

$\gamma + \pi$ is also the percentage growth rate of total wage (or covered) income.¹ Hence, the interest rate used to equate benefits and contributions should be equal to the percentage growth rate of total wage income. This is a necessary condition for satisfaction of the constraints regarding social adequacy, equity, solvency, administrative simplicity, and stability as interpreted in this model.

This result has many interesting normative implications. We retain unresolved skepticism regarding the generality and applicability of the model from which (3.12) was derived, and accordingly our discussion below is predicated on the assumption that (3.12) will emerge essentially unscathed from a more general and comprehensive analysis. Bearing in mind the possibly speculative character of our comment we list several implications of (3.12):

1. Total benefits paid by the system should increase at the rate $\pi + \gamma$. Specifically there is no problem of instability if lump-sum benefit increases do not exceed the percentage rate $\pi + \gamma$, which is the combined growth of the wage rate and of the work force.

2. The "obligation" of the system—i.e., the present value of the total "debt" of the system to the working generation—should in the long run increase at the percentage rate $\pi + \gamma$.

3. Any equity rule that systematically pays more or systematically pays less in benefits than total contributions plus interest at the rate $\pi + \gamma$ will be either unstable or socially inadequate in the long run.

4. The status of social security as an alternative to private provision of retirement income depends on the relation of $\pi + \gamma$ to the "riskless" lending interest rate. If this market rate is systematically below $\pi + \gamma$, then social security may offer a better alternative than private savings per dollar invested as a means of providing for retirement income. This would provide a new justification for social security. If the market lending rate were systematically above $\pi + \gamma$ then a corresponding (per dollar) cost of social security both exists and is calculable. We take no position on this issue here;² we merely note the existence of the question.

Now we turn to one of the deficiencies of our model. While the condition $\pi + \gamma = a$ is apparently necessary for a pension system satisfying all requirements, it is not sufficient. Specifically there is no guarantee that the schedule of lump-sum benefits provided by the system will be socially adequate, particularly in the short run.

Whether a lump-sum payment is or is not adequate depends on a number of issues—some technical, and some questions of political and social policy—that we have deliberately avoided in this paper. We are content here to assume that a well-defined procedure exists for trans-

¹ Total income at time $t = Y(t)$:

$$Y(t) = \int_0^{\infty} [w(x)e^{\gamma x}] D_0 e^{\pi(t-x)} dx$$

$$Y(t) = e^{\gamma t} D_0 e^{\pi t} \int_0^{\infty} w(x) e^{-\pi x} dx$$

$$Y(t) = K e^{(\gamma + \pi)t},$$

where

$$K = D_0 \int_0^{\infty} w(x) e^{-\pi x} dx.$$

² The equality of the interest rate with $\pi + \gamma$ is a result of normative significance in a number of economic models. (See, e.g., Phelps, *op. cit.*, pp. 10–11.)