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The dynamic fiscal effects of demographic shift: The case of Australia☆

George Kudrna [a], Chung Tran [b], Alan Woodland [c,*]

[a] CEPAR, University of New South Wales, Sydney NSW 2052, Australia
[b] Research School of Economics, Australian National University, Canberra ACT 0200, Australia
[c] School of Economics and CEPAR, University of New South Wales, Sydney NSW 2052, Australia

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ABSTRACT

We develop a small open economy, overlapping-generations model that incorporates non-stationary demographic transition paths to study the dynamic fiscal effects of demographic shift in Australia. Since the recent ageing of Australia's population is projected to exacerbate over the coming decades, there are potentially significant macroeconomic implications and impacts on fiscal commitments for old-age related expenditures. To investigate these implications and fiscal impacts, our model pays special attention to Australia's taxation and retirement schemes, to the age structure of government expenditures, and to population dynamics via fertility, longevity and immigration. Our simulation results demonstrate that population ageing shifts the tax base from labour income towards asset income and consumption, and substantially increases old-age related government expenditures. Significant future adjustments in other government expenditures and taxes will be required to finance these expenditures. Interestingly, the main driving factor behind increased fiscal costs is the increase in survival, not the decline in fertility, rates. Increases in fertility and immigration are not effective solutions to such fiscal challenges.

1. Introduction

Australia, like most other developed countries, has an ageing population, which is attributed to falling mortality and, especially, fertility rates in the past. Projected mortality improvements in the next few decades imply further ageing of Australia's population, which is also expected to increase due mainly to net migration inflows. Such fundamental demographic changes will have potentially vast macroeconomic implications and place increasing demands on government spending in the form of old-age related benefits. Fiscal reform will inevitably form part of the overall policy response to demographic change, but formulating an optimal policy response requires a solid understanding of how the evolution of such demographic factors affects individual behavior, market equilibrium, macroeconomic aggregates and government budget operations. In this paper, we study the economic effects of the dynamic evolution of the demographic structure for the Australia economy. Our main goals are to quantify the fiscal challenge caused by demographic shift and to isolate the quantitative importance of each demographic factor.

To that end, we develop a small open economy version of computable overlapping generations (OLG) models that were pioneered by Auerbach and Kotlikoff (1987). This class of models has been used by many researchers worldwide to analyse the economic effects of population ageing – see, for example, Fougere and Merette (1999), Fehr (2000), Kotlikoff et al. (2007), Fehr et al. (2008) and Lisenkova et al. (2013). The model we use for our analysis is an extension of the small open economy, OLG model for Australia that was developed by Kudrna and Woodland (2011). Their model consists of overlapping generations of households and production, government and foreign sectors and incorporates the essential features of the Australian taxation and income retirement systems, including the means tested age pension.

There are two fundamental extensions made here. First, their model is extended to incorporate non-stationary demographic paths consistent with the expected ageing of the Australian population via a demographic model. Specifically, we use the Australian Productivity Commission's MoDEM 2.0 assumptions about future fertility, mortality and net immigration rates to create a range of demographic projections for the Australian population over the next 100 years from our demographic model.[1] We then use these non-stationary demographic paths in our simulations of the economic model. Second, in order to better

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* Corresponding author.
E-mail addresses: g.kudrna@unsw.edu.au (G. Kudrna), chung.tran@anu.edu.au (C. Tran), a.woodland@unsw.edu.au (A. Woodland).

[1] See Cuxson et al. (2008) for detailed documentation of MoDEM 2.0.

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focus on the fiscal implications of such demographic shift, we extend the specification of the OLG model by incorporating a detailed disaggregation of age-related government expenditures. As a result, our model allows us to simulate the differential impacts of population ageing on such age-related expenditures as education, health care, family benefits and age care as well as the publicly provided age pension.

We apply our model to quantify the economic effects of demographic shift in Australia, focusing on the fiscal implications. Demographic shift in Australia increases the proportion of the elderly in the population and decreases the population shares of working cohorts. These changes in the population age distribution alter the general equilibria over a long period of time and our model provides the platform for simulating these changes. Our approach is to maintain assumptions about the policy environment and the structure of the economic model over the simulation period. This enables us to focus solely on the endogenous impact of the exogenous projected changes in the demographic structure of the population on the general equilibrium for the economy and behaviour of households, firms and governments.

Our simulation results provide conclusions regarding a range of outcomes. First, demographic shift in Australia affects various macroeconomic variables. Changes in the population age distribution towards older ages negatively impact labour supply and output but increase assets and consumption, all in per capita terms. We find that per capita GDP decreases 6.2 percent by 2050 as a result of the future demographic shift. This contraction reduces investment opportunities in the domestic economy and leads to increased capital outflows. Second, demographic shift affects the fiscal position of the government over time, with significant changes in the tax base. Tax revenues move in favour of asset incomes and consumption and away from labour earnings.

Third, the projected larger proportion of older Australians leads to significant expansions in old-age related government expenditure programs. Our simulation results indicate that the percentage increases in the sizes of health care, aged care and pension programs by 2050 are 24.5, 125.9 and 62.7 percent, respectively, creating a fiscal challenge. In order to finance such substantial increases in age related benefits, the government will have to cut non-age related expenditures and/or increase taxes substantially during the demographic transition. Specifically, we find that a 32 percent cut in non-age related expenditures or a 28 percent increase in the consumption tax rate is required for the government budget to be balanced in 2050.[2]

Fourth, we quantify the relative importance of the increase in longevity vs. the decline in fertility embodied in the demographic change. Our decomposition results indicate that the main driving force behind the increased fiscal costs is the increase in survival rates rather than the decline in fertility rates. Furthermore, our results lead to the conclusion that higher fertility and increased immigration are not effective solutions to deal with the increasing fiscal burden of old-age related government spending programs, since their fiscal effects are estimated to be rather small.

Our paper is related, and makes contributions, to several strands of the literature on population ageing. First, our paper is related to a growing literature analysing the fiscal effects of population ageing in advanced economies, such as Nishiyama (2013) for the US and Braun and Joines (2014) and Imrohoroglu et al. (forthcoming) for Japan.[3] Our paper extends these studies to the context of a small open economy with the focus on Australia that has quite different taxation and retirement income systems from those in the United States and other OECD countries.[4] Moreover, our model is distinguished from these papers by incorporating a broader range of age-related programs including education, health care, family benefits, age pension, and aged care. This permits considerable variation in government outlays in our simulations, and we demonstrate that population ageing results in quite different fiscal effects across age-related programs. We highlight the pressing problems associated with health care and aged care programs and show that ageing causes an adverse effect on public education expenditure.

Second, our paper is connected to the strand of literature that examines the implications of demographic change by its source, including fertility and survival rate changes. The macroeconomic effects of improved survival rates and longevity are analysed, for example, by Fehr et al. (2008), Kulish et al. (2010) and Zhang and Zhang (2005) using general equilibrium models. While Bloom et al. (2003) provide empirical evidence that lifespan extension should induce higher labour supply, delayed retirement and greater saving, the ageing effect on capital deepening is simulated to be subdued because of the increased tax and social security contribution rates required to balance government budgets (Auerbach and Kotlikoff, 1987; Fehr, 2000; Miles, 1999), with Kotlikoff et al. (2007) and Fehr et al. (2008) even finding capital shallowing. The effects of fertility changes on the government budget, savings, living standards and growth rates has been analysed by a number of researchers, with the findings being inconclusive. Guest and McDonald (2000, 2002) and Guest (2006) find that greater social expenditures by the Australian Government arising from low fertility rates would not occur until after 2040, with minimal increases in taxation, and higher future living standards. On the other hand, simulations of lower fertility rates in Europe and Japan by Fehr et al. (2008) result in lower labour supply and generate significant increases in social security tax rates. Our main contribution to this strand of literature is to decompose the dynamic fiscal effect of population ageing by these two sources of ageing – increased longevity and lower fertility. By doing so, we are able to determine their relative importance in the Australian context. Our simulation results show that changes in survival rates (longevity) are the main driving force behind such a pressing fiscal challenge, with fertility changes being of secondary importance.

Third, we contribute to the literature on the role of immigration. Higher immigration of young and skilled workers is often seen as a way to mitigate the negative economic effects of population ageing on the government budget. This view is supported by Guest and McDonald (2000, 2001), who show that the fiscal and economic effects of higher net immigration are positive for a small open economy like Australia. However, Fehr et al. (2004) show that the effects of higher immigration are far less significant for a large economy such as the United States; even a significant increase in skilled immigration will do little to alter capital shortages, tax hikes and wage falls caused by population ageing. Our paper contributes to this strand of literature by considering the role of immigration in mitigating the negative fiscal effects of ageing for Australia. Our results lead to the conclusion that an increase in immigration is not an effective long-run solution to the population ageing problem.

Finally, we contribute directly to the literature analysing the economic and fiscal effects of population ageing in Australia. Guest and McDonald (2001, 2002) and Guest (2006) used a Ramsey model with

[2] In interpreting these results, note that we assume away non-demographic factors (e.g., medical progress) and policy changes that are to be implemented in near future (e.g., increases in the superannuation contribution rate and in the age pension age) that may have significant implications for economic aggregates.

[3] Fiscal effects are not the only aspect of interest in macroeconomic studies of population ageing. For example, Abel (2003) and Poterba (2004) use such models to examine impacts upon rates of return to assets, while Brooks (2002) and Borsch-Supan et al. (2006) are concerned with asset allocation and impacts on international capital flows.

[4] First, there is no specific labour income tax on the workers' side in Australia; labour income is taxed together with asset income under the progressive personal income taxation. Second, the first pillar of Australia's retirement income policy is the age pension, which is means tested and financed through general taxation revenues. Third, there is no publicly provided earnings-related retirement income scheme such as the US social security system. The second pension pillar in Australia is a privately managed superannuation guarantee scheme that is compulsory and fully funded by employer contributions. The taxation and retirement income systems are discussed in more detail in the model and calibration sections.