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John Piggott
Alan Woodland

Economics of Population Aging

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Handbook of
**THE ECONOMICS OF
POPULATION AGING**

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Handbook of **THE ECONOMICS OF POPULATION AGING**

Volume 1B

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INTRODUCTION TO THE SERIES

The aim of the *Handbooks in Economics* series is to produce Handbooks for various branches of economics, each of which is a definitive source, reference, and teaching supplement for use by professional researchers and advanced graduate students. Each Handbook provides self-contained surveys of the current state of a branch of economics in the form of chapters prepared by leading specialists on various aspects of this branch of economics. These surveys summarize not only received results but also newer developments, from recent journal articles and discussion papers. Some original material is also included, but the main goal is to provide comprehensive and accessible surveys. The Handbooks are intended to provide not only useful reference volumes for professional collections but also possible supplementary readings for advanced courses for graduate students in economics.

Kenneth J. Arrow and Michael D. Intriligator

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EDITORS' INTRODUCTION

Population aging is exerting unprecedented pressures on long-established social norms and policy institutions globally. Sustained falls in fertility and increasing life expectancy are raising deep questions about intergenerational exchange and equity and policy formulation, and will drive global movements in labor, capital, and trade in unknown ways over coming decades. Households are facing unfamiliar and complex yet critical life choices. Employers face the challenge of adapting to an older workforce. And governments under fiscal stress are retreating from the provision of retirement income and health care, raising new challenges for policy design and delivery and opportunities for the private sector in meeting the resource needs of older generations. The United Nations has described the phenomenon as pervasive (it is a global trend); unprecedented (never before has the world witnessed such a change); enduring (it is a change that is likely to be permanent); and profound (it affects all of us in our everyday lives).

Managing these forces is a formidable task, requiring new knowledge and an evidence base that is still in the early stages of development. The need for an intensive and cutting-edge research effort related to demographic aging is documented in the international literature. General calls appear in, for example, the [World Health Organization \(2015\)](#) and the [National Academy of Sciences \(2012\)](#). The National Academies have also identified cognitive aging as a specific area of research need ([Blazer et al., 2015](#)).

Population aging may be thought of as encompassing two related but distinct phenomena. First is the aging of the baby boomers. Second is the impact of population dynamics and evolving changes in demographic structure, nationally, regionally, and globally, comprising both national and regional shifts in fertility, along with the associated management of intergenerational relationships. The first of these is generally given more attention, because the challenges are very direct. In particular, retirement and retirement financing, health and aging, and aged care are all important priorities, requiring changes in policy formulation, business practice, and family behavior, all of which need to be informed by research.

However, the longer-term influences of shifting population dynamics are also very important. The impact of generational imbalance on intergenerational solidarity, on taxation policy, on the structure of the labor force, and on intragenerational inequality and old age poverty are all topics requiring research to fully understand their contours and importance. Similarly, the implications of global population dynamics for trade, migration, and capital flows may be far-reaching, but have been little researched.

This *Handbook*, in two volumes, aims to contribute to the accumulating knowledge base around population aging by bringing together some of the world's leading

economists to provide perspectives from their field to understand the issue. Its objective is to gather into one place as much accumulated knowledge and insight as possible on the economic causes and consequences of demographic change, along with analyses of the policy responses that have emerged. The hope is that this will provide a base to inform and inspire future research in the field.

It can be read either as a whole or as a source of expert knowledge on a specific topic. Volume 1A begins by documenting and explaining theories about demographic change, and then highlights macroeconomic and market adjustments. The underlying motivation here is to provide up-to-date syntheses of current economic thinking on the broad causes and consequences of population aging. Volume 1B drills down to analyze household behavior and policy response. Intergenerational transfers, of time, money, and other resources, are primarily transacted through family and government, so it is natural that these institutions receive emphasis. A concluding chapter describes the data infrastructure which has been built around older cohorts over the last quarter century, and which will provide an important basis for future empirical research in the field.

Volume 1A opens with an account of the current state of empirical knowledge and theoretical structures to explain the phenomenon of population aging (Part I). This thorough overview provides the backdrop for much of the analysis to follow. It is important, when viewing population aging from a developed country perspective, to appreciate that data reliability varies widely across jurisdictions. Population data are regarded as highly reliable in the developed world, but in undeveloped and emerging economies, this is not always so. To give just one example, Indonesia, the world's fourth most populous nation, is still struggling to determine how its demography is unfolding ([McDonald, 2014](#)). It is therefore important to begin the volume with what is known and what we understand about the demography of population aging.

Part II examines both macroeconomic and specific market analyses to explore what we know about the overall economic impacts of population aging. It includes chapters devoted to macroeconomic and global analysis. They deal both with adjustments within a country, and with the interactions between regions with different demographic dynamics. These operate through various mechanisms, including capital and labor flows. A separate chapter is devoted to the links between migration and aging. This part also includes chapters analyzing the functioning of the insurance market in the face of an aging demographic, intergenerational risk-sharing, and the political economy of aging.

Volume 1B begins with a group of chapters (Part III) designed to show how population aging impacts household decisions and behavior. These impacts can be direct, for example, through the influence of smaller families and longer life spans, and indirect, through fiscal adjustments that change the nature of household decision-making. Chapters cover labor market interaction and the retirement decision, perhaps the most important of these decisions, financial choices, and issues within the family. A striking feature of policy reform in the face of an aging demographic is that households

and families are increasingly confronting complex choices that are unfamiliar. Part III concludes with a chapter on complex choices, cognition, and confusion.

Part IV brings a policy perspective to demographic change. Chapters in this part cover the major areas of policy that are impacted by an aging demographic—taxation, health and long-term care, retirement incomes, and inequality. The taxation chapter begins by analyzing the fiscal implications of demographic change. It then discusses design issues, such as age-dependent taxation and the role of capital income taxation in an aging economy. Two chapters deal with retirement incomes, divided into a treatment of government-provided social security programs, and employer-based pensions, which are supported and regulated by policy structures. Workplace pensions are seen as having an important role in the future, as publicly provided retirement incomes face increasing fiscal stress. These are followed by a chapter focused on aging and poverty. Part IV concludes with a chapter on health and long-term care, which emphasizes this latter topic, now at the frontier of policy toward an aging demographic in many countries.

Finally, a concluding chapter (Part V) reviews an important social science research infrastructure development—the establishment of multidisciplinary and nationally representative surveys of older cohorts over the last 30 years, and which now cover about two-thirds of the world's population. These surveys, which are to a considerable extent harmonized between countries, generate an enormous potential for future research.

Inevitably, in an enterprise of this kind, there are gaps. Important among these is a treatment of methodologies regarding mortality and morbidity projections. Official projections have over a long period of time systematically underestimated life-expectancy increase ([Antolin, 2007](#), Table 3), with important consequences for estimates of future costs of social security. Research by academic actuaries and statistical demographers is shedding new light on approaches to these projections, which are crucial in arriving at well-informed household decisions and government policies in the future. Similarly, morbidity trends, and the important question of whether morbidity is expanding or compressing (relatively and absolutely) as life expectancy increases, remain unsettled in many countries.

Neither does the *Handbook* explicitly cover infrastructure development, in particular housing. The role of housing in the context of population aging, both as a stream of services, which needs to adapt to an aging demographic as physical abilities and household structures change with age, and as a capital asset that can act as a stock of precautionary savings in later life, is clearly worthy of analysis. Housing also plays an important role in intergenerational transfers and consequently in influencing the intragenerational wealth distribution among younger cohorts, an important social development.

Finally, the relationship between technology and population aging has not been much explored. For example, the role of research and development in reducing mature age mortality rates through improved health technology, especially for those living in developed countries, has been essential in increasing life expectancy at mature ages over the last

several decades. There are doubtless many other examples of how population aging and technical development might be related.

Many other topics could have been reviewed. But we hope that those we have identified, and the contributors' excellent analyses, will serve as a useful base for moving research on the economics of population aging forward.

JOHN PIGGOTT
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PART III

The Household Perspective

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CHAPTER 8

Retirement Incentives and Labor Supply

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Abstract

In this chapter, we review the evidence on retirement and study the role of incentives in the retirement decision. The key patterns of withdrawal from the labor market are presented and some of the factors that might explain the large and discrete drops in hours of work at the point of “retirement” are presented. We study the main retirement incentives that individuals face and place these financial and other incentives in the context of a structural approach to modeling retirement. We use this approach to frame issues of how government and private pension schemes affect retirement behavior. Noting that the typical household nearing retirement today in most developed economies is one in which both husband and wife work, we examine the theory and evidence on modeling incentives in couples and for joint decision-making. We conclude with a discussion of some of the gaps in our understanding of the employment of the elderly and raise some central questions that should be addressed by future research.

Keywords

Retirement, Aging, Labor supply, Pensions, Retirement models

JEL Classification Codes

H55 (social security and public pensions), I38 (government policy, provision and effects of welfare programs), J08 (labor economics policies), J14 (economics of the elderly), J26 (retirement, retirement policies), J32 (nonwage labor costs and benefits, retirement plans, private pensions)

1. INTRODUCTION

Virtually all developed countries face challenges to the affordability of public (and, in some cases, occupational) pension programs. The shortfalls arise for two reasons. First,

populations in developed countries are aging rapidly. Second, until recently, older individuals in developed countries have been retiring earlier. These two developments created serious strains on public pension programs.

In order to address these issues and help public and occupational pension programs to remain solvent, there have been significant reforms across many countries to pensions and regulations relating to older workers. These policy changes have been accompanied by nontrivial increases in the labor supply of the elderly over the same period. This trend has occurred in multiple countries, raising the question of whether the policy reforms have caused the increases in labor supply.

Employment among the elderly is an important factor in helping developed countries to deal with the ongoing demographic transition toward an older population. It is therefore a topic that has attracted significant attention from policymakers and researchers. In this chapter, we review the evidence on how employment rates among the elderly have changed in developed countries over recent decades and discuss the main factors that are thought to influence older workers' labor supply. We do this within an economic framework of life-cycle decisions about consumption, saving, and labor supply.

In addition to the policies discussed in this chapter, many countries have also changed regulations affecting labor demand. In particular, many have abolished mandatory retirement ages, meaning employers can no longer make workers redundant or refuse to hire them on the grounds of age alone. Such demand-side policies are also likely to have been important in affecting employment rates, but discussion of these is beyond the scope of this chapter.

We start, in [Section 2](#), by describing trends in employment of older women and (in particular) men over the last few decades and put these patterns in the context of a longer historical context. Most of our focus in this chapter is on the extensive margin of labor supply among the elderly. We motivate this focus in [Section 3](#) by describing patterns of withdrawal from the labor market and some of the factors that might explain the large and discrete drops in hours of work that are seen for most people at the point of "retirement."

In order to better understand whether policy reforms have been important for explaining the rise in employment among the elderly, it is essential to know how sensitive labor supply is to the financial incentives caused by these reforms. To further examine these incentives, [Section 4](#) discusses some of the key retirement incentives that individuals face and summarizes key papers that have examined the retirement response to these incentives. We then place these financial and other incentives in the context of a structural retirement model in [Section 5](#). We use the model to frame issues of how government and private pension schemes affect retirement behavior. The discussion in that section builds upon [French and Jones \(2012\)](#). [Lumsdaine and Mitchell \(1999\)](#) also provide a useful survey of similar issues.

In recent years, increasing attention has been paid to joint decision-making within families. This has largely been motivated by the fact that individuals in couples are often observed to exit work at roughly the same time as each other, in a way that cannot simply

be explained by the individual incentives to retire that each member of the couple faces—suggesting instead that some interactions between the behavior of the two members of a couple are important in determining when each quits employment. The growing labor force attachment of women over recent decades means that the typical household approaching retirement today in most developed economies is one in which both husband and wife work. As a result, understanding how the circumstances and behavior of one member of a couple affects those of the other member has become an increasingly important part of understanding employment among the elderly. [Section 6](#) examines the theory and evidence on the joint retirement behavior of couples—extending the discussion of the life-cycle model presented in [Section 5](#) to allow for one partner’s behavior and/or incentives to affect the other. Different motives for retirement in couples are considered, focusing on attempts to separate preferences from financial incentives. We find that ignoring the role of family decisions in modeling retirement can distort the picture of retirement and bias the analysis of retirement policies.

Our main conclusion is that the labor supply of older workers is responsive to changes in retirement incentives. This means that the trend toward lower effective taxes on older workers in many developed countries is likely to continue to fuel the recent trend toward later retirement. This, in turn, is likely to reduce the financial strain on public pension schemes. But we are still some way from fully understanding the precise channels through which external factors (such as reforms to public pension schemes) affect retirement behavior. Despite a large body of important evidence that has been assembled, new patterns of retirement raise new questions about retirement behavior. For example, although the research we review has established that financial incentives from pension schemes have significant effects on the employment of older people, in many countries (such as the United States (US) and the United Kingdom (UK)) retirement incentives from pension plans are now much smaller than in previous years, yet many people in those countries still retire at certain announced “retirement ages”. There remains much to be learned. [Section 7](#) concludes with a discussion of some of these gaps in our understanding of the employment of the elderly and raises some central questions that should be addressed by future research.

2. TRENDS IN EMPLOYMENT AMONG THE ELDERLY

2.1 Postwar Trends in Employment

In the last 20 years, we have seen a rapid increase in employment rates of the age 55+ population in developed countries. All 14 countries listed in [Table 1](#) saw an increase in the employment rate of 55- to 64-year olds between 1999 and 2007 and [Table 2](#) shows that this trend has continued for most countries over the 2007–2013 period that covered the global financial crisis.

[Tables 3](#) and [4](#) show employment patterns of the population aged 15–54. [Table 3](#) shows that, over the period 1999–2007, employment rose for those aged 15–54 in most

Table 1 Changes in employment rate of 55- to 64-year olds, 1999–2007

Country	Change in employment rate, 1999–2007			Employment rate in 1999	Employment rate in 2007
	Men	Women	All		
New Zealand	13.5	17.1	15.3	56.5	71.8
The Netherlands	12.8	14.8	13.8	34.9	48.8
Germany	12.6	14.6	13.5	37.8	51.3
Australia	9.2	16.0	12.5	44.0	56.5
Canada	6.9	13.4	10.2	46.8	57.0
France	8.6	11.1	9.9	28.3	38.2
Belgium	7.8	11.3	9.7	24.7	34.4
Spain	7.2	11.3	9.5	35.1	44.5
United Kingdom	6.5	8.4	7.4	49.3	56.8
Sweden	6.1	6.1	6.1	64.0	70.1
Italy	3.8	8.0	6.0	27.6	33.7
Denmark	5.0	5.2	4.7	54.2	58.9
United States	1.3	6.5	4.1	57.7	61.8
Japan	2.0	3.1	2.7	63.4	66.1

Note: Countries listed from largest increase in employment to smallest. Employment rate shown is calculated across both men and women.

Source: Authors' calculations using data from the OECD and the UK Labour Force Survey.

Table 2 Changes in employment rate of 55- to 64-year olds, 2007–2013

Country	Change in employment rate, 2007–2013			Employment rate in 2007	Employment rate in 2013
	Men	Women	All		
Germany	10.5	14.2	12.3	51.3	63.6
The Netherlands	10.2	12.6	11.3	48.8	60.1
Italy	7.8	10.3	9.0	33.7	42.7
France	7.9	7.0	7.4	38.2	45.6
Belgium	4.9	9.8	7.4	34.4	41.7
Australia	3.3	6.8	4.9	56.5	61.4
Sweden	3.9	3.3	3.6	70.1	73.7
Canada	1.2	5.4	3.3	57.0	60.3
Denmark	1.6	3.9	2.7	58.9	61.7
United Kingdom	0.7	4.6	2.7	56.8	59.5
New Zealand	−1.4	6.4	2.5	71.8	74.3
Japan	−1.7	3.0	0.7	66.1	66.8
United States	−1.4	−0.4	−0.9	61.8	60.9
Spain	−9.1	6.1	−1.3	44.5	43.2

Note: Countries listed from largest increase in employment to smallest. Employment rate shown is calculated across both men and women.

Source: Authors' calculations using data from the OECD and the UK Labour Force Survey.

Table 3 Changes in employment rate of 15- to 54-year olds, 1999–2007

Country	Change in employment rate, 1999–2007			Employment rate in 1999	Employment rate in 2007
	Men	Women	All		
Spain	6.7	18.3	12.6	57.9	70.5
Italy	3.1	8.6	5.7	58.4	64.2
France	2.4	6.5	4.4	65.4	69.8
New Zealand	3.9	4.6	4.2	71.5	75.7
Australia	2.5	5.5	4.0	72.0	76.0
The Netherlands	0.2	6.7	3.3	76.9	80.2
Canada	1.5	5.0	3.3	73.5	76.8
Belgium	0.9	4.9	2.9	65.2	68.0
Japan	0.4	3.2	1.8	70.2	72.0
Sweden	1.6	0.7	1.2	74.1	75.2
Denmark	−0.4	2.5	1.0	80.5	81.5
Germany	−1.1	2.5	0.7	72.3	73.0
United Kingdom	−0.9	0.5	−0.2	74.3	74.1
United States	−3.2	−2.7	−2.9	76.0	73.1

Note: Countries listed from largest increase in employment to smallest. Employment rate shown is calculated across both men and women.

Source: Authors' calculations using data from the OECD and the UK Labour Force Survey.

Table 4 Changes in employment rate of 15- to 54-year olds, 2007–2013

Country	Change in employment rate, 2007–2013			Employment rate in 2007	Employment rate in 2013
	Men	Women	All		
Germany	1.6	4.3	2.9	73.0	75.9
Japan	−0.8	2.9	1.0	72.0	73.1
Sweden	−1.1	0.0	−0.5	75.2	74.7
France	−2.7	−0.0	−1.3	69.8	68.5
United Kingdom	−2.7	−0.4	−1.5	74.1	72.6
Australia	−2.9	−0.8	−1.8	76.0	74.2
The Netherlands	−5.3	0.4	−2.5	80.2	77.8
New Zealand	−4.2	−2.3	−3.2	75.7	72.5
United States	−5.5	−4.0	−4.8	73.1	68.3
Italy	−8.3	−2.0	−5.2	64.2	59.0
Denmark	−7.8	−5.2	−6.5	81.5	75.0
Spain	−18.5	−7.1	−13.0	70.5	57.5

Note: Countries listed from largest increase in employment to smallest. Employment rate shown is calculated across both men and women.

Source: Authors' calculations using data from the OECD and the UK Labour Force Survey.

countries we consider, with the US being a major exception. There is an active debate in the US about what factors explain the historically unprecedented steady decline in labor force participation of both men and women since the turn of the century (Moffitt, 2012). However, as Table 3 suggests, this phenomenon is somewhat peculiar to the US. The US