### **Demographic Change and Fiscal Policy**

As public expenditures on health, education, and transfer programs increase, demographic change has a growing impact on public expenditures and the incentives for behavior created by public transfer programs as well. The essays in this volume discuss such timely topics as demographic change and the outlook for Social Security and Medicare in the United States; long-term decision making under uncertainty; the effect of changing family structure on government spending; how the structure of public retirement policies has encouraged early retirement in some countries and not in others; the response of local community spending to demographic change; and related topics. Contributors include many of the world's leading public finance economists and economic demographers.

Alan J. Auerbach is Robert D. Burch Professor of Economics and Law at the University of California, Berkeley, and Director of its Burch Center for Tax Policy and Public Finance. He is a member of the panel of economic advisers of the U.S. Congressional Budget Office, a research associate of the National Bureau of Economic Research, a fellow of the American Academy of Arts and Sciences, and a fellow of the Econometric Society. Professor Auerbach has served as the deputy chief of staff of the U.S. Joint Committee on Taxation and as vice president of the American Economic Association. He also has served as professor of economics and law at the University of Pennsylvania, and he has held visiting professorships at Harvard and Yale universities. The author, coauthor, editor, or coeditor of ten books, Professor Auerbach has also published dozens of scholarly articles in the profession's leading journals and has served as editor or associate editor of the *Journal of Economic Perspectives, American Economic Review, Journal of Public Economics, National Tax Journal*, and the *Review of Economics and Statistics*.

*Ronald D. Lee* is Professor of Demography and Economics at the University of California, Berkeley, and Director of its Center for the Economics and Demography of Aging. He is a member of the National Academy of Sciences and recently concluded a four-year term as chair of its Committee on Population. Professor Lee is a past president of the Population Association of America (PAA) and is on the Council of the International Union for the Scientific Study of Population (IUSSP). He received the Mindel C. Scheps Award for outstanding contributions to demographic methods and mathematical demography and the Irene Taeuber Award for outstanding career contributions in demographic research. He is author, editor, or coeditor of ten books and is the author of more than 100 scholarly articles and book chapters. Professor Lee's recent research examines intergenerational transfers, and he also works on methods for forecasting population, merging these interests in work on stochastic forecasts of the finances of the Social Security system and of long-term government budgets in general and studies of the fiscal consequences of immigration.

# Demographic Change and Fiscal Policy

Edited by ALAN J. AUERBACH University of California, Berkeley

RONALD D. LEE University of California, Berkeley



### **CAMBRIDGE** UNIVERSITY PRESS

32 Avenue of the Americas, New York NY 10013-2473, USA

Cambridge University Press is part of the University of Cambridge.

It furthers the University's mission by disseminating knowledge in the pursuit of education, learning and research at the highest international levels of excellence.

www.cambridge.org Information on this title: www.cambridge.org/9780521662444

© Alan J. Auerbach and Ronald D. Lee 2001

This publication is in copyright. Subject to statutory exception and to the provisions of relevant collective licensing agreements, no reproduction of any part may take place without the written permission of Cambridge University Press.

First published 2001

A catalogue record for this publication is available from the British Library

Library of Congress Cataloguing in Publication data

Demographic change and fiscal policy / edited by Alan J. Auerbach, Ronald D. Lee.
p. cm.
ISBN 0-521-66244-3

Population – Economic aspects – Congresses.
Population forecasting – Congresses.
Transfer payments – Congresses.
Auerbach, Alan J. II. Lee, Ronald D. (Ronald Demos)
HB849.41.D464 2000
339.5 '2-dc21 00-037939

ISBN 978-0-521-66244-4 Hardback
ISBN 978-0-521-08827-5 Paperback

Cambridge University Press has no responsibility for the persistence or accuracy of URLs for external or third-party internet websites referred to in this publication, and does not guarantee that any content on such websites is, or will remain, accurate or appropriate.

### Contents

List	t of Figures	<i>page</i> vii
List of Tables		xi
Cor	Contributors	
Ack	Acknowledgments	
1	Introduction	1
2	Population Forecasting for Fiscal Planning: Issues and Innovations RONALD LEE AND SHRIPAD TULJAPURKAR	7
2-1	Comment	58
	DANIEL MCFADDEN	
2-2	Comment	69
	JAMES P. SMITH	
3	Uncertainty and the Design of Long-Run Fiscal Policy	73
	ALAN J. AUERBACH AND KEVIN HASSETT	
3-1	Comment	93
	PETER DIAMOND	
3-2	Comment	98
	SHRIPAD TULJAPURKAR	
4	How Does a Community's Demographic Composition	
	Alter Its Fiscal Burdens?	101
	THOMAS MACURDY AND THOMAS NECHYBA	
4-1	Comment	149
	HILARY WILLIAMSON HOYNES	
4-2	Comment	155
	ROBERT J. WILLIS	

5 Social Security, Retirement Incentives, and Retirement Behavior: An International Perspective 159 JONATHAN GRUBER AND DAVID WISE 5-1 Comment 191 AXEL BÖRSCH-SUPAN 5-2 Comment 198 MASSIMO LIVI-BACCI 6 Aging, Fiscal Policy, and Social Insurance: A European Perspective 202 BERND RAFFELHÜSCHEN 6-1 Comment 242 DAVID N. WEIL 6-2 Comment 248 DAVID R. WEIR 7 Demographics and Medical Care Spending: Standard and Nonstandard Effects 253 DAVID M. CUTLER AND LOUISE SHEINER 7-1 Comment 292 VICTOR R. FUCHS 8 Projecting Social Security's Finances and Its Treatment 297 of Postwar Americans STEVEN CALDWELL, ALLA GANTMAN, JAGADEESH GOKHALE, THOMAS JOHNSON, AND LAURENCE J. KOTLIKOFF 8-1 Comment 386 NADA EISSA Demographic Change and Public Assistance 9 Expenditures 391 ROBERT A. MOFFITT 9-1 Comment 426 DAVID CARD 9-2 Comment 435 S. PHILIP MORGAN Index 441

**Contents** 

## Figures

Figure 2.1.	TFR: Actual and Middle Series Projections,	
C	All Forecasts, 1940–2005	page 15
Figure 2.2.	TFR: Actual and High and Low Projections,	
	1940–2005	17
Figure 2.3.	Actual and Middle Series Projections of Life	
	Expectancies for the United States,	
	1930–2030	19
Figure 2.4.	Lee-Carter Mortality Index, $k(t)$ , Fitted	
	(1900–96) and Forecasted (1997–2096)	27
Figure 2.5.	Life Expectancy at Birth, Fitted (1900–96)	
	and Forecasted (1997–2096)	28
Figure 2.6.	Projections of Life Expectancy at Birth,	
	1990–2000	29
Figure 2.7.	Total Fertility Rate, Historical (1917–96) and	
	Forecasted (1997–2096), with 95%	
	Probability Intervals for Annual Values for	
	the Cumulative Average up to Each Horizon	33
Figure 2.8.	TFR by Life Expectancy in 2050	35
Figure 2.9.	TFR in 2050 by TFR in 2020	36
Figure 2.10.	Old-Age Dependency Ratio	38
Figure 2.11.	Total Dependency Ratio	39
Figure 2.12.	Forecasts and Probability Intervals for	
	Government Expenditures	44
Figure 2.13.	Tax Rate for Year-Ahead Balance	46
Figure 2.14.	Histograms of 1,000 Dates of Exhaustion for	
	Three Investment Scenarios	47
Figure 2.15.	Histograms of 1,000 Actuarial Balances in	
	2072 for Three Retirement Age Scenarios	49

### Figures

Figure 2-1.1.	Cohort-Component Accounting Relationship	59
Figure 2-1.2.	Census Midlevel Population Projections	59
Figure 2-1.3.	Census Low Population Projections	60
Figure 2-1.4.	Survival Curves from Age 55, Total	
	Population, from Trended Gompertz	
	Estimates	67
Figure 4-1.1.	Links between Demographics and Fiscal	
	Burden	151
Figure 5.1.	Population 65+/Population 20-64	160
Figure 5.2.	Historical Trends in Male Labor Force	
	Participation, United States	162
Figure 5.3.	Historical Trends in Female Labor Force	
	Participation, United States	163
Figure 5.4.	Labor Force Participation Trends for Men 60	
	to 64, Ten Countries	164
Figure 5.5.	Labor Force Participation Rates by Age and	
	Sex, United States	165
Figure 5.6.	Distribution of Activities of Men by Age,	
	United States	166
Figure 5.7.	Labor Force Participation by Country and	
-	Age	167
Figure 5.8.	Nonwork, Ages 55 to 65	168
Figure 5.9.	Hazard Rate of Leaving the Labor Force for	
C	Men, United States	172
Figure 5.10a.	Hazard Rates for Men in the United States,	
C	1960	173
Figure 5.10b.	Hazard Rates for Men in the United States,	
C	1970	174
Figure 5.10c.	Hazard Rates for Men in the United States,	
C	1980	174
Figure 5.11.	Mean Retirement Age in Germany, 1968–92	176
Figure 5.12.	Hazard and Labor Force Participation Rates	
U	for Germany	176
Figure 5.13a.	Retirement Ages in France, Population Age	
0	60 in 1972	178
Figure 5.13b.	Retirement Ages in France, Population Age	
0	60 in 1978	178
Figure 5.13c.	Retirement Ages in France, Population Age	
0	60 in 1982	179
Figure 5.13d.	Retirement Ages in France, Population Age	
0	60 in 1986	179
Figure 5.14.	Hazard Rates for France	180
0		

	Figures	
Figure 5.15.	Effect of Tax Force on Non-Work	187
Figure 5-1.1.	Average Retirement Age and	
-	Unemployment in Germany, 1960–95	196
Figure 6.1.	Composition of True Public Liabilities	227
Figure 6-2.1.	Long-Run Fiscal Imbalance and Current	
	Deficits	250
Figure 6-2.2.	Elderly Dependency and Demographic	
	Change in Europe and the United States	251
Figure 7.1.	Growth of Medical Care and GDP	259
Figure 7.2.	Increase in Medicare Spending	260
Figure 7.3.	Mortality by Cause of Death, 1950–94	264
Figure 7-1.1.	Annual Rate of Change in Medicare	
	Payments per Person by Age and Sex,	
	1987–95	295
Figure 8.1.	Overview of OASDI Projection	
	Methodology	301
Figure 8.2.	Demographic Projections	302
Figure 8.3.	Short-Range Economic and Revenue	
	Projections	303
Figure 8.4.	Long-Range Economic Projections	304
Figure 8.5.	Long-Range Noninterest Income	305
Figure 8.6.	Short-Range Benefit Payments	306
Figure 8.7.	Long-Range Outgo	308
Figure 8.8.	Short-Range Progress of Funds	310
Figure 8.9.	Long-Range Actuarial Status	311
Figure 8.10.	Number of Female-Headed Families in the	
	United States, 1961–97	323
Figure 8.11.	Average Monthly OASDI Benefit for Female	
	Retired Workers, 1961–97	324
Figure 8.12.	Percentage of Retired Female Workers by	
	Monthly OASDI Benefit Level, 1997	326
Figure 8.13.	Mean Indexed Monthly Earnings (MIME)	
	for Male Home Owners by Rank and Cohort,	
	1931–45	328
Figure 8.14.	Mean Ratio of Wife's MIME to Husband's	
-	MIME for Wives Born 1931–35	329
Figure 9.1.	Real per Capita Expenditures on Income-	
-	Tested Benefits and Share of GDP Used for	
	Need-Tested Benefits, Total and Medical,	
	1968–94	394
Figure 9.2.	Real Welfare Expenditures per Capita,	
-	1965–95	398

### Figures

Figure 9.3.	Number of Welfare Recipients per Capita,	
C	1965–95	400
Figure 9.4.	Real Welfare Expenditures per Recipient,	
	1965–95	401
Figure 9.5.	Divorce Rate and per Capita Number of	
	Female-Headed Households, 1940–44	403
Figure 9.6.	Birthrates for Unmarried Women by Age,	
	1940–93	404
Figure 9.7.	Basis of AFDC Eligibility, 1942–94	405
Figure 9.8.	Two Components of Change in Real per	
	Capita AFDC Expenditures, 1971–95	416
Figure 9-1.1.	Average Welfare Expenditures per Adult	
	Female, United States	427
Figure 9-1.2.	Average Welfare Expenditures per Adult	
	Female, Four Selected Regions	429
Figure 9-1.3.	Average Welfare Expenditures per Adult	
	Female by Race	430
Figure 9-1.4.	Female Headship Rates by Race	432

### Tables

Table 2.1.	Average Annual Rate of Decline in Mortality	
	for Base Period versus Forecast by Age and	
	Sex	page 20
Table 2.2.	High-Low Ranges for Forecasts of Selected	
	Items to 2050 as Percentage of Middle Forecast	22
Table 2.3.	Standard Errors for Forecasts of Annual	
	Population Growth Rate by Horizon	41
Table 2.4.	Errors of Cost Rate Forecasts from ex Post	
	Analysis of OASSA Projections and ex Ante	
	Analysis of Lee-Tuljapurkar Stochastic	
	Forecasts by Horizon	50
Table 2-1.1.	Resident Population by Age, U.S. Census	
	Middle Series, with Cohort-Component	
	Interpolations	61
Table 2-1.2.	Resident Population by Age, U.S. Census Low	
	Series, with Cohort-Component Interpolations	62
Table 3.1.	Optimal Policy Rules under Government	
	Discount Rate = 2, Four-Period Horizon	85
Table 3.2.	Optimal Policy Rules under Government	
	Discount Rate = 1, Four-Period Horizon	90
Table 4.1.	Impact of Demographic Characteristics on	
	Cost Function	109
Table 4.2.	Typical Expenditure Externalities	115
Table 4.3.	Components of Tax and Spending Externalities	121
Table 4.4.	Spillover Parameters for Four Stylized Public-	
	Good Types	125
Table 4.5.	Cost Function Parameters for Three Stylized	
	Public-Good Types	125

### Tables

Table 4.6.	California County Spending Categories as	105
TT 1 1 4 7	Convex Combinations of Stylized Public Goods	127
Table $4.7$ .	Summary Statistics, California Counties	130
Table 4.8.	Effects of Population Age Composition on	
	Expenditure and Revenue Shares for	122
T-1-1- 4.0	California Counties	133
Table 4.9.	Effects of Population Age Composition on per	
	Capita Expenditures and Revenues for	125
TT 1 1 4 10	California Counties	135
Table 4.10.	Budgetary Consequences of Changing the Age	
	Composition of a County's Population in	100
<b>—</b> 11 / / / /	California, Least Squares Estimates	136
Table 4.11.	Budgetary Consequences of Changing the Age	
	Composition of a County's Population in	
	California, Least Absolute Deviation Estimates	137
Table 4-1.1.	Demographic Characteristics of Selected	
	California Counties, 1970–90	154
Table 5.1.	U.S. Base Case	181
Table 5.2.	Additional U.S. Incentive Calculations	183
Table 5.3.	International Summary	184
Table 6.1.	Trends in Fertility, Life Expectancy, and	
	Population Size, 1995–2035	204
Table 6.2.	Projections of the Elderly and Oldest-Old	
	Population, 1995–2055	206
Table 6.3.	Macroeconomic and Fiscal Indicators	209
Table 6.4.	Pension and Health Care Expenditures,	
	1995–2050	212
Table 6.5.	Generational Accounts for Selected Member	
	States of the EU	220
Table 6.6.	Scaled Generational Accounts for Selected	
	Member States of the EU	223
Table 6.7.	Minima and Maxima in the Generational	
	Accounts	224
Table 6.8.	Measuring Generational Balance	225
Table 6.9.	Sources of Generational Imbalance, Total Tax	
	Increase Needed to Restore Generational	
	Balance	228
Table 6.10.	Reforming Public Pension Schemes in Spain.	
	Denmark, and Finland	232
Table 6.11.	Reforming Social Insurance in Germany	236
Table 7.1.	Forecast Changes in Demographics and	
	Medical Spending by Age	256

#### Tables

Table 7.2.	Share of Marginal Survivors by Age	261
Table 7.3.	Percentage of Elderly in Last Year of Life	262
Table 7.4.	Restricted-Activity Days among the Elderly	266
Table 7.5.	Ability to Perform Major Activity among the	
	Elderly	268
Table 7.6.	Self-Reported Health Status of the Elderly	269
Table 7.7.	Disability Rates among the Elderly	270
Table 7.8.	Disability Changes among the Elderly in	
	OECD Countries	271
Table 7.9.	Medicare Expenditures in Last Year of Life,	
	1988	273
Table 7.10.	Annual Growth Rate of Real Medicare	
	Spending by Age	274
Table 7.11.	Forecasts of Medicare Acute Care Expenditures,	
	Accounting for Changes in Age at Death and	
	Disability among Survivors	275
Table 7.12.	Effect of Disability on Medicare Expenditures	277
Table 7.13.	Projected Growth in Medicare Spending under	
	Two Assumptions	278
Table 7.14.	Probability of Nursing Home Use	282
Table 7.15.	Forecasts of Nursing Home Utilization,	
	Accounting for Age at Death, Disability, and	
	Changes in Demographics	285
Table 7.16.	Marital Status of Elderly Population	286
Table 7.17.	Distribution of Medicare Spending by Age, 1992	289
Table 7-1.1.	Reimbursement per Medicare Enrollee by Age.	
	1976	293
Table 7-1.2.	Effect of Change in Age Distribution of	
	Medicare Enrollees on Reimbursement per	
	Enrollee, 1975–95	293
Table 8.1.	CORSIM Modules Used in This Study	315
Table 8.2.	Average Age of Death by Lifetime Labor	
	Earnings	331
Table 8.3.	Total Benefits	335
Table 8.4.	Total Taxes	339
Table 8.5.	Internal Rates of Return under Intermediate	
	Assumptions	341
Table 8.6.	Internal Rates of Return under High-Cost	
	Assumptions	344
Table 8.7.	Internal Rates of Return under Low-Cost	
	Assumptions	347
Table 8.8.	Number of Observations	350
10010 0.0.		550

CAMBRIDGE

### Tables

Table 8.9.	Lifetime Net Tax Rate under Intermediate	255
<b>T</b> 11 0 10	Assumptions	300
Table 8.10.	Lifetime Net Tax Rate under High-Cost	250
<b>T</b> 11 0 11	Assumptions	358
Table 8.11.	Lifetime Net Tax Rate under Low-Cost	
	Assumptions	361
Table 8.12.	Internal Rates of Return under Intermediate	
	Assumptions: A 38% Tax Increase Beginning	
	in 1999	364
Table 8.13.	Internal Rates of Return under Intermediate	
	Assumptions: A 25% Benefit Cut Beginning	
	in 1999	367
Table 9.1.	Expenditures in the Six Largest Welfare	
	Programs in the United States, 1994	396
Table 9.2.	Welfare Participation Rates by Demographic	
	Group, 1994–96	412
Table 9.3.	Changes in Population Shares and AFDC	
	Participation Rates. Selected Groups and	
	Income Levels, 1968–70 to 1994–96	413
Table 9.4.	Decomposition of Change in Real AFDC	
	Expenditures per Capita 1968–70 to 1994–96	414
Table 9.5	Decomposition of Change in AFDC	
10010 9.51	Expenditures by Race Food Stamps	
	Expenditures and Medicaid Expenditures	417
Table 0.6	Projections of Real per Capita Expenditures	717
14010 9.0.	to 2050	122
$T_{2}$ = 1 0 1 1	10 2030 Decomposition of Change in non Conite	422
Table 9-1.1.	Welfere Dependente Deserved by Adult Western	
	1070 21 merece 1007	101
	19/9–81 versus 199/	431

xiv

### Contributors

Alan J. Auerbach University of California, Berkeley

**Axel Börsch-Supan** University of Mannheim

**Steven Caldwell** Cornell University

**David Card** University of California, Berkeley

**David M. Cutler** Harvard University

Peter Diamond Massachusetts Institute of Technology

Nada Eissa University of California, Berkeley

Victor R. Fuchs Stanford University

Alla Gantman Boston University

Jagadeesh Gokhale Federal Reserve Bank of Cleveland Jonathan Gruber Massachusetts Institute of Technology

Kevin Hassett American Enterprise Institute

Hilary Williamson Hoynes University of California, Berkeley

**Thomas Johnson** Cornell University

Laurence J. Kotlikoff Boston University

Ronald Lee University of California, Berkeley

Massimo Livi-Bacci University of Florence

Thomas MaCurdy Stanford University

**Daniel McFadden** University of California, Berkeley

**Robert A. Moffitt** Johns Hopkins University

XV

Contributors

**S. Philip Morgan** Duke University

**Thomas Nechyba** Duke University

Bernd Raffelhüschen Albert-Ludwigs-University of Freiburg

**Louise Sheiner** Federal Reserve Board

James P. Smith RAND Shripad Tuljapurkar Mountain View Research

David N. Weil Brown University

**David R. Weir** University of Michigan

**Robert Willis** University of Michigan

David Wise Harvard University

xvi

# Acknowledgments

This book arose from a conference of international scholars held at the University of California, Berkeley. The conference could not have occurred without funding from the Burch Center for Public Finance at Berkeley, and from the Berkeley Center on the Economics and Demography of Aging, funded by the National Institute on Aging, for which we are grateful. We also thank Denise Brauer for her efforts in planning the conference and preparing the manuscript.