



Social security with rational and hyperbolic consumers[☆]

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ARTICLE INFO

Article history:

Received 18 December 2006

Revised 11 March 2008

Available online 1 April 2008

JEL classification:

H55

J26

Keywords:

Social security reform

Idiosyncratic uncertainty

Hyperbolic consumers

ABSTRACT

The present paper simulates the privatization of social security in an economy populated by overlapping generations of individuals that have time-consistent or time-inconsistent preferences, face mortality and individual income risk as well as borrowing constraints. We compute the transition path and compensate households in order to isolate the efficiency effects of the reforms. The model is calibrated to the German economy where the social security system offers little income insurance. Nevertheless, we find a positive role for social security due to the insurance provision against mortality risk and the provision of a commitment technology for present-biased consumers. In economies with rational consumers the elimination of social security yields an efficiency loss of roughly 0.6 percent of initial resources, while in economies with hyperbolic consumers the efficiency loss increases to 1.8 percent.

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1. Introduction

The welfare and efficiency consequences of pay-as-you-go financed social security are discussed extensively in the economic literature. Since the ground-breaking work of Auerbach and Kotlikoff (1987) various general equilibrium models have been developed which simulate the elimination (or “privatization”) of social security. On the one hand, studies without income and lifespan uncertainty compute the transition path and quantify the intergenerational welfare effects of such a reform. Typically, these models also provide some aggregate efficiency calculations by compensating the income effects of existing generations. Most of these studies demonstrate that social security privatization would generate significant growth effects, improve the welfare of future generations and enhance aggregate efficiency due to the reduction of labor supply distortions. On the other hand, recent advances with general equilibrium simulation models have included idiosyncratic income and lifespan uncertainty as well as liquidity constraints in order to study social security reforms. Their results indicate that, at least in the long run, generations are still better off from privatization even when social security provides insurance in an uncertain world. Consequently, it is not surprising that many economists in industrialized countries propose the partial or complete privatization of social security in order to improve economic efficiency and growth.

However, the simulation approaches of the past have some specific deficiencies that impair their central results. On the one side, the welfare and efficiency effects computed with deterministic models do not include insurance and liquidity effects of social security. On the other side, the computed long-run welfare gains in models which include idiosyncratic income and lifespan uncertainty are much less convincing if they are simply due to intergenerational redistribution effects.

[☆] Previous versions of the paper were presented at conferences and workshops in Berlin, Munich, Tilburg and Wuerzburg.

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Therefore, it is useful to compute also in models with idiosyncratic uncertainty the transition path with compensating transfers in order to separate efficiency consequences of social security privatization from pure distributional effects. This is where the present study steps in. We simulate the elimination of the German social security system in a general equilibrium model featuring income and life-span uncertainty as well as household liquidity constraints. After computing the transition path to the new long-run equilibrium and the intergenerational welfare consequences, we isolate aggregate efficiency effects of such a reform in a separate simulation.

The German social security system offers a special case for the analysis of privatization policies. In contrast to the US system, benefits in the German system are strongly linked to former contributions. This feature dampens the labor supply distortions of the German system while it reduces the insurance provision against income shocks at the same time. Consequently, the present study complements a recent analysis by Nishiyama and Smetters (2007) who simulate the partial privatization of the US social security system. While our general approach follows this previous analysis, we also offer a number of innovations. First, we isolate self-control problems by comparing aggregate efficiency in economies either populated by rational or hyperbolic individuals. Our approach extends the analysis of İmrohoroglu et al. (2003) by simulating the transition path and offering an alternative way to quantify the commitment effect which social security provides for hyperbolic consumers. Second, while the considered pension system provides little income insurance due to the strong tax-benefit linkage, we demonstrate how to separate and quantify its longevity insurance, liquidity and tax distortion effects. Third, in the sensitivity analysis we use a recursive preference approach which allows us to separate the impact of risk aversion and the intertemporal substitution elasticity.

Our results indicate that the German social security system clearly enhances aggregate efficiency although it offers little income insurance. In our preferred parametrization, privatization would induce an aggregate efficiency loss of roughly 0.6 percent of resources in economies with rational consumers and a loss of roughly 1.8 percent with hyperbolic consumers. We show that these results are robust for alternative tax structures, budget adjustment assumptions and preference parameters. Finally, we show that a partial privatization would also yield a clear efficiency loss in our model.

The next section reviews the previous literature. Then we discuss how we model preferences as well as the tax and benefit system. Section 4 explains the calibration and simulation approach. Finally, Section 5 presents the simulation results and Section 6 offers some concluding remarks.

2. Literature review

Since Breyer (1989), economists acknowledge that social security serves as a pure redistribution device across generations when all markets are perfect and labor supply is inelastic. This means that the elimination of social security would generate no welfare gains for future generations as long as all existing old generations are fully compensated. In order to finance its obligations the government would have to raise taxes and debt that exactly match the already existing implicit tax and debt burdens, see Geanakoplos et al. (1998) or Sinn (2000).

Matters are different when central assumptions are relaxed. If labor supply is elastic and benefits are independent of former contributions, pension privatization which is financed by payroll taxes implicitly substitutes a progressive by a proportional tax on labor income. Kotlikoff (1996, 1998) and others have quantified the resulting efficiency gains from privatization in such a framework. However, if benefits are perfectly linked to former contributions, the pay-as-you-go system is Pareto-efficient, even with elastic labor supply (Fenge, 1995). As a consequence, the labor-leisure distortion cannot be reduced by privatization as long as the tax structure is not altered. In addition, relaxing the link between benefits and contributions decreases economic efficiency (Fehr, 2000).

Of course, social security also affects economic efficiency when markets are imperfect and when the unfunded pension system alters the extent of market failure. Hubbard and Judd (1987) analyze the role of social security in economies without private annuity provision and closed credit markets. Social security offers an implicit longevity insurance but increases borrowing constraints in such an environment. Various recent studies include a stochastic income process across the life cycle so that social security also provides an insurance against income uncertainty. İmrohoroglu et al. (1995, 1999) compare long-run equilibria with alternative social security levels in such a framework. Although the flat-rate pension system reduces lifetime income risk, they still find the long-run equilibrium without social security to be optimal. However, since they neglect transitional generations, the result might be due to pure redistribution effects across generations. Consequently, various attempts have been made to reduce the intergenerational income redistribution by incorporating “social security debt” (Storesletten et al., 1999) and inter vivos transfers either motivated by two-sided altruism (Fuster et al., 2003) or family formation (Hong and Rios-Rull, 2007). However, these models only partially neutralize income redistribution and do not isolate the long-run efficiency effects of social security. A similar problem arises in İmrohoroglu et al. (2003) who analyze social security in a model with consumers that have time-inconsistent preferences. Although credit-constrained individuals, who do not adequately save for their retirement, value social security as a commitment device, İmrohoroglu et al. (2003) find that the introduction of social security still decreases long-run welfare for reasonable short-run discount rates of 10 to 15 percent.

All studies with idiosyncratic income uncertainty discussed so far only consider the steady-state effects of social security. The consequences for transitional generations are only indirectly taken into account (i.e. via social security debt). In order to provide a better assessment of social security, it is necessary to compute the transition path between steady states and separate intergenerational redistribution from efficiency effects. The transitional dynamics of various privatization experiments

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