METROECONOMICA
INTERNATIONAL REVIEW OF ECONOMICS

Metroeconomica 00:00 (2015) 00–00
doi: 10.1111/meca.12083

SUSTAINABILITY OF A PAY-AS-YOU-GO PENSION SYSTEM IN A SMALL OPEN ECONOMY WITH AGEING, HUMAN CAPITAL AND ENDOGENOUS FERTILITY

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(November 2014; revised April 2015)

ABSTRACT

The aim of the article is to theoretically investigate if a pay-as-you-go (PAYG) pension system is sustainable in the presence of a declining population and increasing longevity of the retired generation. For this purpose, we use an overlapping generation model with endogenous fertility, endogenous longevity and human capital accumulation in a small open economy. We find that pensions will always increase as long as it is beneficial for parents to invest in human capital. Furthermore, we get the result that the ratio between pension benefits and the consumption of the young generation will strive to a positive limit value, and that a pure PAYG pension system will not run into any solvency problem due to a decreasing fertility rate or ageing.

1. INTRODUCTION

For decades, a discussion about the sustainability and efficiency of a pay-as-you-go (PAYG) pension system has taken place in the literature. In a simple Diamond (1965) economy, with only physical capital, exogenous population growth, no technological progress and fully selfish individuals, a PAYG system is preferable to a capital funded pension system as long as the fertility rate exceeds the interest rate in the long-run. A second important insight is that given that are no distortions in the economy, a PAYG pension system is dynamically efficient in the sense that it cannot be abolished without harming at least one generation. However, the latter result does not hold anymore

* The authors' thank two anonymous reviewers and the editor, Professor Neri Salvadori, for their suggestions and advice. A special thanks to Mr. Michael Minges of ictDATA.org, USA, and Mr. Steven Newton of Queensland University of Technology, Australia, for proof-reading and editing the final version of the paper. All remaining errors are ours. Peter J. Stauvermann acknowledges thankfully the support of the research funds provided by the School of Global Business & Economics of the Changwon National University.

if human capital is considered in the model and if human capital becomes the driver of productivity growth thereby creating positive externalities for future generations. This externality is due to the fact that parents who invest in the human capital of their children do not internalize the increase of the overall efficiency of the human capital accumulation process. Therefore, many economists including Peters (1995), Becker and Murphy (1988) and more recently Rangel (2003), Boldrin and Montes (2005) and Kaganovich and Meier (2012) interpret a PAYG system as a mechanism through which the intergenerational externality can be internalized. The basic idea in these articles is simple: if a PAYG system exists then the pension benefits depend on the labor income of the working generation. The labor income depends on the human capital stock of the working generation and therefore on the investments of their parents in education. Consequently, the parents invest more in education because they benefit from it through higher pensions.

However, the majority of articles which focus on the question of how to internalize the externality created by human capital building assume a constant population or a constant fertility rate. In light of fact that we observe a decreasing total fertility and an increase of longevity in mostly all developed countries, the results derived in these articles may no longer hold or prove to be controversial. As a result, many policymakers and economists around the world are convinced that strong reforms of existing PAYG systems are necessary and in some sense, inevitable to prevent old age poverty. Policymakers go so far as to state that the existing PAYG systems will collapse and become insolvent unless reforms are put in place. The argument is that when the ratio between workers and retired people decreases, then either the contribution rate must increase, which will become economically burdensome for the working generation or the pensions will trend to zero in the long run and thereby creating extreme consequences (poverty and malnourishment) for the old generation. One extreme example of this over-simplified view is highlighted by a German economist, Sinn (2007: p. 3) who argued that:

> 'Roughly speaking, these countries will experience a doubling in the number of elderly relative to the young within the next thirty years. Consequently, the implication for the pay-as-you-go system is straightforward. Either we double the contribution rate if we want to keep the pensions in line with wages, or we halve the pensions relative to wages.'

Of course, these kinds of statements create fear within the public. According to Boeri *et al*. (2001: p. 3), 85 per cent of Germans and 63 per cent of Italians agree that `*the pension system will face a crisis in the next 10–15 years*'. However, there are inconsistencies within the argument of Sinn (2002) as he