

Aging, Factor Prices and Capital Flows

Andrea Bonfatti, University of Padua

Selahattin İmrohorođlu, University of Southern California

Sagiri Kitao, University of Tokyo



G20 JAPAN 2019

January 17, 2019

Prepared for “For a Better Future: Demographic Changes and Macroeconomic Challenges”

Big issue: aging, fiscal sustainability and capital flows

- A major challenge facing not only Japan, but also all economies, developed and developing, is the aging of the populations, driven by
 - Rising longevity
 - Low fertility rates (down to 1.76 in the US in 2017)
 - Rising old-age dependency ratios and fiscal tensions associated with old-age transfer programs.

Big issue: aging, fiscal sustainability and capital flow

- But the countries and regions of the world differ in :
 - The timing and the severity of these demographic trends.
 - Advanced economies started aging earlier than emerging/developing regions.
 - Generosity of the age-dependent transfer programs and implicit debt.
 - Pension systems are less developed or generous in less developed economies, posing less fiscal challenges than in advanced economics.
 - Differing productivity growth rates.
 - All of these affect national saving and regional/domestic investment differently.
 - Capital flows depend on all these factors.

What We Do:

Develop a three-region model of the world economy

Calibrate the model and compute transition paths

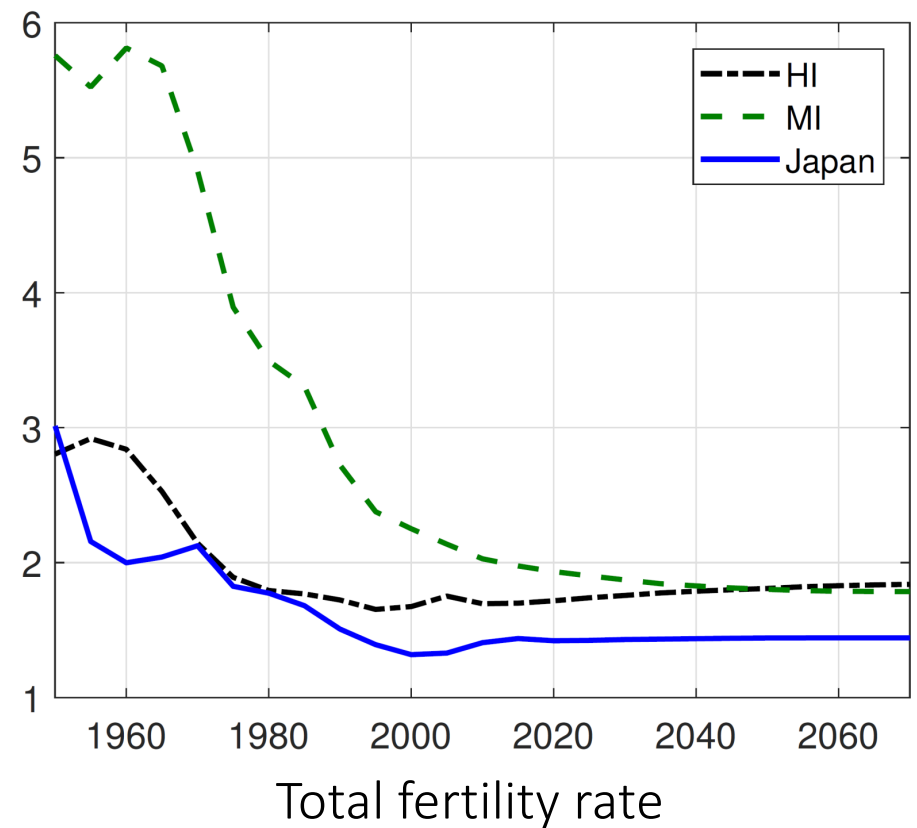
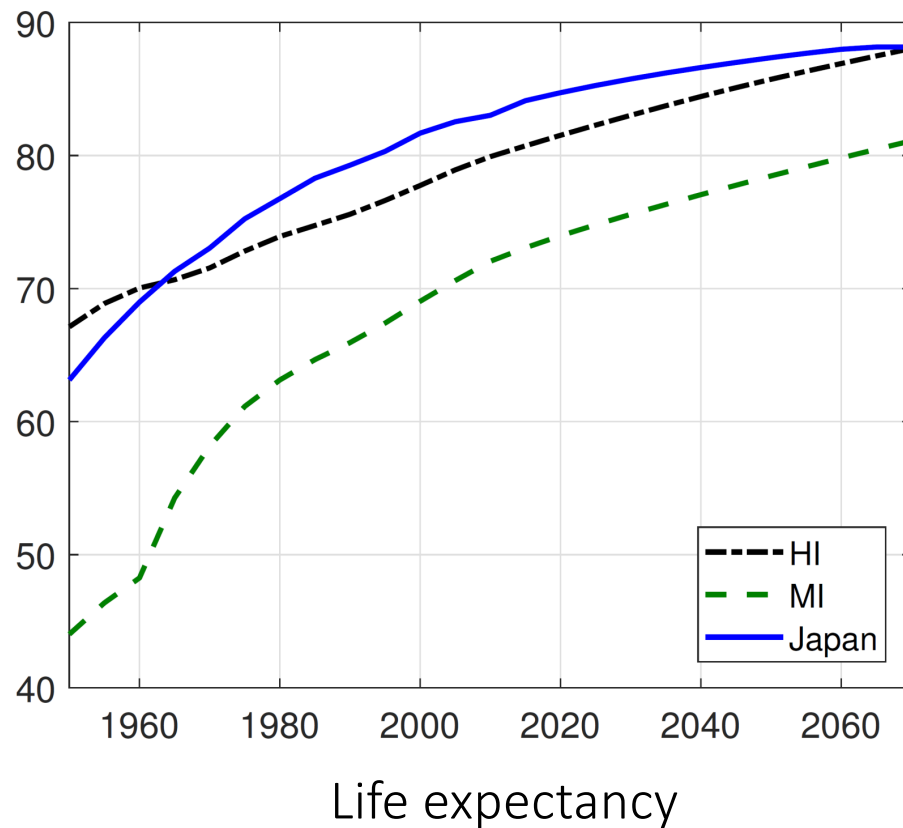
Characterize future capital flows

- To highlight the implications of the different demographic trends, social insurance institutions, and productivity paths, we develop a three-region model of the world.
 - **High Income (HI) region:** United States, Canada, Europe (EU28), Australia and New Zealand.
 - **Middle Income (MI) region:** China, HK, Taiwan, South Korea, Singapore, Thailand, Indonesia, Malaysia, Philippines, Viet Nam, India, Mexico, Brazil, Russia, Saudi Arabia, UAE, South Africa and Turkey
 - **Japan (J)**

National Income Accounts, Household Income Data, Demographic Data and Projections

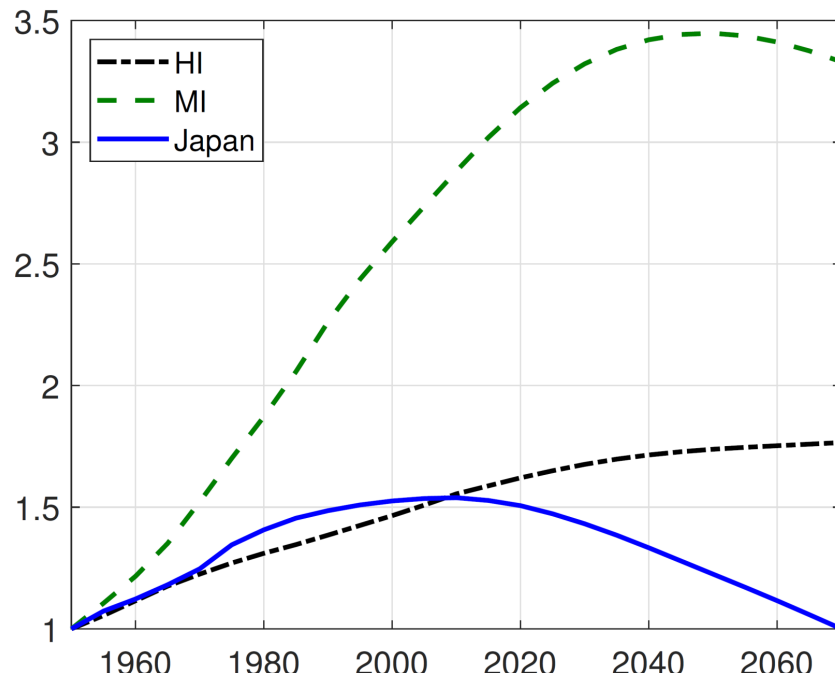
- For HI and MI, use data from United Nations World Population Prospects: the 2017 Revision (2017)
 - Harmonized data and projections for all countries from 1950 to 2100
- For Japan, use 2017 estimates of the National Institute of Population and Social Security Research (IPSS).
 - The UN projections for Japan tend to be very optimistic.
- For all, we use World Bank (WDI), IMF (WEO), OECD (Revenue)
- For Japan, we use BSWS

Demographic trends in the three regions

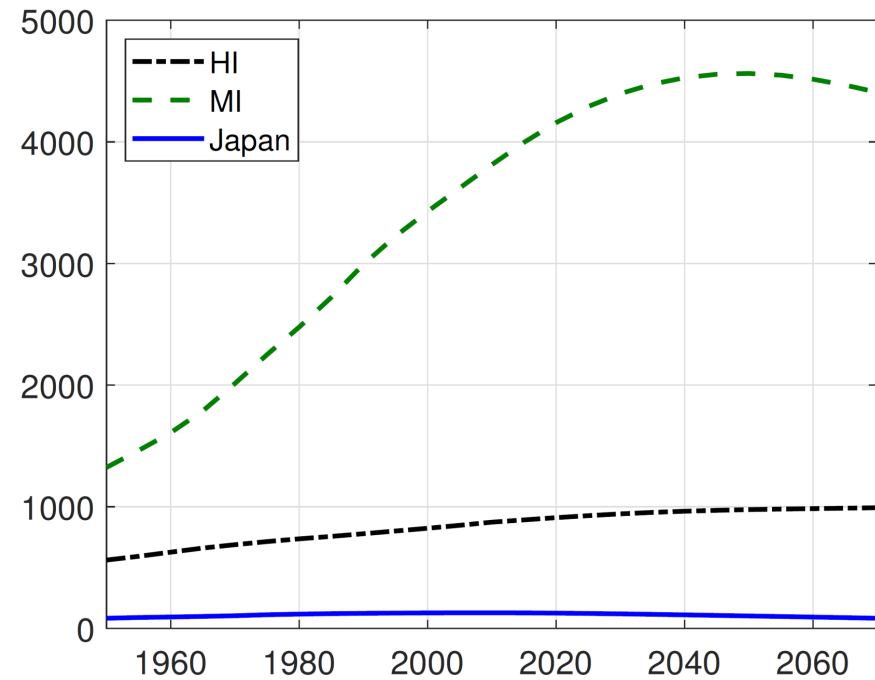


Source: United Nation (2017) and IPSS (2017)

Demographic trends in the three regions



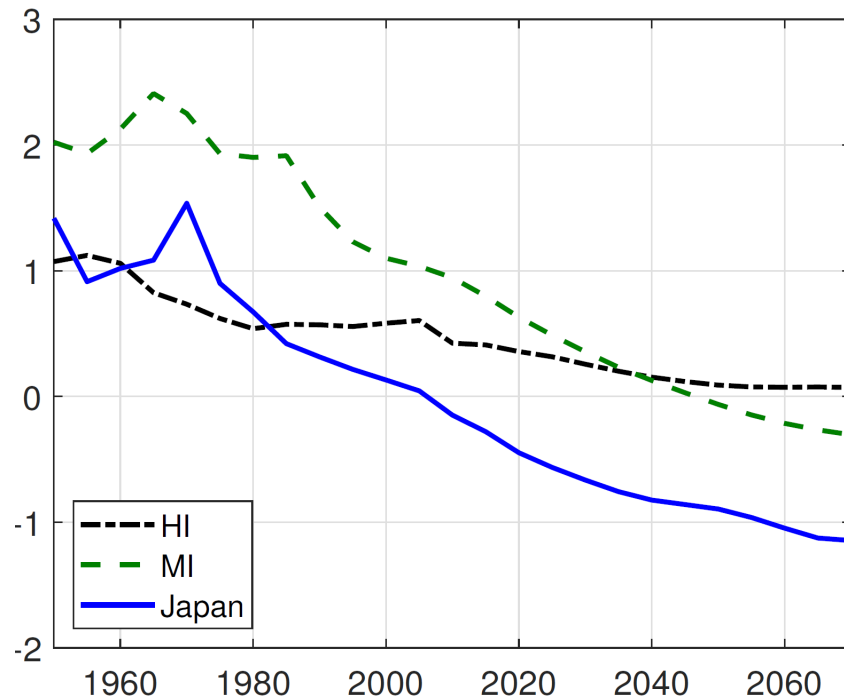
Normalized populations



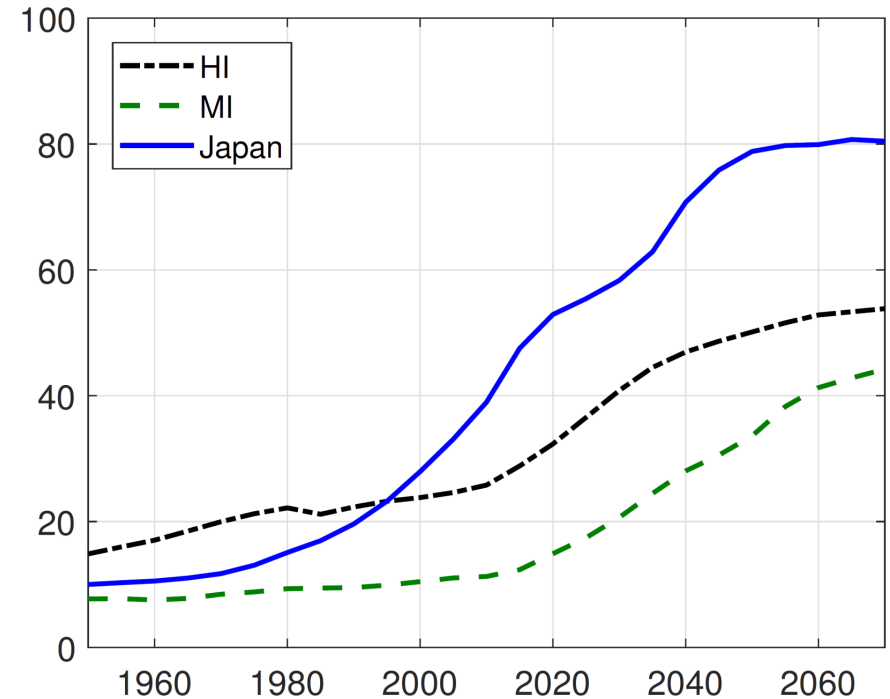
Total populations

Source: United Nation (2017) and IPSS (2017)

Demographic trends in the three regions



Population growth rates (%)



Old-age dependency ratios
($\geq 65/20-64$, %)

Source: United Nation (2017) and IPSS (2017)

Factor prices and capital flows

- These demographic trends and accompanying fiscal adjustments tend to raise the capital-labor ratio and reduce returns to capital (interest rates).
- High capital-labor ratio (due to faster/more severe aging) leads to lower returns to capital.
- Lower total factor productivity (TFP) leads to lower returns to capital.
- When regions/economies experience nonsynchronous aging and differing TFP growth rates, private capital tends to flow to regions/economies with higher return environments (lower capital labor ratio and higher TFP).
- Private savings are determined mostly by life cycle motivations and aging tends to reduce aggregate saving with a smaller fraction of savers in the economy.
- Therefore, future paths of national savings and regional/domestic investments are driven mostly by demographic trends and differences in these and other institutional factors can change capital flows across regions.

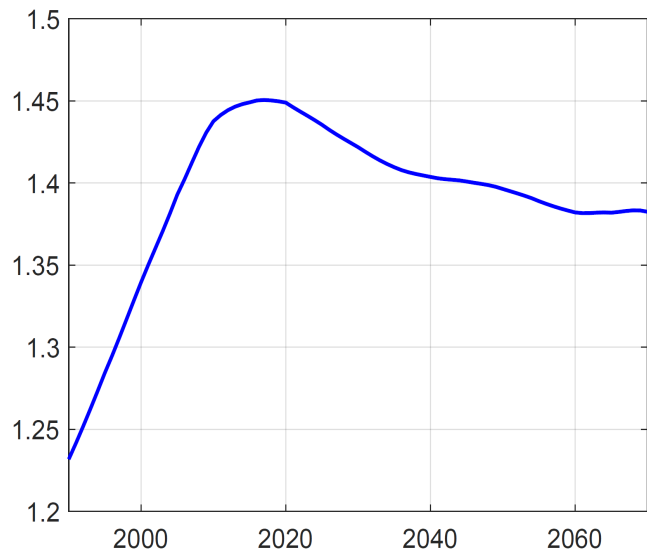
Intuition on Capital Flows

- Given equal quantities of national saving, there are two factors that determine capital flows across regions:

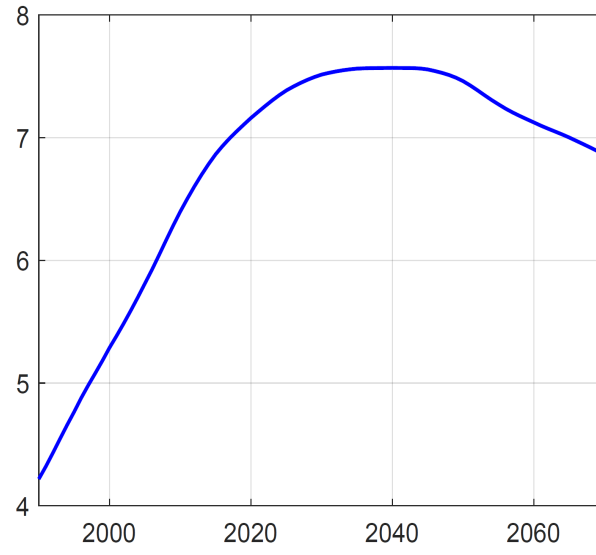
- *return to capital* = $0.35 \times (TFP) \left(\frac{K}{N}\right)^{-0.65} - 0.06$

1. a higher TFP in a region, holding the capital-labor ratio the same in all regions, yields a higher rate of return to capital and therefore attracts foreign capital
2. assuming identical levels of TFP across regions, a lower capital-labor ratio in a region produces a higher return to capital and attracts foreign capital.

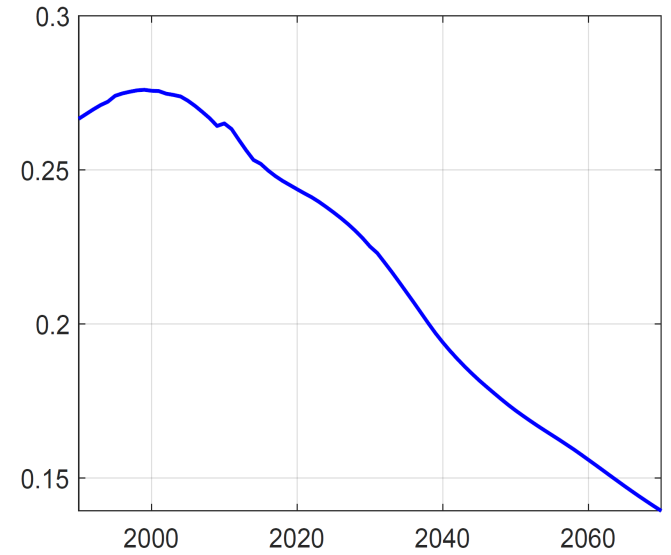
Labor supply: exogenous



High income

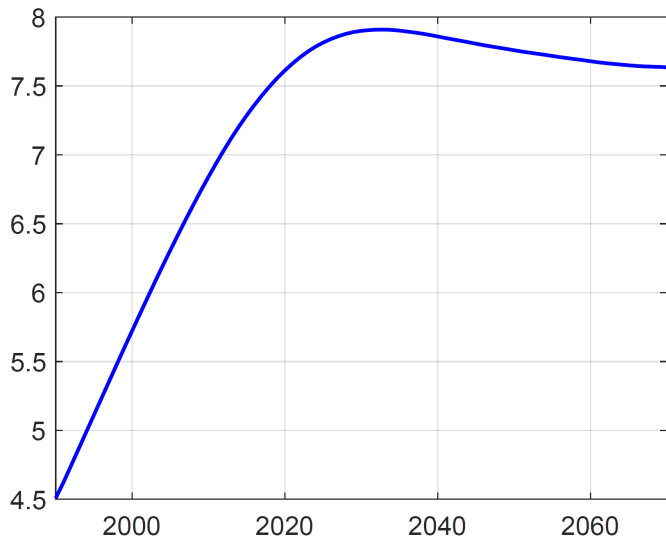


Middle income

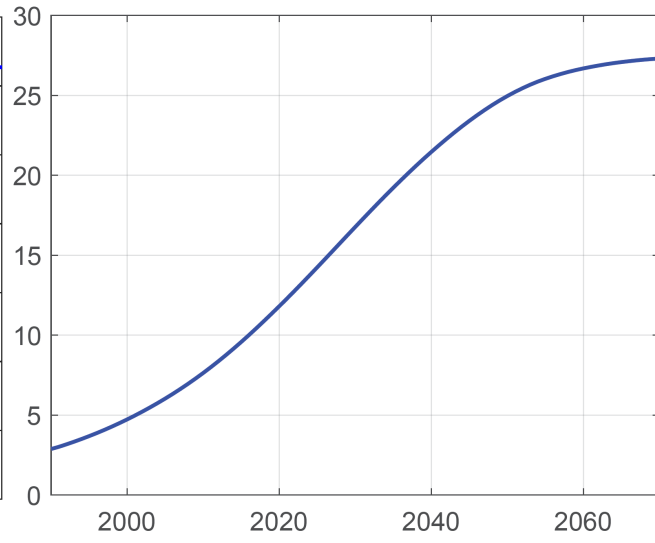


Japan

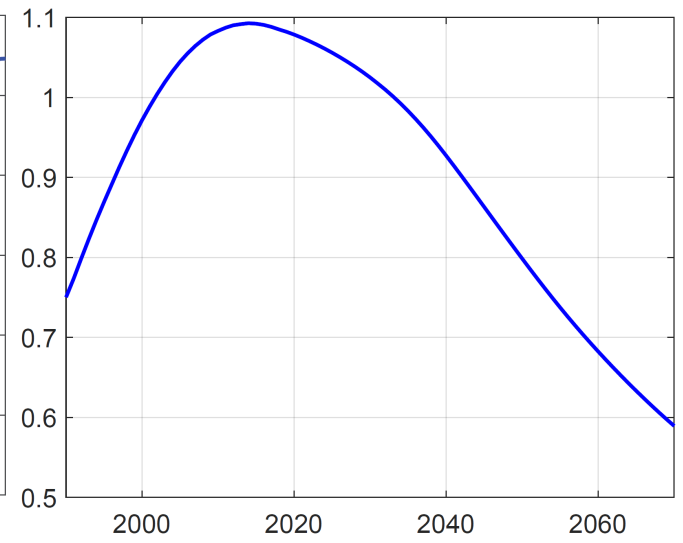
Capital stock: closed economy



High income

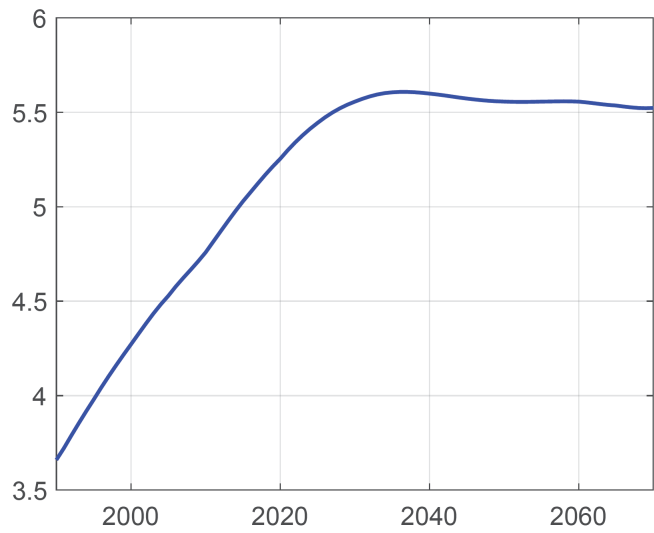


Middle income

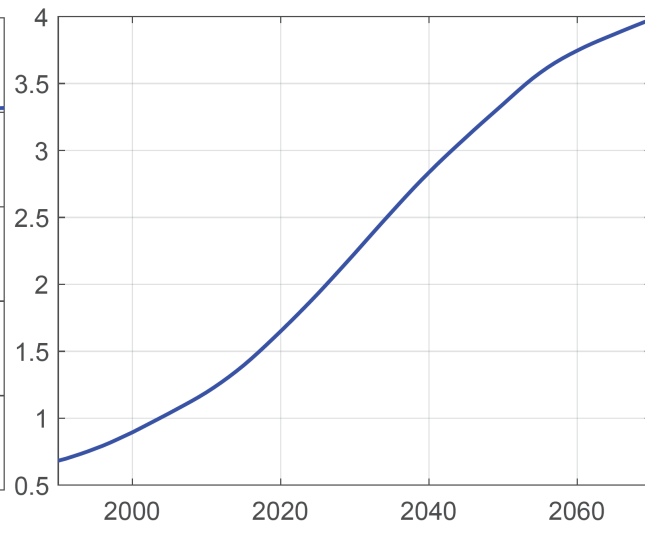


Japan

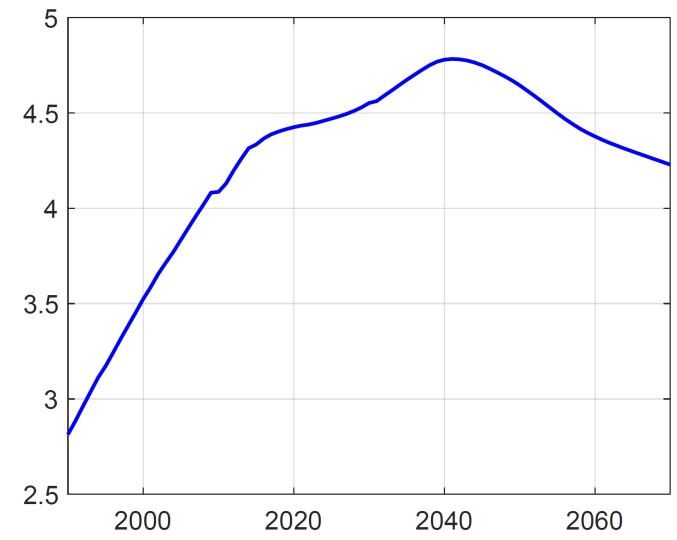
Capital-labor ratio: closed economy



High income

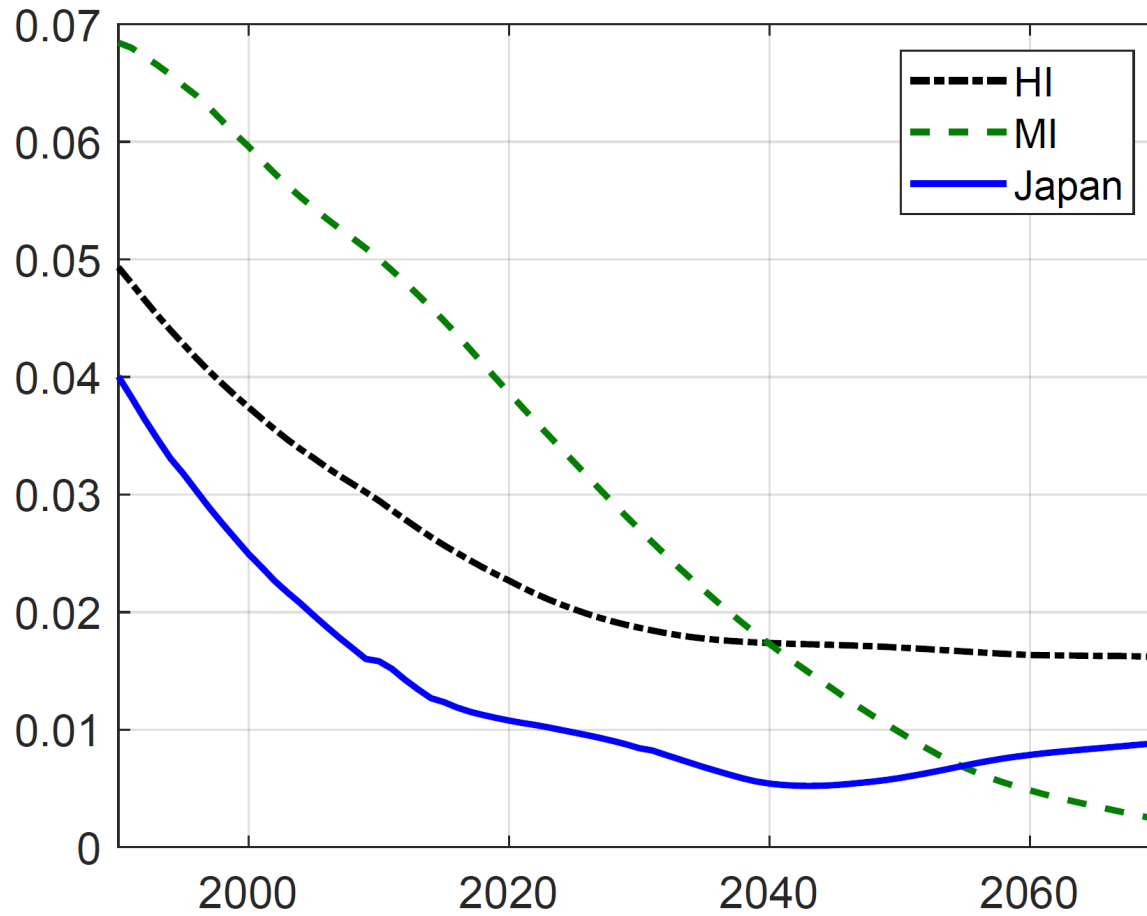


Middle income

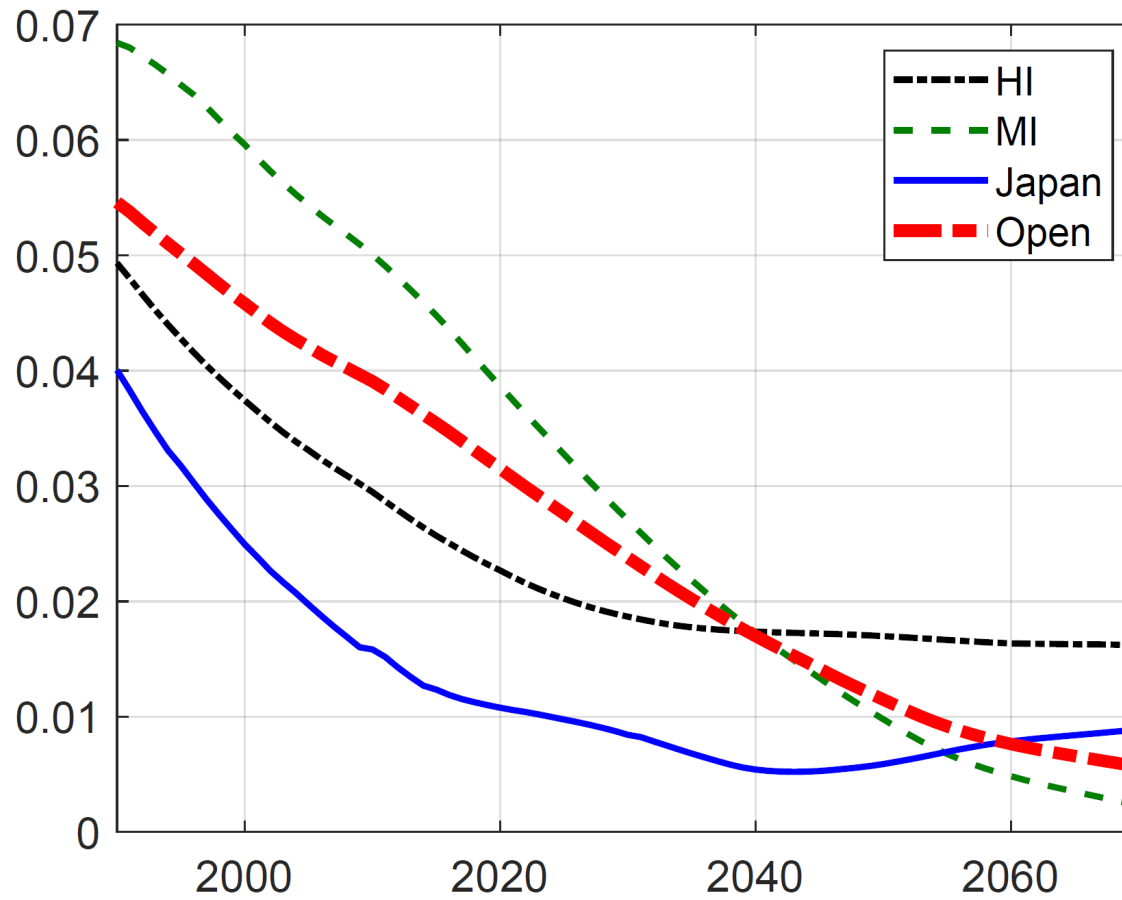


Japan

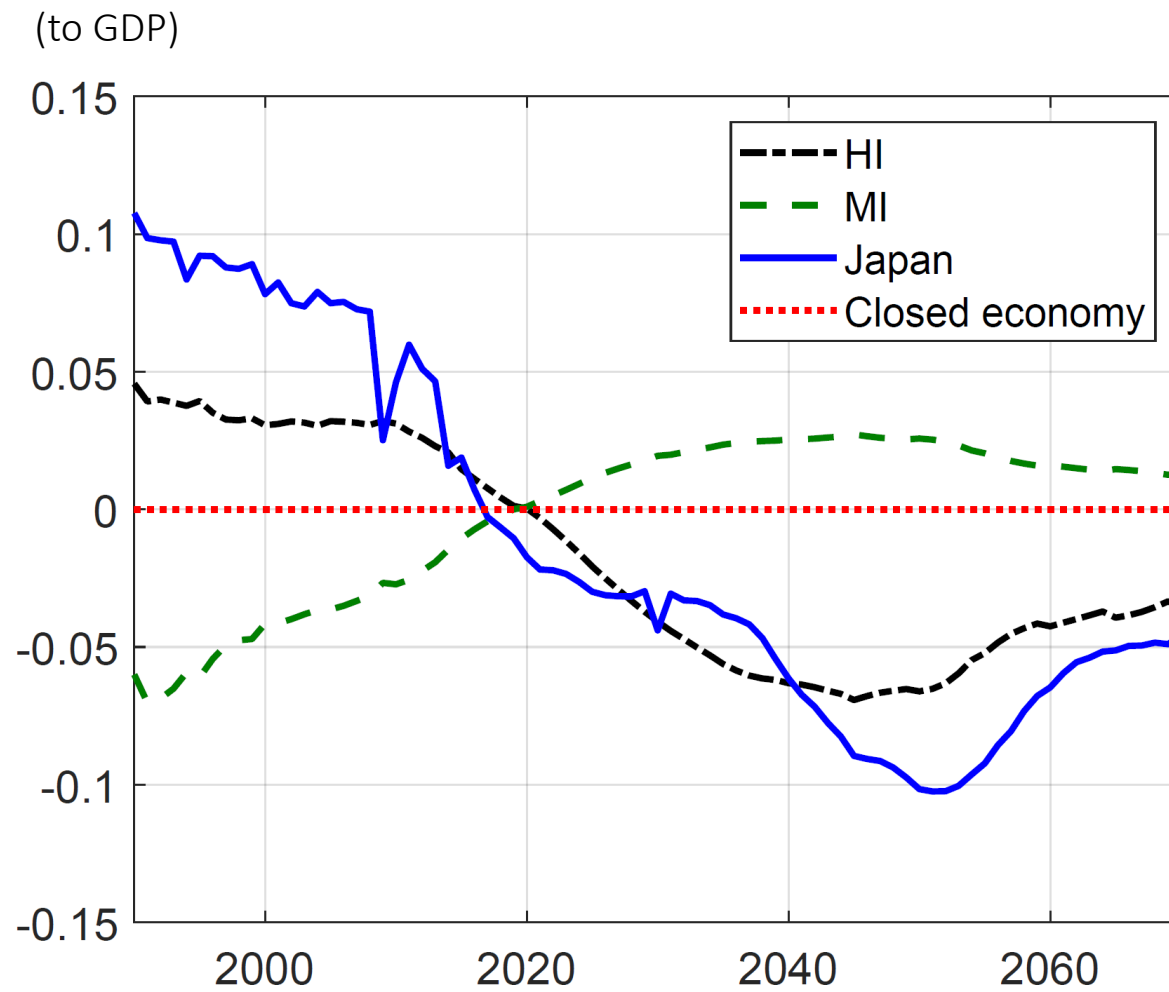
Interest rates : closed economy



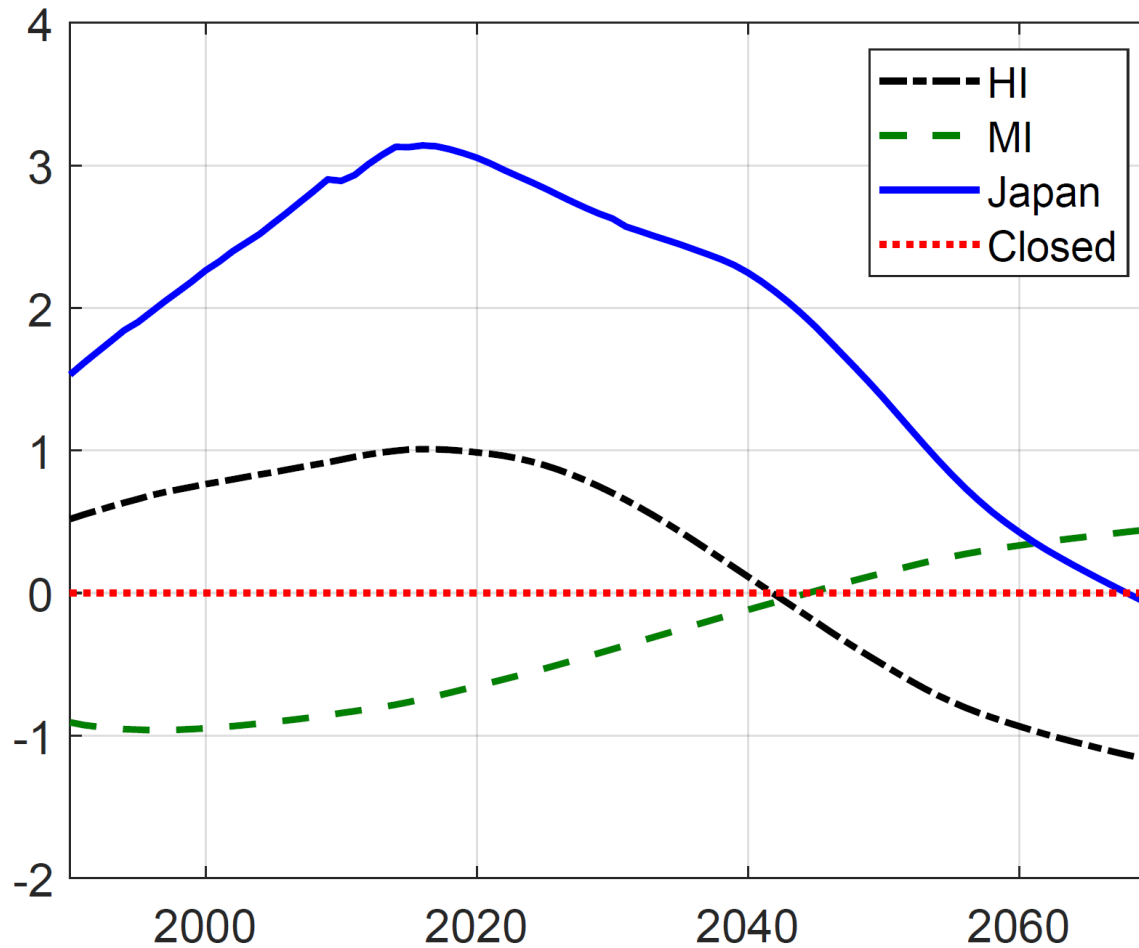
Interest rates : closed & open



Capital-flow (current account) to GDP

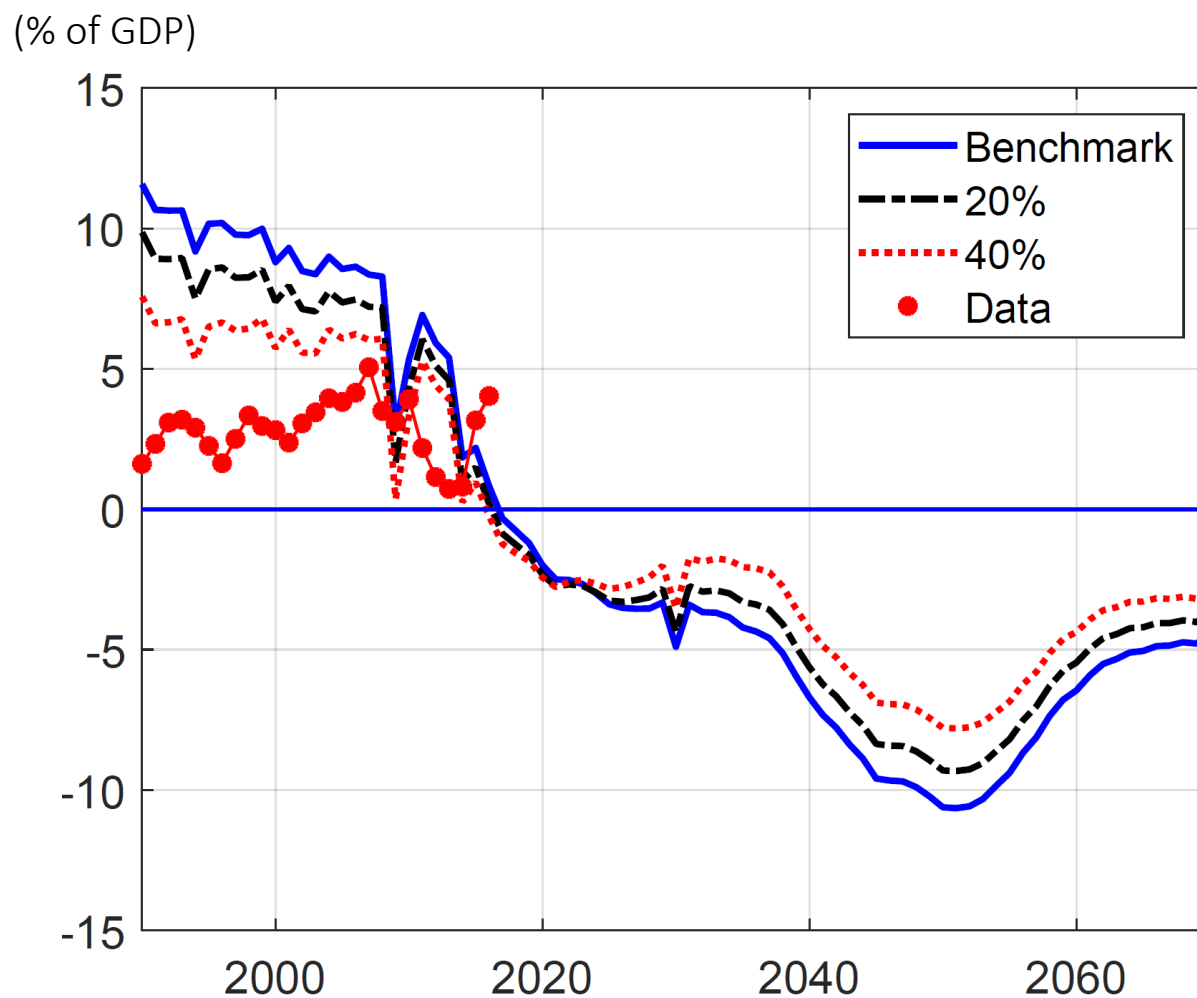


External wealth to GDP



Relative to GDP of each region.

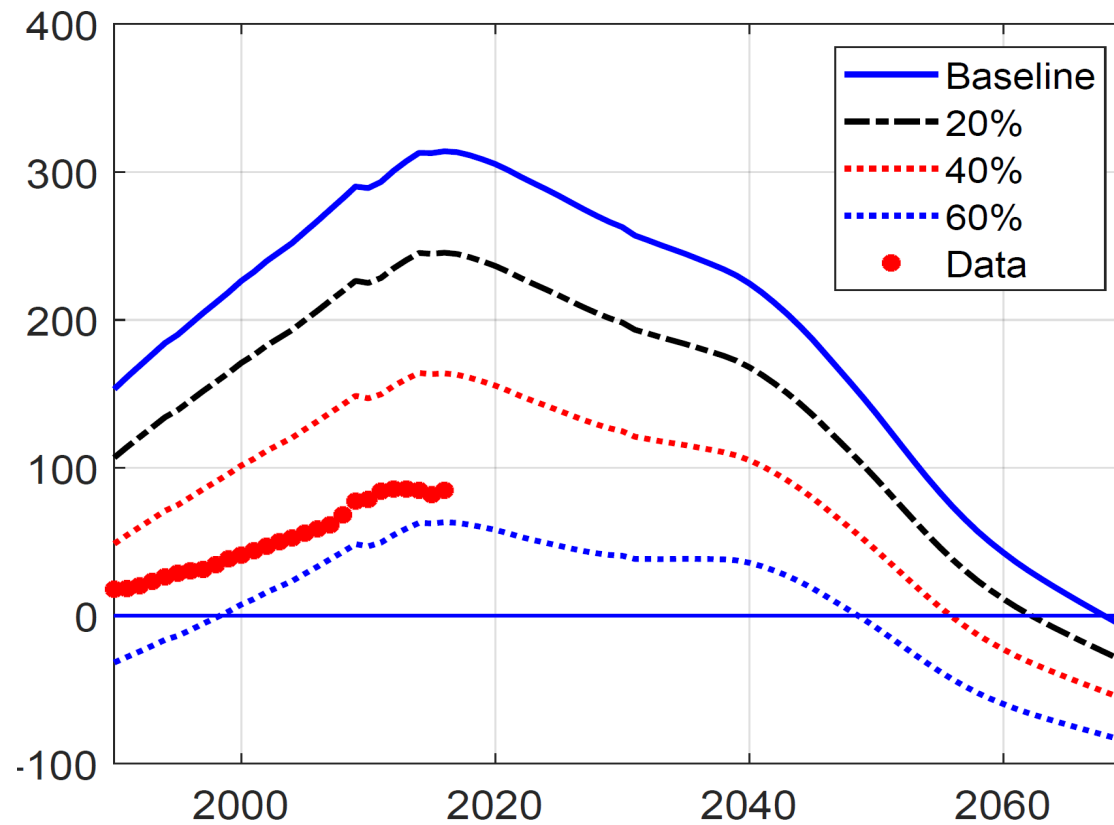
Capital adjustment cost: current account of Japan



Data computed based on Hayashi and Prescott (2002) and the SNA

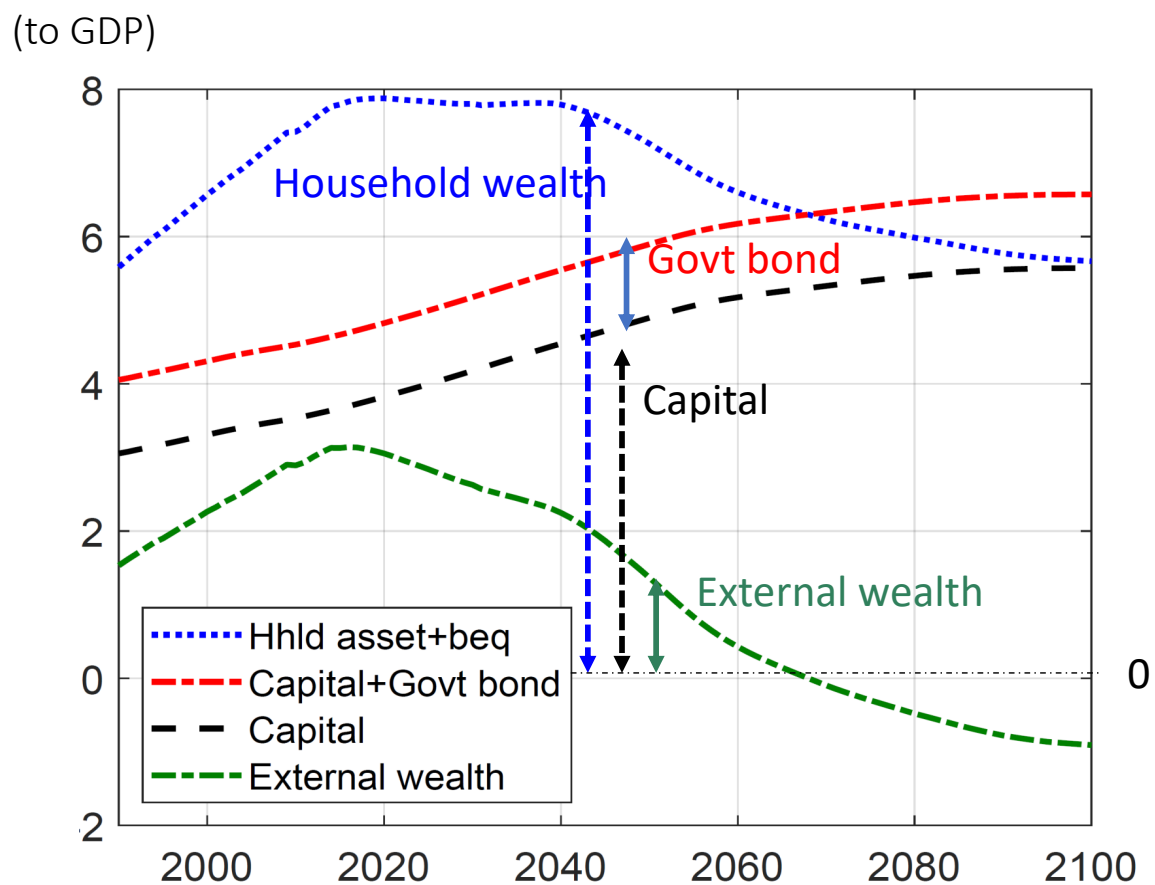
Capital adjustment cost: external wealth of Japan

(% of GDP)



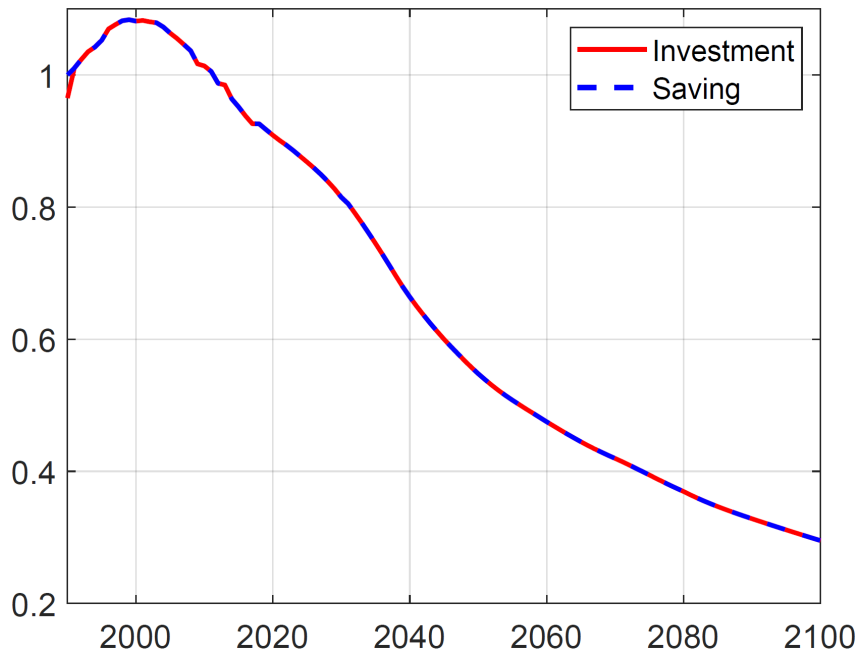
Data computed based on Hayashi and Prescott (2002) and the SNA

Wealth decomposition of Japan : open economy

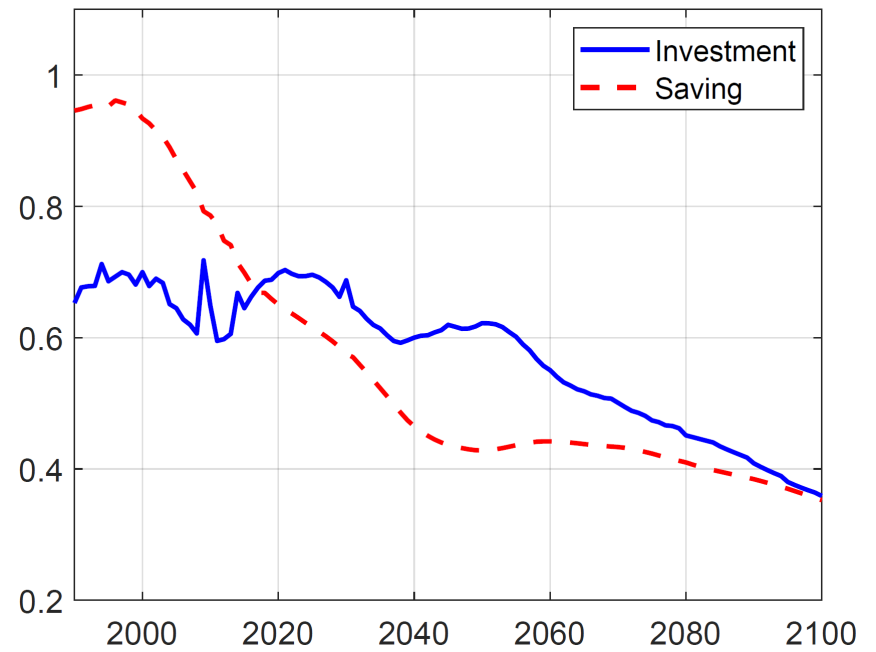


$$\text{Household asset (incl. bequest)} = \text{Capital} + \text{Government bond} + \text{External wealth}$$

Saving and investment in Japan



Closed economy



Open economy

Remarks

- The projected unsynchronized demographic aging across regions, differences in the social security systems, and differing TFP growth tend to induce capital to flow into Japan.
 - Over the next few decades, what implies lower closed-economy interest rates in the MI or higher interest rates in Japan will generate a greater capital flow into Japan and (larger) current account deficits.
- In the open economy, wages are higher and taxes are low due to the capital inflow to Japan, implying more benefits of more openness for future generations.

Remarks

- If Japan's working age population falls slower than projected, fiscal sustainability is easier, and, capital flows in much faster.
- If Japan's TFP grows faster, fiscal sustainability is easier, and, capital flows in a bit faster.
- If MI longevity converges to that of Japan, capital flows in much faster.
- If MI makes pensions more generous, capital flows in slower (as MI saves less).