Full length article

Intergenerational transfers and China’s social security reform

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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 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.

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

http://dx.doi.org/10.1016/j.jeoa.2017.01.003
2212-828X/© 2017 Published by Elsevier B.V.
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 this 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 \( Y_t = A_t K_t^x L_t^{1-x} \) where \( x \) 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 \( \gamma_t \), where \( \gamma_t = (A_t,1)^{1/(1-x)} \). 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:

\[
r_t = xA_t(K_t/N_t)^{x-1} - \delta \quad \text{and} \quad w_t = (1-x)A_t(K_t/N_t)^{x}.
\] (1)

2.2. Government

The government taxes both capital and labor income at rates \( \tau_c \) and \( \tau_o \), 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 \( \tau_{ss} \).

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 \( \Pi(z, z) \). In addition, labor income of both ability types have a deterministic component \( c_t \) representing the age-efficiency profile and a stochastic component, \( u_{jt} \), faced by individuals up to age \( T \).

2.4. Dynastic model

The model economy consists of overlapping generations of households with two-sided altruism as in Imrohoroglu and Zhao (2015). Labor income of a family is composed of the income of the working age individuals before retirement, the father, whose children are at birth determines the permanent 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 \( \Pi(z, z) \). In addition, labor income of both ability types have a deterministic component \( c_t \) representing the age-efficiency profile and a stochastic component, \( u_{jt} \), faced by individuals up to age \( T \).

3. calibrated model

The government runs a pay-as-you-go social security program that is financed by a payroll tax \( \tau_{ss} \).

4. The logarithm of the labor income shock is assumed to follow an AR(1) process with mean zero and variance \( \sigma_{\varepsilon}^2 \), 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 \( \Pi(\mu) \). In addition, the value of \( \mu \) at birth is assumed to be determined by a random draw from an initial distribution \( \Pi(\mu) \).

Please cite this article in press as: Imrohoroglu, A., Zhao, K. The Journal of the Economics of Ageing (2017), http://dx.doi.org/10.1016/j.jeoa.2017.01.003
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