Abstract

Actuarial fairness of a pension system requires that the present value of lifetime contributions equals the present value of expected lifetime benefits at retirement. Two parameters are central for the calculation of the present value: the rate of return and life-expectancy of individuals. In recent years, several countries have introduced adjustment factors or have increased the compulsory pensionable age in order to cope with the cohort specific increase in life expectancy. These reforms lead to a system with more distributional neutrality between cohorts, although they are not necessarily actuarial fair. In contrast, in general pension systems do not reflect the even larger heterogeneity in life-expectancy within a cohort which can be linked to stochastic health shocks, differences in education and heterogeneity in the working place and working history. This heterogeneity might violate the distributional neutrality within a cohort. Additional adjustment factors in the pension formula related to life expectancy could guarantee this neutrality.

In this paper we analyze the distributional and welfare effects of an actuarially fair pension system that allows for heterogeneity in life expectancy within a cohort and compare the findings to the effects of an actuarially fair pension system that imposes a common cohort specific life expectancy. The latter system is comparable to a notional account system as e.g implemented in Sweden. We base the analysis on a structural life cycle model which allows to account for behavioral adjustment of
individuals which are in particular influenced by the design of the pension system. The structural model is estimated based on the longitudinal data of the SOEP.

More specifically we develop and estimate a dynamic structural life cycle model of employment, savings and retirement behavior and based on this model we evaluate the distributional and welfare effects of the different pension systems. Moreover, the model includes a stochastic specification of a dynamic health process which determines if individuals are in bad health, i.e. in disability. In particular we propose a first order stochastic process of health dynamics which varies by education.

We specify two different pension systems and for comparability we impose actuarial fairness in both scenarios. The first system is designed as an actuarial fair system with heterogeneity in life expectancy between cohorts but not within cohorts, this implies in this system there exists no specific disability pension. In the second scenario we allow for heterogeneity in life expectancy between and within cohorts. We start with a simple model extension and allow for heterogeneity in life expectancy by disability status and education. In more detail we estimate differential mortality rates by disability status and for low and high educated and we assume that both the social planner who designs this system as well as the individual who makes optimal life cycle decisions has full information about the life expectancy rates.

In order to assess the distributional and welfare effects of the different systems we estimate the life-time income of households and in particular their pension benefits, i.e. the fair annuity from their pension wealth. Given that low educated have a lower life expectancy when entering retirement their annuity value should be higher in a system which reflects the within cohort heterogeneity. Thus, this scenario should have a positive effect on the distribution of life time income and income in retirement. Changes in the pension system lead to behavior effects of individuals and households. When we evaluate the different scenarios we take this into account. Moreover the behavioral responses are crucial when discussing the potential welfare effects of the different pension systems.