

# ACTUARIAL NOTE

NUMBER 20  
JUNE 1965

U.S. DEPARTMENT OF  
HEALTH, EDUCATION, AND WELFARE  
SOCIAL SECURITY ADMINISTRATION

## STUDIES ON THE RELATIONSHIP OF CONTRIBUTIONS TO BENEFITS IN OLD-AGE BENEFIT AWARDS

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Since the establishment of the Social Security system under the 1935 Act, the placement of increasing emphasis on the social adequacy concept (as opposed to the individual equity concept under individual life insurance contracts) has been witnessed by subsequent amendments. Accordingly, in considering the experience of the Old-Age, Survivors, and Disability Insurance system in its comparatively still early years of operation (the time period here being considered in relation to the ultimate maturity date of the system), one would generally expect the potential old-age benefits currently awarded to be far greater in actuarial value than the accumulated individual contributions made by the insured worker. In other words, the ratio of individual contributions to benefits would be currently very small, but such proportion would gradually rise—other things being equal—as the system matures.

This Actuarial Note first presents the results of two sample studies in regard to the relationship of contributions to benefits in old-age benefit awards. Both samples were chosen by using an account number digital pattern designed to yield a random sample of 100 awards each. Sample No. 1 was selected from old-age benefits awarded in August 1960 and reflected the insured requirements in effect prior to 1960 Amendments ("1 out of 2" provisions). Sample No. 2, on the other hand, was selected from old-age benefits awarded in September 1962 and reflects the "1 out of 4" provisions of the 1961 Amendments.

Table 1 compares the relationship of the value of worker contributions (i.e., employee and self-employed contributions) to the value of the

potential benefits in the two samples. In Sample No. 1, the value of the contributions as a percentage of the value of total benefits is 3.4% for male insured beneficiaries and 2.6% for female insured beneficiaries, disregarding interest. The corresponding percentages in Sample No. 2, which reflects the more recent situation, are 5.3% and 2.9% respectively. It should be noted that the self-employed contributions have been included in the "worker contributions." If only the portion thereof equal to the employee contribution for such earnings were included (the balance of the self-employed contributions being considered as "employer contributions"), the figures for Sample No. 2 would have been 4.9% and 2.8% respectively.

If the contributions were accumulated at 3% interest, and if future benefits were discounted at the same rate of interest, Sample No. 1 would show the percentage to be 5.5% for male beneficiaries and 4.1% for female beneficiaries. The corresponding percentages in Sample No. 2 would be 8.5% and 4.8% respectively. It would seem that in considering monetary payments that are spread over time (such as in this case), the "with interest" computations are of greater significance than the "without interest" ones.

Intuitively, one would expect that the contributions-benefits percentages would increase steadily with the passage of time as the OASDI system matures. The comparison between the two samples indicates that the increase in the percentages, although reasonable for female beneficiaries, is somewhat higher for male beneficiaries than would have been expected in a sample separated by a span of only 2 years.

However, the major reasons for such differential, apart from the possible sampling fluctuations inherent in small samples of this type, is that the increases in the contribution rates during 1960-62 have had the effect of accentuating the increase in the contributions-benefits ratio and that the second sample includes some persons who met the lower eligibility conditions prevailing at that time and who thus would have lower contributions-benefits ratios (particularly is this so for women).

Table 2 shows the contributions-benefits percentages for old-age benefits and lump-sum death payments only (that is, excluding supplementary benefits) for the same two samples. It will be noted that for the female insured beneficiaries, the corresponding percentages for Tables 1 and 2 remain the same, because of the absence of supplementary benefits attributed to the female insured beneficiaries in the two samples. As for the male insured beneficiaries, the elimination of supplementary benefits has little effect on the percentage differentials (mentioned in the preceding paragraph) between the two samples. Thus, Table 2 tends to substantiate the fact that, in disregarding the valuation of the supplementary benefits for those potential beneficiaries who are currently ineligible for such benefits, the comparison between the two samples is not invalidated, however small the two samples may be. Accordingly, the contributions-benefits percentages in Table 2 follow nearly the same pattern as those in Table 1.

Next, this Actuarial Note gives the results of certain calculations of the accumulated value of OASDI contributions and the present value of future benefits for various illustrative categories of individuals attaining age 65 in different years from 1962 to 2010. The underlying mortality and interest assumptions are the same as those used in the calculations for the sample cases.

These illustrative cases, however, assume maximum covered earnings in all possible years (which, because of the weighted benefit formula, produces relatively higher ratios of the value of contributions to the value of benefits than if

persons of all earnings levels were considered). On the other hand, these illustrative cases assume that the individual retires immediately at age 65, whereas the actual experience involves, on the average, some deferment of retirement (thus making the ratio of the value of contributions to the value of benefits somewhat lower for the illustrative cases than would be so under actual experience).

As in the figures for the sample cases, in considering the resulting figures for the illustrative cases, it should be kept in mind that the accumulation of the total OASDI employee contributions as of age 65 is considered. There is thus disregarded the value of the disability and survivor protection that the individual had previously.

Table 3 shows the results of the calculations for these illustrative maximum-earnings cases. For a single male, considering the 3% interest basis, the retirant in 1965 has a value of contributions that is only 17% of the value of the anticipated future benefits, while for a married man the corresponding figure is 10%. For a retirant 45 years from now, who will have paid virtually the maximum tax rate over his entire working lifetime, the corresponding ratios are 133% for the single man and 79% for the married man. On the other hand, for a single woman, the ratio is about 15% for a current retirant and 116% for an ultimate one.

The contributions of the employer are not directly and completely assignable to the particular employee on whose wages they are based. Rather, all contributions are pooled for the general benefit of all covered workers. The cost for those near retirement age when the system started, for those with several dependents, and for those with low earnings are relatively higher and must be met from the general pooled contributions. This procedure has certain similarities to the financing bases for private pension plans. Under the latter, the employer's contributions (relative to pay) are generally not the same for all workers. Rather, they are relatively higher for those near retirement age when the plan started (in large part, because of prior service credits gratuitously given).

The fact that beneficiaries in the early years of the program receive benefits of far greater value than their contributions does not mean that the system is actuarially unsound. The concept of actuarial soundness as it applies to OASDI differs considerably from this concept as it applies to private insurance and private pension plans, although there are certain points of similarity with the latter. In connection with individual insurance, the insurance company or other administering institution must have sufficient funds on hand so that if operations are terminated, it will be in a position to pay off all the accrued liabilities. This, however, is not a necessary basis for a national compulsory social insurance system and, moreover, is not always the case for well-administered private pension plans, which may not have funded all the liability for prior service benefits.

It can reasonably be presumed that, under Government auspices, such a social insurance system will continue indefinitely into the future. The test of financial soundness, then, is not a question of whether there are sufficient funds on hand to pay off all accrued liabilities. Rather, the test is whether the expected future income from tax contributions and from interest on invested assets will be sufficient to meet

anticipated expenditures for benefits and administrative costs.

Despite the fact that for certain cases the ratio of the value of the contributions to the value of the benefits exceeds 100% when interest is considered (but not when interest is not used), it can properly be stated that the young new entrant receives his money's worth in relation to the employee contributions that he pays. This is so when account is taken of the value of the disability and survivor protection before age 65 and of the probabilities of getting married and having children. Moreover, it will be remembered that these comparisons deal only with the maximum-earnings case and not with the more typical average-earnings case.

It should also be kept in mind that the figures in Table 3 relate to the OASDI system as it was before the enactment of the 1965 Amendments (as is also the case for the data presented in Tables 1 and 2 in regard to the two samples of awards). If the provisions of the 1965 Amendments were considered, then in the near-future-year cases the value of the benefits would be increased more than the value of the contributions and, accordingly, the ratio of the value of contributions to the value of benefits would be decreased.

Table 1

VALUE OF CONTRIBUTIONS AS PERCENTAGE OF VALUE OF TOTAL BENEFITS<sup>1</sup>  
FOR SAMPLE CASES

(Mortality Basis: U.S. Life Tables for White Persons, 1949-51)

Sex of Insured Worker	Sample No. 1 <sup>2</sup>		Sample No. 2 <sup>3</sup>	
	Without Interest	With 3% Interest	Without Interest	With 3% Interest
Total:	3.1%	5.1%	4.8%	7.7%
Males	3.4	5.5	5.3	8.5
Females	2.6	4.1	2.9	4.8

<sup>1</sup>Contributions exclude the employer's portion, but include those arising from self-employment.

Benefits include those for old-age, aged wife, mother, child, potential widow's benefit of aged wife or mother, and lump-sum death payment, but exclude those arising from potential wife's and widow's benefits of young wives currently ineligible because of age. The exclusions necessarily result from the lack of basic data available from the sample cards.

<sup>2</sup>Sample No. 1 consists of 62 males and 38 females and relates to old-age awards of August 1960, reflecting "1 out of 2" provisions as to the insured status requirement.

<sup>3</sup>Sample No. 2 consists of 73 males and 27 females, and relates to old-age awards of September 1962, reflecting "1 out of 4" provisions as to the insured status requirement.

Table 2

VALUE OF CONTRIBUTIONS AS PERCENTAGE OF VALUE OF OLD-AGE BENEFITS  
PLUS LUMP-SUM DEATH PAYMENTS ONLY<sup>1</sup> FOR SAMPLE CASES

(Mortality Basis: U.S. Life Tables for White Persons, 1949-51)

Sex of Insured Worker	Sample No. 1 <sup>2</sup>		Sample No. 2 <sup>3</sup>	
	Without Interest	With 3% Interest	Without Interest	With 3% Interest
Total:	3.7%	6.0%	5.3%	8.6%
Males	4.4	7.0	6.1	9.7
Females	2.6	4.1	2.9	4.8

<sup>1</sup>Contributions exclude the employer's portion, but include those arising from self-employment.

Benefits include those for old-age benefits and lump-sum death payments only. In other words, all supplementary benefits to dependents and survivors are excluded.

<sup>2</sup>Sample No. 1 consists of 62 males and 38 females and relates to old-age awards of August 1960, reflecting "1 out of 2" provisions as to the insured status requirement.

<sup>3</sup>Sample No. 2 consists of 73 males and 27 females and relates to old-age awards of September 1962, reflecting "1 out of 4" provisions as to the insured status requirement.

Table 3

VALUE OF EMPLOYEE CONTRIBUTIONS AS PERCENTAGE OF VALUE OF TOTAL BENEFITS  
FOR ILLUSTRATIVE MAXIMUM-EARNINGS CASE

(Mortality Basis: U.S. Life Table for White Persons, 1949-51)

Year of Retirement	Value of Contributions		Value of Benefits		Ratio, Value of Contributions to Value of Benefits	
	Without Interest	With 3% Interest	Without Interest	With 3% Interest	Without Interest	With 3% Interest
Single Male						
1962	\$1,434	\$ 1,885	\$18,768	\$14,764	7.6%	12.8%
1965	1,932	2,580	19,074	15,005	10.1	17.2
1970	2,946	4,080	19,227	15,125	15.3	27.0
1980	5,166	8,066	19,380	15,246	26.7	52.9
1990	7,146	12,399	19,533	15,366	36.6	80.7
2000	8,937	17,407	19,686	15,487	45.4	112.4
2010	9,894	20,543	19,686	15,487	50.3	132.6
Married Male						
1962	\$1,434	\$ 1,885	\$32,331	\$24,906	4.4%	7.6%
1965	1,932	2,580	32,862	25,316	5.9	10.2
1970	2,946	4,080	33,128	25,520	8.9	16.0
1980	5,166	8,066	33,393	25,725	15.5	31.4
1990	7,146	12,399	33,653	25,925	21.2	47.8
2000	8,937	17,407	33,919	26,130	26.3	66.6
2010	9,894	20,543	33,919	26,130	29.2	78.6
Single Female						
1962	\$1,434	\$ 1,885	\$22,395	\$17,182	6.4%	11.0%
1965	1,932	2,580	23,115	17,735	8.4	14.5
1970	2,946	4,080	23,115	17,735	12.7	23.0
1980	5,166	8,066	23,115	17,735	22.3	45.5
1990	7,146	12,399	23,115	17,735	30.9	69.9
2000	8,937	17,407	23,115	17,735	38.7	98.2
2010	9,894	20,543	23,115	17,735	42.8	115.8

**Basic Assumptions:**

- (1) Worker is alive at age 65 and retires at that time (attaining age 65 at the beginning of the year).
- (2) Worker is employed (as an employee) at maximum covered earnings in all years after 1937, or after attaining age 20, if later.
- (3) Married worker has a wife the same age as he is.