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Intergenerational transfers and China's social security reform

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ABSTRACT

Most of the studies examining the implications of social security reforms in China use overlapping generations models and abstract from the role of family support. However, in China, family support plays a prominent role in the well-being of the elderly and often substitutes for the lack of government-provided old-age support systems. In this paper, we investigate the impact of social security reform in China in a model with two-sided altruism as well as a pure life-cycle model. We show that the quantitative implications of social security reform, in particular for capital accumulation and output, are very different across the two models.

1. Introduction

Since the 1990s, China has introduced a series of social security reforms aimed at increasing pension coverage, providing poverty relief, and redistributing income for its growing elderly population. However, changes in demographics and the implications of the one-child policy pose significant challenges to the government' s ability to deliver sufficient old-age support. Sin (2005) provides an extensive study of the old age insurance system in China where the old age dependency rate is expected to rise to 80.3% by 2050 compared to 37.2% in 2010. Song et al. (2014) also discuss some of these challenges and argue that the current social security system does not seem to be sustainable and will require a significant adjustment in either contributions or benefits.

Most of the studies examining the implications of social security reforms in China use overlapping generations models and abstract from the role of family support. However, in China, family support plays a prominent role in the well-being of the elderly and often substitute for the lack of government-provided old-age support systems. For example, in the 2005 Census, 57% of adults between 45 and 60 indicate that they rely on family support while only 25% of them point to pension wealth and income for old-age support. Also, children in China provide substantial levels of support, both in-kind and financial for their parents. For example, 45% of the elderly (60+) in urban households report living with their adult children where positive net transfers from adult children to parents occur in 65% of households.[1] Changes in demographics and the social security program, however, are likely to impact the balance between family support and government-provided support.

In this paper, we examine the implications of social security reform in two model economies. In the pure life-cycle model, individuals obtain utility from their lifetime consumption and leisure and they do not care about their descendants and predecessors. In the dynastic model, the decision-making unit is the household consisting of a parent and children. Agents derive utility from their own lifetime consumption and from the felicity of their predecessors and descendants.[2] In both models, agents face idiosyncratic labor income risk and a realistic pension system. However, in the dynastic model, since parents care about the utility of their descendants, they save to insure them against the labor income risk. Since children are altruistic toward their parents, they support them during retirement. Institutional details and changes in demographics influence the size of these intervivos transfers and saving rates. In the life-cycle model, agents save to insure themselves against income risk and to support themselves during retirement.

Bohn (2006) shows that the impact of population aging on capital-accumulation and interest rates differs across life-cycle and dynastic models because of their different assumptions about bequests. In a life-cycle model, population aging gives rise to an increase in the saving rate as individuals expect to live longer. In a dynastic model, on the other hand, fewer births imply a lower weight in dynastic preferences for future generations and results in lower saving rates. In addition, while public pensions reduce savings unambiguously in a life-cycle model, their impact is subdued in a dynastic model due to an increase in bequests.

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[1] See Choukhmane et al. (2013) for more detail.

[2] Similar to Fuster et al. (2003), Fuster et al. (2007) and Laitner (1992).

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In order to tease out the quantitative implications of the changes in demographics and the pension system in China, we calibrate both models to the Chinese economy in the late 2000s. Next, we investigate the implications of a series of social security reforms on tax rates, saving rate, capital stock, and GDP in both models. We do so by comparing the benchmark economy with counterfactual economies with different policy reforms in each model economy.

The initial steady state represents an economy with a social security replacement rate of 15%, a social security tax rate of 3.9%, and an old-age dependency ratio of 37%. From this initial state, we first examine the implications of the expected change in demographics without changing anything else. We find that the aging of the Chinese population, everything held constant, will have significant implications on the saving rate, tax rates, capital stock, and output. In both models, to keep the social security system as it is, the payroll tax rate increases from 3.9% to 7.9% while lower fertility results in a decrease in the labor supply by 23%. Capital per person implied by the two models, however, is strikingly different. In the life-cycle model, increased longevity results in an increase in the capital per person of about 4%. In the dynastic model, on the other hand, consistent with the discussion in Bohn (2006), capital per person declines. Consequently, output per person is significantly lower in the dynastic model (21%) as opposed to the life-cycle model (11%).

Next, we examine the implications of social security reform in each model. We consider three different reforms. In Reform 1, we consider an increase in the social security replacement rate from 15% to 30%. In the second reform, we increase the retirement age from 60 to 65, and in the last reform we change both the replacement rate and the retirement age at the same time. We compare the implications of these reforms on capital accumulation and output across the two models.

We find that quantitative implications of social security reform are indeed quite different across the two models. For example, an increase in the social security replacement rate reduces capital per-person by 19% in the life-cycle model and 10% in the dynastic model. Similarly, the decline in output implied by the life-cycle model is twice as high as the decline implied by the dynastic model. Implications of the third reform where we increase the retirement age and the replacement rate at the same time, are also significantly different across the two models. The life-cycle model results in a 1% decline in output per-person while the dynastic model results in a 7.6% increase in output per person.

Given the prevalence of family support in China, we suspect the quantitative findings using the dynastic model might provide a better approximation for the Chinese economy. According to these results, changes in demographics together with the changes in social security that are examined in this paper yield a long-term decline in output per-person between 15% and 25%.

The remainder of the paper is organized as follows. Section 2 presents the model used in the paper and Section 3 its calibration. The quantitative findings are presented in Section 4, and Section 5 presents the concluding remarks.

2. Two models

We start by summarizing the features of the economy that are common between the dynastic and the pure life-cycle models.

2.1. Technology

There is a representative firm that produces a single good using a Cobb-Douglas production function $Y_t = A_t K_t^{\alpha} N_t^{1-\alpha}$ where α is the output share of capital, K_t and L_t are the capital and labor input at time t, and A_t is the total factor productivity at time t. The growth rate of the TFP factor is $\gamma_t - 1$, where $\gamma_t = (\frac{A_{t+1}}{A_t})^{1/(1-\alpha)}$. Capital depreciates at a constant rate $\delta \in (0,1)$. The representative firm maximizes profits such that the rental rate of capital, r_t, and the wage rate w_t, are given by:

$$r_t = \alpha A_t (K_t/N_t)^{\alpha-1} - \delta \quad \text{and} \quad w_t = (1-\alpha) A_t (K_t/N_t)^{\alpha}. \tag{1}$$

2.2. Government

The government taxes both capital and labor income at rates τ_k and τ_e, respectively, and uses the revenues to finance an exogenously given amount of government consumption expenditures G. The government runs a pay-as-you-go social security program that is financed by a payroll tax τ_{ss}. [3]

2.3. Demographics

Each period t, a generation of individuals is born who become parents at age T+1. There is a mandatory retirement age R, after which individuals face random lives and can live up to 2T periods. Depending on survival, an individual's life overlaps with his parent's life in the first T periods and with the life of his children in the last T periods. A household, that lasts for T periods, consists of a parent and the children living together. At age T+1, each child becomes a parent in the next-generation household of the dynasty. At the steady state, the size of the population evolves over time exogenously at the rate $g-1$, and the population growth rate satisfies $g = n^{1/T}$, where n is the fertility rate.

Labor income of the working age individuals is determined by three components. First, a shock z at birth determines the permanent lifetime labor ability of an individual: high (H) or low (L). Labor ability of the children, z', is linked to the parent's labor ability, z by a two-state Markov process with the transition probability matrix $\Pi(z\prime, z)$. In addition, labor income of both ability types have a deterministic component ε_j representing the age-efficiency profile and a stochastic component, μ_j, faced by individuals up to age T.[4]

2.4. Dynastic model

The model economy consists of overlapping generations of households with two-sided altruism as in İmrohoroğlu and Zhao (2015). Labor income of a family is composed of the income of the children and the income of the father. The income of the children is given by $w\varepsilon_j\mu_j z_s n$ where w is the economy-wide wage rate, ε_j is labor productivity at age j, and μ_j is the stochastic component of labor income. Before retirement, the father, whose children are j years old, receives $w\varepsilon_{j+T} z_f$ as labor income. Once retired, the father faces an uncertain lifespan where $d = 1$ indicates a father who is alive and $d = 0$ indicates a deceased father. The transition matrix for d is given by $\Lambda_{j+T}(d\prime, d)$ with $\Lambda_{j+T}(0,0) = 1$, and $\Lambda_{j+T}(1,1)$ represents the survival probabilities of the father of age $j+T$. If alive, a retired father receives social security income, SS_j. All children in the household split the remaining assets (bequests) equally when

[3] Both budget constraints are provided in Section 2.6.

[4] The logarithm of the labor income shock is assumed to follow an AR(1) process given by $log(\mu_j) = \Theta log(\mu_{j-1}) + \nu_j$. The disturbance term ν_j is distributed normally with mean zero and variance σ_ν^2 where $\Theta < 1$ captures the persistence of the shock. We discretize this process into a 3-state Markov chain using the method introduced in Tauchen (1986), and denote the corresponding transition matrix by $\Omega(\mu\prime, \mu)$. In addition, the value of μ at birth is assumed to be determined by a random draw from an initial distribution $\overline{\Omega}(\mu)$.