2 (1,092) | 0.4 (96) | 0.3 (71) | 0.4 (95) | 0.1 (14) |
| 6. Skilled Crafts | 2.9 (770) | 2.9 (750) | 2.2 (569) | 0.2 (53) | 0.3 (84) | 0.1 (35) | 0.0 (9) | 0.1 (20) | 0.1 (18) | 0.0 (0) | 0.0 (1) | 0.0 (0) | 0.0 (1) |
| 7. Executive/ Administrative/ Managerial | 4.9 (1,292) | 4.1 (1,077) | 3.6 (941) | 0.2 (56) | 0.2 (56) | 0.1 (21) | 0.0 (3) | 0.8 (215) | 0.7 (185) | 0.1 (15) | 0.0 (5) | 0.0 (9) | 0.0 (1) |
| TOTALS | 100.0% (26,250) | 60.8% (15,952) | 49.1% (12,889) | 3.7% (960) | 3.8% (1,006) | 3.8% (999) | 0.4% (98) | 39.2% (10,298) | 30.6% (8,042) | 3.1% (816) | 3.0% (784) | 2.2% (576) | 0.3% (80) |

a. Source: California Postsecondary Education Commission, "Women and Minorities in California Public Postsecondary Education: Their Employment, Classification, and Compensation, 1977-1979," (Sacramento), March 1981.

Among faculty, for example, white males comprised 80.2 percent of the retirees, while representing only 70.1 percent of all CSUC faculty in 1977; the proportion of white male faculty retirees is thus over-represented by 14.5 percent. In contrast, among secretarial employees, the proportion of white male retirees is over-represented by 103.4 percent; while white males represented 4.9 percent of this group in 1977, they comprised 10.1 percent of those secretarial employees who retired.

A closer examination of Tables 4 and 5 reveals that the opportunities for achieving dramatic increases in the percentage representation of women or racial and ethnic minorities as a result of the ERI program are limited. The tables show that the 1,047 CSUC employees who retired under the ERI program represent only 4 percent of the total 26,250 full-time CSUC employees in 1979. Of this 4 percent, only about three-fifths were white males. As a result, even if all of the full-time positions vacated by participants in the ERI program were replaced by women or minority group members, the proportion of white males would decline by only 2.4 percentage points, to 46.7 percent.

As it turns out, many of the positions vacated by the ERI program participants have been, or will be, filled by newly-hired white males. Data provided by CSUC on the sex and racial/ethnic composition of 524 permanent replacements hired during the first three quarters of 1980-81 to fill the 948 full-time positions vacated during the ERI program indicate that about one-third of the new hires are white males.

Table 6

Estimated Affirmative Action Impact of CSUC
Early Retirement Incentive Program on
Full-Time Employees
(Changes from 1979 in Parentheses)

| Occupational Classification | Total All Employees | MALE | | | | | | FEMALE | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total Male | White | Black | Hispanic | Asian | Native American | Total Female | White | Black | Hispanic | Asian | Native American |
| 1. Faculty | 11,491 | 8,967.0 | 7,884.5 | 213.5 | 283.3 | 545.1 | 40.7 | 2,524.0 | 2,211.2 | 101.5 | 100.6 | 99.7 | 11.0 |
| | | (-105.0) | (-170.5) | (+6.5) | (+34.3) | (+22.1) | (+2.7) | (+105.0) | (+78.2) | (+7.5) | (+15.6) | (+3.7) | (--) |
| | 43.8% | 78.0% | 68.6% | 1.9% | 2.5% | 4.7% | 0.4% | 22.0% | 19.2% | 0.9% | 0.9% | 0.9% | 0.1% |
| | | (-0.9) | (-1.5) | (+0.1) | (+0.3) | (+0.2) | (--) | (+0.9) | (+0.7) | (+0.1) | (+0.1) | (--) | (--) |
| 2. Secretarial/ Clerical | 4,953 | 377.2 | 236.9 | 47.6 | 58.5 | 29.2 | 5.0 | 4,575.8 | 3,394.3 | 362.7 | 505.3 | 274.4 | 39.1 |
| | | (+1.2) | (-8.1) | (+3.6) | (+4.5) | (+1.2) | (--) | (-1.2) | (-24.7) | (+4.7) | (+6.3) | (+13.4) | (-0.9) |
| | 18.9% | 7.6% | 4.8% | 1.0% | 1.2% | 0.6% | 0.1% | 92.4% | 68.5% | 7.3% | 10.2% | 5.5% | 0.8% |
| | | (--) | (-0.2) | (+0.1) | (+0.1) | (--) | (--) | (--) | (-0.5) | (+0.1) | (+0.1) | (+0.3) | (--) |
| 3. Service/ Maintenance | 2,713 | 2,171.4 | 1,050.4 | 449.4 | 423.7 | 223.8 | 24.1 | 541.6 | 254.7 | 189.1 | 60.4 | 31.4 | 6.0 |
| | | (-5.6) | (-38.6) | (+12.4) | (+14.7) | (+2.8) | (+3.1) | (+5.6) | (+2.7) | (+2.1) | (-0.6) | (+1.4) | (--) |
| | 10.3% | 80.0% | 38.7% | 16.6% | 15.6% | 8.2% | 0.9% | 20.0% | 9.4% | 7.0% | 2.2% | 1.2% | 0.2% |
| | | (-0.2) | (-1.4) | (+0.5) | (+0.5) | (+0.1) | (+0.1) | (+0.2) | (+0.1) | (+0.1) | (--) | (+0.1) | (--) |
| 4. Technical/Para-professional | 2,290 | 1,131.5 | 929.5 | 60.4 | 74.2 | 64.4 | 3.0 | 1,158.5 | 933.1 | 67.4 | 64.4 | 87.6 | 6.0 |
| | | (+4.5) | (-6.5) | (+1.4) | (+7.2) | (+2.4) | (--) | (-4.5) | (-9.9) | (+1.4) | (+2.4) | (+2.6) | (-1.0) |
| | 8.7% | 49.4% | 40.6% | 2.6% | 3.2% | 2.8% | 0.1% | 50.6% | 40.7% | 2.9% | 2.8% | 3.8% | 0.3% |
| | | (+0.2) | (-0.3) | (+0.1) | (+0.3) | (+0.1) | (--) | (-0.2) | (-0.4) | (+0.1) | (+0.1) | (+0.1) | (--) |
| 5. Professional | 2,741 | 1,367.6 | 1,045.7 | 105.9 | 86.0 | 111.0 | 19.0 | 1,373.4 | 1,084.6 | 96.0 | 75.9 | 102.9 | 14.0 |
| | | (-5.4) | (-8.3) | (+1.9) | (-1.0) | (+2.0) | (--) | (+5.4) | (-7.4) | (--) | (+4.9) | (+7.9) | (--) |
| | 10.4% | 49.9% | 38.2% | 3.9% | 3.1% | 4.0% | 0.7% | 50.1% | 39.6% | 3.5% | 2.8% | 3.8% | 0.5% |
| | | (-0.2) | (-0.3) | (+0.1) | (--) | (+0.1) | (--) | (+0.2) | (-0.3) | (--) | (+0.2) | (+0.3) | (--) |
| 6. Skilled Crafts | 770 | 751.8 | 564.8 | 54.7 | 89.3 | 35.0 | 8.0 | 18.2 | 17.2 | 0.0 | 0.0 | 0.0 | 1.0 |
| | | (+1.8) | (-4.2) | (+1.7) | (+5.3) | (--) | (-1.0) | (-1.8) | (-0.8) | (--) | (-1.0) | (--) | (--) |
| | 2.9% | 97.6% | 73.4% | 7.1% | 11.6% | 4.5% | 1.0% | 2.4% | 2.2% | 0.0% | 0.0% | 0.0% | 0.1% |
| | | (+0.2) | (-0.5) | (+0.2) | (+0.7) | (--) | (-0.1) | (-0.2) | (-0.1) | (--) | (-0.1) | (--) | (--) |
| 7. Executive/ Administrative/ Managerial | 1,292 | 1,075.1 | 933.3 | 60.7 | 56.6 | 21.6 | 3.0 | 216.9 | 185.3 | 16.6 | 5.0 | 9.0 | 1.0 |
| | | (-1.9) | (-7.7) | (+4.7) | (+0.6) | (+0.6) | (--) | (+1.9) | (+0.3) | (+1.6) | (--) | (--) | (--) |
| | 4.9% | 83.2% | 72.2% | 4.7% | 4.4% | 1.7% | 0.2% | 16.8% | 14.3% | 1.3% | 0.4% | 0.7% | 0.1% |
| | | (-0.1) | (-0.6) | (+0.4) | (--) | (--) | (--) | (+0.1) | (--) | (+0.1) | (--) | (--) | (--) |
| TOTALS | 26,250 | 15,841.6 | 12,645.1 | 99[illegible] | 1,071.6 | 1,030.1 | 102.8 | 10,408.4 | 8,080.4 | [illegible] | 811.6 | 605.0 | 78.1 |
| | | (-110.4) | (-243.9) | (+3[illegible]) | (+65.6) | (+31.1) | (+4.8) | (+110.4) | (+38.4) | (+17.3) | (+27.6) | (+29.0) | (-1.9) |
| | 100.0% | 60.3% | 48.2% | 3.8% | 4.1% | 3.9% | 0.4% | 39.7% | 30.8% | 3.2% | 3.1% | 2.3% | 0.3% |
| | | (-0.4) | (-0.9) | (+0.2) | (+0.2) | (+0.1) | (--) | (+0.4) | (+0.1) | (+0.1) | (+0.1) | (+0.1) | (--) |

Table 6 presents the estimated affirmative action impacts of the Early Retirement Incentive program if the sex and racial/ethnic composition of the total group of replacements ultimately hired to fill the 948 full-time positions vacated during the Early Retirement Incentive program parallels that of the 524 replacements hired during the first three quarters of 1980-81. The table shows that the affirmative action impacts of the ERI program will be rather limited in terms of the percentage distribution of employees by sex and racial/ethnic characteristics. In fact, the proportion of the CSUC workforce represented by any particular affirmative action category will change by no more than 2 percentage points within any of the seven occupational classifications noted, and most changes will be one-half of a percentage point or less.

Among faculty, for example, Table 6 shows that, as a result of the ERI program, the proportion of white males will decline by a net 1.5 percentage points, while the proportions of Hispanic and Asian males will increase by 0.3 and 0.2 percentage points, respectively. Among full-time CSUC employees in general, the table shows that the proportion of white males will decline by an estimated 0.9 percent points.

Of course, by focusing on changes in the percentage distribution, this analysis fails to take account of the increase in the number of employees in affirmative action categories resulting from the ERI program. Table 6 also presents information on the estimated net changes in the numbers of positions held by members of each affirmative action category. The table shows that, after accounting for the sexual and racial/ethnic composition of new hires, the number of full-time CSUC positions held by

white males will decline by an estimated 244, while the number held by members of every other category except Native American females will increase by from 5 (Native American males) to 66 (Hispanic males), as a result of the ERI program.

On balance, our analysis indicates that, by inducing many employees to retire earlier than they would have otherwise, the Early Retirement Incentive program has created additional opportunities for CSUC to address affirmative action goals. At the same time, however, our analysis indicates that the additional opportunities so created are greatly limited by the small number of positions vacated relative to the total number of positions in the CSUC system. Thus, while the ERI program may be viewed as a beneficial adjunct to an existing affirmative action program, it is doubtful whether the program could be justified on this basis alone, absent a demonstration that is the most cost-effective means to achieve affirmative action goals.

## III. WHY EMPLOYEES RETIRED

A cursory examination of the results of the ERI program indicates that the program successfully induced additional employees to retire early. As noted, 1,047 CSUC employees opted to retire during the three-month eligibility period, whereas in previous years only about 150 employees would have been expected to retire during a similar time period.

Yet, it is not clear that all of the 900 or so additional retirements which occurred between March 27 and June 29, 1980 were a direct result of the Early Retirement Incentive program. Some of these retirements may have been due, at least in part, to the climate of uncertainty surrounding the possible passage of Proposition 9 in June 1980. The primary motivation for implementing the ERI program was, after all, to minimize the number of layoffs which might have resulted had Proposition 9 been approved. It is likely, therefore, that at least some employees opted for retirement in order to mitigate the impacts of the possible layoffs--either on the eligible employee himself or on his colleagues.

### A. SURVEY OF ELIGIBLE EMPLOYEES

In an attempt to identify the factors which were most responsible for the participation of CSUC employees in the Early Retirement Incentive program, the Legislative Analyst's Office surveyed a sample of CSUC employees who were eligible for early retirement. The survey questionnaire (included in Appendix A) was sent to a group of 1,029 CSUC employees, representing a one-eighth, random sample of all full-time CSUC employees, not on leave, who were age 50 or older as of June 29, 1980.

Because the response rate to this survey was quite good, we may be confident of the validity of the conclusions discussed below. Of the 1,029 questionnaires distributed, 484 (47.0 percent) were returned complete, 102 (9.9 percent) were returned partially complete, and 360 (36.8 percent) were not returned. The balance, 83 questionnaires, was either not deliverable or was sent to individuals who had less than five years' retirement service credit and, hence, were ineligible for the ERI program.[1] A complete description of the survey methodology is presented in Appendix B.

The first fact established by the survey is that the overwhelming majority of CSUC employees eligible for the Early Retirement Incentive program were aware of the program's existence: over 98 percent of those responding indicated that they were aware of the ERI program. Thus, it is fair to conclude that the success of the ERI program is at least partially attributable to the high level of awareness among eligible employees of the options presented by the program.

A second objective of the Legislative Analyst's survey was to ascertain when employees would have retired, had the ERI program not been available. To this end, ERI program participants were asked to indicate when they would have retired, if the benefits of the program had not been available. In addition, employees who were eligible for the ERI program but who chose not to retire were asked to indicate when they planned to do

1. As evidence of the statistical soundness of the sampling procedure, the sample percentage of those who retired under the ERI program is 11.4 percent, with a 95 percent confidence interval encompassing the range 8.7 percent to 14.1 percent. The actual participation rate for the group of 8,226 full-time employees from which the sample was drawn is 12.8 percent -- well within the confidence interval noted.

so. Interestingly, most employees who retired under the program indicated that they would have retired in three years or less. Conversely, most employees who did not take advantage of the ERI program indicated planned retirement dates that were more than three years away. Responses to this question are presented in Table 7.

Table 7

Relationship Between Planned Retirement Date and Participation in Early Retirement Incentive Program

| | FACULTY | | | NON-FACULTY | |
|---|---|---|---|---|---|
| | ERI Participant? | | | ERI Participant? | |
| | Yes | No | | Yes | No |
| Years to Planned Retirement Date | | | Years to Planned Retirement Date | | |
| 3 or less | 65.4% (17) | 20.3% (51) | 3 or less | 97.4% (37) | 30.1% (71) |
| More than 3 | 34.6 (9) | 79.7 (200) | More than 3 | 2.6 (1) | 69.9 (165) |
| Totals | 100.0% (26) | 100.0% (251) | Totals | 100.0% (38) | 100.0% (236) |

Table 7 shows that 65.4 percent of the faculty who retired under the Early Retirement Incentive program had intended to retire in three years or less, while 79.7 percent of the non-participating faculty did not intend to retire for at least three years. Among non-faculty, the correlation between participation in the ERI program and the employee's planned retirement date is even more striking: fully 97.4 percent of the non-faculty who retired under the ERI program indicated that they would have retired in the next three years anyway.

Finally, the Legislative Analyst's survey attempted to elicit responses on the importance of specific factors affecting retirement behavior under the ERI program. Employees who actually retired under the ERI program were asked to rate the importance of four factors in influencing their decisions to retire: (1) the financial incentive of the two years' extra retirement service credit, (2) the possibility of receiving no salary increase if Proposition 9 passed, (3) the desire to avoid the layoff, transfer, or demotion of one's colleagues if Proposition 9 passed, and (4) the desire to avoid one's own layoff, transfer, or demotion if Proposition 9 passed. Results of the survey are presented in Table 8.

Table 8 shows that, of the four factors mentioned, the most important was the value of the two years' extra retirement service credit. As the table indicates, fully 82.3 percent of the faculty and 87.8 percent of the non-faculty who participated in the ERI program felt that this incentive was "important" or "very important" in their decisions to retire when they did.

Rated next in importance by the respondents to the survey was the desire to avoid the layoff of one's colleagues. This factor, however, was rated "important" or "very important" only about half as frequently as the value of the early retirement bonus. Of the faculty, 43.7 percent said that the desire to avoid the layoff of one's colleagues was "important" or "very important" in their decisions to retire, while 48.3 percent of the non-faculty gave this factor similar ratings.

The third most important factor reported by the respondents was the possibility of receiving no salary increase if Proposition 9 had passed,

Table 8

Factors Influencing CSUC Employees' Decision to Participate in Early Retirement Incentive Program

| | Very Important | Important | Slightly Important | Not Important at All |
|---|---|---|---|---|
| 1. Financial incentive of two years extra retirement service credit | | | | |
| (a) Faculty | 52.9% (18) | 29.4% (10) | 14.7% (5) | 2.9% (1) |
| (b) Non-faculty | 63.6% (21) | 24.2% (8) | 6.1 (2) | 6.1 (2) |
| (c) All employees | 58.2 (39) | 26.9 (18) | 10.4 (7) | 4.5 (3) |
| 2. Desire to avoid layoff, transfer, or demotion of colleagues had Proposition 9 passed | | | | |
| (a) Faculty | 15.6% (5) | 28.1% (9) | 21.9% (7) | 34.4% (11) |
| (b) Non-faculty | 13.8 (4) | 34.5 (10) | 13.8 (4) | 37.9 (11) |
| (c) All employees | 14.8 (9) | 31.1 (19) | 13.0 (11) | 26.1 (22) |
| 3. Possibility of receiving no salary increase had Proposition 9 passed | | | | |
| (a) Faculty | 12.5% (4) | 12.5% (4) | 37.5% (12) | 37.5% (12) |
| (b) Non-faculty | 10.3 (3) | 17.2 (5) | 20.7 (6) | 51.7 (15) |
| (c) All employees | 11.5 (7) | 14.8 (9) | 29.5 (18) | 44.3 (27) |
| 4. Possibility of receiving layoff notice had Proposition 9 passed | | | | |
| (a) Faculty | 6.3% (2) | 6.3% (2) | 6.3% (2) | 81.3% (26) |
| (b) Non-faculty | 7.1 (2) | 10.7 (3) | 17.9 (5) | 64.3 (18) |
| (c) All employees | 6.7 (4) | 8.3 (5) | 11.7 (7) | 73.3 (44) |

although the majority of the respondents did not feel that it was of much importance. Only 25.0 percent of the faculty and 27.5 percent of the non-faculty respondents rated this factor "important" or "very important" in their retirement decisions.

Least important of the four factors was the desire to avoid one's own layoff. This result is not surprising, given the seniority enjoyed by most CSUC employees who would have been contemplating retirement. It is interesting to note that this factor was rated less important among faculty than non-faculty respondents, with 81.3 percent of the former rating it "not important at all" compared to 64.3 percent of the latter. The reason for this difference undoubtedly relates to the additional employment security conferred on senior faculty by the tenure process.

In summary, the survey results indicate that the two years' additional service credit bonus offered by the ERI program significantly influenced the retirement decisions of the vast majority of the early retirees. Other factors (relating to the possible impacts of Proposition 9), while of importance to some of the retirees, were subjectively rated as providing much less of an incentive to retire early.

B. DETERMINANTS OF RETIREMENT BEHAVIOR

While availability of the Early Retirement Incentive program appears to have had a strong effect on the retirement decisions of many CSUC employees, it is also apparent that other factors are of equal or greater importance in determining retirement behavior. The likely determinants of retirement behavior include such factors as an employee's age, his salary, and the value of his retirement annuity, in addition to the availability

of the ERI program. It is the purpose of this section to explore the significance of these and other factors in influencing the retirement decision, as a prelude to the construction of a formal model of retirement behavior.

An appropriate point of departure in the analysis of retirement behavior is to examine the factors which influenced the retirement decisions of CSUC employees who were eligible for the ERI program during the three-month period in which it was offered. Variables which contribute significantly to explaining retirement behavior include the employee's age, his salary, and the APV of his retirement annuity. Such factors as the employee's net assets (equity value of home plus savings or investments, minus indebtedness), health (days of work missed due to illness in the past year), sex, marital status, and race were tested and found to have little or no explanatory power.[2]

Age

Perhaps the most logical choice for a determinant of an employee's retirement behavior is his age. And, indeed, there is a significant difference between the average age of those employees who retired during the ERI program and those who did not. The average age of those who retired was just under 62 years; for those who did not retire, the average age was slightly under 56 years. This six-year difference, moreover, is highly significant in a statistical sense;[3] the odds are greater than 1,000 to 1 that this difference is attributable to chance.

2. In the case of the variable measuring net assets, the lack of explanatory power may have been due, at least in part, to a lack of good data. Many of the employees surveyed were reluctant to supply information about their assets.
3. t-statistic = 10.66, level of significance = 0.000 (2-tail test with 547 d.f.).

Another way of looking at the effect of age on retirement behavior is shown in Table 9, which is a crosstabulation of age and retirement behavior.

Table 9

Relationship Between Age and
Participation in Early Retirement Incentive Program

| | FACULTY | | | NON-FACULTY | |
|---|---|---|---|---|---|
| | ERI Participant? | | | ERI Participant? | |
| Age | Yes | No | Age | Yes | No |
| 50 to 54 | 3.6% (1) | 43.6% (115) | 50 to 54 | 2.6% (1) | 37.5% (94) |
| 55 to 59 | 14.3 (4) | 36.4 (96) | 55 to 59 | 15.8 (6) | 43.8 (110) |
| 60 to 64 | 57.1 (16) | 16.3 (43) | 60 to 64 | 52.6 (20) | 15.9 (40) |
| 65 or over | 25.0 (7) | 3.8 (10) | 65 or over | 28.9 (11) | 2.8 (7) |
| Totals | 100.0% (28) | 100.0% (264) | Totals | 100.0% (38) | 100.0% (251) |

Table 9 shows that, for both faculty and non-faculty, there is a strong positive association between one's age and his decision to retire. Thus, while 82.1 percent of the faculty who participated in the ERI program were age 60 or older, only 20.1 percent of the faculty who did not participate were in this age group. Non-faculty exhibited similar behavior: 81.5 percent of the ERI participants were age 60 or older, while only 18.7 percent of the non-participants were in this age group.

Table 9 also shows that very few of the participants in the Early Retirement Incentive program retired extremely "early." Among faculty, for example, about three-fourths of those eligible for the ERI program were aged 50 to 64; yet fewer than one-fifth of the faculty retirements occurred in this age range. The results presented in the table thus reinforce the observation that ERI program participants did not retire significantly earlier than they would have if the program had not been established.

Value of Annuity

The second significant determinant of retirement behavior is the Actuarial Present Value (APV) of the retirement annuity. As described earlier in this analysis, the Actuarial Present Value translates a stream of future annuity payments into a single, current dollar amount. It is that amount which, if deposited at the time of an employee's retirement, would be just sufficient to pay that employee's retirement benefits over his remaining expected lifetime.

The APV's of the annuities (including the two years' service credit bonus) to which eligible employees were entitled encompassed a wide range: from less than $15,000 to greater than $350,000. Among participants in the ERI program, the average APV of the annuity was slightly over $128,000; among those who did not retire, it was just under $100,000. Again, this difference is statistically significant.[4]

4. t-statistic = 2.61, level of significance = 0.011 (2 tail test with 65 d.f.).

Interestingly, the value of the annuity seems to have been a more important consideration to faculty members than to non-faculty. As Table 10 shows, among faculty there is a strong positive association between the APV of the annuity and participation in the ERI program. Thus, while 40 percent of those who opted to retire had annuities with a total APV of $200,000 or more, only 16 percent of those who retired had annuities with APV's of less than $100,000. Conversely, among faculty who did not retire, only 9.2 percent would have received an annuity of $200,000 or more.

Table 10

Relationship Between Actuarial Present Value of Annuity and Participation in Early Retirement Incentive Program

| | FACULTY | | | NON-FACULTY | |
|---|---|---|---|---|---|
| | ERI Participant? | | | ERI Participant? | |
| APV of Annuity | Yes | No | APV of Annuity | Yes | No |
| Less than $100,000 | 16.0% (4) | 40.2% (101) | Less than $100,000 | 66.7% (22) | 77.5% (186) |
| $100,000 to $199,999 | 44.0 (11) | 50.6 (127) | $100,000 to $199,999 | 21.2 (7) | 15.8 (38) |
| $200,000 or more | 40.0 (10) | 9.2 (23) | $200,000 or more | 12.1 (4) | 6.7 (16) |
| Totals | 100.0% (25) | 100.0% (251) | Totals | 100.0% (33) | 100.0% (240) |

With non-faculty, the association between the APV of the annuity and the employee's retirement behavior is still present, but in a weaker form. Thus, 12.1 percent of those who retired were entitled to annuities with APV's of $20,000 or more, compared to 6.7 percent of those who did not retire.

Final Compensation

The third significant determinant of retirement behavior among CSUC employees is the employee's final compensation (the average annual salary received during the most recent three years). Because the relationship between the employee's final compensation and his retirement behavior is not readily apparent in the kind of simple crosstabulations shown for the other two factors, none is presented here. Rather, the relationship between final compensation and retirement behavior emerges only when other important variables are "controlled," or held constant.

The employee's final compensation is, nevertheless, a significant determinant of retirement behavior: holding age and the value of the annuity constant, an employee is less likely to retire, the greater is his final compensation.[5] This inverse relationship reflects the fact that, in order to retire, the employee must give up the compensation which he is currently earning. And, the greater his compensation, the larger is the "opportunity cost" associated with leaving his current employment.

In summary, then, the three factors of age, final compensation, and the value of the retirement annuity are all significant in explaining differences in retirement behavior among employees who were eligible for the CSUC Early Retirement Incentive program. Further, in comparing retirement behavior during the period in which the ERI program was operational with that of previous years, it is apparent that the presence of the ERI program was a

5. Results of the logit analysis of retirement behavior (described below) indicate that, when variables measuring age, the value of the annuity, and the presence of the ERI program are controlled, the coefficient of the variable measuring final compensation is negative and statistically significantly different from zero. t-statistic = -12.21, level of significance = 0.000 (2-tail test with 904 d.f.).

fourth significant factor in influencing the retirement decision. Still unanswered, however, is the important question of the relative contributions that each of these four factors makes in influencing retirement behavior. To answer this question, it is necessary to compare retirement behavior under the ERI program with that during a similar period when the ERI program was not available. Then, with the assistance of a formal model of retirement behavior, the influence of each of the four factors may be analyzed.

C. RETIREMENT BEHAVIOR MODEL

The model of retirement behavior used in this analysis[6] is based on data comparing the retirement behavior of 433 full-time employees who were eligible to retire during the Early Retirement Incentive program (March 27 to June 29, 1980) with that of 475 full-time employees who were eligible to retire during the same period of the previous year. The 908 employees represent a random sample of approximately one-fourteenth of those employees who were eligible to retire in each of the two years and who were covered by Social Security.

Using a powerful statistical method of curve-fitting, termed logit analysis, the relative contributions of the four primary factors influencing retirement behavior -- age, final compensation, value of the retirement annuity, and availability of the ERI program -- may be identified. Essentially, the logit technique uses information on observed retirement behavior and the values of the explanatory variables to estimate

6. The model's specification derives largely from that of a similar model of retirement behavior among older workers. See Richard V. Burkhauser, "The Pension Acceptance Decision of Older Workers," Journal of Human Resources, XIV, (Winter 1979), pp. 63-75.

the mathematical relationship which best predicts the probability that any employee will retire, given the values of the explanatory variables for that employee.

In an attempt to explain the retirement behavior of CSUC employees, various combinations of nine explanatory variables were tried. These included, in addition to the four primary determinants of retirement behavior noted earlier, information on the employee's net assets, health, sex, marital status, and race. Like the results reported earlier, those of the logit model showed that the four primary determinants of age, final compensation, the APV of the retirement annuity, and the presence of the ERI program were of particular importance in the retirement decision. In fact, using just these four variables, the model successfully predicts retirement behavior in fully 94 percent of the individual cases on which it is based[7] -- an extraordinarily high level of predictive success.

Figure 2 shows the estimated probabilities of retirement at ages 60, 65, and 70 for CSUC employees covered by Social Security whose salary is $24,000 per year. The figure illustrates several points. First, employees at the specified salary level ($24,000 per year) are more likely to retire (1) the older they are and (2) the greater is the value of the total retirement annuity, expressed as an Actuarial Present Value. For example, an employee who was 60 years old with a salary of $24,000 and a retirement annuity equal to $50,000 (APV) would have had an estimated probability of retirement under the ERI program of 2.0 percent; if his retire-

7. A successful prediction is defined as one in which either: (1) the logit model predicts a probability of retirement greater than or equal to 50 percent and the employee actually retires or (2) the logit model predicts a probability of retirement less than 50 percent and the employee actually does not retire.

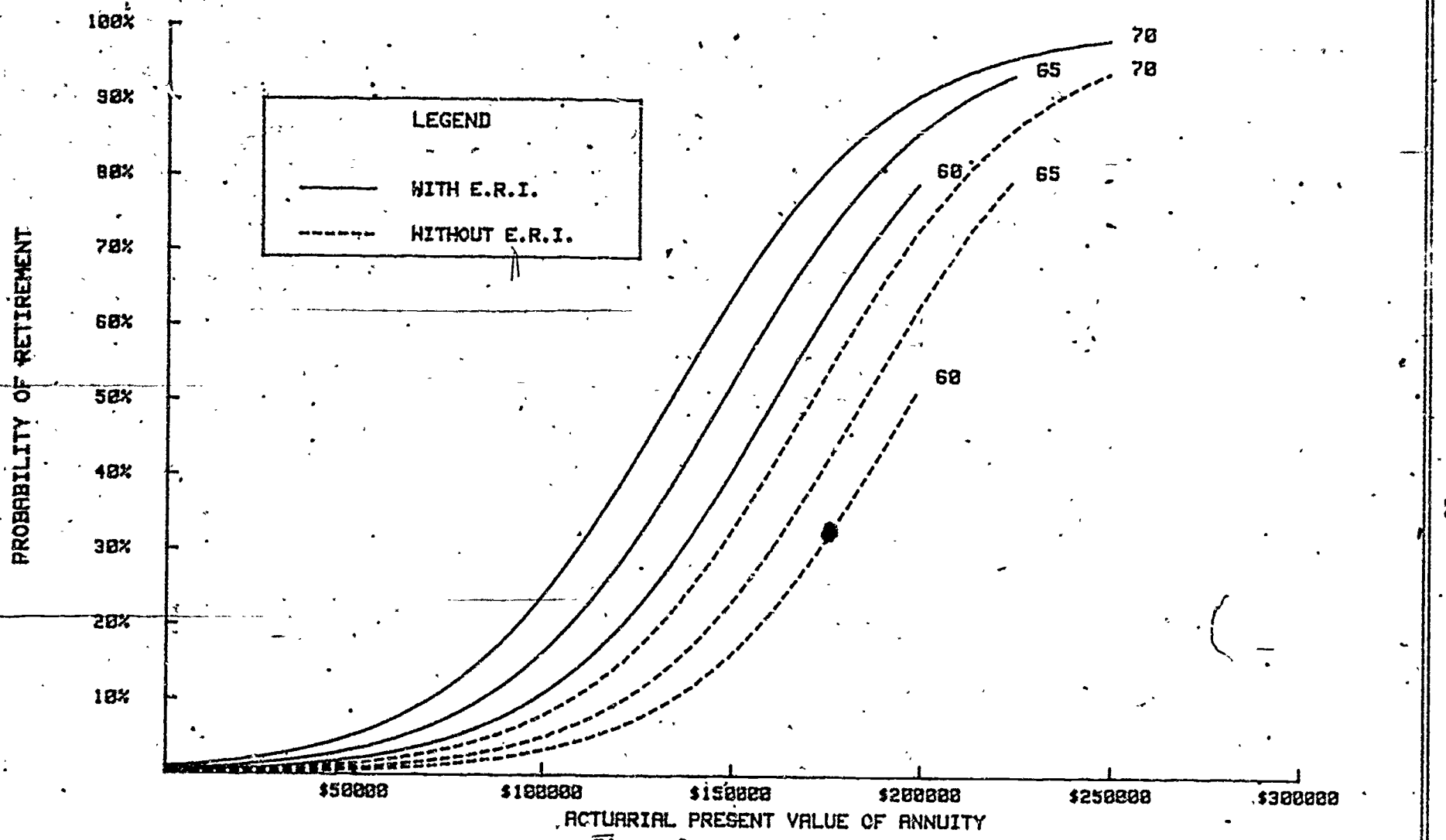



Figure 2

ESTIMATED EFFECT OF CSUC
EARLY RETIREMENT INCENTIVE (E.R.I.) PROGRAM
ON 3-MONTH PROBABILITY OF RETIREMENT
AT AGES 60, 65, AND 70
(for employees covered by Social Security,
earning $24,000 per year)

ment annuity were $100,000, his probability of retirement would have been 10.5 percent; and if his retirement annuity were $200,000, his probability of retirement would have been 79.0 percent.

Second, Figure 2 shows that the amount of incentive provided by the ERI program (that is, the increase in the probability of retirement) varies depending on the probability that the employee would have retired even if the program had not been established.[8] Where the probability is either low or high, the additional incentive provided by the program is small; it is greatest where the employee's probability of retirement is near 50 percent.

Consider the case of a 65-year-old employee earning $24,000, whose retirement annuity without the ERI program has an APV of about $100,000. Given these values, his estimated probability of retirement is only about 5 percent. With the ERI program in effect, he would be eligible for a bonus which would increase the APV of his annuity by about $11,000. This increases the probability of retirement by about 17 percentage points, to approximately 22 percent.

8. Mathematically, the increase in the probability of retirement associated with the ERI program is given by the following equation:

$$\Delta P \approx (1.26 + 0.03463x)\ [P(1 - P)]$$

where P is an employee's probability of retirement without the ERI program and x is the value of the two years' additional retirement service credit, in thousands of dollars.

Suppose instead that the employee's annuity were worth $175,000. The value of the bonus, which is dependent only on the employee's age and his final compensation, is still worth about $11,000. In this case, however, the increase in the employee's probability of retirement induced by the ERI program is much greater. Whereas his pre-ERI program probability of retirement is about 42 percent, with the ERI program in effect, it is about 79 percent -- an increase of approximately 37 percentage points.

Finally, Figure 2 illustrates a general characteristic of all logit curves -- they are steepest at the point where the probability of retirement equals 50 percent. This, in turn, implies that the increase or decrease in the probability of retirement associated with a change in any of the explanatory variables (in this case, the APV of the retirement annuity), is greatest for an employee who is relatively indifferent between retiring now or later. In other words, this shape means that, if an employee's mind is already made up about retirement, a slight change in one or another of the determinants noted is not going to change his chances of retiring very much. If, on the other hand, he is "sitting on the fence," a relatively small change in one of the determinants (such as the addition of $11,000 in retirement annuity) will have a marked effect on the probability that he will retire.

D. EFFECT OF THE ERI PROGRAM

The results of the retirement behavior model clearly indicate that the CSUC Early Retirement Incentive program had a dual impact on retirement behavior. First, by offering an employee an increase in the value of his retirement annuity, the program increased the probability that the employee

would retire by the "normal" amount associated with changes in annuity value. Second, the ERI program caused a direct increase in the probability of retirement, quite apart from that which might normally have been expected to occur as a result of the increase in annuity value. This is apparent because, even after controlling for an employee's age, his final compensation, and the value of his retirement annuity (including, where appropriate, the value of the early retirement bonus), there is a significant difference between the retirement behavior of those eligible to retire between March 27 and June 29, 1979 and that of those eligible during the same period in 1980, when the ERI program was in effect.

Why should the Early Retirement Incentive program have this additional impact on retirement behavior, independent of the effect associated with changes in annuity value? Quite simply, the ERI program had this additional impact because the program was offered for a limited time only, on an "all or nothing," "take it or leave it" basis. CSUC employees knew that if they did not take advantage of the ERI program when it was available, they might not have another chance to do so. On the other hand, had the ERI program been offered on a permanent basis (that is, had retirees been given automatically two years' additional service credit, irrespective of when they retired), then one would have expected to see virtually all of the program's impact through the normal effects of changes in annuity value on retirement behavior. To reiterate, the ERI program had a significant positive impact on retirement behavior, independent of that which would otherwise have been associated with changes in annuity value, as a direct result of the program having been offered on a limited time basis, with little or no chance of repetition in the near future.

It would clearly be incorrect to conclude that, if the Early Retirement Incentive program were adopted on a permanent basis, or even offered with predictable frequency, high participation rates similar to those observed under the original program could be sustained, for two reasons. First, once the most likely candidates for participation in the ERI program have retired, it will take some time for the eligibility pool to build up again. The situation is somewhat analogous to a pressure cooker in which a valve is opened. At first, there is a great outrush of steam and pressure, but if the valve is opened too wide for too long, the escaping pressure is slight. The second reason why such high participation rates could not be sustained relates more to human nature: if an ERI program were offered, say, every year, each eligible employee would have much less of an incentive to retire during any given eligibility period.

In conclusion, then, there can be little doubt that the "now or never" aspect of the CSUC Early Retirement Incentive program contributed greatly to its success in inducing additional employees to retire during the three-month eligibility period of March 27 to June 29, 1980.

## IV. FISCAL IMPACT OF THE ERI PROGRAM

One of the most important, and certainly the most difficult, question regarding the impact of the Early-Retirement Incentive program concerns the program's net fiscal impact: did the ERI program "pay for itself"? To answer this question, it is necessary to know something about when the participants in the program would have retired, had the ERI option not been available. If it is possible to predict with some certainty the probability that an employee will retire during a given year, this information may then be used to simulate what retirement behavior would have been, both with and without the ERI program. Then, if the estimated total cost of compensation without the ERI program exceeds the total cost of compensation with the program by more than the cost of funding the two years extra retirement service credit offered as an incentive, it may be concluded that the ERI program "pays for itself."

### A. DIRECT COSTS

The primary direct cost associated with the ERI program is the cost of the two years' additional retirement service credited to program participants. As noted earlier, 1,047 CSUC employees opted to retire under the ERI program; of these, 486 were faculty and 561 were non-faculty. The total costs of funding the early retirement bonuses for these employees amounted to approximately $11.1 million, with about $6.6 million attributable to faculty and $4.5 million attributable to non-faculty retirements. The average cost per retiree of funding the bonus thus equalled about $13,600 for faculty and $8,000 for non-faculty.

Under the terms of the legislation which created the Early Retirement Incentive program (Chapter 656, Statutes of 1979), the full costs of funding the additional two years' service credit bonuses had to be paid by CSUC. In June 1980, CSUC paid the total amount due the State Teachers' Retirement System ($292,444) and $4.0 million of the $10.4 million due the Public Employees' Retirement System. In April 1981, the system paid the remainder due PERS, $6,395,497, plus $324,060 in interest charges calculated at a 6.6 percent annual rate. These transactions are summarized in Table 11.

Table 11

Summary of Early Retirement Incentive Program Funding

| | |
|---|---|
| I. Paid the Public Employees' Retirement System | |
| A. Two years' service credit | |
| 1. Initial payment | $ 4,000,000 |
| 2. Final payment | 6,395,497 |
| B. Interest @ 6.6% (7/1/80 - 3/31/81) | 324,060 |
| C. Administrative charges | 86,480 |
| Subtotal | $10,806,037 |
| II. Paid the State Teacher's Retirement System | 292,444 |
| TOTAL | $11,098,481 |

B. NET FISCAL IMPACT

In the following analysis, the net fiscal impact of the ERI program is estimated separately for faculty and non-faculty positions, for two reasons. First, while Early Retirement Incentive-type programs are, at least in principle, applicable to various employee groups, such programs are likely to be of particular interest to institutions of higher education which are seeking ways of increasing turnover among faculty. One analyst of college and university early retirement systems, Dr. Carl V. Patton of the University of Illinois, describes the plight of higher education institutions in the following terms:

> Academia's interest in early retirement and mid-career change programs derives to a large extent from the budgetary and manpower problems now faced by many colleges and universities. During the so-called "steady-state," some colleges and universities will find that they are able to hire few young professors -- the very people upon whom they depend substantially for new ideas and rejuvenation. The problem will be particularly acute for institutions with large percentages of tenured faculty members, schools experiencing slow or no growth, and those having few retirements. These institutions may find that they are unable to respond to enrollment shifts and other changing demands. Furthermore, the steady-state and low turnover may make it difficult for a university to increase the number of women and minority faculty members at a rate it considers desirable.[1]

The second reason for analyzing separately the fiscal impact of the ERI program on faculty positions relates to certain practical considerations involved in simulating retirement behavior among CSUC employees. First, the fiscal implications of the ERI program are likely to differ greatly for

1. Carl V. Patton, Academia in Transition, (Cambridge, Mass.: Abt Books), 1979, p. 5.

faculty versus other CSUC employees. Because the salary range between an entry-level assistant professor and a full professor at the top step is much greater than the salary range for any other occupation within the CSUC system, the replacement of a faculty position vacated by retirement with a new hire at the entry level is likely to result in considerably more savings than, say, replacing a senior clerical worker with his entry-level counterpart. Second, data such as age and salary distributions, which are necessary for the construction of a simulation model, are readily available for faculty.

1. FACULTY

As noted above, the appropriate method for evaluating the fiscal impact of the Early Retirement Incentive program is to compare the costs of compensation both with and without the program. To fully account for the longer-run as well as the current fiscal effects of the ERI program, the comparison should cover projected costs several years into the future. If total estimated compensation costs without the ERI program exceed those with the program by more than the cost of funding the additional two years of retirement service credit, then the program has generated net savings to the state.

The following simple model of faculty retirement behavior is intended to clarify the steps involved in making these comparisons.

a. Simple Model of Faculty Retirement

Suppose that the ERI program induces a professor earning $30,000 per year to retire in the current year and that he is replaced by an entry-level assistant professor earning $18,000 per year. Further suppose that

the new professor is expected to remain in the CSUC system for 10 years. What are the savings to the system, if any, resulting from the full professor's early retirement?

Figures 3 and 4 illustrate the savings to the CSUC for this one case. Figure 3 presents the cost to the system over the next ten years of the assistant professor. The graph assumes that his salary will increase, on average, by 11 percent per year due to merit steps and cost of living increases. Figure 4 shows what the system would have spent over the next ten years in the absence of the full professor's early retirement. The graph assumes that, were the ERI program not available, the professor would have retired in three years. The graph also assumes that, over these three years, the professor's salary would have increased by 6 percent per year, because he is eligible only for cost of living adjustments. Finally, Figure 4 assumes that when the professor retires, he is replaced by an assistant professor earning $21,438 (that is, the old entry-level salary of $18,000 inflated for three years at 6 percent per year). The assistant professor's pay increases thereafter by 11 percent per year.

The savings attributable to the professor's early retirement are calculated by subtracting the shaded area in Figure 3 from that in Figure 4. If the resulting dollar amount is greater than the cost to the CSUC system of funding the professor's extra two years of retirement service credit, then the ERI program has generated net savings.

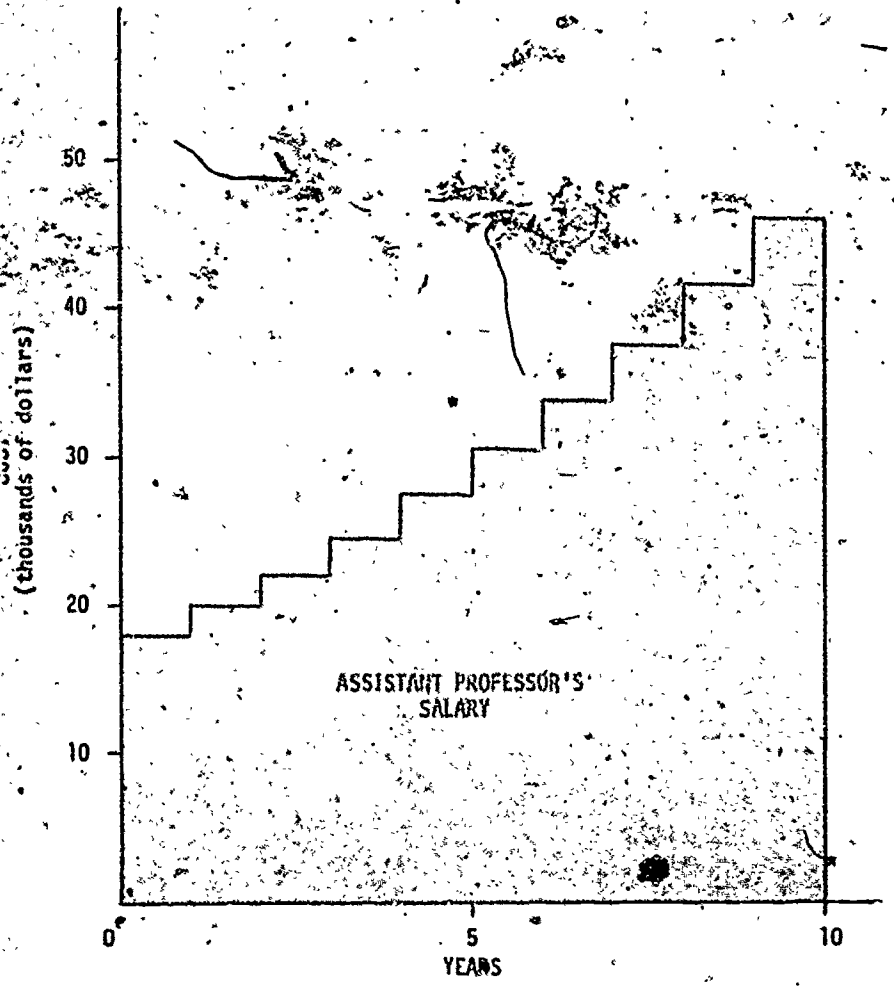



Figure 3. Costs with ERI

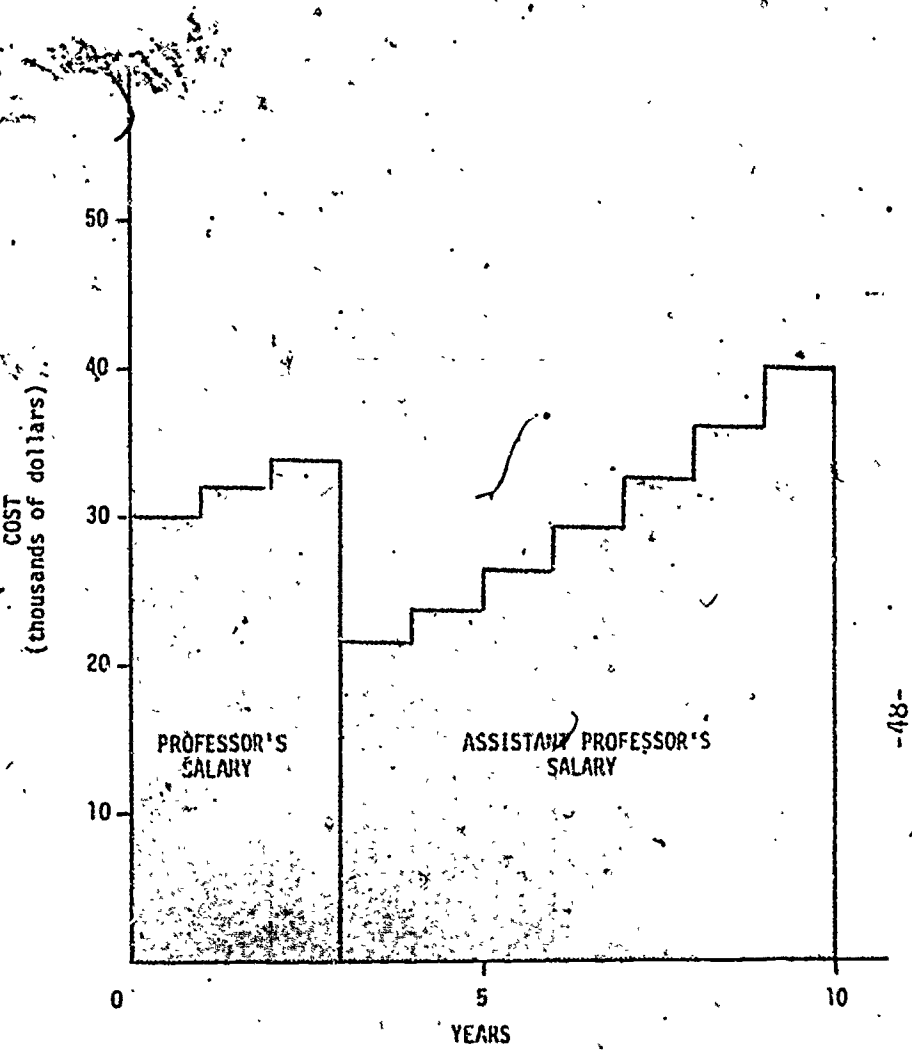



Figure 4. Costs without ERI

Hypothetical Costs Associated
With a Faculty Position
(Simple Model)

In the example just presented, the savings in compensation costs attributable to the ERI program equal $4,248. That is, compensation costs under the program are $4,248 less than they would have been without the program. In order to calculate the net cost of the ERI program associated with this position, the cost of the two years' service credit bonus must be subtracted from the savings in compensation. If the resulting dollar amount is positive, then the ERI program has generated net savings for this position. In order to determine whether the ERI program as a whole has "paid for itself," similar calculations must be made for each of the positions vacated under the program, and the total net cost or savings tallied.

Note that, in order to evaluate the cost or savings attributable to the ERI program, it is necessary to analyze the retirement behavior only of those positions which were vacated by retirees under the ERI program. The reason is straightforward: if an employee did not choose to retire during the three-month eligibility period the ERI program was in effect (and thus declined to take advantage of the "bonus" which it afforded), he most certainly would not have retired during this same period, had the ERI program not been in effect. Thus, it is reasonable to assume that the retirement behavior of these employees in the absence of the ERI program (and the costs associated with their positions) would have been the same as that during the program. Consequently, these compensation costs may be ignored in analyzing the fiscal impact of the ERI program.

b. Limitations of Simple Model

A little reflection on the simple model just described reveals some serious limitations. First, how is one to determine the number of years

that the early retiree would have remained in the CSUC system, had the ERI program not been available? Second, how is one to determine the number of years that a new employee will remain in the system? And, finally, how does one determine the new employee's salary?

Further reflection on these crucial parameters indicates that each is not strictly "determined" but, rather, is characterized by a certain probability of occurrence. That is, it is not possible to say, for example, that in the absence of the ERI program a given employee would definitely have retired in exactly three years. It may be possible to state with some degree of confidence, however, that in the absence of the ERI program, this particular employee's probability of retirement within one year would have been, say, 20 percent; within two years, 50 percent, and so forth, where such probabilities are a function of the employee's age, salary, and the value of his retirement annuity. Similarly, it may be possible to calculate the probability that a newly-hired employee will leave the CSUC at any given point in time, based on such characteristics. Indeed, this is the approach which is taken in the simulation model used in this analysis, described below.

The problem of determining the new employee's salary is a bit more complicated because of the correlation between an employee's age and his salary -- the older he is, the higher his salary is likely to be. One solution, which again is used in the simulation model, is to pick the new employee's age based on the actual age distribution of newly-hired, full-time faculty within CSUC. Then, the new employee's salary may be picked from a table giving the actual average salary paid faculty members of a given age. This approach has the added advantage of eliminating the need

for assumptions regarding a rate of salary increase for various employees, if it may be assumed instead that the relationship between faculty members' ages and their salaries will remain fairly constant over the period examined. Then, whenever an employee's age increases, his salary may be increased according to the age-salary relationship described in the table.

c. Description of the Faculty Simulation Model

The faculty simulation model used in this analysis, then, builds on the simple model described earlier, while avoiding the simple model's limitations just noted. In brief, the computer-based model calculates estimated compensation[2] costs for 221 full-time faculty positions[3] vacated during the ERI program, for two cases: (1) with the ERI program in effect and (2) without the ERI program. Costs are projected for a period of fifteen years in each case, and the cost difference compared. In addition, the simulation model keeps a record of the costs of the two years' additional service credit so that the net cost of the ERI program may be evaluated.

The computer simulation model begins by calculating the 15-year projected costs of the affected faculty positions under the assumption that the ERI program is in effect. First, the computer "throws the dice" (generates a random number) and uses this information to pick the age of the newly-hired faculty member from a table giving the actual age distribution of recently-hired faculty. Next, the computer picks the employee's

2. Unlike the simple model described earlier, the faculty simulation model calculates total compensation costs (i.e., salary plus fringe benefits) associated with each position. The cost of benefits is calculated at 26 percent of the employee's salary.
3. Although 329 full-time faculty positions were vacated during the period the ERI program was in effect, data necessary for the simulation model were available for only 221 of these.

salary from a table relating age to average salary.[4] Based on the employee's age, salary, and years of service credited to PERS, the Actuarial Present Value of the retirement annuity he would receive by retiring in the current year is calculated.[5] Then, the employee's probability of separation from the CSUC system in the current year is calculated (as described below). Next, the computer generates another random number and, based on this figure and the probability of separation just calculated, decides whether the employee leaves the CSUC system. If the employee leaves, the computer generates a random number to pick the age of another new hire, and the process begins again. If the employee does not leave, the cost of his salary and benefits is tallied, the counters keeping track of the year simulated, the employee's age, and his years of service credited to PERS all advance by one, the employee's salary is increased accordingly, and the process begins anew.

This process of simulating faculty behavior with the ERI program continues for fifteen years of projected costs, at which point the model has calculated the projected costs associated with just the first of the 221 faculty positions simulated. The computer model then performs the same calculations for each of the remaining 220 positions until the calculation of the total costs associated with these positions, with the ERI program in effect, is completed.

4. The tables giving the age distribution of newly-hired faculty and the relationship between faculty age and average salary are presented in Appendix B.
5. A description of how the APV of the retirement annuity is calculated is presented in Appendix B.

Following similar procedures, the computer simulation model calculates what the projected costs would have been had the ERI program not been in effect. This time, the model begins by estimating the probability that the early retiree would have retired, had the ERI program not been available (some of the "early" retirees, of course, would have retired regardless of whether the ERI program was available). As before, the computer generates a random number to decide whether the employee leaves the system. If he leaves, a new employee is chosen to replace him and the simulation continues along the lines previously described. If he does not leave, his salary is tallied and the simulation continues. A flow chart, describing these processes in some detail, is presented in Appendix B.

1. Budgeted Versus Actual Costs

The distinction between budgeted and actual costs is crucial in analyzing the fiscal impact of the Early Retirement Incentive program. Budgeted costs are the relevant measure for assessing the fiscal impact of the ERI program on the California State University and Colleges and the State of California. Actual costs, however, are the relevant measure for assessing the likely fiscal impact of an ERI-type program on most other institutions of higher education.

In preparing CSUC's annual budget, the system budgets each faculty position which is occupied as of June 30 (the day before the beginning of the new fiscal year) at the actual salary for that position, adjusted for merit raises and cost-of-living increases. In addition, any faculty positions which are vacant on June 30 are reclassified to the entry level (assistant professor, step 3) and budgeted accordingly.[6] Finally, the

6. The annual salary of an assistant professor, step 3 in 1980-81 is $19,692.

system recognizes that, because of turnover, not all positions budgeted will actually be filled during the entire budget year by deducting an amount for "normal salary savings" (in 1980-81, this amount equalled 1.1 percent of the total budget for faculty salaries).

As noted, all faculty positions which are vacant on June 30 are reclassified to an assistant professor, step 3. If the position is subsequently filled at a higher salary level, the difference between these two salaries must be funded by additional salary savings realized from other faculty positions (either by granting fewer promotions or by holding open other faculty positions vacated during the budget year). Conversely, if the position is filled at a salary below that of an assistant professor/3, "excess" salary savings are generated. In practice, then, the sum of the salaries budgeted for all faculty positions in the CSUC represents an upper limit on the actual amount which may be spent for faculty compensation.

Because the Early Retirement Incentive program was in effect from March 27 to June 29, 1980, the vast majority of the faculty positions vacated under the program were still vacant on June 30, 1980. As a result, the salaries for these positions were reclassified to those of an assistant professor/3 for the 1980-81 fiscal year, even though the actual, first year salary costs associated with the new faculty hired to fill these positions would likely exceed their budgeted costs. This would occur because the average salary paid a new professor within CSUC is generally greater than that of an assistant professor, step 3. But, in order to pay these new professors' salaries at rates higher than those budgeted, the CSUC system would have to achieve "excess" savings with respect to the total

salaries budgeted for remaining faculty positions. (In following budget years, this problem will not be as acute, because the actual salaries paid the new faculty hired during 1980-81 will be reflected in those subsequent budgets.)

Thus, any expenditures over the amounts budgeted for the new salaries of faculty positions vacated under the ERI program must be offset by reductions under the amounts budgeted for salaries of all other faculty positions. In this sense, the amounts budgeted for the faculty positions affected by the ERI program represent the relevant measure of resources, associated with these positions, which are available for expenditure by CSUC. Therefore, budgeted costs are the relevant measure for assessing the fiscal impact of the ERI program on the California State University and Colleges.

On the other hand, for institutions of higher education in general (which do not follow the CSUC budgetary practice of reclassifying vacated faculty positions downward), budgeted costs are likely to provide a misleading -- and overly-optimistic -- picture of an ERI-type program's fiscal effects. For these institutions, actual costs are the more appropriate measure of fiscal impact.

The simulation model developed for this analysis calculates the fiscal impact of the ERI program in two ways. In the first version, the model assumes that the positions vacated during the ERI program are reclassified to the assistant professor/3 level in 1980-81. The model further assumes that any faculty position vacated during a subsequent fiscal year will be vacant on June 30 of that year and, hence, will also be

reclassified to assistant professor/3 for the fiscal year immediately following the year in which the vacancy occurs. The results generated by this version, termed "projected budgeted costs", are presented in the text. The second version of the model reports the "projected actual costs" associated with the positions vacated under the ERI program. Readers interested in the simulated fiscal impact of the ERI program, reported on an "actual cost" basis, should refer to Appendix C.

ii. Estimating the Probability of Separation[7]

The calculation of a faculty member's probability of separation from the CSUC system takes place in two parts:

- if the employee is under 50 years of age, his probability of separation is derived from a table, based on actual CSUC experience, relating the probability of separation to the employee's age,[8]
- if the employee is aged 50 or older, his probability of separation is based on a logit model similar to the one described in Chapter III.

The logit model estimates a faculty member's probability of separation based on his age, his salary, the Actuarial Present Value (APV) of his retirement annuity; and a dummy variable indicating whether the ERI program was in effect.

7. For purposes of the faculty simulation model, the terms "separation" and "retirement," as they apply to faculty aged 50 or older, are used interchangeably, although technically, "separation" is a broader term than "retirement," encompassing retirements, deaths, "quittings" and "firings." A comparison of predicted retirement probabilities with historical separation rates for these employees revealed negligible differences.
8. The table relating the faculty member's probability of separation to his age (for those under 50) is presented in Appendix B.

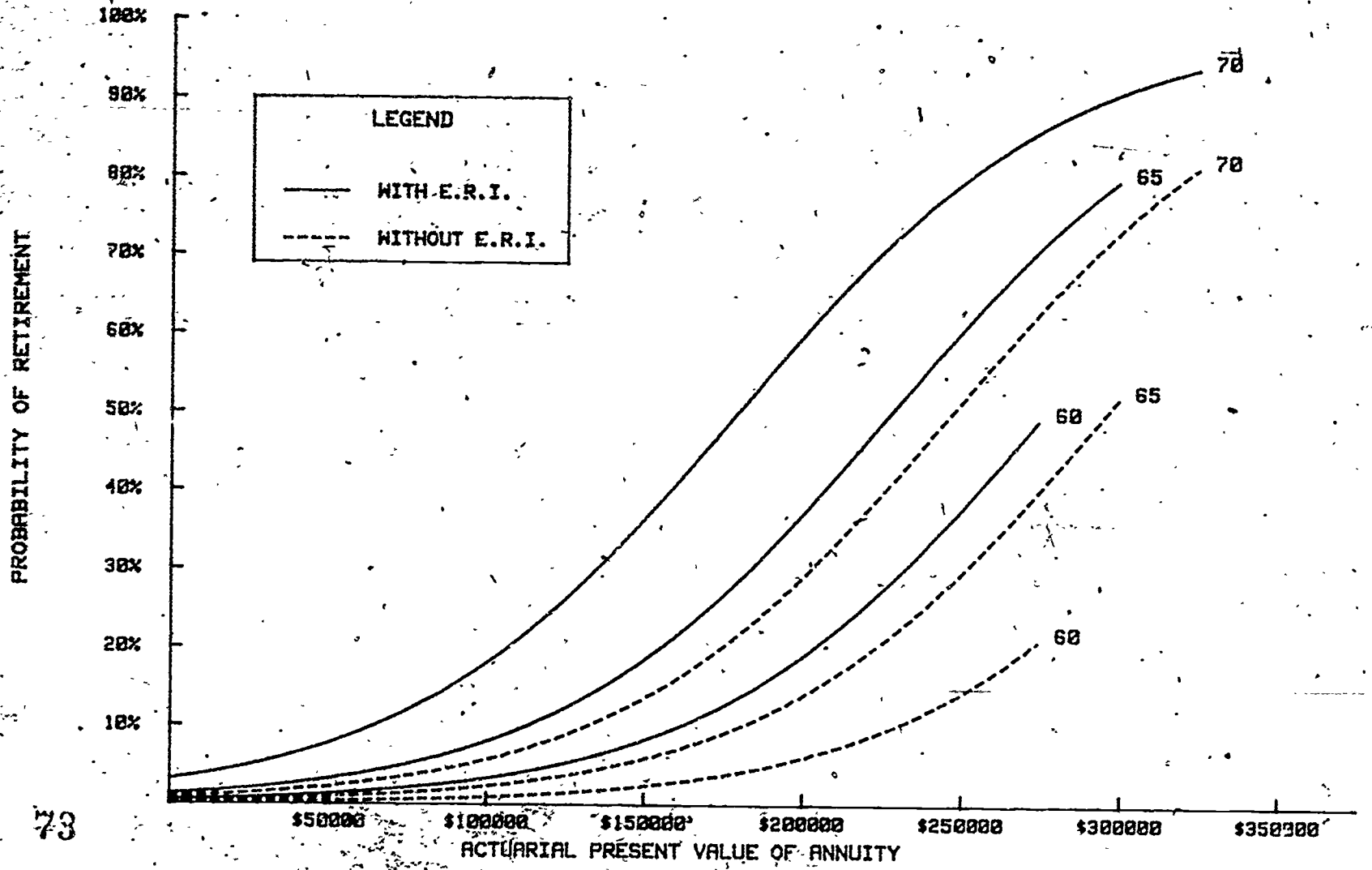



Figure 5

ESTIMATED EFFECT OF CSUC EARLY RETIREMENT INCENTIVE (E.R.I.) PROGRAM ON 3-MONTH PROBABILITY OF RETIREMENT AT AGES 60, 65, AND 70

(for faculty covered by Social Security, earning $31,416 per year)

The model successfully predicts the retirement behavior of CSUC faculty who were eligible for the ERI program in 95 percent of the cases.[9] Results of the faculty logit model are shown graphically in Figure 5.

Figure 5 shows the estimated effect of the CSUC Early Retirement Incentive program on the probability that a given faculty member would retire during a three-month period, at ages 60, 65, and 70. The probabilities shown in the figure are for faculty who were at the top step of the full professor rank in 1979-80 (earning $31,416 per year) and who were covered by Social Security. Like the logit curves described earlier in this analysis, these curves show that faculty members at this salary level are more likely to retire (1) the older they are and (2) the greater is the APV of their retirement annuity. Calculations of separation probabilities for specific ages and years of retirement service credit are presented in Table 12.

9. A successful prediction is defined as one in which either: (1) the logit model predicts a probability of retirement greater than or equal to 50 percent and the employee actually retires or (2) the logit model predicts a probability of retirement less than 50 percent and the employee actually does not retire.

Table 12

Estimated Effect of Early Retirement Incentive Program on Probability of Retirement At Ages 50 to 70[a]

| Age | Years of Retirement Service Credit | APV[b] of Annuity Without ERI Program | APV[b] of Additional 2 Years Service Credit | Total APV[b] of Annuity With ERI Program | Estimated Three-Month Probability of Retirement Without ERI | With ERI | Change |
|---|---|---|---|---|---|---|---|
| 50 | 5 | $ 22,878 | $ 9,151 | $ 32,029 | 0.0% | 0.1% | 0.1% |
| | 10 | 45,756 | 9,151 | 54,907 | 0.1 | 0.2 | 0.1 |
| | 15 | 68,634 | 9,151 | 77,785 | 0.1 | 0.3 | 0.2 |
| | 20 | 91,512 | 9,151 | 100,663 | 0.1 | 0.5 | 0.4 |
| | 25 | 114,390 | 9,151 | 123,541 | 0.2 | 0.8 | 0.6 |
| 55 | 5 | $ 27,774 | $11,110 | $ 38,884 | 0.1% | 0.4% | 0.3% |
| | 10 | 55,548 | 11,110 | 66,658 | 0.2 | 0.7 | 0.5 |
| | 15 | 83,323 | 11,110 | 94,432 | 0.3 | 1.2 | 0.9 |
| | 20 | 111,097 | 11,110 | 122,206 | 0.5 | 2.0 | 1.5 |
| | 25 | 138,871 | 11,110 | 149,981 | 0.8 | 3.4 | 2.6 |
| | 30 | 166,645 | 11,110 | 177,755 | 1.3 | 5.6 | 4.3 |
| 60 | 5 | $ 33,970 | $13,588 | $ 47,558 | 0.3% | 1.2% | 0.9% |
| | 10 | 67,940 | 13,588 | 81,528 | 0.5 | 2.3 | 1.8 |
| | 15 | 101,910 | 13,588 | 115,498 | 1.0 | 4.4 | 3.4 |
| | 20 | 135,880 | 13,588 | 149,468 | 1.8 | 8.1 | 6.3 |
| | 25 | 169,850 | 13,588 | 183,438 | 3.4 | 14.4 | 11.0 |
| | 30 | 203,820 | 13,588 | 217,408 | 6.4 | 24.3 | 17.9 |
| | 35 | 237,790 | 13,588 | 251,378 | 11.5 | 38.1 | 26.6 |
| 65 | 5 | $ 35,811 | $14,324 | $ 50,135 | 0.7% | 3.2% | 2.5% |
| | 10 | 71,621 | 14,324 | 85,945 | 1.4 | 6.2 | 4.8 |
| | 15 | 107,432 | 14,324 | 121,756 | 2.7 | 11.5 | 8.8 |
| | 20 | 143,242 | 14,324 | 157,567 | 5.1 | 20.5 | 15.4 |
| | 25 | 179,053 | 14,324 | 193,377 | 9.7 | 33.9 | 24.2 |
| | 30 | 214,864 | 14,324 | 229,188 | 17.5 | 50.4 | 32.9 |
| | 35 | 250,674 | 14,324 | 264,998 | 29.6 | 66.8 | 37.2 |
| | 40 | 286,485 | 14,324 | 300,809 | 45.5 | 80.0 | 34.5 |
| 70 | 5 | $ 30,280 | $12,112 | $ 42,393 | 1.5% | 6.7% | 5.2% |
| | 10 | 60,561 | 12,112 | 72,673 | 2.7 | 11.4 | 8.7 |
| | 15 | 90,841 | 12,112 | 102,953 | 4.8 | 18.7 | 13.9 |
| | 20 | 121,122 | 12,112 | 133,234 | 8.2 | 29.0 | 20.8 |
| | 25 | 151,402 | 12,112 | 163,514 | 13.7 | 42.2 | 18.5 |
| | 30 | 181,683 | 12,112 | 193,795 | 22.1 | 56.6 | 34.5 |
| | 35 | 211,963 | 12,112 | 224,075 | 33.6 | 69.9 | 36.3 |
| | 40 | 242,244 | 12,112 | 254,356 | 47.5 | 80.6 | 33.1 |
| | 45 | 272,524 | 12,112 | 284,636 | 61.7 | 88.1 | 26.4 |

a. Probabilities shown are for male, married faculty, covered by Social Security, with final compensation of $28,765 per year.
b. Actuarial Present Value.

Table 12 presents in tabular form the information contained in Figure 5. In addition, the table presents estimated probabilities of separation for faculty at ages 50 and 55. The table shows that, for faculty whose age is near 50 and whose years of service credit are few, the three-month probability of separation is very slight. For example, a 50 year old faculty member with 10 years of retirement service credit has an estimated three-month probability of separation of just 0.1 percent. With the ERI program in effect, his probability of separation is increased only very slightly, to 0.2 percent.

For older employees with more years of retirement service credit, in contrast, the three-month probability of separation is rather high. For a 65-year-old faculty member with 35 years of retirement service credit, the estimated three-month probability of separation is 29.6 percent without the ERI program and 66.8 percent with the program. Note that the additional incentive provided by the ERI program is greatest for faculty whose pre-ERI program probability of separation is in the 20 to 50 percent range.

It is important to emphasize that the probabilities presented in the figure and in the table are <u>three-month</u> probabilities. That is, the figures shown represent the probability that a faculty member would retire during a three-month period (such as that during which the ERI program was in effect). The probability that a faculty member would retire during a given <u>year</u> is, of course, higher than the three-month probability. For example, in the absence of the ERI program, the three-month probability of separation of a 65-year-old faculty member with 35 years of retirement service

credit is 29.6 percent, as noted above. The corresponding annual probability of retirement, however, is 75.4 percent.[10]

d. Faculty Simulation Model Results

The faculty simulation model described above was run for 25 simulations of fifteen years each. The model estimated the future costs associated with 221 of the 329 full-time faculty positions vacated during the CSUC Early Retirement Incentive program, both with and without the ERI program in effect. These 221 positions represent those positions held by individuals covered by Social Security, for which the necessary data on age, final compensation, years of retirement service credit, and value of the annuity were available. The average costs per year for the 25 simulations were then inflated by a factor of 1.49 (i.e., 329/221) to yield estimated costs associated with the 329 full-time faculty positions vacated.

i. Projected Net Costs

Budgeted costs, as projected by the simulation model, are presented in Table 13. (A similar table, giving actual costs, is presented in Appendix C.) Table 13 shows that, for full-time faculty, the Early Retirement Incentive program does, indeed, "pay for itself." In the first year of the ERI program, the estimated costs of funding the two years of additional retirement service credit equal $4.2 million; at the same time, the estimated cost savings attributable to the ERI program (allowing for the fact that some of the early retirees would have retired in any event)

10. The following formula relates the yearly probability of separation to the three-month (quarterly) probability:

$$P_y = 1 - (1-P_q)^4$$

Thus, $P_y$ equals $1 - (1 - 0.296)^4$, or $P_y = 0.754$

Table 13

SIMULATED FISCAL IMPACT OF CSUC
EARLY RETIREMENT INCENTIVE (E.R.I.) PROGRAM
(for 329 full-time faculty positions
vacated during the E.R.I. program)
-- AVERAGES FOR 25 SIMULATIONS --

PROJECTED BUDGETED COSTS

| YEAR | SALARIES + BENEFITS (A) W/ ERI | (B) W/OUT ERI | DIFF'CE (A-B) (C) | 2 YR SERVICE (D) | NET COST (E) | DISCOUNTED NET COST 2% | 4% | 6% | 8% | 10% |
|---|---|---|---|---|---|---|---|---|---|---|
| 1980-81 | $8,163,130 | $12,745,764 | $-4,582,634 | $4,220,192 | $-362,442 | $-362,442 | $-362,442 | $-362,442 | $-362,442 | $-362,442 |
| 1981-82 | 10,368,359 | 12,570,765 | -2,202,406 | -- | -2,202,406 | -2,159,222 | -2,117,698 | -2,077,742 | -2,039,265 | -2,002,187 |
| 1982-83 | 10,580,170 | 12,245,791 | -1,665,621 | -- | -1,665,621 | -1,600,943 | -1,539,960 | -1,482,397 | -1,428,002 | -1,376,546 |
| 1983-84 | 10,775,[illegible]6 | 11,909,449 | -1,133,553 | -- | -1,133,553 | -1,068,172 | -1,007,724 | -951,753 | -899,851 | -851,655 |
| 1984-85 | 10,981,085 | 11,744,490 | -763,405 | -- | -763,405 | -705,268 | -652,562 | -604,688 | -561,125 | -521,416 |
| 1985-86 | 11,166,230 | 11,497,642 | -331,412 | -- | -331,412 | -300,170 | -272,397 | -247,650 | -225,553 | -205,781 |
| 1986-87 | 11,347,892 | 11,392,517 | -44,625 | -- | -44,625 | -39,626 | -35,268 | -31,459 | -28,121 | -25,190 |
| 1987-88 | 11,474,520 | 11,290,905 | 183,615 | -- | 183,615 | 159,848 | 139,532 | 122,114 | 107,138 | 94,224 |
| 1988-89 | 11,602,178 | 11,343,718 | 258,460 | -- | 258,460 | 220,593 | 188,154 | 162,161 | 139,638 | 120,573 |
| 1989-90 | 11,758,865 | 11,430,639 | 328,226 | -- | 328,226 | 274,645 | 230,607 | 194,276 | 164,195 | 139,200 |
| 1990-91 | 11,840,308 | 11,505,395 | 333,913 | -- | 333,913 | 273,925 | 225,580 | 186,455 | 154,666 | 128,738 |
| 1991-92 | 11,945,219 | 11,606,864 | 338,355 | -- | 338,355 | 272,126 | 219,789 | 178,241 | 145,115 | 118,591 |
| 1992-93 | 12,036,690 | 11,661,731 | 374,959 | -- | 374,959 | 295,653 | 234,198 | 186,343 | 148,901 | 119,473 |
| 1993-94 | 12,093,730 | 11,673,182 | 420,548 | -- | 420,548 | 325,097 | 252,570 | 197,169 | 154,635 | 121,818 |
| 1994-95 | 12,157,857 | 11,772,734 | 385,123 | -- | 385,123 | 291,875 | 222,399 | 170,340 | 131,119 | 101,415 |

equal $4.6 million, for a net savings of $362,442. Thus, the simulation model indicates that over 100 percent of the costs associated with funding the extra annuities for faculty early retirees is recouped by cost savings in the first year.

The table also shows that significant cost savings associated with the vacated full-time faculty positions persist for several years, with estimated savings of $2.2 million in 1981-82, declining to $45,000 in 1986-87. From 1987-88 onward, the estimated costs associated with the ERI program are virtually identical to those without the program, with the former exceeding the latter by no more than $0.4 million (about 3 percent of the total costs of compensation associated with the 329 full-time faculty positions in these years).

The costs reported in Table 13, it must be emphasized, represent real dollar costs. That is, no allowance has been made for inflation-driven, cost of living increases in salaries and benefits. (Recall that increases in compensation are based on a table relating the faculty member's age to an average salary for that age.) Similarly, the discount rates reported under the heading "Discounted Net Cost" represent real rates of interest, that is, the interest rate net of inflation. The table thus shows that, under any reasonable assumption regarding an appropriate discount rate, the conclusion that the ERI program pays for itself (for faculty positions) remains valid.

Figure 6 presents the same information as Table 13 on (undiscounted) costs, in graphic form. The figure clearly shows the tendency of the ERI program to generate significant savings in the early years following the program's implementation. The figure also shows how estimated costs for the vacated full-time faculty positions, both with and

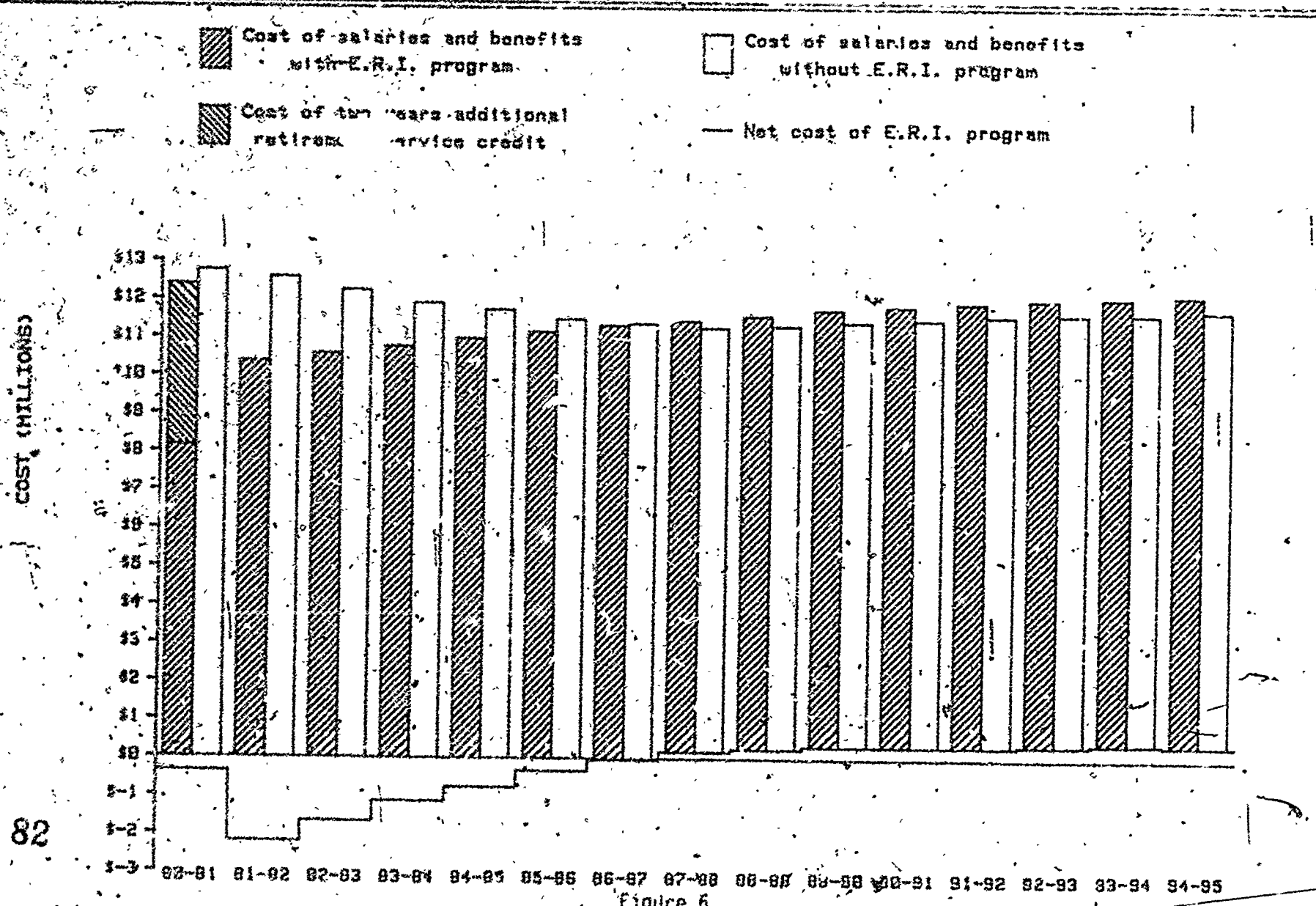



Figure 6

SIMULATED FISCAL IMPACT OF CSUC EARLY RETIREMENT INCENTIVE (E.R.I.) PROGRAM (for 329 full-time faculty positions vacated during the E.R.I. program)

without the ERI program, converge around 1986-87 and remain virtually identical thereafter.

ii. Optimal Frequency of Offering a Faculty ERI Program

The phenomenon of converging costs illustrated in Figure 6 reflects the restoration, in a sense, of these costs to an equilibrium level. That is, prior to the offering of the ERI program, the 329 full-time faculty positions which would later be vacated were occupied by a group of faculty whose ages and compensation levels were substantially above the averages for full-time faculty in general within CSUC. As these faculty members took advantage of the ERI program and their positions were filled by younger, lower-salaried faculty, the cohort's average age and compensation levels shifted in the other direction -- below the respective means for full-time faculty in general. Gradually, as a result of aging, salary increases, and additional turnover, the cohort's compensation costs approach a long-run equilibrium level. For estimated costs in the absence of the ERI program, a similar phenomenon occurs. In this case, however, the 329 full-time faculty positions are gradually vacated as a result of normal retirements and the cohort's compensation costs approach the long-run equilibrium level from above.

Important implications regarding the optimal frequency of offering an Early Retirement Incentive-type program for faculty follow from the equilibrium-seeking phenomenon just noted. Based on the simulation model results, approximately seven to eight years must pass following the offering of the ER. program before such an equilibrium will have been

restored. This in turn, implies that it will take about this length of time for sufficient "pressure" to build up to achieve similar numbers of retirements in a subsequent offering of an ERI-type program. If results similar to those obtained from the CSUC Early Retirement Incentive Program (as it applies to faculty) are desired, then, the next ERI-type program probably should not be offered for at least seven to eight years.

iii. Caveat: Effects of Faculty Early Retirement Plan

As noted, the simulation model results reported in Table 15 indicate that the CSUC Early Retirement Incentive program will generate net savings associated with the full-time faculty positions vacated; the model further indicates that such savings will amount to approximately $8.1 million during the five years following the offering of the ERI program. It must now be noted that, because of an additional retirement incentive offered by CSUC to faculty employees only, these estimated savings may be overstated by $1 million or more.

Under the CSUC Faculty Early Retirement Plan (FERP), authorized since 1963 by statute (Government Code Section 21155), faculty who retire are permitted to return to their respective campuses and teach up to one term per year until reaching age 70. The returning faculty are paid at their former salary rate, as adjusted by any salary increases which may have been granted since their retirements.

In addition to receiving the two years' service credit bonus, then, faculty who retired under the ERI program are also eligible to return and teach under the FERP. To the extent that they do so, and fill positions

which otherwise would have been filled by newly-hired faculty, the estimated savings attributable to the ERI program will be reduced.

While it is not possible to estimate exactly the magnitude of the additional costs associated with the faculty who return, a rough estimate may be made based on information obtained from the questionnaire sent all 329 full-time faculty who retired under the ERI program. Responses to the Legislative Analyst's questionnaire indicate that 61 percent of these faculty planned to return and teach on a part-time basis under the FERP. If all of the full-time faculty who indicated their intention to do so actually returned to the campuses and taught on a part-time basis during the first year following the ERI program, about 85 full-time faculty positions would be taken, at a cost (including fringe benefits) of about $3.0 million. Had these positions been filled instead by newly-hired faculty, total costs associated with these 85 positions would amount to about $2.1 million. Thus, as a result of the participation of faculty retirees in the Faculty Early Retirement Plan, the first-year net savings of $362,442 given by the simulation model could be offset by additional costs of up to $0.9 million.

On balance, our analysis indicates that, even after accounting for these additional first-year costs attributable to the Faculty Early Retirement Plan, the Early Retirement Incentive program's fiscal effect with respect to faculty is still one of net savings. This conclusion is based on the observation that, ~~in the~~ second year and thereafter, the additional costs resulting from participation of retired faculty in the FERP will decline. Further, to the extent that FERP-related costs persist,

they will, in all likelihood, be more than offset by the yearly net savings predicted by the simulation model, with the result that the additional costs incurred in the first year will be outweighed by net savings in the second and succeeding years. For these reasons, our conclusion that the CSUC Early Retirement Incentive program represents a cost-effective means of inducing faculty to retire early remains unchanged.

2. NON-FACULTY

An assessment of the Early Retirement Incentive program's fiscal impact on non-faculty positions is more difficult to make than it was for faculty because, while the latter is a relatively homogeneous group, non-faculty employees comprise a diverse range of occupations, ranging from clerical workers to vice-chancellors. As such, the tasks involved in modelling the fiscal impacts of the ERI program with respect to non-faculty -- especially estimating the costs associated with the new hires -- pose virtually insurmountable problems.

Despite the problems involved in modelling the fiscal impacts on non-faculty positions, however, it is still possible to draw some conclusions regarding the question of whether non-faculty retirements also "pay for themselves." The analysis which follows will demonstrate that it is highly unlikely that non-faculty retirements generate any net savings and that such retirements probably generate substantial net costs. Thus, the answer to the question, "Do non-faculty retirements pay for themselves?" appears to be "No."

That the fiscal implications of non-faculty retirements differ so greatly from those of faculty is a direct consequence of (1) the amount of

potential savings that can be realized by replacing retired employees and (2) the costs of funding the early retirement bonus associated with each type of position. Quite simply, the range of faculty salaries is far broader than that of any other occupational group in the CSUC syste And, although the average cost of funding the two years additional service credit bonus was less for non-faculty than for faculty, the much greater potential savings associated with faculty replacements overwhelms these added costs. Thus, while the total cost of funding the two years' additional service credit bonuses for non-faculty totalled about $4.5 million, the CSUC Chancellor's Office estimated that the total potential savings (that is, the savings without regard to normal retirement activity) attributable to non-faculty turnover was only about $2.3 million, resulting in a net cost of at least $2.2 million in the first year.

Earlier in this report, we noted that when a faculty member at the top step of the full professor range retires, the salary associated with his position is reclassified to that of an assistant professor, step three. The salary of a position vacated during the ERI program by a full professor at the top step was therefore reclassified from $34,476 down to $19,692 -- a savings in the first year of $14,784. And, as also noted earlier, the average cost per faculty retiree of funding the two years' service credit bonus was $13,600. After adjusting for the costs of fringe benefits,[11]

11. The cost of fringe benefits is calculated at 26 percent of the employee's salary.

the potential first-year savings attributable to any given faculty position equals about 137 percent of the cost of funding the retirement bonus. This fact is reflected in the results of the faculty simulation model wherein about 109 percent of the costs of funding the bonus are recouped during the first year. (The reason why the model shows 109 percent, and not 137 percent, is that not all faculty retirees were at the top step, full professor salary level.)

Among non-faculty, in contrast, no occupational category shows a range between its highest salary and its entry level salary which even approaches that of faculty. For example, of the six non-faculty occupational groups shown in Table 4, the group with the greatest number of participants in the ERI program was secretarial employees, many of whom were classified as Clerical Assistant IV. The top salary for this position in 1980-81 is $17,808; when vacated, the position's salary was reclassified to $16,299 -- a potential savings of only $1,901, after adjusting for the cost of benefits. Assuming that this employee retired at age 62 (the average age of all ERI program participants), the cost of funding the two years' service credit bonus would have ranged from $7,259 to $9,039. In this case, then, the potential first-year savings attributable to the Early Retirement Incentive program amount to only 21 to 26 percent of the cost of funding the retiree's bonus.

To show that the phenomenon illustrated by this example is not unique to secretarial employees, consider the case of a CSUC vice-chancellor at the top of his salary range, earning $69,540 in 1979-80. Had this

employee retired under the ERI program, the salary for his position would have been reclassified to $57,288 in 1980-81 -- a savings of $15,438, after adjusting for the cost of benefits. Again assuming a retirement age of 62, however, the cost of funding this employee's bonus would range from $30,637 to $38,148. Thus, the potential first-year savings attributable to the retirement of a vice-chancellor would equal only 40 to 50 percent of the cost of funding this retiree's bonus -- far less than the potential 137 percent savings attributable to a faculty retirement.

The final important difference between faculty positions and those of other CSUC employees relates to the number of "steps" from the entry level to the top salaries. While the range of salaries encompasses 13 steps for the former, that of the latter encompasses only five steps. Thus, even if a non-faculty position were vacated at the top step and reclassified to an entry-level salary, the savings in compensation costs thereby created would rapidly evaporate as the new hire was promoted. For this reason, it is unlikely that such savings over time would be sufficient to offset the substantial first-year deficits already noted.

Based on these and other examples, then, our analysis indicates that the cost of funding the two years' additional service credit for non-faculty employees almost certainly outweighs any savings generated by filling these positions with new employees at a lower salary level. For this reason it is highly unlikely that the retirements of non-faculty "paid for themselves." We therefore conclude that the ~~CSUC Early~~ Retirement Incentive program is <u>not</u> a cost-effective means of inducing non-faculty employees to retire early. This conclusion would also apply to other ERI-type programs covering employees in occupations that do not have broad salary scales.

## CONCLUSION

Our analysis of the Early Retirement Incentive program offered employees of the California State University and Colleges indicates that the results of the program are decidedly mixed:

- During the three-month period that the Early Retirement Incentive program was in effect, CSUC experienced nearly a sevenfold increase in retirement activity, with retirements during the quarter jumping from a normal level of about 150 to a total of 1,047. Yet, it is not clear that all of these additional retirements were attributable solely to the ERI program, and most of those who retired indicated that they would have retired within three years anyway.
- The vast majority of those who retired under the ERI program indicated that the availability of the two years of additional retirement service credit significantly affected their decisions to retire, but the effect of the bonus as an inducement to retire was most pronounced for those employees who already were indifferent between retiring now or later. Other factors such as an employee's age, his salary, and the total value of the retirement annuity to which he was entitled were of equal or greater importance in influencing retirement behavior.
- By inducing 390 white male, full-time faculty members to retire, the ERI program created additional opportunities to address affirmative action hiring goals. Yet, even if all of the full-time faculty positions vacated under the ERI program were

filled by women or members of racial or ethnic minorities, the proportion of faculty represented by white males would decline by only 3.4 percentage points, to 66.7 percent. If, on the other hand, the sexual, racial, and ethnic composition of the replacements parallels that of the new faculty hired during the first three quarters of 1980-81, the proportion of white male faculty will decline by only 1.5 percentage points -- to 68.5 percent.

Our analysis indicates that the Early Retirement Incentive program more than paid for itself in terms of faculty retirements. Our analysis indicates that by inducing faculty to retire, the program yielded estimated net savings of up to $6.8 million in the following seven years. For non-faculty, however, our analysis indicates that the program is not cost-effective and that it will lead to undeterminable, but probably significant, additional costs to the state. On balance, the total fiscal impact of the ERI program with respect to all CSUC employees -- faculty and non-faculty -- is unclear.

Based on our analysis of the CSUC Early Retirement Incentive program, we make the following recommendation:

We recommend that, if the Legislature decides to offer an Early Retirement Incentive-type program to CSUC employees in the future, (1) such a program include as one of its elements a limited eligibility period, similar to that of the original program (three months) and (2) such a program not be offered until 1986-87, at the earliest, because our analysis indicates that:

- The high level of participation in the original program (and the consequent cost savings for faculty) is largely attributable to the fact that the ERI program was offered for a limited time only, and
- The optimal frequency of offering an ERI-type program to CSUC faculty is no more than every seven to eight years.

## APPENDIX A

### Materials Sent Employees Included In Legislative Analyst's Survey

1. Cover letter
2. Questionnaire sent to 1,029 full-time CSUC employees who were eligible for the Early Retirement Incentive program
3. Questionnaire sent to 329 full-time CSUC faculty who retired under the Early Retirement Incentive program

# Joint Legislative Budget Committee



# California Legislature

LEGISLATIVE ANALYST
WILLIAM G. HAMM

925 L STREET, SUITE 1550
SACRAMENTO, CALIFORNIA 95814
(916) 445-4656

Dear CSUC Employee:

We are writing to ask your cooperation in a study of retirement within the California State University and Colleges. This study is being conducted by the Legislative Analyst's Office in cooperation with the CSUC Chancellor's Office, pursuant to the requirements of AB 876 (Chapter 656, Statutes of 1979) that "the Legislative Analyst shall evaluate the results of the early retirement incentive program...and its effectiveness in preventing layoffs and shall report his findings to the Legislature by January 1, 1981."

Your responses to the enclosed questionnaire will greatly assist the Legislature in evaluating the impact of the CSUC Early Retirement Program and will aid in the determination of whether similar benefits are offered to other state employees in the future. Therefore, your cooperation and thoughtful responses are valuable not only to the Legislature but, ultimately, to your colleagues in CSUC and other state agencies.

Please note that we are asking your participation in this survey whether or not you decided to retire under the provisions of the Early Retirement Program. You have been chosen from a sample of all CSUC employees who were eligible to take advantage of the early retirement legislation, whether or not you actually did so. Because the survey uses precise scientific methods and a statistically valid sample, we feel confident that it will produce some very useful results. However, responses from all persons surveyed, whether or not they actually took advantage of the Early Retirement Program, are crucial to the validity and usefulness of the study.

Once you complete the questionnaire form, please return it immediately in the enclosed envelope. Your answers will be treated with the strictest confidentiality. Please do not sign your name; a serial number on the first page identifies your form. The link between respondent names and their serial numbers is kept in a locked file and will be destroyed after the data are processed. Results from the study will not be used to compare individuals but will be used only in systemwide statistics. Copies of the final report will be available after January 1, 1981 through this office.

We greatly appreciate your participation in this survey. No one else can substitute for you; your cooperation is essential if we are to obtain representative findings. If you should have any questions, please call Mr. Raymond M. Reinhardt in this office at (916) 322-6934. He will be happy to assist you in any way he can.

Sincerely,

William G. Hamm

William G. Hamm
Legislative Analyst

California Legislature
Joint Legislative Budget Committee
Legislative Analyst's Office

A STUDY OF THE DETERMINANTS OF RETIREMENT
WITHIN THE CALIFORNIA STATE UNIVERSITY AND COLLEGES

Undertaken Pursuant to the Requirements of AB 876
(Chapter 656, Statutes of 1979)

QUESTION 1.

How many years service in public employment do you have credited to the Public Employees' Retirement System (PERS) or the State Teachers' Retirement System (STRS)? (Do not include any extra service credit granted by the Early Retirement Program. If you are a member of both PERS and STRS, include total service credited to both systems.)

If you have five (5) or more years of service credit, please round your answer to the nearest full year. If you have less than five years of service credit, please give the exact number of years and months.

Years of service credit _____

IF YOU HAVE LESS THAN FIVE (5) YEARS OF RETIREMENT SERVICE CREDIT, CHECK THE BOX AT RIGHT ---------- ☐

THEN STOP. DO NOT COMPLETE THE REMAINDER OF THE QUESTIONNAIRE.

RETURN THE UNCOMPLETED QUESTIONNAIRE IN THE ENVELOPE PROVIDED.

IF YOU HAVE FIVE OR MORE YEARS OF RETIREMENT SERVICE CREDIT, CONTINUE.

QUESTION 2.

Please indicate your marital status:

Married _____

Not married (divorced, separated, widowed or single) _____

QUESTION 3.

How many days of work did you miss during the past 12 months, due to illness?

Number of days missed due to illness _____

TURN PAGE OVER AND CONTINUE WITH QUESTION 4.

QUESTION 4.

Please estimate the current value of your net assets (if married, include net assets jointly held with your spouse). Net assets are defined as: (a) the equity value of your home (if you own it) plus any other savings or investments which you might own, MINUS (b) the value of your outstanding debts.

Please round your answer to the nearest increment of $5,000. If you are a net debtor (i.e., your liabilities exceed your assets), please answer $ 0 .

Total net assets: $_____

QUESTION 5.

Were you aware of the opportunity to receive two years of extra retirement service credit provided by the Early Retirement Program? (This program, created by AB 876, granted CSUC employees retiring between March 27, 1980 and June 29, 1980 an extra two years of service credit toward their retirement pension benefits.)

YES, I was aware of the program _____

NO, I was not aware of the program _____

QUESTION 6.

Did you choose to retire from CSUC under the Early Retirement Program created by AB 876?

YES, I retired between March 27, 1980 and June 29, 1980 _____

NO, I did not retire between March 27, 1980 and June 29, 1980 _____

QUESTION 7.

IF YOU ANSWERED "YES" TO QUESTION 6, ANSWER QUESTION 7(a).

IF YOU ANSWERED "NO" TO QUESTION 6, ANSWER QUESTION 7(b).

a) If the two years of extra retirement service credit provided by the Early Retirement Program had not been available, when would you have retired?

At the same time _____

Within the next year _____

In 1 to 2 years _____

In 2 to 3 years _____

Not for at least 3 years _____

CONTINUE TO QUESTION 8 AND THE REMAINDER OF THE QUESTIONNAIRE.

QUESTION 7 (cont'd.)

b) When do you plan to retire?

Within the next year _____

In 1 to 2 years _____

In 2 to 3 years _____

Not for at least 3 years _____

STOP. DO NOT COMPLETE THE REMAINDER OF THE QUESTIONNAIRE. PLEASE CHECK TO SEE THAT YOU HAVE ANSWERED ALL PREVIOUS QUESTIONS COMPLETELY. RETURN THE QUESTIONNAIRE IN THE ENVELOPE PROVIDED.

QUESTION 8.

Please assess the importance of the following factors in influencing your decision to retire now:

a) Possibility of receiving no salary increase this year if Proposition 9 (Jarvis Income Tax Initiative) were to have passed

Very important _____

Important _____

Slightly important _____

Not important at all _____

b) Possibility of receiving a layoff notice if Proposition 9 were to have passed

Very important _____

Important _____

Slightly important _____

Not important at all _____

c) Desire to avoid the layoff, transfer or demotion of my colleagues if Proposition 9 were to have passed

Very important _____

Important _____

Slightly important _____

Not important at all _____

TURN PAGE OVER AND CONTINUE WITH QUESTION 8(d).

QUESTION 8 (cont'd.)

d) Financial incentive of two years' extra retirement service credit provided by the Early Retirement Program

Very important _____

Important _____

Slightly important _____

Not important at all _____

QUESTION 9.

Do you plan to engage in other employment (outside of CSUC) upon your retirement from CSUC?

YES, I have another position _____

YES, I plan to take another position but do not have one at this time _____

NO, I do not plan to take another position _____

IF YOU ARE NOT A FACULTY MEMBER, STOP NOW. DO NOT COMPLETE THE REMAINDER OF THE QUESTIONNAIRE. PLEASE CHECK TO SEE THAT YOU HAVE ANSWERED ALL PREVIOUS QUESTIONS COMPLETELY. RETURN THE QUESTIONNAIRE IN THE ENVELOPE PROVIDED.

IF YOU ARE A FACULTY MEMBER, CONTINUE.

QUESTION 10.

Do you intend to return to CSUC to teach on a part-time basis under the provisions of the Faculty Early Retirement Plan? (This plan allows faculty to return to the campus and teach one term per year.)

YES _____

NO _____

STOP. PLEASE CHECK TO SEE THAT YOU HAVE ANSWERED ALL QUESTIONS COMPLETELY. RETURN THE QUESTIONNAIRE IN THE ENVELOPE PROVIDED.

California Legislature
Joint Legislative Budget Committee
Legislative Analyst's Office

# A STUDY OF THE DETERMINANTS OF RETIREMENT WITHIN THE CALIFORNIA STATE UNIVERSITY AND COLLEGES

Undertaken Pursuant to the Requirements of AB 876
(Chapter 656, Statutes of 1979)

SUPPLEMENTAL FORM FOR FACULTY RETIRING BETWEEN MARCH 27, 1980 AND JUNE 29, 1980.

QUESTION 1.

How many years service in public employment do you have credited to the Public Employees' Retirement System (PERS) or the State Teachers' Retirement System (STRS)? (Do not include any extra service credit granted by the Early Retirement Program. If you are a member of both PERS and STRS, include total service credited to both systems.)

If you have five (5) or more years of service credit, please round your answer to the nearest full year. If you have less than five years of service credit, please give the exact number of years and months.

Years of service credit _____

IF YOU HAVE LESS THAN FIVE (5) YEARS OF RETIREMENT SERVICE CREDIT, CHECK THE BOX AT RIGHT ---------- ☐

THEN STOP. DO NOT COMPLETE THE REMAINDER OF THE QUESTIONNAIRE.

RETURN THE UNCOMPLETED QUESTIONNAIRE IN THE ENVELOPE PROVIDED.

IF YOU HAVE FIVE OR MORE YEARS OF RETIREMENT SERVICE CREDIT, CONTINUE.

QUESTION 2.

If the two years of extra retirement service credit provided by the Early Retirement Program had not been available, when would you have retired? Please give your best estimate of the number of years until you would have retired. If you would have retired at the same time (irrespective of the extra two years of service credit), please answer 0.

I would have retired in _____ years

QUESTION 3.

Do you intend to return to CSUC to teach on a part-time basis under the provisions of the Faculty Early Retirement Plan? (This plan allows faculty to return to the campus and teach one term per year.)

YES _____

NO _____

QUESTION 4.

Please indicate your marital status:

Married _____

Not married (divorced, separated, widowed or single) _____

QUESTION 5.

How many days of work did you miss during the past 12 months, due to illness?

Number of days missed due to illness _____

QUESTION 6.

Please estimate the current value of your net assets (if married, include net assets jointly held with your spouse). Net assets are defined as: (a) the equity value of your home (if you own it) plus any other savings or investments which you might own, MINUS (b) the value of your outstanding debts.

Please round your answer to the nearest increment of $5,000. If you are a net debtor (i.e., your liabilities exceed your assets), please answer $ 0 .

Total net assets: $_____

STOP. PLEASE CHECK TO SEE THAT YOU HAVE ANSWERED ALL QUESTIONS COMPLETELY.

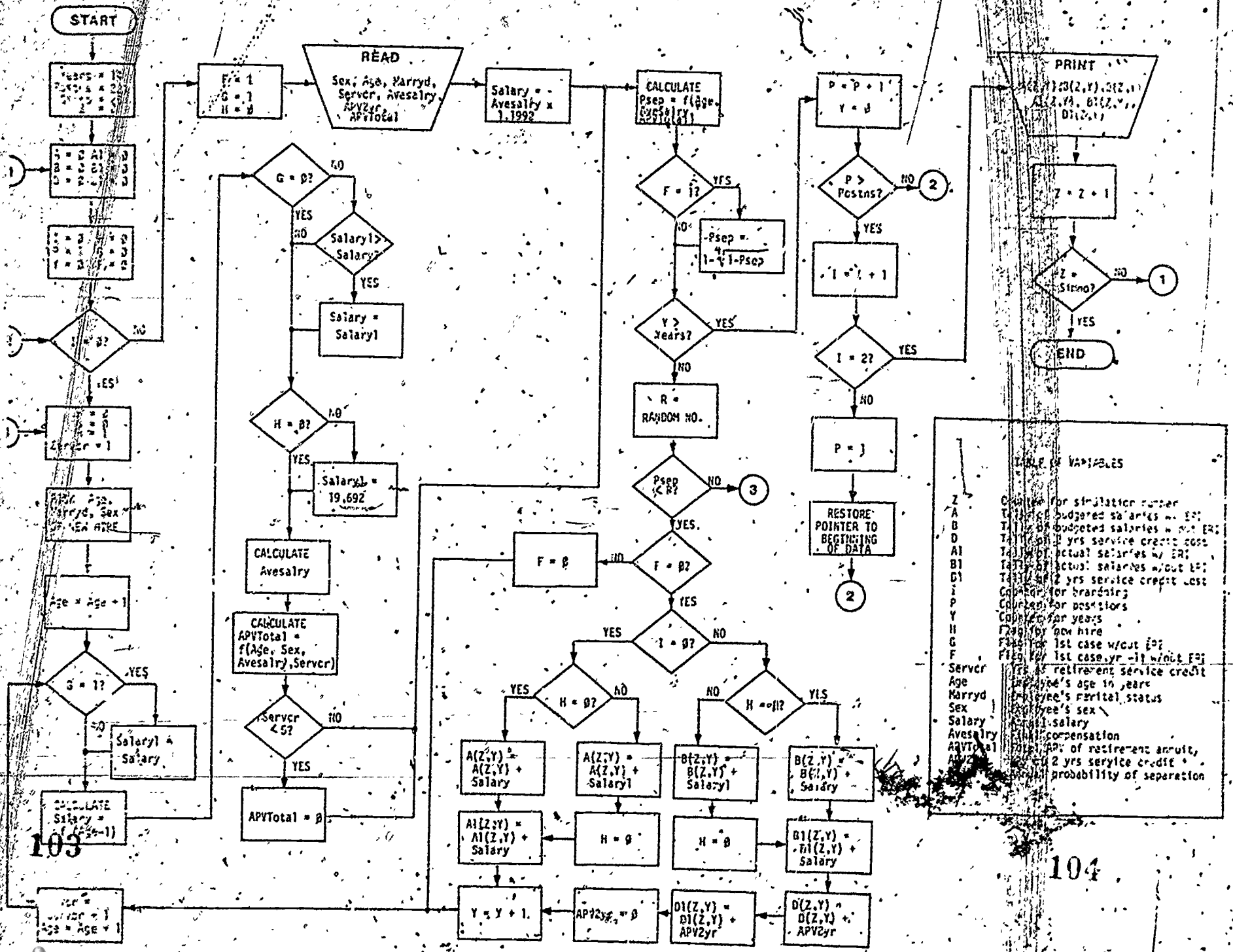
RETURN THE QUESTIONNAIRE IN THE ENVELOPE PROVIDED.

SUPPLEMENTAL FORM FOR FACULTY RETIRING BETWEEN MARCH 27, 1980 AND JUNE 29, 1980

## APPENDIX B

## Documentation of Faculty Simulation Model

1. Computer flow chart
2. Age distribution of newly-hired faculty
3. Relationship between faculty age and average salary, 1980-81
4. Separation rates of faculty aged 49 or under
5. Calculating the Actuarial Present Value of the retirement annuity


START
READ
Sex, Age, Marryd, Servcr, Avesalry, APVYrs, APVTotal
Salary = Avesalry x 1.1992
F = 1
G = 1
H = 0
CALCULATE Psep = f(Age, Sex, Salary)
F = 1?
YES
NO
Psep = 4√1-Psep
P = P + 1
Y = 0
P > Postns?
NO
2
YES
I = I + 1
I = 2?
YES
NO
P = 1
RESTORE POINTER TO BEGINNING OF DATA
2
Y > Years?
YES
NO
R = RANDOM NO.
Psep < R?
NO
3
YES
F = 0?
NO
YES
I = 0?
NO
YES
H = 0?
NO
YES
H = 0?
NO
YES
A(Z,Y) = A(Z,Y) + Salary
A(Z,Y) = A(Z,Y) + Salary1
B(Z,Y) = B(Z,Y) + Salary1
B(Z,Y) = B(Z,Y) + Salary
A1(Z,Y) = A1(Z,Y) + Salary
H = 0
H = 0
B1(Z,Y) = B1(Z,Y) + Salary
Y = Y + 1.
APV2yr = 0
D1(Z,Y) = D1(Z,Y) + APV2yr
D(Z,Y) = D(Z,Y) + APV2yr
F = 0
G = 0?
NO
YES
Salary1 > Salary?
NO
YES
Salary = Salary1
H = 0?
NO
YES
Salary1 = 19,692
CALCULATE Avesalry
CALCULATE APVTotal = f(Age, Sex, Avesalry, Servcr)
Servcr < 5?
NO
YES
APVTotal = 0
G = 1?
YES
NO
Salary1 = Salary
CALCULATE Salary = f(Age-1)
Age = Age + 1
PRINT
Z = Z + 1
Z = Simno?
NO
1
YES
END
TABLE OF VARIABLES
Z Counter for simulation number
A Table of budgeted salaries w/ ERI
B Table of budgeted salaries w/out ERI
D Table of 2 yrs service credit cost
A1 Table of actual salaries w/ ERI
B1 Table of actual salaries w/out ERI
D1 Table of 2 yrs service credit cost
I Counter for branching
P Counter for positions
Y Counter for years
H Flag for new hire
G Flag for 1st case w/out ERI
F Flag for 1st case,yr -II w/out ERI
Servcr Yrs of retirement service credit
Age Employee's age in years
Marryd Employee's marital status
Sex Employee's sex
Salary Initial salary
Avesalry Final compensation
APVTotal Total APV of retirement annuity,
APV2yr APV of 2 yrs service credit
Psep Annual probability of seperation

# AGE DISTRIBUTION OF NEWLY HIRED FACULTY

| Age | Percentage | Cumulative Percentage | Age | Percentage | Cumulative Percentage |
|---|---|---|---|---|---|
| 23 | 0.91% | 0.91% | 47 | 1.29% | 87.74% |
| 24 | 0.91 | 1.82 | 48 | 1.29 | 89.02 |
| 25 | 0.91 | 2.73 | 49 | 1.29 | 90.31 |
| 26 | 6.53 | 9.26 | 50 | 1.29 | 91.60 |
| 27 | 6.53 | 15.79 | 51 | 0.79 | 92.39 |
| 28 | 6.53 | 22.32 | 52 | 0.79 | 93.18 |
| 29 | 6.53 | 28.85 | 53 | 0.79 | 93.97 |
| 30 | 6.53 | 35.38 | 54 | 0.79 | 94.76 |
| 31 | 4.52 | 39.90 | 55 | 0.79 | 95.55 |
| 32 | 4.52 | 44.44 | 56 | 0.41 | 95.96 |
| 33 | 4.52 | 48.97 | 57 | 0.41 | 96.38 |
| 34 | 4.52 | 53.51 | 58 | 0.41 | 96.79 |
| 35 | 4.52 | 58.04 | 59 | 0.41 | 97.21 |
| 36 | 3.49 | 61.53 | 60 | 0.41 | 97.62 |
| 37 | 3.49 | 65.02 | 61 | 0.29 | 97.91 |
| 38 | 3.49 | 68.51 | 62 | 0.29 | 98.20 |
| 39 | 3.49 | 72.00 | 63 | 0.29 | 98.50 |
| 40 | 3.49 | 75.49 | 64 | 0.29 | 98.79 |
| 41 | 1.93 | 77.42 | 65 | 0.29 | 99.08 |
| 42 | 1.93 | 79.36 | 66 | 0.23 | 99.31 |
| 43 | 1.93 | 81.29 | 67 | 0.23 | 99.54 |
| 44 | 1.93 | 83.23 | 68 | 0.23 | 99.77 |
| 45 | 1.93 | 85.16 | 69 | 0.23 | 100.00 |
| 46 | 1.29 | 86.45 | | | |

## RELATIONSHIP BETWEEN FACULTY AGE AND AVERAGE SALARY 1980-81

| Age | Salary | Age | Salary | Age | Salary |
|---|---|---|---|---|---|
| 23 | $18,271 | 39 | $27,004 | 55 | $32,141 |
| 24 | 18,729 | 40 | 27,543 | 56 | 32,241 |
| 25 | 19,186 | 41 | 28,082 | 57 | 32,340 |
| 26 | 19,644 | 42 | 28,622 | 58 | 32,413 |
| 27 | 20,102 | 43 | 29,057 | 59 | 32,461 |
| 28 | 20,569 | 44 | 29,388 | 60 | 32,510 |
| 29 | 21,044 | 45 | 29,718 | 61 | 32,558 |
| 30 | 21,521 | 46 | 30,049 | 62 | 32,606 |
| 31 | 21,997 | 47 | 30,379 | 63 | 32,739 |
| 32 | 22,473 | 48 | 30,679 | 64 | 32,514 |
| 33 | 23,059 | 49 | 30,948 | 65 | 32,288 |
| 34 | 23,756 | 50 | 31,217 | 66 | 32,062 |
| 35 | 24,454 | 51 | 31,486 | 67 | 31,837 |
| 36 | 25,150 | 52 | 31,755 | 68 | 32,708 |
| 37 | 25,847 | 53 | 31,941 | 69 | 31,385 |
| 38 | 26,465 | 54 | 32,041 | | |

SEPARATION RATES OF FACULTY-
AGED 49 or UNDER

| Age Group | Annual Probability of Separation |
|---|---|
| 25 or under | 14.46% |
| 26 to 30 | 11.68 |
| 31 to 35 | 11.37 |
| 36 to 40 | 5.96 |
| 41 to 45 | 4.43 |
| 46 to 49 | .02 |

# CALCULATING THE ACTUARIAL PRESENT VALUE OF THE RETIREMENT ANNUITY

The Actuarial Present Value (APV) of the retirement annuity is calculated using the following table, provided by actuaries of the Public Employees' Retirement Service:

## Reserve Required Per Year Of Credited Service

| AGE | I. Reserve Required for Each $1,000 of Final Monthly Compensation | | II. Adjustment for Coordination With Social Security | |
|---|---|---|---|---|
| | MALES | FEMALES | MALES | FEMALES |
| 50 | $1,848.50 | $2,144.00 | $-246.50 | $-285.50 |
| 51 | 1,921.50 | 2,239.00 | -256.00 | -298.50 |
| 52 | 1,997.00 | 2,337.50 | -266.00 | -311.50 |
| 53 | 2,074.00 | 2,438.50 | -277.00 | -325.50 |
| 54 | 2,158.50 | 2,549.00 | -288.00 | -340.00 |
| 55 | 2,244.00 | 2,660.50 | -299.00 | -354.50 |
| 56 | 2,335.50 | 2,780.50 | -311.50 | -371.00 |
| 57 | 2,429.00 | 2,904.50 | -324.00 | -387.00 |
| 58 | 2,530.50 | 3,037.50 | -337.50 | -405.00 |
| 59 | 2,634.50 | 3,176.00 | -351.50 | -423.50 |
| 60 | 2,744.50 | 3,322.50 | -365.50 | -442.50 |
| 61 | 2,855.50 | 3,472.00 | -380.50 | -463.00 |
| 62 | 2,961.50 | 3,617.00 | -395.00 | -482.50 |
| 63 | 3,067.00 | 3,763.50 | -409.00 | -502.00 |
| 64 | 2,981.00 | 3,675.50 | -397.50 | -490.00 |
| 65 | 2,893.50 | 3,586.50 | -386.00 | -478.50 |
| 66 | 2,805.00 | 3,496.50 | -374.00 | -466.50 |
| 67 | 2,716.00 | 3,404.50 | -362.00 | -454.00 |
| 68 | 2,624.50 | 3,311.50 | -350.00 | -441.50 |
| 69 | 2,533.00 | 3,218.00 | -337.00 | -429.00 |
| 70 | 2,446.50 | 3,130.0 | -326.00 | -417.50 |

III. Factor for Continuance to Surviving Spouse (Married Retirees Only).

| | MALE RETIREES | FEMALE RETIREES |
|---|---|---|
| A. Retiree Covered by Social Security | 1.0935 | 1.0195 |
| B. Retiree Not Covered by Social Security | 1.1871 | 1.0389 |

The use of this table is illustrated by the following examples:

| | Example A | Example B | Example C | Example D |
|---|---|---|---|---|
| 1. Sex | M | M | F | M |
| 2. Age | 64 | 64 | 60 | 63 |
| 3. Years of Service | 23 | 5 | 32 | 18 |
| 4. Married? | Yes | Yes | Yes | No |
| 5. Covered by Social Security? | Yes | No | No | Yes |
| 6. Final Monthly Compensation | $2,500 | $2,500 | $2,000 | $1,500 |
| Calculation of APV of Retirement Annuity: | | | | |
| A. Per $1,000 Final Compensation | $2,981.00 | $2,981.00 | $3,322.50 | $3,067.00 |
| B. (#6 x A) - 1,000 | $7,452.50 | $7,452.50 | $6,645.00 | $4,600.50 |
| C. Social Security Adjustment: | -397.50 | N/A | N/A | -409.00 |
| D. (B + C) | $7,055.00 | $7,452.50 | $6,645.00 | $4,191.50 |
| E. (#3 x D) | $162,265.00 | $37,262.50 | $212,640.00 | $75,447.00 |
| F. Factor for continuance to spouse | 1.0935 | 1.1871 | 1.0389 | 1.0 |
| G. APV of Annuity (E x F) | $177,436.78 | $44,234.31 | $220,911.70 | $75,447.00 |

## APPENDIX C

### Simulated Fiscal Impact of CSUC Early Retirement Incentive (ERI) Program

### (Projected Actual Costs)

SIMULATED FISCAL IMPACT OF CSUC
EARLY RETIREMENT INCENTIVE (E.R.I.) PROGRAM
(for 329 full-time faculty positions
vacated during the E.R.I. program)
-- AVERAGES FOR 25 SIMULATIONS --

PROJECTED ACTUAL COSTS

| YEAR | SALARIES + BENEFITS (A) W/ ERI | (B) W/OUT ERI | DIFF'CE (A-B) (C) | 2 YR SERVICE (D) | NET COST (E) | DISCOUNTED NET COST 2% | 4% | 6% | 8% | 10% |
|---|---|---|---|---|---|---|---|---|---|---|
| 1980-81 | $10,280,568 | $13,195,288 | $-2,914,720 | $4,220,192 | $1,305,472 | $1,305,472 | $1,305,472 | $1,305,472 | $1,305,472 | $1,305,472 |
| 1981-82 | 10,506,158 | 12,820,817 | -2,314,659 | -- | -2,314,659 | -2,269,274 | -2,225,634 | -2,183,641 | -2,143,203 | -2,104,235 |
| 1982-83 | 10,725,543 | 12,493,723 | -1,768,180 | -- | -1,768,180 | -1,699,519 | -1,634,782 | -1,573,674 | -1,515,929 | -1,461,306 |
| 1983-84 | 10,928,195 | 12,195,187 | -1,266,992 | -- | -1,266,992 | -1,193,915 | -1,126,351 | -1,063,791 | -1,005,779 | -951,910 |
| 1984-85 | 11,137,451 | 12,000,390 | -862,939 | -- | -862,939 | -797,222 | -737,644 | -683,529 | -634,286 | -589,399 |
| 1985-86 | 11,309,353 | 11,773,799 | -464,446 | -- | -464,446 | -420,663 | -384,741 | -347,061 | -316,094 | -288,384 |
| 1986-87 | 11,454,565 | 11,639,913 | -185,348 | -- | -185,348 | -164,594 | -146,483 | -130,663 | -116,801 | -104,624 |
| 1987-88 | 11,578,418 | 11,544,518 | 33,900 | -- | 33,900 | 29,512 | 25,761 | 22,545 | 19,780 | 17,396 |
| 1988-89 | 11,713,799 | 11,538,670 | 175,129 | -- | 175,129 | 149,471 | 127,965 | 109,876 | 94,617 | 81,699 |
| 1989-90 | 11,839,915 | 11,591,590 | 248,325 | -- | 248,325 | 207,787 | 174,470 | 146,983 | 124,224 | 105,314 |
| 1990-91 | 11,940,967 | 11,644,814 | 296,153 | -- | 296,153 | 242,949 | 200,070 | 165,370 | 137,176 | 114,180 |
| 1991-92 | 12,032,474 | 11,730,038 | 302,436 | -- | 302,436 | 243,238 | 196,457 | 159,320 | 129,710 | 106,002 |
| 1992-93 | 12,118,067 | 11,775,639 | 342,428 | -- | 342,428 | 270,002 | 213,880 | 170,176 | 135,983 | 109,108 |
| 1993-94 | 12,177,448 | 11,810,052 | 367,396 | -- | 367,396 | 284,009 | 220,649 | 172,250 | 135,091 | 106,422 |
| 1994-95 | 12,245,844 | 11,878,037 | 367,807 | -- | 367,807 | 278,752 | 212,399 | 162,681 | 125,224 | 96,855 |

# APPENDIX D

## A Note on Research Methodology

## A NOTE ON RESEARCH METHODOLOGY

The results reported herein are based on an analysis of the CSUC Early Retirement Incentive program, conducted over a one-year period from June 1980 through June 1981. The analysis comprised three major tasks: (1) a survey of employees eligible for the Early Retirement Incentive (ERI) program, (2) the specification and estimation of a formal model of retirement behavior among CSUC employees, and (3) the specification and estimation of a faculty flow model to assess the fiscal impacts of the ERI program.

### SURVEY OF ELIGIBLE EMPLOYEES

The first task in the analysis of the effects of the Early Retirement Incentive program involved surveying two groups of CSUC employees: (1) a random sample of all full-time CSUC employees, not on leave, who were age 50 or older as of June 29, 1980 and (2) the entire group of full-time CSUC faculty, not on leave, who elected to retire under the ERI program. The purpose of these surveys was twofold: first, to obtain subjective impressions of the importance of several factors which might have influenced employees' retirement decisions (including factors related to the potential impacts of Proposition 9) and, second, to obtain data which would be used in the other two tasks. Data solicited by the two surveys included information on each employee's years of retirement service credit, marital status, health, and net assets. In the case of the first survey (of eligible employees), these data would be used in modelling retirement behavior; in the case of the second survey (of faculty who retired) they would be used in estimating the fiscal impact of the ERI program.

Copies of both questionnaires used in the surveys are presented in Appendix A.

Using the data files of the CSUC Personnel Information Management System (PIMS), a total of 8,226 employees were identified as employed full time, not on leave, and age 50 or older as of June 29, 1980. From this population, a one-eighth, systematic random sample was drawn, yielding 1,029 individuals. This group received the first, general questionnaire. In addition, the PIMS data base was used to identify those full-time faculty, not on leave, who actually retired during the ERI program's three-month eligibility period -- a population of 329 individuals. The second, faculty questionnaire was mailed to each member of this group. Questionnaires were mailed to both groups in September 1980.

Response rates to both the general and faculty questionnaires were quite good. Of the 1,029 general questionnaires distributed, 484 (47.0 percent) were returned complete, 102 (9.9 percent) were returned partially complete, and 360 (36.8 percent) were not returned. The balance, 83 questionnaires, was either not deliverable or was sent to individuals who had less than five years retirement service credit and, hence, were ineligible for the ERI program. The response rate to the faculty questionnaires was even better. Of the 329 questionnaires mailed, 185 (56.2 percent) were returned complete, 42 (12.8 percent) were returned partially complete, and 82 (24.9 percent) were not returned.

Shortly after the questionnaires were received at the Legislative Analyst's Office, all responses were coded in computer-readable format. Data from each employee's questionnaire were than matched with other data for that employee already on file in the PIMS data base. These data

included information on the employee's age, sex, race, occupational title, final compensation, retirement system membership (PERS or STRS), and whether he retired during the ERI program. Using these two sources, two merged data files were created for respondents to the general and faculty questionnaires, respectively. The merged data files contained no information which could be used to identify individual employees.

Next, using the Statistical Package for the Social Sciences (SPSS), data in the two merged files were subjected to preliminary analysis, encompassing the generation of descriptive statistics and crosstabulations, tests of differences of means, and exploratory data analysis using linear regression. Calculations were performed on an IBM 4341 computer at the state's Stephen P. Teale Data Center. The purpose of this preliminary analysis was to lay the groundwork for the formal specification and estimation of the retirement behavior model.

## RETIREMENT BEHAVIOR MODEL

As described in the text of this report, the retirement behavior model for CSUC employees uses the statistical technique known as logit analysis to predict the probability that an employee will retire, given his age, final compensation, value of the retirement annuity, and a dummy variable indicating the presence of the Early Retirement Incentive program.

Data for the retirement behavior model came from two sources: (1) the merged data file incorporating the PIMS data and the responses to the general questionnaires and (2) a data file derived solely from PIMS, consisting of a sample of full-time CSUC employees who would have been eligible for the ERI program, had it been offered exactly one year earlier. Total usable responses from the first source numbered 581, or 7.1 percent

(approximately one-fourteenth) of the population of 8,226 from which the responses were drawn. Therefore, a one-fourteenth, systematic random sample of full-time CSUC employees, not on leave, who were age 50 or older as of June 29, 1979 was drawn from the PIMS data base. The total population thus identified consisted of 8,398 individuals; of these, 600 were included in the sample.

As noted, the model of retirement behavior is based on the following data: whether or not the employee retired during the specified period (the dependent variable), his age, final compensation, and the value of his annuity, and a dummy variable indicating whether the ERI program was in effect. Data on all but one of these variables were available from the PIMS data base. To calculate the Actuarial Present Value (APV) of an employee's retirement annuity, however, data on his years of retirement service credit were needed. (For employees who were eligible for the ERI program when it was offered in 1980, this information was obtained through the general survey.)

Because information on employees' retirement service credit was not readily available from either CSUC or PERS, only two alternatives remained for obtaining these data: (1) send out another mail survey for the sole purpose of gathering this information or (2) approximate the number of years of retirement service credit as a function of other, known, information. For obvious reasons, the second alternative was chosen and the employees' years of service credit were approximated based on age.

final compensation, sex, and occupational class (faculty or non-faculty).[1] The estimate for the years of retirement service credit so obtained was then used to calculate the value of the employee's retirement annuity, based on a table supplied by PERS.

Finally, the data file on the two groups of CSUC employees (those eligible for the ERI program in 1980 and those who would have been eligible had a similar program been offered in 1979) was reduced by about one-fourth through the elimination of observations on individuals who were not covered by Social Security. This action was based on the reasonable assumption that the retirement behavior of employees covered by Social Security (who would be entitled to an additional annuity) differed from that of employees not covered by Social Security. Removal of the observations of individuals not covered by Social Security reduced the size of the data set from 1,181 to 908. Of the 908 observations included in the final data set, 433 came from the 1980 group and 475 from the 1979 group.

As noted, the parameters of the retirement behavior model were estimated using logit analysis. The logit technique differs from other curve-fitting methods (such as linear regression analysis) in several respects,

1. The equation, based on data from 549 CSUC employees who were eligible for the ERI program in 1980, is as follows:

Servcr = -7.678 + 2.642 (Age) + 2.697 (Avesalry) + 0.935 (Sex) + 2.272 (Class)

where Servcr is years of retirement service credit; Age is the employee's age minus 50, divided by 10; Avesalry is his annual final compensation, divided by 10,000; Sex is a dummy variable for the employee's sex (1=M, 0=F); and Class is a dummy variable for occupational class (1=Faculty, 0=Non-faculty).

one of the most important involves the range of predicted probabilities, which in the logit model is strictly between 0 and 100 percent, inclusive. For this and other reasons, the logit model is particularly appropriate to the analysis of retirement behavior.

The estimated logit equation is as follows:[2]

$$\log \frac{P}{1-P} = \underset{(3.43)}{0.9519}\,(\text{Age}) - \underset{(-12.21)}{3.557}\,(\text{Avesalry}) + \underset{(8.72)}{3.463}\,(\text{APV Total}) + \underset{(4.21)}{1.260}\,(\text{ERI Dummy})$$

t-statistics in parentheses
likelihood ratio = 893.70

The variables used in the logit equation are as defined below.

Definition of Variables
Retirement Behavior Model

| | |
|---|---|
| P | Probability that employee will retire during three-month period |
| Age | Employee's age minus 50, divided by 10 |
| APV Total | Total Actuarial Present Value of employee's retirement annuity (including APV of two years' additional service credit, if applicable), divided by 100,000 |
| Avesalry | Employee's final compensation (average salary paid employee during most recent three years), divided by 10,000 |
| ERI Dummy | Dummy variable indicating presence of ERI program (1 = Yes, 0 = No) |

2. The dependent variable in the logit equation, $\log \frac{P}{1-P}$, may be interpreted as the logarithm of the odds that a given employee will retire during the three-month period. For example, a probability of .75 equals odds of .75 to (1- .75), which equals .75 to .25, or 3 to 1 odds.

To provide estimated retirement probabilities for the faculty simulation model, described below, a second logit equation was estimated using a subset of the 908 observations on CSUC employees in general. This subset consisted of 398 observations on full-time faculty, of which 206 were from 1980 and 192 were from 1979. The estimated logit equation for faculty only is as follows:

$$\log \frac{P}{1-P} = \underset{(3.57)}{1.850}\,(\text{Age}) - \underset{(-7.91)}{2.931}\,(\text{Avesalry}) + \underset{(3.71)}{1.911}\,(\text{APV Total}) + \underset{(2.47)}{1.291}\,(\text{ERI Dummy})$$

t-statistics in parentheses
likelihood ratio = 415.61

The variables used in the faculty logit equation again are as defined above.

The parameters of both specifications of the logit model were estimated on the University of California at Berkeley's CDC 6400 computer, using the QUAIL statistical package.

FACULTY SIMULATION MODEL

The final task in the analysis of the Early Retirement Incentive program involved specifying and estimating a model of faculty flow to be used in assessing the fiscal impact of the program. This simulation model was built upon the foundations laid by the preceding two tasks: data on the faculty positions vacated during the ERI program came from the merged faculty data file created during the first task, while the second task provided estimates of each employee's probability of retirement.

The faculty simulation model was programmed in the BASIC language on the Legislative Analyst's Hewlett-Packard 9835A minicomputer. The general operation of the model is described in the main body of this report; a flow chart of the model is presented in Appendix B. A brief discussion of the model's accuracy follows.

## Accuracy of the Faculty Simulation Model

Answering the question of how accurately the faculty simulation model replicates the impact of the CSUC Early Retirement Incentive program poses a difficult problem. Obviously, the ultimate test of any model's accuracy is its ability to replicate observed behavior. Yet, for the first case analyzed -- retirement behavior with the ERI program -- data on actual future costs will not be available for several years while for the second case -- retirement behavior without the ERI program -- cost data will never be available. (It is not possible to observe what actual retirement behavior would have been in the absence of the ERI program.) In a sense, then, the accuracy of the faculty simulation model cannot be assessed.

In another sense, however, a simulation model is only as good as the assumptions on which it is based, and it is possible to examine the assumptions underlying this model. The four key assumptions are as follows:

1. The retirement behavior of full-time faculty, both with and without the ERI program, may be predicted based on four variables: (1) age, (2) final compensation, (3) APV of the retirement annuity, and (4) whether the ERI program was in effect.
2. The age distribution of newly-hired, full-time faculty may be derived from the actual age distribution of this group during the three years immediately preceding the ERI program.
3. The salary levels of full-time faculty may be estimated based on the actual relationship, during the three years immediately preceding the ERI program, between age and average salary.

4. The relationships described in assumptions 1 through 3, above, may be assumed to remain constant over the period of time simulated.

As noted in the main body of this report, the first assumption (regarding prediction of retirement behavior) appears justified: the logit model used to calculate the probability of retirement accurately predicts the retirement decision in fully 95 percent of the 398 cases on which it is based (retirement behavior of 206 faculty eligible for retirement during March 27 to June 29, 1980 and 192 faculty eligible for retirement during March 27 to June 29, 1979). The second assumption, regarding the ages of newly-hired faculty, also seems quite reasonable.

The third assumption, however, may be subject to some criticism in that it implicitly assumes that the age/salary structure of the CSUC faculty at a point in time represents the age/salary relationship experienced by a typical faculty member over time. How valid this assumption is depends, at least in part, on whether the observed age/salary structure is relatively static or changing; unfortunately, evidence on this point is not available.[3]

[3] A better alternative, perhaps, to using the age/salary structure to determine a given faculty member's salary would involve gathering information on the probability that a faculty member at a given rank and step (e.g., assistant professor, step 3) will remain in his current "state" or move to another "state" (e.g., advance one step, advance two steps, separate from the system). Unfortunately, the data necessary to implement this approach, which has been successfully employed in other faculty simulation models, were not available. See David S.P. Hopkins, "Faculty Early-Retirement Programs," Operations Research, 22 (May-June 1974), pp. 455-67 and Paul Gray, "A Faculty Model for Policy Planning," Interfaces, 10 (February 1980), pp. 91-103.

The validity of the the fourth, and final, assumption is debatable. Obviously, it is highly unlikely that the three prior assumptions will remain constant over the period simulated; the important questions to be answered, however, are: (1) by how much do the assumptions vary over time? and (2) how do these variations affect the accuracy of the cost projections? With respect to these questions, it can only be noted that (1) to the extent the first three assumptions vary, their variation is likely to be greater, the farther ahead one attempts to forecast, and (2) similarly, the variability of the cost estimates obtained is likely to parallel that of these assumptions. In simple terms, the farther into the future one attempts to forecast, the less reliable such forecasts become. Thus, while we can be reasonably certain that the estimated costs for the first year are accurate, we are less confident about those in the second year, and so on. Similarly, a five-year net cost figure is probably more reliable than a fifteen-year figure.

Another indication of the simulation model's accuracy relates to the behavior of the model itself: do the cost estimates vary widely from one simulation to another? If so, then the underlying phenomenon which the model is attempting to reflect (in this case, faculty flow) may be inherently unstable. In such cases, a simulation model is of little use. Fortunately, the cost estimates provided by the faculty simulation model display a relatively high degree of consistency. In fact, for the yearly "Net Cost" figures presented in Table 13 (column E), 95 percent of the annual net cost estimates yielded by any given simulation will fall within a range of from plus or minus $50,000 to plus or minus $210,000 about the figure indicated, depending on the year examined.

A final indication of the faculty simulation model's accuracy is given by comparing the predicted number of faculty early retirees who would have retired within a given time period, in the absence of the ERI program, to the early retirees' own estimates of when they would have retired. Again, the faculty simulation model performs quite well: the model predicts that about 43 percent of the faculty early retirees would have retired in three years or less, while 55 percent of these early retirees responding to the Legislative Analyst's questionnaire[4] indicated that they would have retired within this time period.

4. Faculty retirees, covered by Social Security, who responded to the general questionnaire.