

rate, the rate of return, the type of demographic projections (including P_n) and the length of the working career L .

The values of P_n to be used in equation (3) for single males and single females are derived directly from the official projected mortality rates for males and females. However, the probabilities to be used in evaluating the benefit stream of a couple (eligible for wife's benefits) are compound probabilities involving the mortality rates of both sexes.²³ This evaluation required special treatment which for the first time required certain assumptions concerning the internal benefit structure.²⁴

C. PROJECTIONS OF TAX-BENEFIT RATIOS AND RATES OF RETURN FOR THE RECIPIENT OF AVERAGE EARNINGS

Other studies of the return to participants in the social security system have stressed lifetime tax-benefit ratios. Such projections will be presented, briefly, here, but the main focus will be on a different criterion. The most arbitrary element in T/B projections is the rate of return imputed to taxes and used to discount benefits. Previous studies have attempted no deflation of taxes and benefits. However, even if they had, the real rate of return is probably even more difficult to project than the real earnings growth rate, and it also varies enormously from one type of asset to another. For this reason projections of the T/B ratios will not be stressed. Instead the measure sought was the real yield on contributions implied by any given tax-benefit projection.

The real rate of interest on contributions was defined as the particular rate of return which would equalize the real accumulated tax (plus imputed yield) and the present value of real benefits discounted at the same rate at the point of retirement. This is the yield which produces a tax-benefit ratio of unity according to previous definitions. Before presenting these, some examples will be given showing the sensitivity of projected T/B ratios to the assumptions concerning the rate of return.

THE EMPIRICAL APPROACH

The first estimates are on an average earner basis and continue to abstract from variations by family structure and income. Estimation of the tax-benefit ratios on the basis of relations (1) to (3) was routine, but several aspects of the estimates are relevant to a discussion of the findings. In the first place, for simplicity the tax was assumed to be paid annually at the beginning of each calendar year, with annual benefits beginning on the 65th birthday. In effect this simplification moves both taxes and benefits one-half year ahead of the pace

²³ These three beneficiary types are special cases intended to be illustrative only. It seems likely that they will have some relevance to the more complex tax-benefit relationships for working couples whose partners had working careers of varying lengths.

²⁴ First consider such a couple with a given starting benefit. (Allowance will be made ultimately for the fact that couples have higher starting benefits on the average than single earners.) Assume that upon the death of a wife a widower's benefits become two-thirds of the level originally received by the couple and a widow's benefits are 55 percent, as under the present law. Then the present value becomes the sum of three components—benefits as couple, and potential benefits as widower and as widow. Denoting the probability of living from 65 to age n as P_{nm} and P_{nf} for males and females, respectively, the present value of the stream received as a couple is obtained by replacing P_n in equation (3) by $P_{nm}P_{nf}$. The potential stream in the widower status is evaluated by replacing P_n by $P_{nm}(1-P_{nf})$ and multiplying by two-thirds. For the widow status the probability term is $(1-P_{nm})P_{nf}$ and the multiplier is 55 percent.