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Population ageing and pension reform in a small open economy with non-traded goods

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Abstract

In this paper we study the implications of population ageing in an economy with a sizeable non-traded goods sector. To this effect a highly stylized micro-founded macro model is constructed in which the age structure of the population plays a non-trivial role. The model distinguishes separate birth and death probabilities (thus allowing for net population change), allows for age-dependent labour productivity (thus mimicing life-cycle saving), and includes a rudimentary pension system (thus allowing for intergenerational redistribution). The model is used to analytically study demographic and pension shocks.

JEL classification: D91; E13; F41; H55

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1. Introduction

The western world is ageing rapidly. As was recently argued by Lee (2003), the ageing process since the postwar period can be attributed both to increased longevity

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and reduced fertility. As a result, the population share of elderly people has increased dramatically. For example, for the countries comprising the most developed regions, the old-age dependency ratio[1] was 12% in 1950, 21% in 2000, and is projected to increase to 44% in 2050 – see United Nations (2003). Between the most developed regions countries there is quite a lot of variation. For example, Japan had an old-age dependency ratio in 2000 of only 25% but this ratio is expected to rise to 72% by 2050. For a number of small open European economies the corresponding figures are: Belgium (from 26% to 47%), Germany (from 24% to 49%), Italy (from 27% to 65%), and the Netherlands (from 20% to 42%). The figures for the United States are less drastic but still noticeable (from 19% in 2000 to 32% in 2050).

It is widely believed that demographic changes of such order of magnitude will have profound and long-lasting economic effects, both on the world as a whole and on individual countries. This paper focuses on the second issue by posing the question: How will small open economies be affected by ageing? We answer this question in two steps. First, we analyse the macroeconomic effects of various (composite) demographic shocks in a model of a small open economy with a non-traded goods sector. We show how changes in the demography influence capital accumulation, household consumption, aggregate output, and economic growth, both at impact, during transition, and in the long run.

In the second step, we study the macroeconomic and welfare effects of pension reform. Many western countries rely heavily on unfunded pay-as-you-go (PAYG) pension systems which may become untenable due to the ageing process. Of course, in the absence of Ricardian equivalence, PAYG systems are equivalent to government debt and their reform will therefore exert significant intergenerational effects. Simply put, both explicit and implicit public debt represent an intergenerational burden in such a setting.

In contrast with the vast majority of studies on population ageing, we employ an *analytical* framework which is simple and flexible enough to establish our results.[2] The advantage of doing so is that we are thus able to highlight the key economic mechanisms by which ageing and pension reform exert their influence on the economy. This may make our paper useful for teaching purposes also. Like Gertler (1999) we do not consider our approach to be a substitute for large-scale numerical simulation models, but rather to be supplementary to such models. Our analysis makes use of modelling insights from two main bodies of literature. First, in order to allow for overlapping generations (OG) and the possibility of Ricardian non-equivalence, we employ the framework originally developed by Yaari (1965) and Blanchard (1985), and further extended by Buiter (1988), Giovannini (1988), Weil (1989), and Bovenberg (1993). In this framework, potentially disconnected generations are born at each instant and all agents face a constant probability of

[1]The old-age dependency ratio is defined as the ratio of the elderly population (65+ years) to the working-age (15–64 years) population.

[2]Most studies on population ageing employ dynamic calibrated computable general equilibrium (CGE) models in the style of Auerbach and Kotlikoff (1987). See, for example, Hubbard and Judd (1987), Auerbach et al. (1989), Cutler et al. (1990), Auerbach et al. (1991), Broer (2001), and Fehr et al. (2004).