Fiscal cost of demographic transition in Japan

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ABSTRACT

This paper quantifies the fiscal cost of demographic transition that Japan is projected to experience over the next several decades, in a life-cycle model with endogenous saving, consumption, and labor supply in both intensive and extensive margins. Retirement waves of baby-boom generations, combined with a rise in longevity and low fertility rates, raise the old-age dependency ratio to 85% by 2050, the highest among major developed countries, and generate a significant budget imbalance, as the government faces rising costs of public pension and health and long-term care insurance. Preserving the current level of the transfers will require a major increase in taxation. Using consumption taxes to balance the government budget, the tax rate reaches the maximal value of 48% in late 2070s. A pension reform to reduce benefits by 20% results in a peak tax rate of 37%, which can be reduced further to 28% if the retirement age is also gradually raised by 5 years.

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1. Introduction

There is much fear that aging demographics in Japan could stifle the third-largest economy of the world as it faces rising public expenditures and shrinking labor force and tax revenues. This paper quantifies the fiscal cost of demographic transition that Japan is projected to experience over the next several decades and evaluates the impact on the economy under alternative policy scenarios in the short and long-run.

We simulate our model starting with the demographics of 2010 and follow the population dynamics using official projections over the next five decades through 2060. Fig. 1 shows the age distribution of the population in 2010, which indicates the waves of retirement that will hit the economy during coming decades. In addition, while fertility rates remain well below the replacement rate, the number of prime-age individuals at 20–64 is expected to fall dramatically, from above 75 millions in 2010 to 30 millions in 2080 as shown in Fig. 2(a). Fig. 2(b) plots the path of projected old-age dependency ratios, defined as the ratio of population aged 65 and over to age 20–64. As the first and second baby-boom generations successively reach the retirement age, the ratio will rise from below 40% to almost 90%.[1]

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[1] In general, individuals born in 1947–1949 (age 63–65 in 2010) in Japan are called as the first baby-boom generation and those born in 1971–1974 (age 39–42 in 2010) the second baby-boom generation, who are mostly children of the first baby-boomers. There has not been a rise in fertility rates which would give a rise to the third baby-boom.
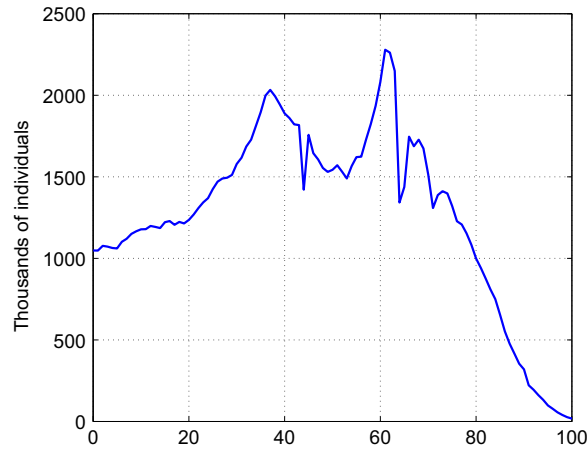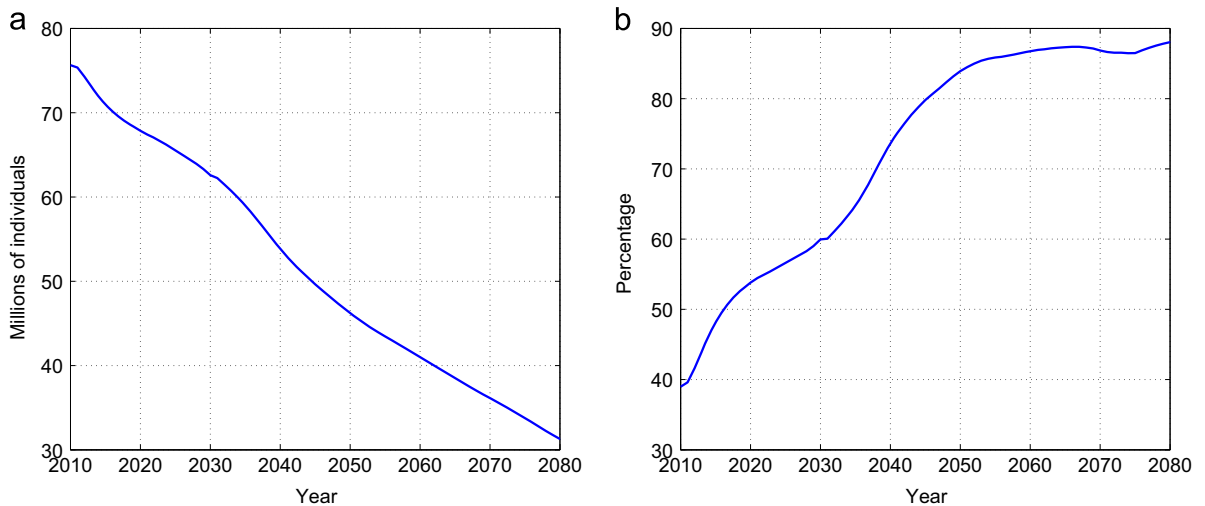
Fig. 1. Population by age in 2010.

Fig. 2. Demographic projections (IPSS). (a) Population at age 20–64. (b) Old-age dependency ratio: ratio of population aged 65 and above to 20–64.

After 2060, up to when official demographic projections are available, we assume that fertility rates will start to recover gradually so that growth rate of the number of individuals at age 25 (which is the age to become economically active in our model) will reach 0% by 2150 and that conditional survival probabilities will stay at the projected level of 2060. Although the dependency ratio will rise and stay at a very high level for many years during the transition, it will eventually decline and stabilize at about 53% when the age distribution becomes stationary under our simulation assumptions. Life expectancy will rise from 83.5 in 2010 to 88.0 in the long-run.[2]

As a first exercise, we compute a change in the tax burden imposed on consumption, which is necessary to balance the government budget in the long-run when the demographic transition is complete and there is no change in policies except for the consumption tax rate. We find that consumption tax will have to rise from 5% in 2010 to 19.3% in the long-run. The sizeable adjustment is necessary despite the fact that average earnings of individuals will be significantly higher in the long-run. Individuals choose to work longer in both intensive and extensive margins to cover consumption over a longer expected life-time, which increases revenues from labor income taxes. In addition, people save more for a longer retirement period and earn more capital income as well. Since capital rises by more than labor, wage rate goes up, further increasing individuals' earnings. It is the massive rise in government expenditures on public pensions and health and long-term care insurances that makes the large increase in consumption tax inevitable. The expenditures for pension benefits and health and long-term care insurance will rise from 10.3% and 5.9% of output, respectively, to 13.1% and 8.2% in the long-run.

Financing the demographic change by labor income taxes will be significantly more distortionary. The tax rate has to rise by 13.5%, a similar magnitude to the consumption tax, but labor force participation rates plummet compared to the case of

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[2] The numbers are the average of male and female. The life expectancy is estimated at 80.1 for male (86.9 for female) in 2010 and 84.7 (91.3) in 2060, according to the National Institute of Population and Social Security Research (IPSS).