

WHAT IS THE ADDED COST TO PERMIT UN-
RESTRICTED ELECTION OF OPTIONAL
FORMS OF RETIREMENT INCOME?

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INTRODUCTION

THE typical pension plan specifies that, to be eligible for an actuarially equivalent optional form of retirement income, an employee must either prove his good health or elect the optional form a specified number of years, such as five, prior to his retirement date. When the election of an optional form results in an increased amount at risk, these restrictions are necessary if the cost of the plan is not to be increased as the result of "selection" by employees electing the optional form.

The actuary has accepted these restrictions readily, because his training has taught him to safeguard the integrity of the fund by resisting the payment of any benefit not anticipated in the computed cost.

The employer, in contrast, has often accepted these restrictions reluctantly, because they are difficult to administer, and because they frequently prevent the election of optional forms by the very employees who are most desirous of making the election.

Consequently, the employer logically asks such questions as: How much will it increase my cost to change the 5-year period to 3 years? How much will it cost to change the 3-year period to 2 years? How much will it cost to permit an employee to cancel an election at any time before his retirement?

These questions elicit less satisfactory answers than most other questions in the pension field, and inadequate answers produce unsatisfactory results. On the one hand, a plan permitting unrestricted election may be underfunded because the cost thereof has been underrated. On the other hand, the effectiveness of a plan may be impaired by unnecessarily severe restrictions imposed because of an unreasonable fear of excessive costs, perhaps based on a statement such as "You must not eliminate the 5-year period or the plan will not be actuarially sound."

The subject of this paper is the question: "What is the added cost to permit unrestricted election of optional forms of retirement income?" In this paper, "unrestricted election" means that the employee has the right to elect, at his retirement date and regardless of his health condi-

tion, to receive an optional form of retirement income in an amount actuarially equivalent to the amount of income he would otherwise receive on the normal form.

It is assumed herein, in developing the added cost of unrestricted election, that the mortality table, which is adopted by the actuary to determine actuarial equivalence and to estimate costs, accurately reflects the mortality of a substantial group of employees covered under a plan that (i) requires retirement at the 65th birthday and (ii) does not permit unrestricted election. The cases of optional forms of benefits under a plan where retirement is not automatic and at early retirement are discussed in Sections 3 and 4.

TABLE 1
MOST LIKELY ADDED COST, AS A PERCENTAGE OF THE COST ON THE
NORMAL FORM, TO PERMIT UNRESTRICTED ELECTION
OF AN OPTIONAL FORM

Normal Form	Optional Form	Most Likely Added Cost
Election by Males Aged 65		
Life Annuity	Cash Settlement	3.6%
Life Annuity	100% J & S*	3.1
Life Annuity	10-Year Certain & Life	1.9
10-Year Certain & Life	100% J & S*	1.3

* Females assumed to be age 60, on the average.

Using the method described in this paper, the figures in Table 1 were developed to illustrate the magnitude of the added cost incurred when the restrictions on the right to elect options are eliminated. Often practitioners in the pension field have stated that the cost of permitting unrestricted election would be prohibitive. The results shown in Table 1 do not bear this out. On the contrary, the added costs are of such a magnitude that many employers will undoubtedly be able to provide the unrestricted election as an added plan benefit.

SECTION 1. FAILURE OF STATISTICAL METHOD

The 1954 Reports of Mortality and Morbidity Experience show that mortality is higher under refund than under nonrefund individual immediate annuities, and the 1956 Reports show that the mortality under payee elections is lower than under nonpayee elections. In neither instance, however, are the statistics particularly helpful in answering the subject question, since in each case the statistics only confirm what we already know, namely: that persons will tend to elect the option most

favorable to themselves. The unknown quantities are (1) the percentage of the retiring employees that will elect an option and (2) the relationship between the percentage electing and the resultant antiselection.

The percentage electing will vary widely among plans for various reasons. The variations will result from the attitude of the employer with respect to educating employees about the available options, the amount of pension available, the classes of employees covered, and the roadblocks placed in the way of the employees who wish to elect an optional form. It is to be expected that more employees will elect an option under plans permitting unrestricted election than under the typical plan which specifies health and period restrictions. This expectation is supported by statistics, admittedly sparse, under one plan which permits unrestricted elections: out of 55 retirements, 60% of the employees chose an optional form—cash settlement not available—and 40% drew benefits on the normal form.

SECTION 2. DESCRIPTION OF SUGGESTED METHOD

Since no satisfactory statistical approach is available, deductive logic has been employed to determine a "mathematical maximum" added cost and then a "maximum anticipated" added cost. The "maximum anticipated"

TABLE 2
ADDED COST, AS A PERCENTAGE OF THE COST ON THE NORMAL FORM
TO PERMIT UNRESTRICTED ELECTION OF OPTIONAL FORMS

NORMAL FORM	OPTIONAL FORM	ADDED COST AS A PERCENTAGE OF COST ON NORMAL FORM		
		Most Likely	Maximum Anticipated	Mathematical Maximum
Election by Males Aged 65				
Life Annuity	Cash Settlement	3.6%	6.2%	19.7%
Life Annuity	100% J & S, Female Age 50	3.5	5.7	17.7
Life Annuity	100% J & S, Female Age 60	3.1	5.1	15.6
Life Annuity	10-Year Certain & Life	1.9	3.0	8.0
10-Year Certain & Life	Cash Settlement	1.7	3.1	13.5
10-Year Certain & Life	100% J & S, Female Age 60	1.3	2.2	9.5
Election by Females Aged 65				
Life Annuity	Cash Settlement	3.2%	5.4%	18.0%
Life Annuity	10-Year Certain & Life	1.3	1.9	5.5

pated" amounts are derived from the "mathematical maximum" amounts by application of the percentage of employees assumed to elect the option. Using a less conservative, but more realistic, assumption as to the percentage electing, what are considered to be the "most likely" added costs have also been determined. These are summarized in Table 2.

Mathematical Maximum

The following analysis utilizes two key facts:

- (1) The added cost, per \$1.00 of annuity, to provide an optional benefit on an unrestricted basis is greatest when the option is exercised only by employees who die during the year of age 65, and steadily decreases as the average age at death of the employees electing the option increases.
- (2) If all retiring employees make an unrestricted election of the same optional form, the mortality of the group will be average and there will be no added cost. (This approach resembles that employed by Mr. Frank L. Griffin, Jr., in his paper entitled "A New Approach to the Problem of Term-Insurance Conversion Costs," *RAIA*, XXXI, October, 1942.)

The method of analysis is explained by reference to the columns of Table 3 which show the development of the added cost to permit un-

TABLE 3
MATHEMATICAL MAXIMUM ADDED COST TO PERMIT MALES AGED 65 AN
UNRESTRICTED ELECTION OF AN ACTUARIALLY REDUCED
10-YEAR CERTAIN & LIFE ANNUITY

Age at Death	(1) $n|_m q_{65}$	(2) \ddot{a}_{65}	(3) $.906 \overline{\ddot{a}_{65:10}}$	(4) Cost per \$1.00 (3)-(2)	(5) $n|_m q_{65} \times (4)$	(6) $\Sigma(5)$
65.....	.029	\$ 1.00	\$ 7.96	\$ 6.96	\$.20	\$.20
66.....	.030	1.97	7.96	5.99	.18	.38
67.....	.031	2.91	7.96	5.05	.16	.54
68-69...	.067	4.28	7.96	3.68	.25	.79
70-74...	.186	7.25	7.96	.71	.13	.92
75-79...	.201	10.94	9.91	-1.03	-.21	.71
80-84...	.189	14.11	12.78	-1.33	-.25	.46
85-89...	.145	16.84	15.26	-1.58	-.23	.23
90-94...	.083	19.18	17.38	-1.80	-.15	.08
95-99...	.032	21.19	19.20	-1.99	-.06	.02
100-110...	.007	22.89	20.74	-2.15	-.02	0
	1.000					

$$\Sigma n|_m q_{65} \times (2) = \Sigma n|_m q_{65} \times (3) = \$11.55$$

NOTE: The mathematical maximum added cost equals \$.92, or 8.0% of \$11.55, which is the cost of \$1.00 of annual life annuity-due (normal form).

restricted election of an actuarially equivalent 10-year certain and life benefit in lieu of a life annuity. The 1937 Standard Annuity Mortality Table and 3% interest are used for illustrations throughout this paper.

Column (1): This column shows, for the employees alive at age 65, the probability of death at various ages. With reference to the symbol ${}_{n|m}q_{65}$, the n indicates the lowest age of the age group at death less 65, and the m indicates the range in the age group at death.

Column (2): This column shows, by age at death, the present value at age 65 of \$1.00 of annual life annuity-due.

Column (3): This column shows, by age at death, the present value of \$.91 of annual 10-year certain and life annuity-due, which is actuarially equivalent at age 65 to \$1.00 of annual life annuity-due.

Column (4): This column shows, by age at death, the differences between the present value of \$.91 of 10-year certain and life annuity-due and the present value of \$1.00 of life annuity-due. These differences represent the cost of electing the option with respect to \$1.00 of life annuity. After age of death 74, of course, the differences are negative.

Column (5): This column shows the cost, by age at death, to be added to \$11.55 (the cost of \$1.00 of annual life annuity-due, at age 65, computed assuming the 1937 Standard Annuity Mortality Table and 3% interest) if all persons dying at that age had elected the option. The sum of this column is zero.

Column (6): This column is the cumulative total of column (5). The mathematical maximum added cost occurs when all persons who die at ages under 75, and no others, elect the option.

The mathematical maximums shown in Table 2, for various optional forms, were developed using this method.

Percentage Selecting

To answer an employer in terms of the mathematical maximums illustrated in Table 2 would clearly be misleading, because there is no reason to expect elections by all employees whose elections result in an added cost and elections by no employees whose elections result in a decreased cost. Thus, modifications in the mathematical results are in order, and such modifications should be based on answers to the following two questions:

- (1) What percentage of the employees dying at each age are aware, on the 65th birthday, of the conditions that will be the cause—perhaps indirect—of death?
- (2) What percentage of the employees so aware on their 65th birthday will elect an option *because of* their health condition?

ELECTION OF OPTIONAL FORMS OF INCOME

Based on Metropolitan and T.I.A.A. statistics showing the causes of death of annuitants (summarized in Table 17 of "A New Mortality Basis for Annuities," TSA I), the deaths at ages 65 through 79 were assumed to result from the following causes:

Cause	Percentage of Total
Cardiovascular-renal.....	61%
Cancer.....	12
Pneumonia and Influenza.....	6
Accidents.....	2
All Other Causes.....	19
Total.....	100%

Question 1: What percentage are aware, on their 65th birthday, of the condition that will be the cause—perhaps indirect—of death?

The empirical answer to this question, for each cause of death, is discussed below, and is summarized in Table 4.

TABLE 4
PERCENTAGE OF EMPLOYEES DYING, ASSUMED TO BE AWARE,
AT AGE 65, OF THE CONDITION THAT WILL BE
THE CAUSE OF DEATH

Age at Death	Cardio- vascular- renal	Cancer	Pneumonia and Influenza	Total*
65.....	95%	95%	25%	87%
66.....	75	65	10	67
67.....	65	30	10	54
68.....	60	0	10	46
69.....	55	.....	10	42
70.....	50	.....	10	38
71.....	45	.....	10	35
72.....	40	.....	10	31
73.....	35	.....	10	27
74.....	30	.....	10	23
75.....	25	.....	10	20
76.....	20	.....	10	16
77.....	15	.....	10	12
78.....	10	.....	10	8
79.....	5	.....	10	5
80 and over.....	0	.....	0	0

* The total column is a weighted average, assuming the average percentage for the specified causes applies to "All Other" causes.

Accidents: None.

Pneumonia and Influenza: The duration of these illnesses is relatively brief (two or three months) and it is assumed that 25% of the employees who die of pneumonia and influenza at age 65 will be aware of their con-

dition on the 65th birthday. It is also assumed that 10% of the employees who die of pneumonia and influenza at ages above 65 and before 80 had another serious condition, such as a cardiovascular-renal condition, of which they were aware at age 65.

Cancer: Most fatal cases of known cancer terminate in death within 3 years, and, consequently, it is assumed that employees who die of cancer at ages 68 and over will not be aware of this illness on the 65th birthday. The percentages of persons dying of cancer prior to age 68, who are assumed to be "aware" at age 65, are shown in Table 4, for ages of death 65, 66, and 67.

Cardiovascular-renal: This general class of illness is symptomized by high blood pressure, abnormal pulse, enlarged heart, faulty EKG, and heart murmurs. Although these symptoms may continue 20 or 30 years without death, it is assumed that employees who die of this cause after age 79 will not have been aware of this illness at age 65. This assumption is conservative because an employee who retires at age 65 and lives to age 80 will have lived longer than the average life expectancy at age 65; therefore, the election of an optional form, by such an employee, will decrease, not increase, the cost of the plan.

Discussions with persons versed in underwriting have led to an assumption that about 40% of the persons dying before age 80 from cardiovascular-renal causes will have been aware of their illness at age 65. The percentages assumed to be so aware, by age at death, are indicated in Table 4.

All Other Causes: It is assumed that the employees dying from "All Other Causes" will be aware, at age 65, to the same extent as the other employees on a combined basis.

Question 2: Of those aware, how many elect?

Persons not in normal health do not necessarily make an election for health reasons. In fact, it is the opinion of some underwriters that most persons who make an election prompted by the desire to "select" die within three years of the election.

Two experimental scales showing empirical percentages of employees who, aware of a condition at age 65 that will be a contributing cause of death, elect an optional form of income, are indicated below:

Age at Death	Scale A	Scale B
65	80%	100%
66	50	80
67	35	60
68 through 79	25	50

Scale A is an intuitive guess after discussions with underwriters, and was utilized to determine the "most likely" added costs shown in Table 2; Scale B was utilized to determine the "maximum anticipated" added costs shown in Table 2.

Percentage Electing: In addition, 10% of the employees considered not to be aware, at age 65, of such a condition, are assumed to elect an option for financial reasons, unless they die at age 90 or over. Ten percent would undoubtedly be low for any plan permitting unrestricted election; this assumption is conservative, since the higher the percentage who elect for financial reasons, the lower is the added cost of unrestricted election. Nevertheless, the 10% is reduced to 5% for ages 90 and above, with further reduction, under Scale B, to 0% for ages 95 and above, since some persons from a long line of octogenarians would never look with favor on an actuarially reduced pension.

The percentages assumed to elect an option are shown below by age groups:

AGE OF DEATH	PERCENTAGE AWARE AT AGE 65	PERCENTAGE WHO SELECT		PERCENTAGE IN GOOD HEALTH WHO ELECT	TOTAL PERCENTAGE ELECTING	
		Scale A	Scale B		Scale A	Scale B
65.....	87%	70%	87%	1%	71%	88%
66.....	67	34	54	3	37	57
67.....	54	19	32	5	24	37
68-69.....	44	11	22	6	17	28
70-74.....	31	8	16	7	15	23
75-79.....	12	3	6	9	12	15
80-84.....	0	.....	.....	10	10	10
85-89.....	0	.....	.....	10	10	10
90-94.....	0	.....	.....	5	5	5
95 and over..	0	.....	.....	5*	5	0

* For Scale B, percent is 0 for ages 95 and over.

Cost of Unrestricted Election

Referring back to Table 3, column (5) indicates the cost of a 10-year certain and life option if all persons make the election. The application, to column (5), of the percentages assumed to elect therefore yields the expected added cost. The application of both Scale A and Scale B is illustrated below:

AGE	COL. (5) TABLE 3	PERCENTAGE ASSUMED TO ELECT		ADDED COST	
		Scale A	Scale B	Most Likely	Maximum Anticipated
65.....	\$.20	71%	88%	\$.14	\$.18
66.....	.18	37	57	.07	.10
67.....	.16	24	37	.04	.06
68-69.....	.25	17	28	.04	.07
70-74.....	.13	15	23	.02	.03
75-79.....	-.21	12	15	-.03	-.03
80-84.....	-.25	10	10	-.03	-.03
85-89.....	-.23	10	10	-.02	-.02
90-94.....	-.15	5	5	-.01	-.01
95-99.....	-.06	5	0	.....	.....
100 and over.	-.02	.....	.....	.....	.....
	\$ 0			\$.22	\$.35

The "most likely" and the "maximum anticipated" added cost to provide unrestricted election of the 10-year certain option are therefore \$.22 and \$.35, respectively, or, in relation to \$11.55, 1.9% and 3.0% respectively.

SECTION 3. RETIREMENT NOT AUTOMATIC

The added costs above are expressed as percentages to be applied to costs computed using a mortality table appropriate for a group covered by a plan that requires retirement at age 65; the added costs would be greater percentages of the computed cost, of course, if the mortality table and the retirement assumption adopted in determining costs are appropriate for a group of employees who retire, on the average, at age 67 or 68.

By conservative choice of assumptions, however, the computed costs will be such that the percentages developed above, for use under a plan that requires retirement at age 65, may also be utilized when retirement is not automatic at age 65. Further, if retirement at age 65 is assumed for cost estimates under a plan that does not specify automatic retirement, the percentages developed above are conservative in view of possible gains under the mortality and retirement assumptions.

This is not to say that the true cost of a plan permitting deferred retirement is not increased when unrestricted elections are provided. In fact, when advising an employer, scrupulous care must be taken to distinguish between actuarial cost estimates and the true cost of a plan as it will evolve over a period of years.

SECTION 4. EARLY RETIREMENT

The added cost to permit unrestricted election of optional forms of income at early retirement is more difficult to determine, because the probability of early retirement must be estimated. To arrive at reasonable results, a select and ultimate mortality table was developed under the following assumptions:

- (1) That the total number of lives, both active and retired, is represented at each age by the l_x of the Standard Annuity Mortality Table.
- (2) That 3% of l_x lives, according to the Standard Annuity Mortality Table, retire early at each age from 55 to 64.
- (3) That these early retirees are subject to mortality equal to 500% of standard mortality in the first year of retirement and standard mortality after the fifth year of retirement; and during the intermediate years, that the relation of mortality to standard mortality is as determined by Newton's divided difference formula with 5th differences assumed to be equal, as follows: 278% in the second year, 167% in the third year, 119% in the fourth year and 103% in the fifth year.
- (4) That all of the l_{65} lives, according to the Standard Annuity Mortality Table, who had not retired early will retire at age 65.

The reports of the Committee on Group Annuity Mortality show approximately one living annuitant who has retired prior to the normal retirement date for every four living annuitants who have retired on or after the normal retirement date. Measured by the mortality table developed under the above assumptions, the number of lives on early retirement equals approximately 50% of the number of lives on normal retirement and, consequently, the added costs described below are on the high side.

Further, the select mortality rates are conservative if the results are applied to a plan which provides a permanent and total disability retirement benefit in lieu of the typical group annuity early retirement. In addition, if the employees in service are covered by a liberal group-term life insurance program, mortality after early retirement may not be greater than mortality among employees in service.

Based on the select and ultimate mortality table described, and 3% interest, there were determined the added costs, shown below, which would be incurred if the retirees elected various unrestricted actuarially equivalent optional forms of benefits. In this regard, employees retiring early are all assumed to elect the same form of benefit; and employees retiring at normal retirement are all assumed to elect the same form of benefit except where, as indicated, the percentage electing is assumed to be that percentage which will result in the "most likely" added costs.

**ADDED COST WITH RESPECT TO ANNUITY BENEFIT ACCRUED BY A MALE
PRIOR TO AGE 55—NORMAL RETIREMENT AT 65**

NORMAL FORM	ELECTION IN EVENT OF		ADDED COST, AS PERCENT- AGE OF COST ON NORMAL FORM
	Early Retirement	Normal Retirement	
Life Annuity	Normal Form	Normal Form	0.4%
Life Annuity	Normal Form	10-Year Certain & Life*	1.8
Life Annuity	10-Year Certain & Life	10-Year Certain & Life	2.3
Life Annuity	10-Year Certain & Life	Cash Settlement*	5.1
10-Year Certain & Life	Normal Form	Normal Form	2.3
10-Year Certain & Life	Normal Form	Cash Settlement*	3.5

* Assuming the cost of benefits for employees retiring at the normal retirement date to be increased by the percentages shown in Table 2 as the "most likely" added cost.

The percentage increase in the computed cost of a plan would be somewhat smaller than indicated above, of course, since added costs would be smaller with respect to benefits accrued after, rather than before, the age of 55.

SUMMARY

Without meaning to rule out other arrangements, there follows a set of conditions under which unrestricted election of options would be sound for a plan covering a group of employees whose mortality may accurately be predicted. The size of such a group would be a matter for actuarial judgment, taking into account mortality risk incurred because of disproportionately large benefits in force on the lives of one or a small number of employees.

- (1) Early retirement permitted at or after the age of 60 and before the normal retirement age of 65. ("Retirement" at ages below 60 is frequently a misnomer, because employees at such ages often do not leave the work force, and this should be the principal criterion of "retirement.")
- (2) Permanent and total disability retirement income benefits provided which are greater than the actuarially equivalent benefits at the early retirement age.
- (3) Unrestricted and irrevocable election of various optional forms, other than a cash settlement, permitted at the time of normal and early, but not disability, retirement. Cash settlement to be granted only at normal retirement and only when, in the opinion of a pension com-

mittee, the cash settlement results in a significant tax saving to the employee. Such cash settlement to be authorized in the pension plan by wording of the following nature: "such other amount and form of benefit as may be requested by the employee and approved by the committee."

- (4) Computed costs to be increased in accordance with the method described in this paper.

DISCUSSION OF PRECEDING PAPER

R. F. LINK:

Pension Planning

Mr. Hanson asks, "What is the added cost to permit unrestricted election of optional forms of retirement income?" He then provides answers to this question in financial terms. It is also possible to answer the question in terms of pension planning, and this may conceivably shed light on the financial aspects.

The purpose of notice periods is twofold. First, by requiring that financial planning be done well in advance of retirement date, notice periods may cause the choice of options to be made on the basis of the employee's financial considerations rather than health considerations. Second, to the extent that health does become a factor in the choice, a notice period serves to minimize the employer cost effect.

Why is there such great interest in shorter notice periods? Sometimes we hear that a five year period is considered too long for effective planning; that is, an employee cannot see well enough at age 60 what his circumstances are likely to be at age 65. Perhaps the employer may object to having the attention of his employees directed prematurely to the subject of retirement. One could comment in passing that a great advantage of a long notice period is that it does require that the problem of retirement be considered. It may therefore stimulate the employee to do some retirement planning on his own behalf.

A powerful second motivation for shortening notice periods is to accommodate those employees who wish to make the choice on grounds of health. Any reasonable advance notice period requires advance planning; the shorter the notice period, the more it accommodates also a selective planning based on health considerations.

Finally, notice periods are inconvenient in connection with early retirement. Most employees who retire at an early date probably do not know that date five years or one year in advance. They therefore have great difficulty in putting an optional form into effect at an early retirement date. Furthermore, the employee who actually gives the notice and elects the optional form may find, when his optional retirement date arrives, that he does not wish to retire. This can create a difficult and confusing situation. This situation cannot be solved by shortening the notice period unless we go all the way to something like thirty days or ninety days. This could be

a rather unsatisfactory and costly arrangement, Mr. Hanson's figures notwithstanding.

Why not permit unrestricted optional form elections if an employer is willing to bear the cost? If the options are available only at a single date for a given employee, there is nothing very wrong with this. We may not all admire the resulting plan, but at least the employee knows what he has coming and suffers from no delicate problems of timing.

On the other hand, if an option can be put into effect at any age within a given range of ages by the mere act of submitting an election and retiring (or, in fact, if retirement on the normal form results in a considerable increase in death benefit protection), then you have in the plan what amounts to a death benefit for active employees. This benefit is obtained by having the alertness and good luck to submit retirement papers just before death—and the further good luck to survive, in case of fatal illness, to the next permissible retirement date. This last is a crucial point of the plan in the case of accidental death.

Under these conditions, there is particular need for an employer to be sure that an employee is well informed as to his rights under the retirement plan, in order that the employee will not lose, through ignorance, benefits to which he is clearly entitled. The employer may feel obliged to have retirement papers carried to an employee who is seriously ill. A delicate judgment is necessary here unless the employer just ignores the problem. A moral problem as to the possible back-dating of an election may arise when the employer is delinquent in carrying out these essential functions.

The employee faces an equally delicate choice. Suppose he has had a heart attack of moderate severity. Should he retire, perhaps surrendering opportunities of future gainful employment, in order to create a maximum estate? Or should he gamble on recovery? Even an employee in good health may be concerned lest he be stricken while active. This situation existed until recently in the retirement plan for teachers in New York City. It was known as the "death gamble."

The deficiencies noted above apply also to the variant which we call the "floating date option." In this case, the employee elects an option, giving, say, five years' notice. The notice period expires at age 55. If the employee retires at any date thereafter, the optional form takes effect. If he dies in active service, it does not. The notice period in this case accomplishes little good, but does limit the employee's freedom of choice.

In discussion with employers, we have occasionally found a quite complacent attitude concerning this problem of deathbed elections. The employer says, "We can handle this situation all right," or simply feels that

the problems are in the minds of actuaries, rather than being practical problems with which an employer must deal. It seems to me that this is tragic irresponsibility. What answer can be given to the widow of an employee who failed, through ignorance, to elect an option? What justification can be given for a situation in which those "in the know" enjoy benefits which may be denied to others by chance or ignorance? We are always careful in defining the conditions under which employees become entitled to insurance benefits provided by the employer; we should be equally concerned about the reasonableness of the conditions attaching to what may be the biggest benefits of all. From this point of view, a notice period serves a valuable function.

Some of the foregoing thoughts are expressed in the following imaginary incident. A group adopted a lump sum option under an otherwise conventional retirement plan with no preretirement death benefits. The president asked the personnel man to rewrite the plan booklet to cover the new feature. What he wrote is shown in *Appendix I*. Question: Was the president surprised when he saw what the personnel man had written?

How much of a notice period is required to cure the situation? A notice period of one month will cut out some cases of sudden death but may change the basic situation very little. Mr. Hanson's figures indicate that 70% or 87% of the employees who will die within one year have election-triggering suspicion of that fact. This suggests that a one year period is an absolute minimum. As a matter of fact, it is about as easy to pick five years from Mr. Hanson's tables as it is to pick any other period. Incidentally, as to optional retirements, I prefer his Scale B to his Scale A, because the thinking at early retirement tends to be more oriented toward health considerations. The foregoing is on the questionable assumption that Mr. Hanson's scales are select scales which may be used with respect to other retirement ages than age 65.

What can we do about the difficult problems associated with the election of options at early retirement dates? One suspects that devices will be found to improve this situation. I will list here several that have been used.

1. A common arrangement where an employee cannot qualify for an option at early retirement is to commence his benefit on the normal form and convert at the end of the notice period. It is helpful in these cases if any group insurance coverage can be continued at least until the end of the notice period.
2. If the retirement plan provides a preretirement death benefit based on employee contributions, then it may be relatively harmless from the

pension planning viewpoint to permit the election of optional forms without notice, because no great improvement of death benefit protection is achieved by the election. Note, however, that the absence of notice will still increase costs.

3. A plan providing, for example, a ten year certain life annuity as the normal form may also provide that an employee who dies during the optional retirement period will be considered, in effect, to have retired. Thus, no important risks ride on the act of retirement.
4. Widows' benefits are obviously pertinent to this problem. If it is desired to provide for the hazard of sudden illness followed by death, a widow's benefit has the advantage of making the protection automatic and of recognizing clearly the cost of it. A disadvantage of the widow's benefit is that it applies only to married employees and does not normally cover employees who might appropriately nominate other individuals as joint annuitants or beneficiaries.
5. Considerable attention has recently been given to arrangements permitting an employee to enjoy the protection provided by typical retirement plan options while remaining in active employment. Special factors are used so that the employee is charged for the protection. This is a sound and desirable development; I hope that progress can be made on it. The Equitable designed such an arrangement for one employer about eight years ago; the employer in question declined in the end to put it into operation. More recently, we did put such an arrangement into effect under a deposit administration contract; in this case, the applicable plan provisions were designed by a consultant, with our assistance.

Financial Aspects

For options at normal retirement date only, Mr. Hanson's figures indicate that the choice of a notice period has certain cost implications but that the total range of cost is probably less than 5% of the basic cost of the plan. He is to be congratulated for synthesizing a result which comes fairly close to what is often observed or believed in practice. The Equitable, for example, would use group immediate annuity rates which are about $3\frac{1}{2}\%$ higher in those rare cases where options are afforded without notice at normal retirement date under a deposit administration contract.

The greater cost problem on notice periods for options arises in connection with early retirements. Mr. Hanson's paper does not come to grips with this problem. Assumptions as to the mortality to be expected among optional retirements do not tell the complete story; in the absence of a notice requirement, retirement will be dictated by health considerations

as outlined above. This means that benefit of survivorship will be minimized on a large portion of the deaths occurring in the optional retirement age range. Most deaths will be preceded by the election of an optional form. Four classes of deaths will not. These are (i) those who have already retired, (ii) those who do not know the provisions of the plan, (iii) those whose fatal illness or accident does not leave sufficient time to elect an option, and (iv) those who do not have a potential joint annuitant, this being the only available option. Upon the assumption that *all* deaths are associated with a concurrent election of the 100% joint and survivor annuity option under a noncontributory plan, the cost of the plan can be increased by as much as 15% for annuities already accrued at the beginning of the optional retirement period. Taking all factors into account, 10% may be a better figure for the cost of a completely unrestricted election of the 100% joint and survivor annuity at both optional and normal retirement dates. Note that there may be some offset arising from other benefit programs; however, the joint and survivor protection is usually a great deal larger than that afforded under other programs, and an employee is also able to convert his group insurance.

As to cases where retirement is not automatic at sixty-five, and optional forms take effect at actual retirement date with no notice requirement, high additional costs to the plan will result for the same reasons that are indicated above in connection with elections at optional retirement dates. The same pension planning aspects apply. As a matter of fact, additional costs will result in the late retirement case even if the option takes effect at normal retirement date (perfectly sound pension planning). Under the arrangements commonly seen in practice, the protection enjoyed in the interval between normal retirement date and actual retirement date exceeds in value any gain to the plan because of the reduction in annuity with respect to an employee whose joint annuitant dies before actual retirement occurs. In either case, any recognition given in the assumptions to the possibility of late retirement should, as Mr. Hanson indicates, be tempered with a recognition of the protection aspects. I agree with Mr. Hanson that the costs under these arrangements will not be higher than the costs which would apply under the same plan if retirement were automatic at age sixty-five (presuming that the benefit payable at a late retirement date is not increased on some concept of actuarial equivalence).

Mr. Hanson recommends a set of four plan features which, taken in combination, are intended to represent a sound environment for the exercise of options without a notice period. The key point of his recommendation is apparently that unrestricted options would be unavailable to an employee retiring on account of disability. I have some doubt about the

complete effectiveness of this condition. It presents an employee with the choice between taking a disability retirement income on a single life basis (the present value of which may be extremely small) or, by refusing to admit or apply for disability, exercising an option probably much greater in value. Again, the pension planning aspects rear their ugly head; the cost aspects are difficult to assess, but I doubt that additional costs are completely avoided.

In *Appendix II* I have set down some minor variations of Mr. Hanson's results, including a consideration of the effect of various notice periods. This is an extremely thorny and confusing subject, and we are all indebted to Mr. Hanson for bringing it so ably to our attention.

Appendix I

Excerpt from an Imaginary Retirement Plan Booklet

Lump Sum Option

The plan permits you to take, in lieu of a retirement income, a single payment on your retirement date. The single payment is equal to the actuarial value of the retirement income you would otherwise have received—about \$15,000 for \$100 of monthly income at normal retirement date.

This option should be of particular interest to an employee who is in poor health at retirement date, because it assures him the full benefit of contributions made by or for him under the plan. This benefit could be largely lost by an employee who elects income and dies soon after retirement.

An employee above the age of 55 who becomes seriously ill, so that his life expectancy seems curtailed, should consider making an immediate application for retirement, in order to be able to exercise the option of receiving a lump sum. In this situation, the lump sum option resembles a large death benefit, payable in advance, providing that the employee survives to the next permissible retirement date under the plan. This involves delicate timing and close attention.

If you fail to apply for retirement, the lump sum option cannot apply under any circumstance.

Appendix II

Added Cost of Options as a Function of the Notice Period

Mr. Hanson has calculated various costs based on unrestricted election of optional forms. The following material represents an attempt to produce some corresponding figures on the basis of various notice periods. The results are shown in the accompanying table, for cash settlement only.

The basic assumption in these calculations is that Mr. Hanson's scales expressing the percentage electing can be applied at earlier ages—that is,

that the entire scale can be reasonably shifted back in age to represent the situation, for example, with respect to persons electing at 60 an option to take effect at age 65. This means that 71% (or 88%) of those persons at age 60 who will die before age 61 will elect the option effective at age 65. This assumption can, of course, be questioned on two grounds. First, the percentages at age 60 ought, if computed from basic data, to differ from those at 65 to some degree. Second, the remoteness of the effective date may have some effect. There seems to be no better assumption quickly available.

In Method I, Mr. Hanson's Scale A is applied directly in terms of the age at election. His ultimate election rate of 5% is continued to age 100. Method I produces almost the same cost for a 5-year election as for a

ADDED COST OF A CASH SETTLEMENT OPTION AT NORMAL RETIREMENT DATE, AS A PERCENTAGE OF THE COST ON THE NORMAL FORM, FOR VARIOUS NOTICE PERIODS

NOTICE PERIOD IN YEARS	METHOD OF CALCULATION			
	I	II	III	IV
0.....	3.6%	3.2%	4.2%	2.1%
1.....	2.3	1.7	2.7	1.4
2.....	1.7	1.1	1.8	.9
3.....	1.5	.8	1.4	.7
5.....	1.4	.6	1.0	.5

3-year election. This seems to result from the fact that the percentage electing is a falling percentage even at very long durations.

In Method II, Mr. Hanson's Scale A was modified to continue the 10% election rate to the end of the table. This lowered the apparent cost of elections and produced a slightly greater differential between three and five years' notice.

In Method III, the percentage electing was taken as Mr. Hanson's "Percent Who Select," Scale A. This amounts to assuming that the only elections made are for health reasons. This approach is of limited significance in itself, and was taken to pave the way for Method IV.

In Method IV, all employees are assumed to be divided, without regard to health, into two groups, those who would elect for reasons other than health, and those who would not do so. It is assumed that 50% of the employees elect the option for reasons other than health, producing no extra cost (other percentages could be used). The cost for elections by those in poor health among the remaining group can then be determined

by Method III. Thus costs under Method IV can be determined by applying to Method III costs the complement of the percent assumed to elect for nonhealth reasons.

Method IV brings out most clearly the point that the extra cost due to options may be lowest in those cases where the options are most generally used, and highest where the options are most sparsely used. This illustrates the extreme difficulty of determining an extra "short notice" charge applicable at the retirement date of employees electing an option.

It should be emphasized that this discussion of notice periods applies to elections made to take effect at a unique single date for each employee. The results should be viewed with great caution. The problem of costing notice periods applicable to elections made for optional retirement dates is a far more difficult one. No suggestions are offered on this score.

L. E. COWARD:

Mr. Hanson is to be congratulated on a fine paper. He has done an excellent job of substituting "facts for appearances and demonstrations for impressions."

I am convinced that a selection of options, subject to the least possible restriction, is very desirable in a pension plan. The right to make unrestricted option elections, including even deathbed elections, is appreciated by employees for whose benefit the plan was designed. Mr. Hanson has demonstrated that a reduction in the option period from 5 years to 2 years results in an almost negligible extra cost. Over half the added cost of unrestricted elections is in respect of those who die in the first year.

I had the impression that a good part of the cost of antiselection under unrestricted elections could be met by adjusting the option tables—that is, by rating the age of the pensioner up one year and the joint annuitant down one year (and increasing the interest rate in the case of cash options). However, Mr. Hanson's method demonstrated that this adjustment is not sufficient. For example, Mr. Hanson assumes in Scale A that 14.2% will elect the joint and survivor option. If the ages are rated the joint and survivor factor is reduced by 4.2%. Hence the adjustment of the factor covers an extra cost of 14.2% of 4.2%, that is, 0.6%. This compares with Mr. Hanson's "most likely" cost of 3.1%.

Incidentally, Mr. Hanson assumes in Scale B that 88% of those dying at age 65 will elect a joint and survivor option—which is improbable since it exceeds the proportion married.

Leaving out the cash option, the cost of allowing the choice of more than one option is generally equal to the cost of the most expensive option. I suggest therefore that it is well worth while for the employer to meet the small extra cost of allowing a choice of several options (except

cash) on normal retirement, subject to a waiting period of six months or one year, and with option tables adjusted for antiselection as suggested above.

CONRAD M. SIEGEL:

The galley proof of Mr. Hanson's fine paper arrived at an especially appropriate time, since my office is currently acting on behalf of a union whose demands include the reduction of the five year waiting period to two years. The plan involved is a traditional deferred group annuity issued on a contributory basis twenty years ago. The normal form is the modified cash refund annuity and the only option available is a joint and last survivor annuity. The union's contention was that the five year period could be reduced to two years without significant out-of-pocket cost by the company, in view of the following considerations:

- (1) The two year election period would substantially eliminate "death bed" elections.
- (2) The previous history of the plan which indicated that no union employees had elected optional pensions.
- (3) The conservatism of the premium and reserve basis in the light of the improved investment and federal income tax situation.

The insurance company, however, quoted added costs which, from their effect on those at the bargaining table, can only be described as staggering. The insurance company's method of computation was also described and appeared to be difficult to justify from both a theoretical and a practical standpoint.

Mr. Hanson has, in the absence of relevant statistics, presented a method which seems quite reasonable and he is to be commended.

Reduction in Election Period

In order to develop a crude measure of the added costs involved in shifting from a five year election period to a two year election period, I have used the device of setting forward the rates in Mr. Hanson's scales A and B. For example, with a two year election period and Scale A it is assumed that 71% of those dying at age 63 will elect the optional form, 37% of those dying at age 64 will elect the optional form, 24% of those dying at age 65 will elect the optional form and actually commence receipt of pensions, and so forth. On this basis and on the assumption that the normal form is a life annuity to a male aged 65 and the optional form is a 100% joint and survivor annuity to a male aged 65 and a female aged 60, under Scale A the five year period requires an added cost of 1.3% and the two year period requires an added cost of 1.5%. Thus, the incremental cost of changing from a five year election period to a two year election period is a relatively modest 2/10 of 1%.

In order to compare the effect of various scales of the distribution of deaths among optionees, it is interesting to derive two statistics from the scales. Scale A, for example, indicates, on the basis of the 1937 Standard Annuity Table, that 14.2% of the retirees elect the optional form and that the average age (last birthday) at death of those employees retiring on the optional form is 74.5 years.

In the 1955 Part 4 examination, question 8 of the afternoon paper suggested an alternate set of hypothetical assumptions. It was assumed that 50% of the employees would elect the option and that these employees would account for 100% of the deaths in the first five years after retirement. Assuming that after age 70 the survivors of both groups experience standard mortality, these assumptions then produce an added cost of 6.0% with, as mentioned before, a 50% election rate and an average age at death of 76.7 years for those electing the option. The table shows statistics based on various election assumptions.

ADDED COST, AS A PERCENTAGE OF THE COST ON THE NORMAL
FORM TO PERMIT ELECTION OF OPTIONAL FORM
RETIREMENT AT NORMAL RETIREMENT DATE
NORMAL FORM—LIFE ANNUITY, MALE AGED 65
OPTIONAL FORM—100% J&S, MALE AGED 65, FEMALE AGED 60

Election Restrictions	Computation Assumptions	Percentage of Retirees Electing Optional Form	Average Age (Last Birthday) at Death of Employees Retiring on Optional Form	Added Cost
Unrestricted	Scale A	14.2%	74.5 years	3.1%
Unrestricted	Scale B	18.3	73.3	5.1
Unrestricted	1955 Part 4 Question 8, Afternoon	50.0	76.7	6.0
2 Yrs. or Good Health	Scale A (+2)	9.2	74.9	1.5
2 Yrs. or Good Health	Scale B (+2)	10.5	73.0	2.9
5 Yrs. or Good Health	Scale A (+5)	7.7	74.5	1.3
5 Yrs. or Good Health	Scale B (+5)	7.9	72.5	2.4
	Mathematical Maximum	42.3	70.9	16.1*
	100% Election	100.0	78.9†	0.0

* Computed without grouping ages in critical 75-79 age range. Value of 15.6% in paper is based on grouping of this age range.

† 65 + ea on 1937 Standard Annuity Table.

The figures shown in the table can be graphed and used effectively in answering such questions as: "Given a certain percentage of retirees electing the option, what is the mathematical maximum or what is the most likely added cost?"

Selection by Healthy Lives

It should be noted that the joint and survivor computations assume the mortality of the contingent female annuitant will be standard. Perhaps a case might be made for assuming somewhat lower initial mortality for this group. Similarly, where the normal form of annuity is, say, a life annuity with ten years' payments certain, a retiree electing a life annuity might be expected to experience somewhat lower initial mortality. It should be noted that, where several optional forms of pension are available, the over-all mathematical maximum added cost will be greater than the mathematical maximum added cost of the option with the greatest mathematical maximum added cost.

Assessment of Added Costs against Optionees

Three or four years ago the optional election period became a competitive consideration in the Canadian deferred group annuity market, and, for retirements at normal retirement date, the period was reduced from five to two and finally zero years by some companies. In order to avoid increasing premium rates, in connection with which there is intense competition (see *TSA XI*, 128), some companies attempted to counteract the resulting antiselection by reducing the actuarial equivalence factors. The methods used were largely empirical, often involving age ratings for the employee and/or the contingent annuitant.

It is interesting to examine the figures developed by this approach using Mr. Hanson's methodology. Based on 1937 Standard Annuity Mortality and 3% interest, the actuarial equivalence factor for a 100% joint and survivor annuity for a male aged 65 and a female aged 60 replacing a life annuity on the male is .678. Assuming Scale A election rates, it is necessary to reduce the factor to .523 in order to produce an expected added cost of zero. The mathematical maximum added cost is 8.5%. Similarly, assuming Scale B election rates, the factor would be reduced to .478 and this factor would involve a mathematical maximum added cost of 6.9%. These indicated reductions appear more conservative than those used by the Canadian companies. In addition, there should be considered the effect of the equivalence factor itself on the election rates, since obviously a .478 factor will be attractive only to the most seriously impaired lives.

Human Nature and Antiselection

There is considerable room for discussion in connection with the derivation of scales which Mr. Hanson used to compute his "most likely" and "maximum anticipated" added costs. I am reasonably convinced that

large employers, in whose hands is concentrated substantial purchasing power and who can afford to retain competent actuarial counsel, can and will intelligently exercise selection. I am not so convinced, however, as to the ability of the average employee, lacking sophisticated actuarial and financial training, to exercise intelligent self-selection very often. All of us come into contact with situations in which individuals make choices between various alternatives and come up with a decision which we would consider to be faulty from an actuarial or financial viewpoint. The philosophy "a bird in the hand today is worth ten birds ten years from now" is a frequent rationale for decision-making. Very frequently we see terminating employees accepting a few hundred dollars as a refund of their contributions in lieu of a deferred paid-up annuity with substantially greater actuarial value. Another principle is: "You get your money back so you can't lose." Examples of this include the sale of life insurance policies with a return of premium feature, health insurance policies that pay you \$100 a week while you are in the hospital and the "full face amount" if you are not sick, cash refund annuities, etc.

Consider a male employee aged 65 with a wife aged 60 who is entitled to a pension on the life annuity basis of \$100 per month. If he is allowed to select a 100% joint and survivor annuity the amount of annuity is reduced to, say, \$68 per month. The actuary, interested in selection, is vitally concerned with the ability of the \$32 reduction in the life annuity to offset the newly created \$68 reversionary annuity. The employee, on the other hand, is principally concerned with the fact that whereas before he had a \$100 annuity, he now has a \$68 annuity. Very little importance is attached to the reversionary annuity, representing, as it does, an uncertain possibility of some money going to someone else after his death. Since \$100 is greater than \$68, the joint and survivor option is usually not chosen, although in many cases it is probably indicated based on financial and health circumstances.

In the field of individual policy pension plans I have observed an interesting phenomenon. Usually the normal form is a life annuity with perhaps ten years' payments certain. The employee is permitted, without health or period restrictions, to choose from a bewildering variety of options, including a cash or installment refund option, based on the cash surrender value at retirement. This latter figure is usually completely new to the employee, since, in the plans I am familiar with, a lump sum payment is not available to the employee. The cash value bears no relationship to the employee's own contributions and little relationship to the employer's contributions. Yet, if an option is elected, I have usually found that the cash or installment refund option is the one selected.

The Statistical Approach

In Section 1 of the paper Mr. Hanson points out quite correctly that the available statistics are not suitable for the purpose of calculating added option costs. However, I feel that consideration should be given, either by individual insurance company or consulting actuaries, or by the appropriate committees of the Society, to developing statistical data as to the percentage of employees electing options and possibly as to the resultant antiselection. For example, I believe there exists a substantial body of data with respect to the election of options on an unrestricted basis (as to health and period) in the offices of actuaries of life insurance companies who write individual policy pension trust plans. In this instance, of course, the election of lump sum surrender values at retirement would not be too meaningful, since some trustees have found it financially beneficial to purchase immediate annuities from another life insurance company in view of new money investment considerations.

Ultimate Added Costs

Although it is helpful to have some numerical measure of the expected added costs developed by the statistical or deductive methods, in a specific case I am convinced that the real added cost of these options will depend upon the extent, the quality, and the impartiality of employee counseling during the working years and at retirement. Consider a case where an insurance agent is counseling the employee and the agent recognizes an opportunity for antiselection. Do the agent's loyalties rest with his principal (the insurance company), his client (the employer), or the employee? His advice might differ considerably depending upon his basic loyalties. Our office installed a self-administered pension plan in a relatively small organization sixteen years ago, and in that time there have been forty-five retirements. We believe this firm has an extremely fine employee relations program and is genuinely concerned with helping the employee to make a decision which is in the best interest of the employee and his family without regard to the financial effect of the individual transaction on the pension plan. The normal form of annuity is a life annuity with ten years' certain payments. The optional forms include a life annuity, a life annuity with twenty years' certain payments, and a 100% joint and survivor annuity. Of the forty-five retirements, twenty-nine chose the normal form and of these nine have died; two each chose an increased death benefit in the form of the joint and survivor and the life and twenty years' certain forms respectively, and no deaths have occurred among these four; twelve employees chose a reduced death benefit in the form of an increased life annuity and of these four have died. The data are sparse and did not

warrant a mortality investigation; however, a brief examination of the exposures and deaths did not indicate, in my opinion, significant anti-selection for health reasons.

In conclusion, I should like to congratulate Mr. Hanson on presenting a very timely and thought-provoking paper.

R. W. WALKER:

Mr. Hanson has indeed given us a challenging analysis of a question that is all too common. He has approached it analytically, to be sure, and has demonstrated the costs on a comparative basis: likely, more likely, and most likely—not, as some of us might prefer, unlikely, more unlikely, and most unlikely.

I have some concern that this particular analysis might mislead, not actuaries, but indeed lay people. I am not criticizing the technical basis. I am concerned, though, that lay people might be misled, as a result of this particular type of analysis, into misinterpretation, and with it incorrect conclusions, concerning the value of each of the various elections available. In other words, my concern relates to the misinformed uses to which material of this type may well be put by the uninformed. In retirement planning there are unfortunately more uninformed people than informed people. Here in this paper we have a comparison of what one might call “actuarial equivalents.” The measures given of the election privileges related to them is probably good enough. I find, however, that when comparing retirement benefits there is a great deal of attention focused on the actual monthly income, say \$100 per month. Then, with this base, those interested move with the constant income to the variety of methods by which this income may be paid: a life income, a guaranteed life income, an income certain, a joint and survivor income approach, and the like. The differences in cost of these *different benefits* are substantially different from the differences in cost in the granting of “actuarially equivalent” benefits. In one, selection costs only are being compared. In the other, benefit costs in addition are being compared.

For example, the value of the life annuity of \$1 per annum is properly compared with the value of an annuity of \$0.906 per annum payable for ten years certain and life thereafter. In the evaluation of these likes, Mr. Hanson has produced measures of the values of selection in the choices. This is wholly different from the measure of the difference in value plus the cost of selection had the choice been \$1 per annum in both instances. I don't want to belabor the obvious or that which is obvious to all of us. I do want to remind each of us that biblical quotations are frequently taken

out of context for nonbiblical purposes. Similarly, between the "hallowed" covers of the *Transactions* is truth. It too can be misquoted.

THOMAS P. BLEAKNEY:

For those of us who have been forced on occasion to advise our clients as to the costs of unrestricted election of optional forms, Mr. Hanson's paper bridges a wide gap in the field of actuarial science. As he states in his paper, there is a widely held belief that such costs would be prohibitive. In carrying out the motto of the Society, Mr. Hanson has, to my mind, substituted a demonstration for a contrary impression.

In this connection, the experience of the Employees' Retirement System of the State of Washington may be of interest. Since 1951, the System has had unrestricted choice of options under its plan. The options available are a 100% J&S, a 50% J&S, and, for that portion of the allowance purchased by the employee's accumulated contributions only, a cash refund annuity.

In many respects, the retirement provisions of the System are as adverse with regard to antiselection as would normally be found. There is no "normal" retirement date, retirement taking place at any time after completion of thirty years of service, or, for most employees over sixty, the completion of five years of service. There is a compulsory retirement age of seventy, but this is subject to extension on an individual basis. The only feature of the plan which prevents it from exhibiting the most extreme antiselection with respect to choice of options is a provision for a widow's benefit for an active member who dies while eligible to retire. Her benefit is such as she would have received had the employee retired upon his date of death and selected the 100% joint and survivor option.

The following table gives the approximate distribution of retirements for the four-year period ended June 30, 1959.

Choice	Male	Female
No Option.....	45%	70%
Cash Refund.....	34	27
100% J&S.....	11	2
50% J&S.....	10	1
	100%	100%
Number Retiring (approximate):	1,800	700

An indication of the antiselection exercised by those choosing the options can be gained from the following table:

DEATHS AMONG RETIRED MEMBERS
JULY 1, 1955-JUNE 30, 1959
(Expected by 1937 Standard Annuity Mortality Table)

YEAR OF RETIREMENT	MALES			FEMALES*	
	Actual Deaths	Expected Deaths	Mortality Ratio	Actual Deaths	Expected Deaths
No Option					
1st	23	32	72%	7	8
2nd	32	35	91	9	9
3rd	35	38	92	8	11
Totals	90	105	86%	24	28
Cash Refund					
1st	23	23	100%	3	3
2nd	24	21	114	1	3
3rd	8	15	53	4	2
Totals	55	59	93%	8	8
100% J&S					
1st	11	11	100%	2	1
2nd	14	7	200	0	0
3rd	8	6	133	1	0
Totals	33	24	138%	3	1
50% J&S					
1st	11	10	110%	0	0
2nd	9	7	129	0	0
3rd	6	5	120	0	0
Totals	26	22	118%	0	0

* Ratios not shown, due to sparseness of data.

For comparison, during the same period, the aggregate mortality experience of retired members (including a few beneficiaries) for *all* durations of retirement was as follows, as compared with the same mortality standard:

	Actual Deaths	Expected Deaths	Mortality Ratio
Males.....	689	641	107%
Females....	147	157	94

Although the experience is obviously limited, it was felt that the tables to be used for the calculation of the option factors should reflect the apparent antiselection. Incidentally, while an employer or the trustees of a negotiated plan may be able to let the costs of the unrestricted election be spread among the other costs of the plan, the administrative board of a statutory plan is generally more restricted in such action.

Accordingly, in connection with other modifications, the System's board recently adopted a new set of mortality tables for the determination of the purchase rates of annuities from accumulated employee contributions, and for the factors to be used in determining the reduced benefits under the optional benefits. The mortality rates of the new tables bore the following percentages to the corresponding mortality rates of the 1937 Standard Annuity Mortality Table:

	YEARS AFTER RETIREMENT			
	First	Second	Third	Fourth and Subsequent
<i>Male</i>				
Annuity Purchase Rate.....	100%	100%	100%	100%
Cash Refund.....	100	100	100	100
100% J&S.....	145	130	115	100
50% J&S.....	145	130	115	100
<i>Female</i>				
Annuity Purchase Rate.....	61	74	87	100
Cash Refund.....	70	80	90	100
100% J&S.....	100	100	100	100
50% J&S.....	100	100	100	100

There was a reluctance to adopt tables fully reflecting the apparent antiselection without a study of additional experience. However, if decisive weight could be given to the limited experience to date, the male-

J&S portion of the above table might have been as in the following "experience" table:

	1st Year	2nd Year	3rd Year	4th & Subs.
100% J&S.....	205%	170%	135%	100%
50% J&S.....	175	150	125	100

On the basis of the $3\frac{1}{4}\%$ interest rate used by the System, the male-J&S factors computed on the basis of the 1937 Standard Annuity Table, of the adopted table, and of the "experience" table would compare as follows:

AGE	OPTION	STANDARD ANNUITY FACTOR	ADOPTED TABLE		"EXPERIENCE" TABLE	
			Factor	Ratio to Standard Annuity	Factor	Ratio to Standard Annuity
60*.....	100% J&S	72.3%	71.2%	98.5%	69.8%	96.5%
65*.....	100% J&S	69.4	67.9	97.8	66.0	95.1
70*.....	100% J&S	66.5	64.5	97.0	61.9	93.1
60*.....	50% J&S	83.9	83.2	99.2	82.7	98.6
65*.....	50% J&S	81.9	80.9	98.8	80.2	97.9
70*.....	50% J&S	79.9	78.4	98.1	77.5	97.0

* The joint annuitant is assumed to be a female three years younger.

In view of the inherent freedom of choice of date of retirement, the results given in the table above would seem to add some empirical weight to the theoretical results reached by Mr. Hanson.

ALAN A. GROTH:

Mr. Hanson is to be congratulated upon presenting this timely paper. Those of us in the pension consulting business are frequently asked the question, "What is the added cost of permitting the unrestricted election of optional benefits?" Mr. Hanson has derived a method to determine the "mathematical maximum" of the added cost based on the assumption that, expressing it in laymen's terms, everybody who will die earlier than his life expectancy will elect the option, and everybody who will survive his life expectancy will elect the basic benefits and not elect any option.

Mr. Hanson had also stated in the first section of his paper that there is no satisfactory statistical approach to evaluate the actual cost of un-

restricted elections. However, subsequently he derived two additional percentage figures, the "maximum anticipated" cost and the "most likely" cost of unrestricted elections. Both of these are based on certain assumptions. This approach has the disadvantage that the results might be disproved by challenging the assumptions. Another actuary might change only one of the several assumptions and arrive at an entirely different result.

About three years ago, during an informal discussion on employee benefit plans,¹ I indicated a method of arriving at the figure that Mr. Hanson calls the "maximum anticipated" cost.

Mr. Hanson derived the "maximum anticipated" and the "most likely" cost figures on the basis of two arbitrary scales which indicate what percentage of the employees are going to elect an option. These scales might be applicable to one or another pension plan, but should not generally be used. There are companies where practically nobody elects options and there are companies, on the other hand, where almost all employees elect an option. For this reason, I do not think that a "most likely" cost figure, as derived by Mr. Hanson, can reliably be estimated.

We have, however, a tool which, as indicated earlier, enables us to evaluate a reliable "maximum anticipated" cost. This is based on the following very simple thesis. The possibility of electing an option theoretically divides the employees into two groups. Those who are in worse than average health are going to elect an option that contains some kind of insurance element. Those who are in better than average health will elect the basic life annuity form. Mr. Hanson's approach is based on the former group. But the cost of election can be evaluated by concentrating on the other group, on the employees who are in better than average health. Calculating the added cost of providing annuities for such a superselect group, we may obtain a "maximum anticipated" cost figure. We may use, for example, the statistical data available for immediate nonrefund annuities or for payee elections and then a reliable estimate of the maximum anticipated cost may be arrived at. Using, for instance, the 1960 Modification of the *a*-1949 Table, just presented by Mr. Sternhell, and assuming that the average mortality in 1960 is represented by the 1951 Group Annuity Table, the added cost is 5.2%, which is relatively close to Mr. Hanson's estimates.

C. L. TROWBRIDGE:

Mr. Hanson is to be congratulated on his willingness to undertake a very difficult and important analysis. The analysis is difficult because it involves that most elusive of all actuarial concepts, antiselection. It is

¹ TSA X, 270.

important because it suggests to pension actuaries the attractive possibility of eliminating, for a price, certain common but troublesome restrictions on option election.

Not only has Mr. Hanson tackled a formidable problem important to the pension actuary, but he has done so with considerable skill and imagination. The measurement he is attempting does not succumb easily, however. I hope Mr. Hanson will understand if I take the viewpoint that his paper is a good start in this area, but that there is much here yet for actuaries to learn.

It should be stated here that the writer of this discussion is not among those practitioners in the pension field (referred to in the paper) who believe that the cost of unrestricted election is prohibitive. One need only note the thousands of pension plans funded by individual policies or by group permanent (both of which generally permit election of retirement options right up to retirement date) to realize that many employers, knowingly or unknowingly, have been willing and able to pay the necessary price. Although the cost is not prohibitive, neither is it insignificant, and an attempt to establish the relative value of unrestricted option election is therefore well worth while.

If there were adequate statistics on retired life mortality, by amounts of reserve released on death, and with the experience under plans granting unrestricted options separate from that under plans offering similar options on a restricted basis, then the measurement Mr. Hanson is attempting could be arrived at more accurately and more directly.

In the absence of such data Mr. Hanson goes at the problem in essentially two steps. First he calculates the financial effect of perfect antiselection against the plan, calling the results he obtains the "mathematical maximum." Second, he corrects for the inability of pensioners to select perfectly against the plan, and for the fact that they don't always do so even if they can. He goes about the first step, the calculation of the mathematical maximum, by a method illustrated in Table 3. In connection with this calculation there are a few items worthy of note:

1. Mr. Hanson's analysis expresses the life annuity as a weighted average of annuities-certain, where the weights appear in column (1) and the annuities-certain in column (2). It is an interesting coincidence that in another paper presented at this same meeting Mr. David Berne has expressed exactly the same relationship.
2. The author seems to view the potential antiselection as being entirely a matter of the pensioner in relatively poor health electing a higher death benefit option than the normal form. Such a view appears to put too much emphasis on the designation of the normal form, and to overlook

the fact that every retiree has a choice (no matter what the normal form) of all the options offered. A broader view might emphasize the range of options available, and the 8% of Table 3 might be considered to be the cost of perfect antiselection against a plan which offers only the life annuity and 10-year certain and life options, no matter which happens to be the normal form.

3. As a practical matter many plans offer several retirement options. Obviously the offering of more than two choices is a complicating factor. From the viewpoint of the mathematical maximum, however, it seems clear that the intermediate options can be ignored, with the mathematical test on the extreme choices only. The practically important figures in the right-hand column of Table 2 would appear to be those comparing (1) the Life Annuity with J&S (at about a 16% level), as perhaps typical of the plan with a full range of options except cash, and (2) the Life Annuity with Cash (at nearly 20%) as typical of the plan granting unrestricted cash.
4. The introduction of a Joint & Survivorship option adds the possibility of additional antiselection based on an especially healthy second life. Mr. Hanson is certainly to be forgiven if he has ignored this complicating factor in his calculations. I suppose he has assumed the Standard Annuity Table for the second life, despite the possibility of relatively low mortality among those in the contingent annuitant group. I understand that a special study of contingent annuitant mortality is now being undertaken by the Committee on Group Annuity Mortality.
5. Table 3 calculates an extra cost of 8% at age 65, for an unrestricted choice of life annuity or 10-year certain and life, assuming perfect antiselection against the plan. The percentage is a function of the underlying mortality table, as are all the results in Table 2. On the Group Annuity Table with Projection C—generation attaining age 65 in 1960—the first and fourth mathematical maximums of Table 2 turn out to be 17.9% and 6.6% respectively, rather than the 19.7% and 8.0% on Standard Annuity.

Having arrived at a measure of the financial effect of perfect antiselection, Mr. Hanson turns to the troublesome question of how much antiselection will in fact occur. He comes up with two scales of election percentages for retirement at age 65, varying by age at actual death, but presumably independent of the combination of options under consideration. One might guess that tax and investment considerations could easily cause distortion with respect to the cash option.

The derivation of these percentages leaves much to be desired from a

theoretical point of view, but how many of us could do any better with this elusive matter? A division of the "most likely" percentages of Table 2 by the corresponding "mathematical maximum" shows up the interesting fact that Scale A represents an antiselection factor of about $\frac{1}{3}$ —i.e., if Scale A holds, only about $\frac{1}{3}$ of the financial effect of the potential or perfect antiselection actually is felt. Similarly Scale B represents an antiselection index of about $\frac{1}{3}$.

Combining his Scales A and B with his calculation of the "mathematical maximum," Mr. Hanson arrives at his estimate for the cost of unrestricted options of 3+ % under Scale A, 5+ % under Scale B, for a range of options including both life annuity and J&S, with another $\frac{1}{2}$ % to 1 % if cash is allowed. These estimates strike me as being somewhere in the right order of magnitude. An adjustment of this size might well be handled, as a practical matter, through age setback in the mortality table.

The careful reader of Mr. Hanson's paper may be a little disappointed in those portions dealing with early and late retirement.

As to the late retirement situation, Mr. Hanson contents himself with the general comment that the extra cost is relatively higher for retirement at ages above 65, but because of conservatism elsewhere may conveniently be ignored. This is avoiding the question, if the author's goal is to measure the added cost. I would hope that Mr. Hanson might be willing to work out Table 2, for age 70 perhaps, as an indication of how much his results are affected by retirement age.

I must admit that the author has lost me in his Section 4 on early retirement. There appears to be confusion between (1) the cost of an early retirement provision, and (2) the cost of unrestricted option election available at early retirement.

At least in the absence of disability or death benefits, there is potential antiselection in simply permitting an immediate income upon early retirement, even though there might be no options whatsoever as to form of annuity. This particular antiselection many plans bear without too much concern. Perhaps this cost is what Mr. Hanson measures on the first and fifth lines of his last table.

The granting of an optional form of income (particularly cash or J&S) on early retirement is an additional potential for antiselection, the cost of which is not shown in Mr. Hanson's last table. A very rough test, assuming retirement at age 55 under Mr. Hanson's special mortality assumptions for early retirees, seems to indicate a mathematical maximum (for the option election alone) in the same general magnitude as shown in the paper for age 65. The lower age is about offset by the substandard mortality assumed.

In summary let me express my pleasure in seeing a paper of this type. Its conclusion that unrestricted options can be granted, for a price, seems to be sound. Some employers will be willing to contribute an additional 2% to 5% to eliminate restrictions on option election; others might well prefer to spend any extra dollars available to improve the benefits or decrease employee contributions.

J. B. MACDONALD:

I should like to congratulate Mr. Hanson upon a very interesting and valuable paper. I know that it is a subject many actuaries have considered, but it is the first time I have seen it approached in such a precise manner.

I have only two comments to make, one a slight criticism. Implicit in Mr. Hanson's approach is the assumption that all pensioners receive about the same income. However, in many pension plans, at least the ones with which I am familiar, some senior employees or executives frequently retire on much larger pensions than the rank-and-file. This is particularly true of final average salary plans. Antiselection exercised by these people may be sufficient to invalidate some of the conclusions as to cost which are reached. It also seems reasonable to assume that people with larger pensions are in a better position to take a reduced pension for reasons of selection. A man with a small pension may hesitate to reduce it further in order to antiselect, while a man with a large pension (who may also have other resources) would not have the same reluctance.

My other comment is with respect to the method of charging the added cost. It is suggested, and I think properly, that the basic premiums should be increased. However, some companies make the necessary allowance in the optional annuity rates, and here the charge is more substantial. For example, if a charge of 3% extra is needed on the entire group, and we assume that 40% of the group elect optional annuities, then a charge of 7½% is needed in the optional annuities. This will have the effect of discouraging elections where there is little or no selection (and there are such elections), and limiting them to elections with a high degree of selection. Then the charge made will be inadequate, and we are embarking on a vicious circle. I think it is obvious that the extra charge must be made in the premium rates.

WILLIAM F. MARPLES:

This paper of John Hanson's introduces for discussion a subject of concern to all consultant actuaries. We are interested in the unrestricted option from two angles. First, we have to answer the employer who wishes to grant the unrestricted option and asks how much it will add to the cost of

his plan. Second, we are asked to adjust the option percentages so as to minimize any additional cost to the plan. Both of these requests are reasonable and yet difficult to answer in an informed manner. The questions arise from the administrative difficulties experienced when it is necessary to explain to active persons, five years before retirement, what decisions have to be made about their pension and their options under the pension plan. It is so much easier to go over everything involved when the person's interest is keenly engaged by the prospects of retirement in a short period of time. My feeling has always been that we can adjust the reduction percentages in such a way as to minimize or eliminate any extra cost, and Mr. Hanson's calculations confirm and support the adjustments I have made hitherto.

RICHARD DASKAIS:

Two of the most common uses of the word "actuarially" in the field of pensions are in the terms "actuarially equivalent" and "actuarially sound." In the minds of many nonactuaries the two terms suggest the same concept; if an unrestricted election of an option is not truly on an actuarially equivalent basis, it is not actuarially sound. Mr. Hanson's paper points out the difference between the two terms by describing ways of estimating the cost of making actuarially sound an election not truly made on an actuarially equivalent basis.

Mr. Hanson first computes the mathematical maximum antiselection cost for a particular option and then he estimates the most likely additional cost by making certain assumptions of the percentage of employees who actually will select against the plan. These assumptions are in turn based on certain empirical assumptions of the employees' awareness of their health at the time they retire.

According to the author's Scale A about 14% of employees will elect an option at retirement, or according to Scale B about 18% will elect an option. If it may be assumed that elections in excess of these percentages are not being made because of an employee's awareness of his poor health, the experience below suggests that the amount of antiselection decreases considerably as the amount of pension to which an employee is entitled increases, but that the level of antiselection according to the author's assumptions may exist among employees whose pensions are relatively small. Thus it can be expected that the percentage cost of antiselection will be greater in a "pattern" plan (providing the same pension per year of service for all employees, regardless of earnings) than it will be in a "conventional" plan (providing pensions based upon the employees' earnings).

The table below shows the elections made by the male employees of a

DISTRIBUTION OF ELECTIONS OF MALE EMPLOYEES RETIRING IN 1958-1960
EMPLOYEE OR CO-PENSIONER ALIVE ON DECEMBER 31, 1960

	BY NUMBER OF PENSIONERS					BY AMOUNT OF LIFE PENSION
	Hourly Paid Employees	Salaried Employees			Total	Total
		Life Pension under \$100	Life Pension \$100-\$200	Life Pension over \$200		
Life Pension..	334 (83%)	62 (77%)	32 (58%)	22 (35%)	450 (75%)	(55%)
J&S Option..	67 (17%)	19 (23%)	23 (42%)	41 (65%)	150 (25%)	(45%)
Total.....	401 (100%)	81 (100%)	55 (100%)	63 (100%)	600 (100%)	(100%)

large manufacturing company retiring at or after normal retirement age of 65 during 1958-1960, with the employee or the spouse under a joint and survivor option alive on December 31, 1960. (Data are not readily available on the employees who retired in 1958-1960 and who died prior to December 31, 1960 without electing a joint and survivor option or on employees who elected an option but both the employee and spouse died prior to December 31, 1960.) The company has a single pension plan which covers substantially all of its United States employees. The plan permits the unrestricted election of either a 100% or a 66 $\frac{2}{3}$ % joint and survivor option, but only the spouse of the employee may be the co-pensioner.

The salaried employees have been broken down according to the amount of life pension to which they would have been entitled if they elected no option. The life pensions of almost all of the hourly employees were under \$100. The average amount of life pension of the hourly employees who elected an option was \$67 monthly; the average amount of life pension of the hourly employees who did not elect an option was \$58.

If a pension plan provides that the only option available is a joint and survivor option with the spouse as co-pensioner, the amount of antiselection will obviously be less than if less restrictive options are available, because some employees will not be married, will not care to provide a reversionary pension to their spouses due to various personal reasons, or will have spouses in poor health. Although many employers may be perfectly willing to pay the cost of antiselection for the benefit of their employees' spouses, these employers may not want to pay for any antiselec-

tion for the benefit of persons such as grown children who are not financially dependent upon the employee after his retirement.

Although the pension plan may be selected against by permitting unrestricted election of options, the cost to the employer of the selection against the pension plan may be partially offset by outside savings to the employer in the form of reduced demands by his employees for the continuation of substantial amounts of group life insurance after retirement, or reduced charges for conversion against his group life insurance experience.

(AUTHOR'S REVIEW OF DISCUSSION)

JOHN HANSON:

The mortality statistics submitted by Mr. Thomas P. Bleakney with respect to retired lives under the Employees' Retirement System of the State of Washington are of considerable interest, and they generally confirm the notion that employees in poor health will choose options that increase the amount "at risk."

The option factors Mr. Bleakney has computed on the basis of the mortality statistics, in order to assess the added cost against the pensioners electing an option, are extremely useful. His option factor reductions range up to 7% using the actual mortality experience, and up to 3% using his adopted table. For example, for a male aged 65, Mr. Bleakney's reduction in the Standard Annuity 100% J&S factor is 2.2% using the adopted table and 4.9% using the actual experience.

In contrast, Mr. Siegel's reduction in the factor for a male aged 65 is 23% (from .678 to .523) using Scale A, or 30% (.678 to .478) using Scale B. This difference in magnitude results because Scales A and B anticipate that only about 10% of the employees not aware of a serious health condition at age 65 make an election, and Mr. Bleakney's statistics resulted under a plan where a more significant share of the elections were undoubtedly made for reasons having nothing to do with selection against the plan.

With respect to the percentage who will elect, 55% of the State of Washington retirees made an election during the specified four-year period, 41% of the salaried employees elected a J&S option under the plan described by Mr. Daskais, and 60% of the employees elected an option under the plan mentioned in Section 1 of the paper. These percentages, all resulting under plans permitting unrestricted elections, suggest that, at least for salaried employees, Scales A and B understate significantly the number of employees who will elect an unrestricted option. The paper did not discuss the possibility of charging the added cost against the retirees, and I now conclude that if such charges are based on Scales A and B, they

may be much too high under a plan providing substantial benefits to salaried employees.

To obtain a more appropriate measure of the charge against optionees under a liberal plan where a large share of the retirees are expected to elect, Scale C has been developed under which 44% of the retirees would elect an option. Scale C anticipates that the same number of employees as under Scale A will elect in order to select against the plan, and that 40% of the employees who do not select will make an election for other reasons. Using Scale C, a reduction of about 4.5% in the 100% J&S factor, male aged 65, would absorb the added cost of the unrestricted election. This corresponds reasonably well to Mr. Bleakney's reduction and to the 4.2% charge mentioned by Mr. Coward on the basis of an age rating.

Mr. MacDonald suggests that the added cost of the unrestricted election should be charged to the employer, and that if the option factors are such that the entire cost is charged to the optionees, there may then be a "vicious circle," because the benefit would be reduced so significantly that only the selecting employees would elect. This would certainly appear to be a danger if the reductions are determined under Scales A and B to be 23% and 30%, respectively. However, if the reductions are of the 4.5% magnitude, this danger should be slight.

As a matter of general interest, the added costs, based on Scale C, to permit unrestricted election of certain options are shown below. The added costs developed in the paper are also shown.

NORMAL FORM	OPTIONAL FORM ELECTION BY MALE AGED 65	ADDED COST, AS A PERCENTAGE OF COST ON NORMAL FORM			
		Scale C	Most Likely	Maximum Antici- pated	Mathe- matical Maximum
Life Annuity....	Cash Settlement	2.5%	3.6%	6.2%	19.7%
Life Annuity....	100% J&S, Female Age 60	2.2%	3.1%	5.1%	15.6%
Life Annuity....	10-Year Certain & Life	1.4%	1.9%	3.0%	8.0%

I agree with Mr. L. E. Coward that a reduction in the option period from five years to two years results in an almost negligible added cost, and with Mr. Siegel's measurement of this added cost at 2/10 of 1%, using Scale A.

The statistics provided by Mr. Richard Daskais support the contention that selection will be relatively less under the more liberal plans than under the typical plan for hourly employees, because it appears that, the

larger the pension payable, the more likely are elections to be made for financial reasons. Under the plan discussed by Mr. Daskais, which permits unrestricted elections, there should certainly be less added cost, as a percentage of standard cost, with respect to the group receiving pensions in excess of \$200 (65% elected an option) than with respect to the group of hourly employees receiving average pensions of \$67 (17% elected an option).

Dr. Groth argues that the maximum anticipated and the most likely costs developed in the paper "should not generally be used." He then develops a "maximum anticipated" cost of his own which he terms to be "reliable," and which is apparently equal to exactly 5.2% under all plans, no matter what options are available.

Dr. Groth observes that another actuary might change "one of several assumptions" stated in the paper and arrive at an entirely different result. It is to be expected, of course, that actuaries will not all make the same assumptions about any contingency, and an essential purpose of the paper was to develop a method that would recognize the contingencies involved. Because he ignores some of the essential contingencies, I find myself in basic disagreement with Dr. Groth's 5.2%.

Specifically, his approach ignores the contingencies described in Section 1 of the paper as the "unknown quantities," namely: (1) the percentage of retiring employees that will elect an option and (2) the relationship between the percentage electing and the resultant antiselection. His 5.2% cost increase was obtained by dividing an immediate life annuity intended to measure "superselect" mortality (for male aged 65, based on Sternhell's 1960 Modification of the *a*-1949 Table) by an immediate life annuity intended to measure average mortality in 1960 (for male aged 65, based on 1951 Group Annuity Table). The significance of this relationship is not readily apparent. If the 1951 Group Annuity Table is the mortality table adopted for the actuarial valuation, it would seem that his 5.2% cost increase should be applied only to that part of the computed cost which could be attributed to the "superselect" group. If the 1951 Group Annuity Table is not the mortality table adopted for the actuarial valuation, it would then seem that there would be no computed costs to which the 5.2% could logically be applied.

Dr. Groth is in error when he states that my approach is based on the group who are "in worse than average health," since the approach used in the paper recognizes all employees, and a review of the tables in the paper shows that while added cost is expected with respect to those electing who are in worse than average health, reduced cost is expected with respect to those electing who are in better than average health. To illustrate, of the

14.2% of all retirees who are assumed to elect an option using Scale A, 46% are assumed to select and 54% are assumed to elect for financial reasons.

Dr. Groth dismisses the added cost developed in the paper (but does not apply the same argument to his own 5.2% "maximum anticipated cost") because "there are companies where practically nobody elects options and there are companies, on the other hand, where almost all employees elect an option." Reasons for such variations were described in Section 1 of the paper, and the "roadblocks placed in the way of employees who wish to elect an optional form" is probably the key reason why there are not more elections under existing pension plans. It seems clear that a substantial proportion of the retirees will elect an option under any plan where the elections are unrestricted. This is evidenced by the figures submitted by Mr. Bleakney and Mr. Daskais, as well as by the figures stated in the second paragraph of Section 1 of the paper. Thus, Scales A and B are with respect to elections under plans permitting unrestricted election. After removing all restrictions, underwriters would generally expect some selection against the plan, and would therefore not agree that Dr. Groth is realistic when he says there are companies where "practically nobody elects options." The fact that his 5.2% is relatively close to the costs developed in the paper appears to be completely coincidental, and I do not find his figure to be at all reassuring.

Two themes run through Mr. Link's discussion, one a significant contribution and the other a new dimension. The significant contribution is his emphasis on the cost of poorly designed or administered benefits, and the new dimension is his discussion of the moralities and responsibilities of the various parties in the design and operation of an employee pension plan. As an example of poor design Mr. Link cites the New York City Teachers' "death gamble," where in theory all deaths prior to retirement could be associated with concurrent elections of early retirement and a 100% joint and survivor annuity option, thus eliminating the benefit of survivorship.

With respect to the question of added cost in the event of elections at early retirement, the assumptions underlying the costs developed in the paper are intended to be appropriate when there is effective control over the "death gamble" type of situation. The control was stated as follows in Section 4 of the paper: "Further, the select mortality rates are conservative if the results are applied to a plan which provides a permanent and total disability retirement benefit *in lieu of* the typical group annuity early retirement." (Emphasis added.)

When Mr. Link states that the provision of a disability benefit presents

an employee, by refusing to admit to or apply for the disability benefit, with the choice of taking a disability retirement income or exercising an option probably greater in value, he is not discussing the soundly designed type of plan considered in the paper. Moreover, when he states that "I prefer his Scale B to his Scale A, because thinking at early retirement tends to be more oriented towards health considerations," he has misinterpreted the purpose of Scales A and B, which were used only to determine added cost in the event of normal retirement, and which have nothing to do with the added cost developed in connection with early retirement.

With respect to sound design and administration of pension benefits, it would appear to be basic that an employee should not have a choice between a disability pension and an early retirement pension. Under a plan where there is no choice between the two benefits, a comparison appears to be inappropriate. If such comparisons are undertaken, however, it is not an exceptionally difficult administrative problem to explain to the employee that he receives an annual disability income of say, \$100, in lieu of a 100% joint and survivor pension of \$46 at age 60 or \$34 at age 55 (early retirement and option factors based on Standard Annuity mortality, 3%, female 5 years younger than male). For an employee retiring at age 64, the problem is more acute, and an employer concerned with employee reactions might choose to permit optional forms of payment of disability pension commencing two or three years after retirement, if the employee is still living. On this basis, the usual restrictions would apply at disability and at early retirement.

The purpose of the paper, of course, was to measure the cost of eliminating such restrictions, under a plan that is firmly administered. As Mr. Siegel suggests, some employees are concerned principally with the reduction in the monthly pension and hardly at all with the payment of a reversionary annuity. With respect to Mr. Siegel's statement that the average employee does not exercise intelligent self-selection very often, it appears that the average employee can select, but not so intelligently that his choice will involve the maximum added cost to the employer, unless, of course, Mr. Link's viewpoint prevails and employers provide professional counsel to employees to help them maximize selection against the plan.

Two comments on the assumptions underlying the early retirement costs follow. First, the retirement and mortality assumptions resulted in approximately 50% as many early retirees as normal retirees; this is about twice as many early retirees in relation to normal retirees as is indicated for group annuity plans by statistics of the Committee on Group Annuity Mortality. Second, the select mortality table developed especially for the computation of early retirement costs assumed mortality in relation to

standard mortality as follows, by year of retirement: first year, 500%; second year, 278%; third year, 167%; fourth year, 119%; fifth year, 103%; thereafter, 100%. The mortality indicated by Mr. Bleakney for the first three years of retirement under the State of Washington plan is much lower than the assumed rates, although the mortality under the Washington plan would certainly have been higher, especially in the first year of retirement, if there had been no in-service widow's benefit. Lacking any statistics from Mr. Link, I have no reason to accept his contention that these assumptions are inadequate.

Mr. Link suggests that the added cost to permit unrestricted J&S elections by early retirees might be 10% under a plan of the "death gamble" type. It would have been easier to confirm Mr. Link's 10% if he had indicated his method of computation, but by varying the above assumptions so that they better conform to the "death gamble" situation, it is possible to arrive at added costs in excess of 10%. Apparently there is no substitute for sound design.

The table in Section 4 of the paper indicates an added cost of 5.1% with respect to benefits accrued prior to age 55, for a 10-year certain and life election by all early retirees, and a cash settlement election by normal retirees on a "most likely" basis. No calculations have been completed for election of a J&S option by early retirees, but the added cost of the cash settlement election by early retirees, which is shown below, is clearly in excess of the added costs to permit J&S options at early retirement.

ADDED COST,* AS A PERCENTAGE OF COST ON NORMAL FORM, WITH RESPECT TO BENEFITS ACCRUED BY A MALE PRIOR TO AGE 55

PLAN PERMITS	NORMAL FORM OF PAYMENT	
	Life Annuity	10-Year Certain Life
1. Cash Settlement at Normal Retirement, no Early Retirement.	3.6%	1.7%
2. Cash Settlement at Normal or Early Retirement	6.6%	5.3%

* With respect to added costs at normal retirement, "most likely" amounts are included.

Mr. Link's "new dimension" involves the expression of sentiments about the duties and obligations of the various parties involved in the design and operation of pension programs. For example, he states that the employer "may feel obliged" to have retirement papers carried to an em-

ployee who is seriously ill, and that a "moral problem" arises as to the back-dating of an election when the employer is "delinquent" in carrying out these "essential" functions. He further suggests that there is "tragic irresponsibility" on the part of the employer who feels that the situation can "be handled." Although not mentioned by Mr. Link, a similar problem exists with respect to terminated employees with vested pensions. Should the employee be required to apply for the benefit or is the employer morally obligated to search him out over the face of the globe to be certain that he enjoys his expectations? Certainly an argument can be made that after a detailed description of plan provisions is given to employees, the employee then bears a large measure of responsibility for applying for benefits.

It is not improper for a person engaged in designing pension plans to express sentiments of the above nature to an employer, but a question could be raised if such feelings should effectively preempt decisions that should belong to the employer; that is, statements such as "it can't be done" or "it isn't right" should not be permitted to terminate discussion. Indeed, a common response of this type, "it costs too much," was one of the prime motives for preparation of the paper.

On reflection, Mr. Link's fear that death in service might often follow concurrent elections of early retirement and an option can be understood by reference to the evolution of insurance coverages. That is, the historical inability of the insurance industry as a third party to control disability costs sheds light on Mr. Link's concern for administration of disability benefits.

Mr. MacDonald suggests that selection by executives receiving large pensions, perhaps under a final-pay plan, may be sufficient to invalidate some of the conclusions as to costs which were reached in the paper. I would agree that the method used in the paper is not appropriate for a small group of employees where a substantial portion of the plan's liability is attributable to one employee. For this reason it was stated in the summary of the paper that the method would be used "for a plan covering a group of employees whose mortality may accurately be predicted. The size of such a group would be a matter for actuarial judgment, taking into account mortality risks incurred because of disproportionately large benefits in force on the lives of one or a small number of employees." Certainly the method outlined in the paper leaves a substantial area for the exercise of actuarial judgment.

For a sufficiently large group, however, there would appear to be no danger in permitting unrestricted elections even if pensions are computed on a final-pay basis. In fact, the final-pay plan might result in the lowest

percentage added cost because there are likely to be a significant number of elections for financial reasons.

I concur in Mr. Marples' comments which are at variance with those of Dr. Groth.

A criticism has been made that there is a lack of actuarial "purity" in the heading of column (2) of Table 3, a life annuity due at age 65. The essence of the analysis in the paper was to consider employees dying at various ages as separate groups. Thus, there is a different mortality table for each group of employees, with the probability of death equal to zero for each age before the first age in the range of ages of death. Each number in column (2) is the value of the life annuity due for the population dying within the indicated age groups. This corresponds to the idea that the life expectancy at any age varies according to the mortality table assumed.

Mr. Siegel and Mr. Trowbridge both point out, correctly, that in theory there can be selection by healthy lives who elect a life annuity under a plan with a 10-year certain and life normal form. Mr. Trowbridge states that the 8% mathematical maximum cost of Table 3 might be considered to be the cost of perfect antiselection against a plan which offers only the life annuity and 10-year certain and life forms of option, no matter which happens to be the normal form. I concur, but the essential point is that the mathematical maximum costs have no practical application and are used only as steps in arriving at the most likely and the maximum anticipated added costs which are intended to be related to the computed costs of a plan. Further, in progressing from the mathematical maximum added cost to the most likely and maximum anticipated costs by means of Scales A and B, various assumptions are involved with respect to the proportion of the employees that will elect an option; the normal form is very significant to these assumptions. In making these assumptions, it is not difficult to dismiss as insignificant the costs of selection by employees in extra good health who select a life annuity option in lieu of a 10-year certain and life normal form.

I agree with Mr. Trowbridge that there is much yet for actuaries to learn with respect to the added cost of plans that provide unrestricted elections, and the discussions have contributed a great deal of useful information. With respect to the possibility that additional antiselection will result because the second life is especially healthy, it was intended that the comparison of the 100% joint and survivor costs in Table 2, female age 50, with similar costs, female age 60, would give a measure of this possible antiselection.

Mr. Trowbridge's summary of the estimated cost of unrestricted op-

tions at 3+ $\%$ under Scale A and 5+ $\%$ under Scale B with another 1% for cash options is reasonable provided these generalizations are applied to plans permitting unrestricted election at the normal retirement age only, and provided further that the normal form is the life annuity. Of course, added costs developed under Scale C might be more appropriate for some plans.

I agree with Mr. Trowbridge that the cost of unrestricted elections where retirement is optional after age 65 has not been measured as accurately as where retirement is required at age 65. I believe that the percentages determined on the basis outlined in the paper can be applied to plans permitting late retirement, however, resulting in conservative over-all cost. I have not devised a method of working out a more precise estimate for this type of plan, and it would not seem to be helpful to work out Table 2 for age 70, as Mr. Trowbridge suggests. The approach would be considerably more complicated than this and would require an assumption as to the percentage of the employees who would retire at each age from 65 to 70, rather than the Table 2 assumption that all employees retire at one age.

I find Mr. Walker's comment that the added costs might be termed "unlikely, more unlikely, and most unlikely" to be inconsistent with the concept of actuarial costs in general, since actuarial estimates are based on numerous assumptions, none of which are likely to be realized exactly. Nevertheless, it becomes necessary to estimate these costs and certainly it is the actuary's function to do so.

Mr. Walker may be correct that there is a need for concern about misinformed uses to which the information in the paper may be put by the uninformed. Most insured pension plans are designed by qualified personnel in the home offices of the various insurers, however, and in the case of the sale of individual retirement income or annuity contracts the agent's lack of knowledge about the cost of unrestricted elections is not important because the premiums for such insurance contracts are sufficient to provide such elections at normal, early or other retirement.