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Editorial

An introduction to the macroeconomics of aging[☆]

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ABSTRACT

This special issue contains six articles that develop macroeconomic models that analyze the impact of population aging—and the impact of government policies related to pensions and health care in response to aging—on aggregate employment, investment, wages, and interest rates. Increased spending on pensions and public health care programs is projected to impose a major fiscal burden not only on the developed world but also on much of the less developed world. The articles in this special issue point to the directions that economists need to take in analyzing the impact of aging on the macroeconomy.

Introduction

Population aging is occurring around the world. In response to aging, macroeconomists are building models to analyze the impact of aging—and the impact of government policies related to pensions and health care in response to aging—on aggregate employment, investment, wages, and interest rates. This issue includes six articles, preliminary versions of which were presented at either one or both of two conferences: the Workshop on the Macroeconomics of Population Aging at the Harvard T. H. Chan School of Public Health in September 2015 and the Workshop on Aging and Macroeconomics at the Barcelona GSE Summer Forum in June 2016. This article introduces these articles and connects them to the existing economics literature.

According to the UN population projections, the *old-age dependency ratio* (population 65 and older divided by population 15–64) in the world will increase from 13% in 2015 to 38% in 2100.¹ Fig. 1 illustrates the rapid increase in projected dependency ratios in Japan, Europe and the United States. Japan is an extreme case; aging has been accelerating in Japan over the past 60 years, and its old-age dependency ratio will reach 70% by the year 2050. Europe and the United States are not as extreme but are still projected to have old-age dependency ratios of roughly 50% by the end of the twenty-first century. Southern European countries, such as Greece, Italy, Portugal and Spain, are expected to reach levels similar to those of Japan by 2050.

This phenomenon is not exclusive to more developed regions in the world, where the ratio is increasing from 27% to 54%, but is also present in less developed regions where the ratio is projected to

increase from 10% in 2015 to 36% in 2100. Within less developed countries, there is considerable variability. The data in Fig. 2 show the rapid aging projected for China and Brazil, where the old-age dependency ratio is expected to grow from less than 10% in 2015 to approximately 60% in 2100. In contrast, the old-age dependency ratio in sub-Saharan Africa is projected to be only 21% in 2100. The population in India is aging at a slower rate than in China, but the old-age dependency ratio is still expected to reach over 40% by 2100.

This process of worldwide aging presents challenges in terms of macroeconomic growth and stability. The age composition of the population directly affects the supply of factors of production in the economy, with an older population being associated with relatively more capital and less labor. Consequently, aging directly affects the production possibilities and the returns to factors of production, resulting in higher wages and lower returns to capital and interest rates. In addition, to the extent that many of the welfare state entitlements—pensions, health care, and so on—are associated with age or labor force participation, aging poses challenges to most countries with respect to the viability of public finances. Finally, the age composition of the labor force affects the dynamism of the economy as a whole, potentially influencing the rate of innovation and economic growth.

To analyze aging and the impact of resulting increases in government spending on pensions and health care, the articles in this volume use dynamic general equilibrium models in which heterogeneous consumer-workers who differ by age, education, income, wealth, and health status interact with each other, with firms that hire them, with private insurance providers, and with government pension and health

[☆] The data used in this paper are available at www.econ.umn.edu/~tkehoe. The views expressed herein are those of the authors and not necessarily those of the Federal Reserve Bank of Minneapolis or the Federal Reserve System.

¹ We focus on the intermediate scenario, while the projected dependency ratios by year 2100 could be 29 or 51 in the other two scenarios considered by the UN.

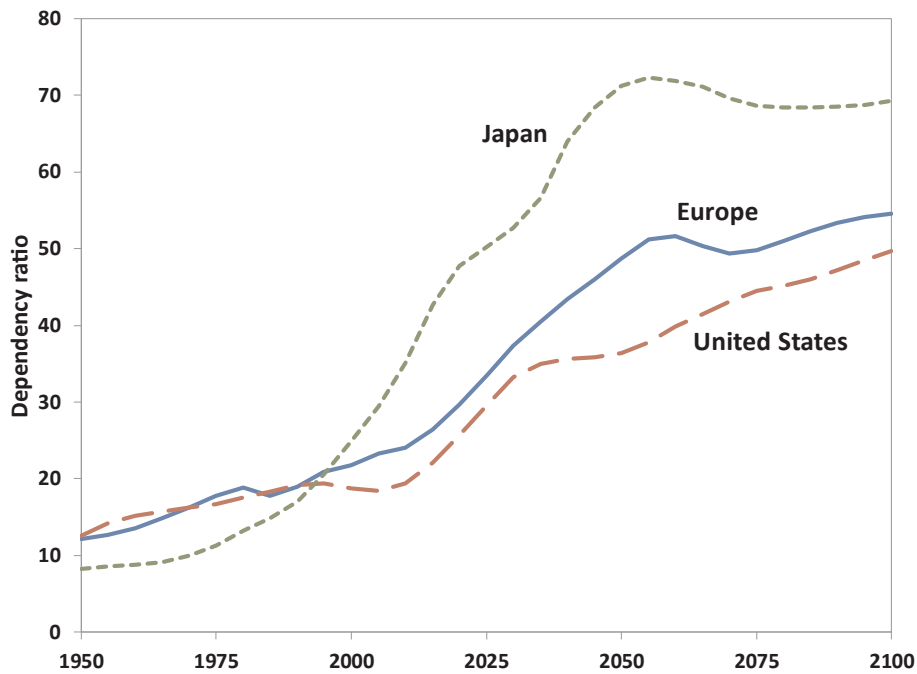


Fig. 1. UN demographic projections in selected developed regions. Source: United Nations, World Population Prospects: The 2017 Revision.

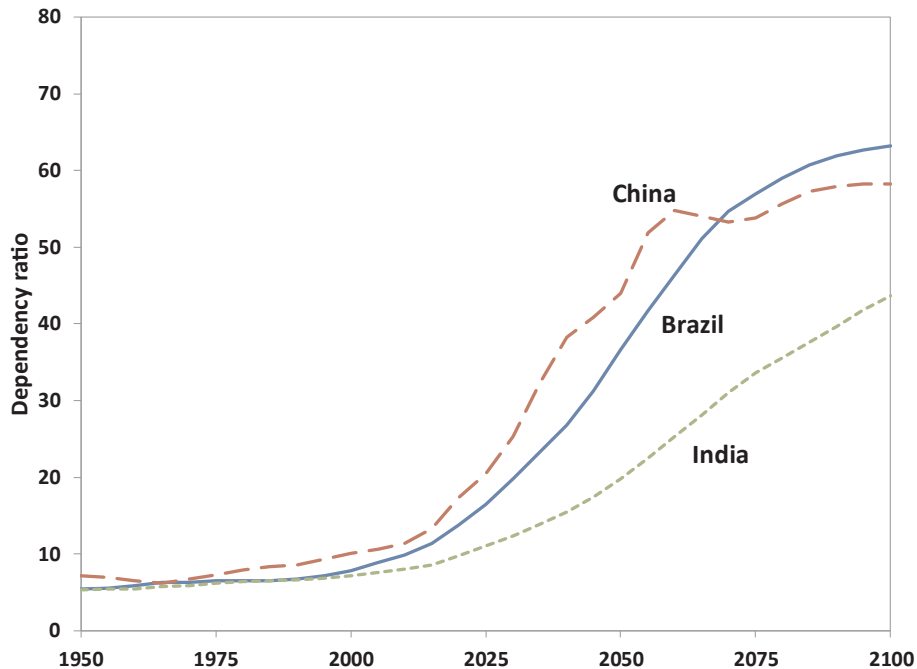


Fig. 2. UN demographic projections in selected less developed regions. Source: United Nations, World Population Prospects: The 2017 Revision.

care programs. The complexity of economic interactions among the different agents in these macro models produces an analysis that goes beyond those provided by the simple econometric expenditure projections that are typically provided by government agencies and international institutions.

General theoretical approach

Building on the seminal work of [Auerbach and Kotlikoff \(1987\)](#), economic researchers have made large-scale overlapping generations (OG) models a standard tool in macroeconomic and economic policy

analysis. In these models, the age composition of the population plays a key role, both in understanding the dynamics of the economy as a whole and in evaluating the macroeconomic and welfare implications of alternative economic policies.

Following [Huggett \(1993\)](#) and [Aiyagari \(1994\)](#), economists have developed newer generations of OG models to incorporate uninsurable earnings and productivity risk, allowing for a much richer description of intra-cohort heterogeneity. The literature measuring income risk faced by households is large and has recently been growing rapidly. See [Heathcote et al. \(2009\)](#) for an excellent survey of this literature and [Guvenen et al. \(2016\)](#) for a recent contribution. [İmrohoroğlu et al.](#)

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