



# Migration, social security, and economic growth<sup>☆</sup>

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## ABSTRACT

This paper studies the effect of population aging and international migration on economic performance. Fertility is endogenized so that immigrants and natives can have different fertility rates, which provides a more realistic view of policy effects. Fertility is an important determinant to the tax burden of social security since it affects the quantity and quality of future tax payers. We find that introducing immigrants into the economy can reduce the tax burden of social security. If the survival probability of young agents to old age (or the replacement ratio) is high enough, the growth rate of GDP per worker for an economy with international migration will be higher than for a closed economy. Regarding migration policies, our numerical results indicate that economic growth rate of GDP per worker will first decrease then increase as the flow of immigrants increases. Attracting more skilled immigrants will enhance economic growth.

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## 1. Introduction

Over the past century longevity has steadily increased in countries which have experienced economic growth. The upward trend of life expectancy at age 65 for female and male in Canada, France, Japan, the United Kingdom and the U.S.A. during the period from 1980 to 2005 is presented in Fig. 1a and b. One implication of longevity growth is that more resources must be devoted to supporting the elderly, and governments have often raised social security expenditures. Fig. 1c shows that the ratio of pension expenditure to GDP increased along with life expectancy in Canada, France, Japan, United Kingdom and U.S.A. over the period from 1980 to 2005.<sup>1</sup>

However, for most industrialized countries a decline in mortality is accompanied by a reduction in fertility over the course of development. The graying of many countries' populations has led many to worry about the future tax burden of social security. In short, the concern is that expenditures on old-age entitlements will continue to grow even as there are fewer young people available to contribute to the tax base.

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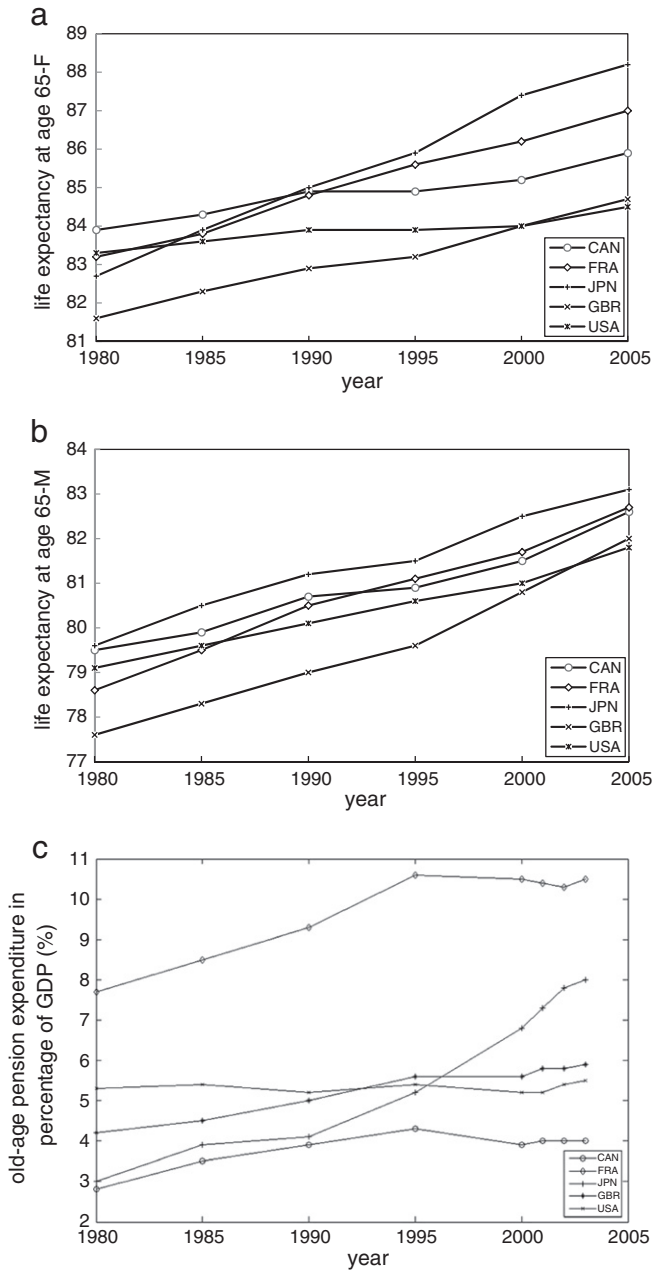
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<sup>1</sup> Data source for Fig. 1a and b: OECD's iLibrary. Data source for Fig. 1c: *World Development Indicator*, World Bank.

There is a huge amount of literature devoted to the increasing social security burden caused by aging populations and possible solutions to this problem. These studies can be classified into two categories. The first line of research focuses on the sustainability of a pay-as-you-go (PAYG) system or on possible reforms to the social security system. The interaction of public investment in education, social security and growth is investigated by Kaganovich and Zilcha (1999) and Pecchenino and Pollard (2002). Based on a two-sector growth model, Zhang et al. (2001) compare the effects of mortality decline on long-run growth under funded and unfunded social security schemes. Recently, Groezen et al. (2003) and Fenge and Meier (2005) suggest that the burden of social security can be mitigated by using child allowances. With child allowances, the cost of raising children becomes lower and parents will have stronger incentives to have more children.<sup>2</sup>

The second category of previous research considers the problem of increasing social security burden in an economy with international migration. This research line demonstrates that introducing immigrants can alleviate the increasing burden of social security for developed countries. Razin and Sadka (1999) show that even introducing low-skilled immigrants who are often beneficiaries of the welfare state into an economy can be beneficial to all income and all age groups. With a dynamic set-up, adult immigrants share the burden of social security with natives upon their migration into the host

<sup>2</sup> However, this view is challenged by Mochida (2005) who argues that when uncertain lifetime is incorporated into the model, introducing child allowances does not necessarily increase fertility because it may induce a higher tax rate. With lower after-tax income and increasing life expectancy, adults may choose to work more and have fewer children in order to save more for their post-retirement consumption.



**Fig. 1.** (a) Life expectancy at age 65 (female). (b) Life expectancy at age 65 (male). (c) The percentage of pension expenditure to GDP.

country. Although these immigrants will create a new welfare burden in the future, the burden will be shared by newly introduced immigrants as long as the economy is ever-lasting. By using the data from Current Population Survey (CPS) and Public Use Microdata Sample (PUMS), Lee and Miller (2000) project the fiscal impact of immigrants and their descendants. They find that the net present value contributed by an immigrant is always positive to the Old-Age, Survivors, and Disability Insurance (OASDI).

In this paper, we follow the second line of research to revisit the issue of an increasing social security burden in an economy with international migration. Besides examining the impact of introducing immigrants on the tax burden of a social security program, we also explore immigration's effects on key macroeconomic variables such as fertility, educational investment and economic growth. There are two major differences between this paper and existing research. First, while previous literature tends to treat fertility as an exogenous

variable, fertility decisions are endogenized in this paper.<sup>3</sup> It is now well-known that parents' decisions about fertility and the educational investments of their offspring are interdependent (Becker et al., 1990).<sup>4</sup> So a migration model allowing parents to make decisions on fertility and educational investments in their children can give a more realistic view of policy effects.

Second, we assume that the level of immigrants' human capital can be different from that of natives. Different levels of human capital cause immigrants and natives to make different choices about fertility and investment in their children's education which will in turn affect economic growth. Furthermore, fertility matters when considering an economy with heterogeneous agents, because it will also affect the future population structure and the quality of labor force. Both population structure and quality of labor force are important determinants of the burden of social security.

We develop an overlapping generations model of social security within which adults make decisions about consumption, fertility and investment in their children's education. In order to compare the impact of longevity in an economy with international migration with that in a closed economy, we first consider a simple, closed economy with a PAYG social security program.<sup>5</sup> We show that a balanced-growth-path (BGP) equilibrium exists in such an economy. An increase in the survival probability of young agents to old age will increase the tax rate necessary for social security and reduce after-tax income. Reduced after-tax income will cause adults to have fewer children (income effect). But the lower after-tax wage rate will also reduce the time cost of raising children and will motivate adults to have more children (substitution effect). We find that the income effect will dominate the substitution effect and an increase in the survival probability will reduce fertility and investment in children's education. This will slow economic growth. On the other hand, a higher survival probability to old age will induce more savings which increases economic growth. If the survival probability is high enough, the former effect will dominate the latter, and the increased survival probability will retard economic growth. We also find that an increase in social security payments will raise fertility and decrease educational expenditure if the degree of altruism is sufficiently low. Hence, under this condition an increase in the social security payment will lower economic growth.

Next, we consider an economy with international immigrants. In order to study the impact of migration policy regarding the quality of immigrants, we assume that immigrants possess a different level of human capital from natives.<sup>6</sup> The existence of heterogeneous agents makes the model more complicated, so we simulate the model to quantify the effects of migration policy. We find that introducing low-skilled immigrants into the economy can reduce the social security tax rate since immigrants have higher fertility. A migration policy which allows the amount of immigrants whose human capital level is 94% of natives to be 2% of the population of natives in every period can lower the social security tax rate by 1.83% in the long run. If the survival probability of young agents to old age (or the replacement ratio) is high enough, the growth rate of GDP per worker for an economy with migration will be higher than for a closed economy, provided that the gap of human

<sup>3</sup> For example, Razin and Sadka (1999) and Doi et al. (2006) develop models with exogenous fertility rate to study the immigration issue for a host country.

<sup>4</sup> A wealth of studies exists on the trade-off of fertility and educational investments of children. Among all, see de la Croix and Doepke (2003, 2004).

<sup>5</sup> An economy with social security program and endogenous fertility is also studied by Zhang et al. (2003) and Zhang and Zhang (2003). However, in their studies, social security payments are treated as endogenous variables. The impact of choices of fertility and educational investment on the future social security payments is taken into consideration when parents make their decisions on the quality and quantity of children. In this paper, we follow Kaganovich and Zilcha (1999) and Groezen et al. (2003) by assuming that social security payment is treated as an exogenous variable when adults make optimal decisions.

<sup>6</sup> The characteristics of immigrants are emphasized in Storesletten (2000). In his study, immigrants are differentiated in age at the time of immigration and by their legal status.

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