



# Social security and demographic trends: Theory and evidence from the international experience

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## Abstract

The worldwide problem with pay-as-you-go, defined-benefits social security systems is not just financial. Through a dynamic, overlapping-generations model where forming a family and bearing and educating children are choice variables, we show that social security taxes and benefits generate incentives to reduce both family formation and fertility, and that these effects cannot be fully neutralized by counteracting inter-temporal or intergenerational transfers within families. We implement the model using calibrated simulations as well as panel data from 57 countries over 32 years. We find that PAYG tax measures account for a non-trivial part of the downward trends in family formation and fertility worldwide, especially in OECD countries.

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## 0. Introduction

Social security has become a subject of intense policy concern because of its financial vulnerability. We focus on a related, but no less important issue: social security's impact on the real economy, particularly through demographic trends. Data from 57 countries show that average

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annual marriage net of divorce rate per 1000 people age 15 and over fell from 9.72 in 1960 to 6.40 in 1990, and that average total fertility rate (TFR) fell from 3.82 in 1965 to 2.07 in 1989. In the US, the proportion of married persons in the population age 15 and over fell from 67.9% in 1950 to 56.5% in 2000, and TFR fell from 3.09 in 1950 to 2.06 in 2000. These dramatic trends stem from secular trends in basic determinants of family formation and fertility worldwide. Our theoretical and empirical analyses indicate, however, that the defined-benefits, pay-as-you-go (PAYG) social security systems operating in most countries have independently contributed to these trends.

More specifically, controlling for a number of theoretically relevant variables that affect the incentive to form families and bear children in a panel of 57 countries over the period 1960–1992, we find that upward shifts in the ratio of social security’s pension benefits to GDP, which approximates the PAYG system’s equilibrium tax rate (PEN), have depressed the net marriage rate in the adult population (the rate of marriage net of divorce) and the total fertility rate. These effects are especially large in OECD countries, and they are generally not observed in countries where social security is a provident fund, rather than a defined-benefits, PAYG system.

The insights we offer to rationalize these effects are based on a model of endogenous growth where human capital is the engine of growth, family choices include fertility and investment in children’s education (quantity and “quality” of children) by altruistic parents, and family formation itself is a choice variable. Theoretically, we focus on the way the scale of the PAYG system, as indicated by the level of taxes and defined-benefits, affects these decisions.

The basic source of these effects is an externality inherent in the PAYG system. Old-age benefits are “*defined*”: they are fixed largely independently of one’s own contributions, and regardless of one’s children’s contributions, or whether one has any children. Individuals thus have little incentive to take such contributions into account in making fertility and related decisions, and the incentive to form a family is affected by the implicit subsidy that defined benefits provide to single (childless) households.

The possible effects of PAYG systems on fertility, typically measured by the total fertility rate (TFR), were analyzed in several previous studies using different model specifications.<sup>1</sup> All implicitly reach a common conclusion, however, which is a central proposition in Ehrlich and Lui (EL) (1998): exogenous increases in PAYG taxes must exert opposite effects on *at least one* of the parental choice variables. We go beyond all previous studies by considering the role of family formation, since families are more likely to bear children than single households.<sup>2</sup> Consideration of family formation adds to our understanding of the way social security taxes affects TFR, since changes in the latter may come about in principle from changes in the percentage of families among all households, as well as from changes in the within-families fertility rate (FFR). This formulation also uncovers different welfare implications of social security for single and married households.

<sup>1</sup> For example, Becker and Barro (1988) use a static framework that does not allow for human capital investments and endogenous growth. Ehrlich and Lui (1998), and Ehrlich and Zhong (1998) allow for endogenous growth, but not for family formation. Effects also differ by the weight assigned to specific altruistic sentiments, as opposed to intergenerational transfers. In most cases, backward altruism by parents towards children is the motive for having children. Boldrin et al. (2005), in contrast, is based on altruism of children toward parents. Cigno and Rosati (1996) consider a static model with forward or backward altruism or without altruism at all.

<sup>2</sup> To our knowledge, no previous study has dealt directly with the effect of social security on family formation. However, Baker et al. (2004), and Dickert-Conlin and Meghea (2004) study the effect of reform in the Canadian and US social security systems on family breakups.

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