Social Security Reform in a Dynastic Life-Cycle Model with Endogenous Fertility

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A Non-Technical Summary

This paper studies the effects of social security reform on welfare, efficiency and inequality in a dynastic, life-cycle general equilibrium model with endogenous fertility. We compare the steady states of the pay-as-you-go and fully funded systems when parents choose the number of children optimally. In our model of two-sided altruism, the motivation for fertility comes from a combination of "parental altruism" and "old age security" approaches. In the first one, parents' utility depends on their own consumption, the number of children and the utility of each child. In the "old age security" motive parents expect to be cared for by their children in their old age.

Our paper is the first that combines the "old age security" and "parental altruism" fertility motivations within a detailed general equilibrium, dynastic life-cycle model. It builds on the last important contribution to the social security literature, the dynastic models based on Fuster (1999) and Fuster et al. (2003). We present a general equilibrium, overlapping generations model with two-sided altruism among individuals whose differences in skills (education) and life-time expectancy lead also to heterogeneity in income, wealth, and therefore, fertility. In the PAYG system, the old age support parents receive is independent of the number of children they have. The fully funded system internalizes the fertility decision: parents finance their retirement consumption from savings or from the old age support from their own children. Thus children are perceived as an alternative investment good, costly in terms of time and goods. The return comes in terms of transfers from children when they start working. In addition, the FF reform eliminates the social security tax, which is distortive and costly for borrowing-constrained agents. Whether fertility increases with the elimination of the PAYG system is the outcome of this trade-off. We decompose the old age investment in children and assets. Also, we study how much the role of family insurance adds to the partial insurance roles provided by the pay-as-you-go system against the mortality and income risks.

Fertility choice in a dynastic model requires two theoretical contributions: first, we adapt the transformation in Alvarez (1999) for individual dynastic households composed of fathers, sons and children. Second, contrary to models with exogenous fertility, dynasties that die off cannot be replaced by artificially created new families. Rather, it is the fertility choice of other households that more than replaces the deceased dynasties and leads to a constant population growth in the steady state.

We calibrate the benchmark model to the U.S. data. As Fuster et al (2003), we assume an exogenous labor supply, abstract from individual earnings uncertainty over the life cycle, and limit attention to steady-states. We find that the effects of endogenous fertility are large and important in their direction. First, in the PAYG system, low skill (education) agents invest relatively more in terms of children while the high skill

(education) agents invest relatively more in terms of assets and intergenerational transfers. These savings-fertility differences lead to a 20% higher aggregate capital stock in the endogenous PAYG steady state compared to the otherwise same PAYG steady state with exogenous fertility. Second, we find that a fully funded social security reform increases fertility by 10.3% and decreases the capital stock by 8.3%. This is because high skill individuals shift from investment in capital to investment in children (the reform reduces fertility differences across household types). Finally, as in the data, the PAYG system increases the capital-output ratio.

Assumptions on agents' heterogeneity (survival probabilities and skill differences) are quantitatively important: fertility and allocation responses by different types of households significantly affect aggregate levels and equilibrium prices. To isolate these effects, we simulate four alternative models that differ in their assumptions on survival and income uncertainty. We find that children are used relatively more for insurance against survival uncertainty while assets are used for insurance against skill risk in future generations. It seems that the PAYG system provides the high skill households with a means to insure against the latter risk. Namely, their bequests are much higher than in the FF system, contributing to greater wealth inequality.

We also find that all newborn households and the majority of the population are better off in the FF steady state. Unfortunately, the complexity of the model does not allow us to simulate a transition between the two steady states. In other papers with exogenous fertility, agents usually prefer the new steady state but the transition to reach it is too costly. The main reason is that agents need to accumulate capital stock during the initial stages of the transition. However, in our endogenous fertility model, capital decreases in the FF steady state. This deaccumulation of capital stock could provide additional consumption to households who would otherwise suffer from the transition. These results indicate that models with exogenous fertility suffer from two errors: first, they undervalue the capital stock in the PAYG steady state by forcing the high skill agents to invest in children as much as the low skill agents do. In our simulated PAYG steady state with exogenous fertility, the capital stock is more than 20% lower. Second, these models predict the wrong direction of changes (by a huge magnitude) in capital stock after the FF reform. These errors might lead to misleading conclusions about the behavior of different groups of the population, aggregate outcomes, welfare gains, transition dynamics and political support for the reform.

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Tento článek zkoumá efekty reformy penzijního systému na blahobyt, efektivitu a nerovnost v podrobném OLG modelu životního cyklu s endogenní fertilitou a dynastiemi, jejichž členové se liší schopnostmi a mortalitou. Porovnáváme rovnovážný stav s průběžným financováním důchodů a penzijní reformy s osobními účty, v nichž jednotlivci volí optimální počet dětí. Tento článek je první, který kombinuje motivaci pro fertilitu z důvodů "jistoty ve stáří" a "altruismu".

Náš článek je založen na posledních příspěvcích k literatuře o penzijní reformě v podobě dynastických modelů Fuster (1999) a Fuster et al. (2003). Předkládáme model s dvousměrným altruismem mezi jednotlivci, kteří se liší schopnostmi (vzděláním) a

očekávánou délkou života, a tudíž i přijmy, majetekem a fertilitou. Efekty endogenní fertility jsou velké a důležité v jejich směru. Zaprvé, v systému s průběžným financováním jednotlivci s nízkými schopnostmi (vzděláním) investují více ve formě počtu dětí, zatímco jednotlivci s vyššími schopnostmi (vzděláním) investují více ve formě majetku a mezigeneračních transferů. Tyto rozdíly ve fertilitě a spoření vedou o 20% vyšší akumulaci kapitálu v průběžném rovnovážném stavu s endogenní fertilitou než v jinak stejném rovnovážném průběžném stavu s exogenní fertilitou. Za druhé, důchodová reforma zvyšuje fertilitu o 10,3% a snižuje akumulaci kapitálu o 8,3%. Důvodem je přechod jednotlivců s vyššími schopnostmi ze spoření ve formě majetku na spoření ve formě počtu dětí (reforma tak snižuje rozdíly ve fertilitě mezi jednotlivými typy domácností). Jako v datech, průběžný systém financování zvyšuje poměr kapitálu a výroby. Studovaná reforma také zvyšuje blahobyt většině domácnostem.