The Future of Retirement: Population Aging and Individual Life Cycles

Robert J. Willis

Department of Economics and

Institute for Social Research

University of Michigan

Motivation of My Talk

- Demographic changes leading to population aging and increased longevity create challenges for all industrialized countries

- The Health and Retirement Study is designed to develop data for the U.S. to help scientific and policy researchers understand these challenges and design policies to meet them.

  – Similar data now being collected throughout Europe, in Asia and parts of Latin America (but not Canada).

Motivation (cont.)

- In this talk, I will survey some of these demographic trends through the lens of two types of economic theory
  - microeconomic theory of life cycle behavior
  - aggregate overlapping generations model with realistic demography
- Focus on implications for retirement behavior and policy questions
- Briefly survey some relevant results from HRS and other data

Changing Landscape of Aging In America

- **Changing Demographic Structure**
  - Baby Boom approaches retirement
  - Growth in longevity
  - Divorce revolution and changes in family structure

- **Changing Landscape of Work and Retirement**
  - Continued decline in defined benefit pensions, solvency issues
  - Increase in 401(k), other defined contribution plans
  - Decrease in employer health insurance; disappearing retiree health insurance
  - Increased complexity of decisions about work, savings, health, and retirement

Changing Landscape of Aging In America (cont.)

- **Changing Epidemiological and Health Care Trends**
  - Continued improvements in medical/pharmaceutical technology, rapidly rising expenditures
  - Obesity trends
  - Growth in risk of ending life with dementia as competing causes of death decrease

- **Changing Policies**
  - Debates on Social Security reform, solvency
  - Cuts and restructuring of Medicaid
  - New Medicare Prescription Drug program
  - Tax reform and Medicare reform on horizon

Economic Measures in HRS Guided by Theory

- **Macroeconomic framework**
  - **overlapping generations model** (P. Samuelson)
    - developed with detailed demography by R. Lee and R. Willis
- **Microeconomic Theory**
  - **Life Cycle Model** (F. Modigliani and M. Friedman)
  - **Human capital** (G. Becker, J. Mincer, Y. Ben Porath)
  - **Health capital** (M. Grossman)
  - **Expected utility theory and behavior under uncertainty**, (J. von Neuman and O. Morgenstern, Merton)

Economic Measures in HRS Guided by Theory (cont.)

- **Income**
  - from labor, assets, government transfers, family transfers
- **Wealth**
  - from personal assets, future streams of employer pensions, social security benefits, value of inheritances received or bequests given
- **Consumption**
  - goods and services, out-of-pocket medical expenses, transfers to children and others
- **Expectations**
  - subjective probabilities of survival, leaving a bequest, entry into nursing home, large medical expenses, stock market returns, economic conditions

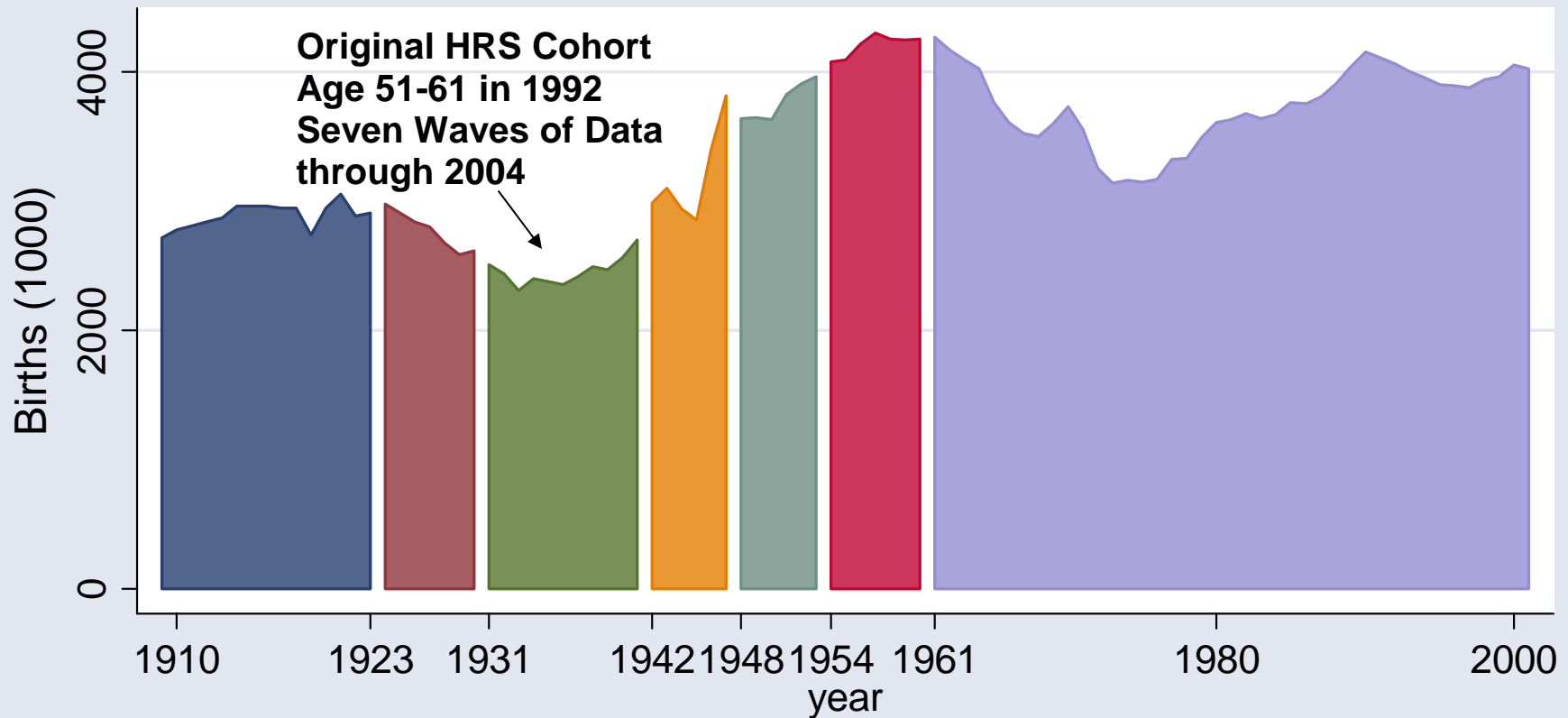# Baby Boom, Baby Bust and the Changing U.S. Age Distribution

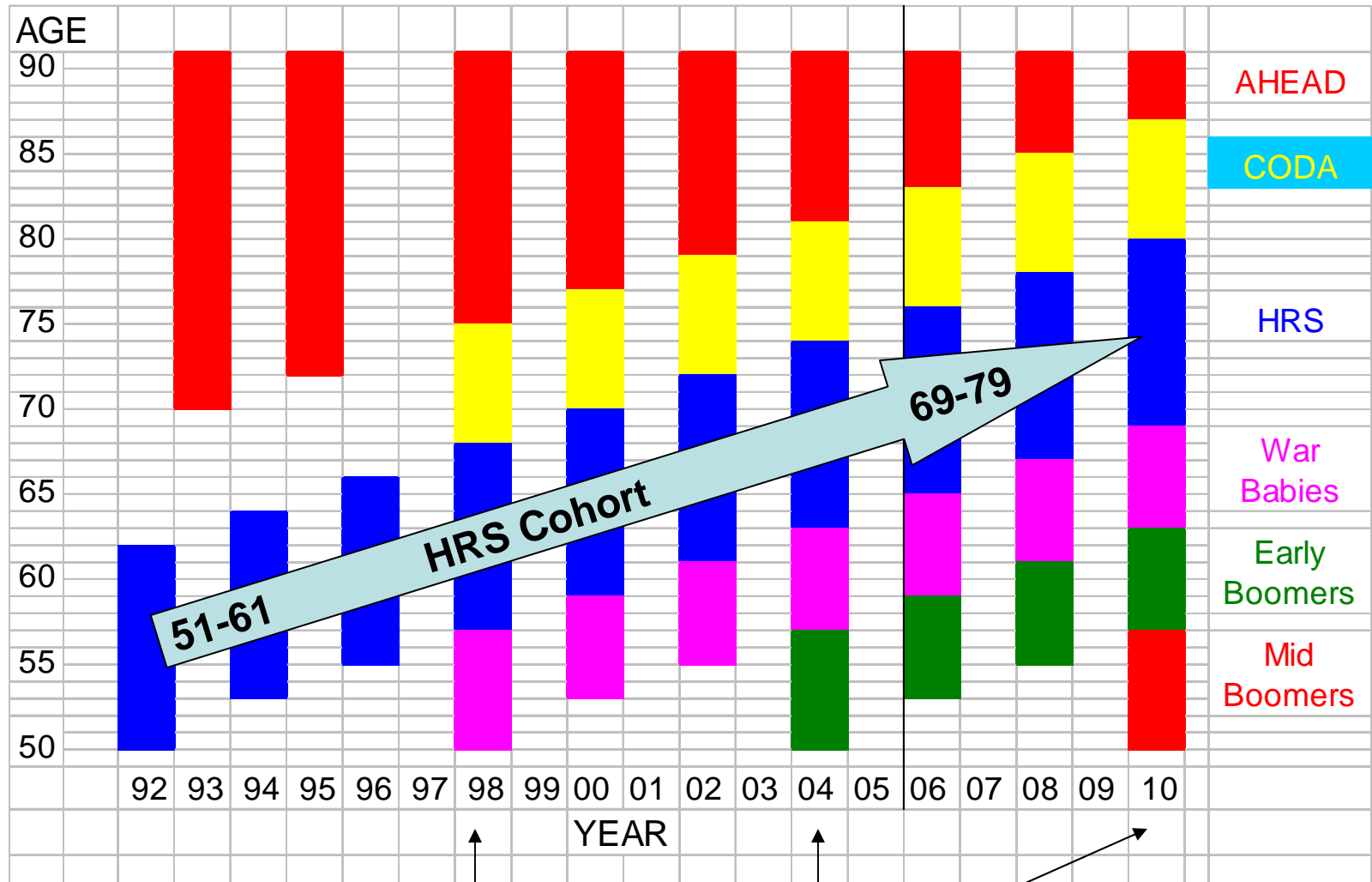# U.S. Fertility History: Numbers of Live Births, 1910-2002

Figure 1.

LIVE BIRTHS* (millions)

Baby Boom 76 million (38-56)

Baby Bust 41 million (27-37)

Baby Boomlet 99 million** (0-26)

"Grandparents" 44 million (78-92)

"Parents" 55 million (57-77)

2002

Yardeni
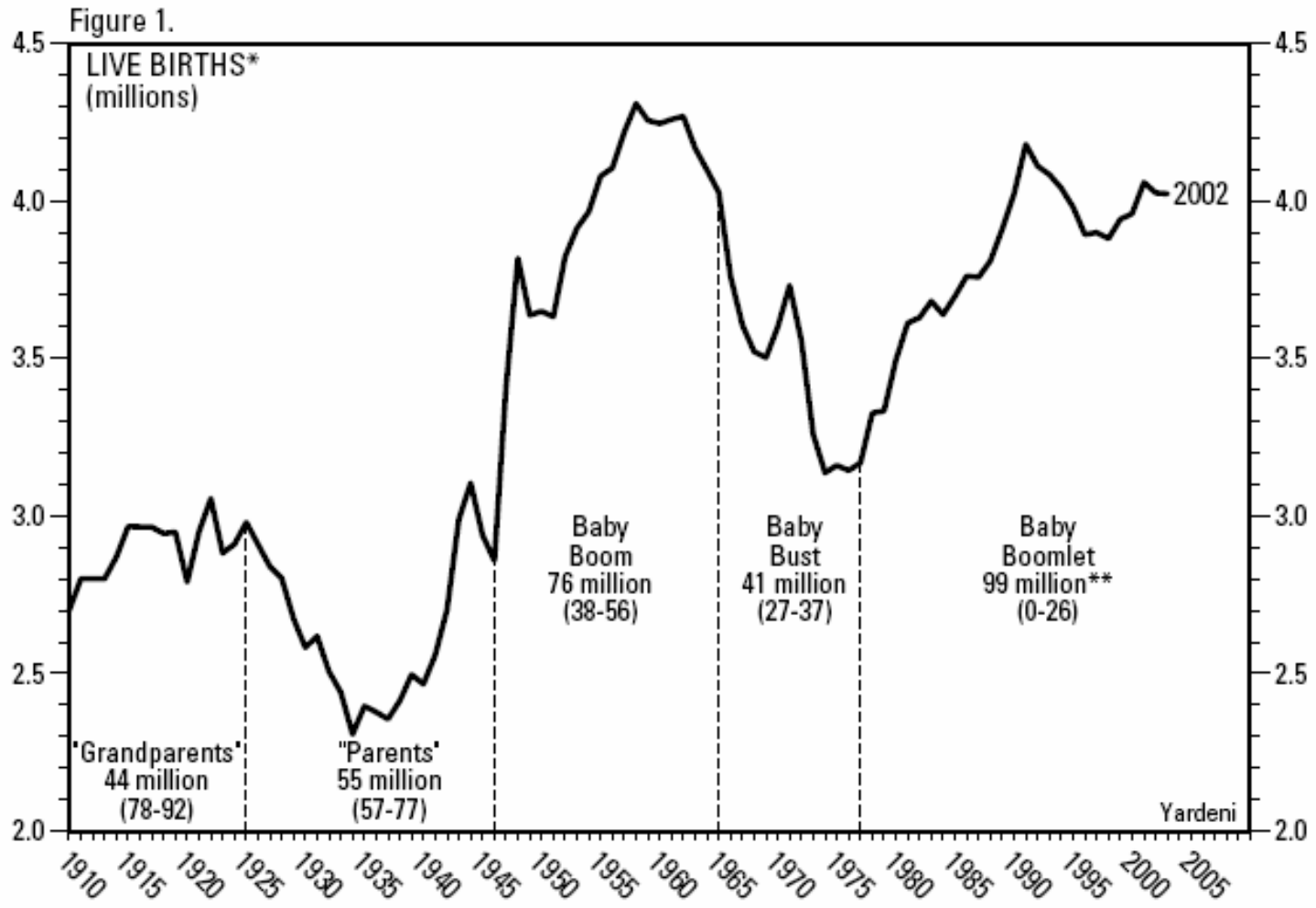
Figure 3. Size of Birth Cohorts Represented in HRS

Total Number of Births in U.S. in Year

**Original HRS Cohort
Age 51-61 in 1992
Seven Waves of Data
through 2004**

Legend:
- 1890-1923 AHEAD
- 1924-1930 CODA
- 1931-1941 HRS
- 1942-1947 War Baby
- 1948-1953 Early Boomer
- 1954-1960 Mid Boomer
- 1960-2000 Post Boomer
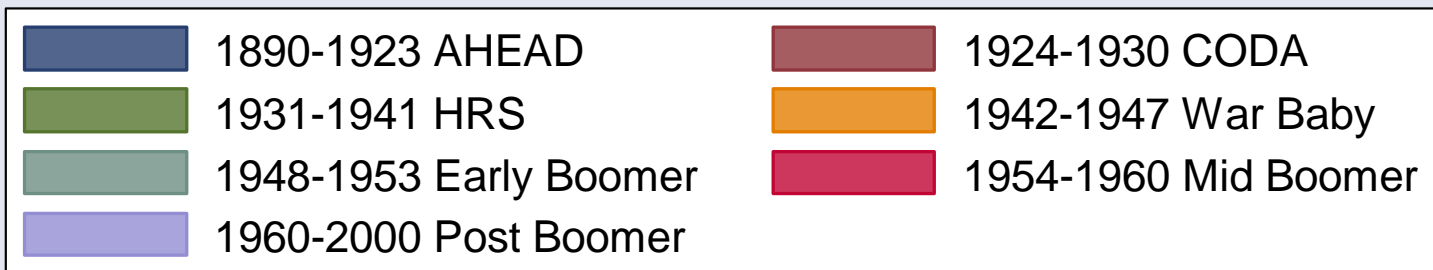
HRS Steady State Design

Figure 4. Cohort Fertility and Percent Childless
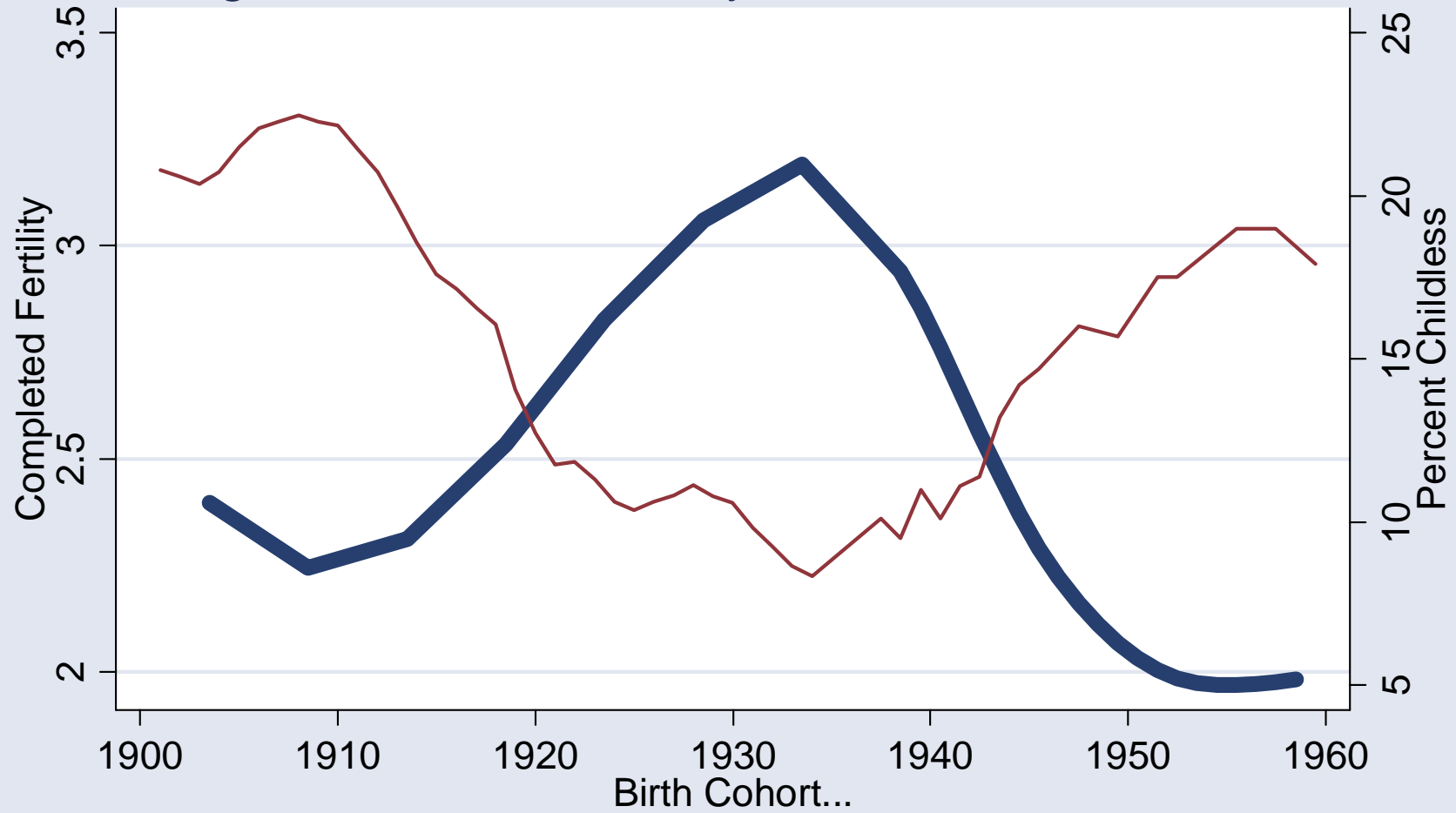
Source: Heuser (1976) and NCHS Vital Statistics, various tables

Divorce Rose Rapidly in the 1970s, More than Doubling from 1965 to 1980
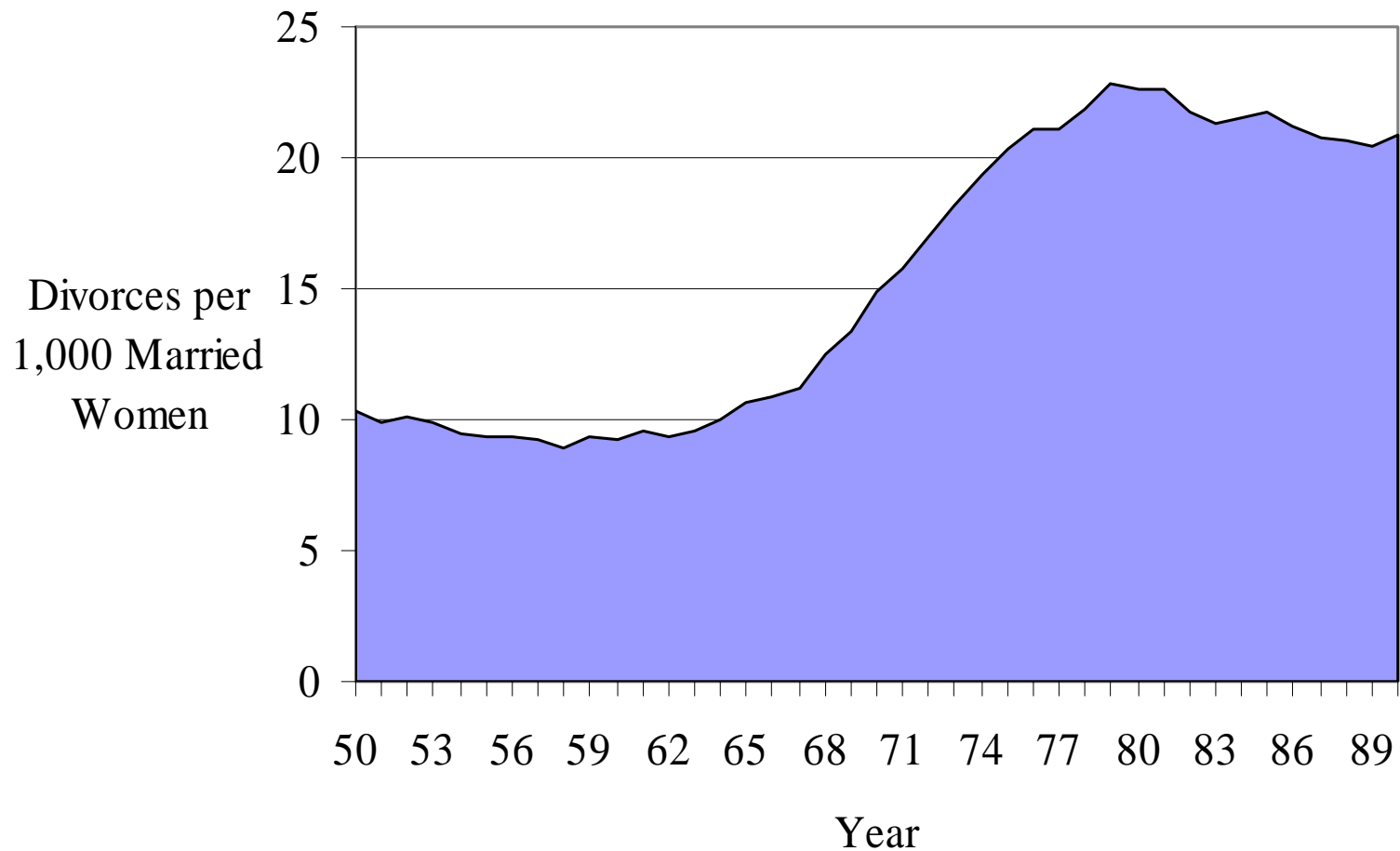
Lasting Impact of Divorce Explosion for Future Retirees

Original HRS
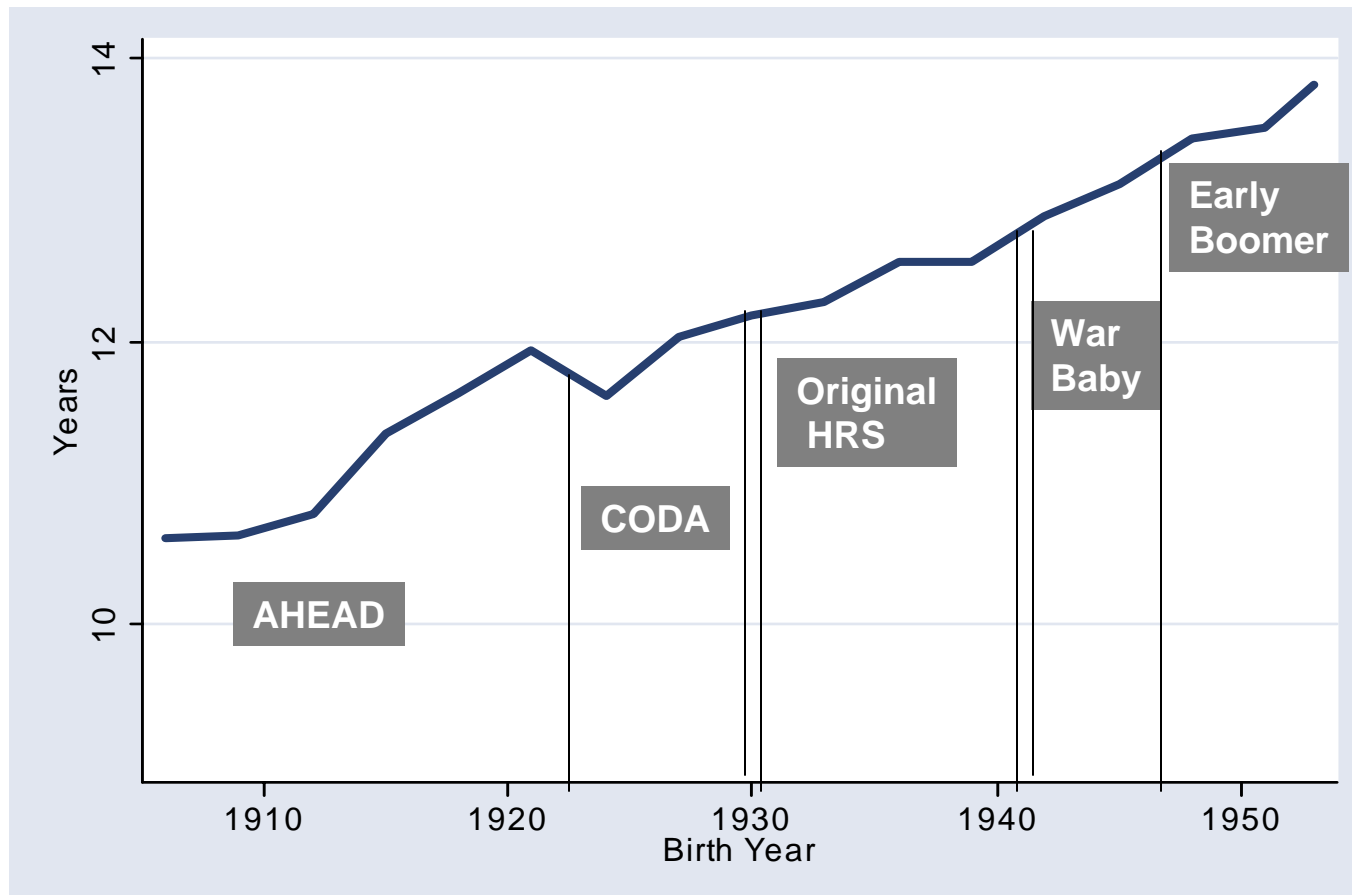**Age 25 in 1961-66**
14.8% Div/Sep in 1992

War Babies
Age 25 in 1967-72
18.0% Div/Sep in 1998

Early Boomers
Age 25 in 1973-78
24.1% Div/Sep in 2004

Divorces per 1,000 Married Women

25

20

15

10

5

0

50   53   56   59   62   65   68   71   74   77   80   83   86   89
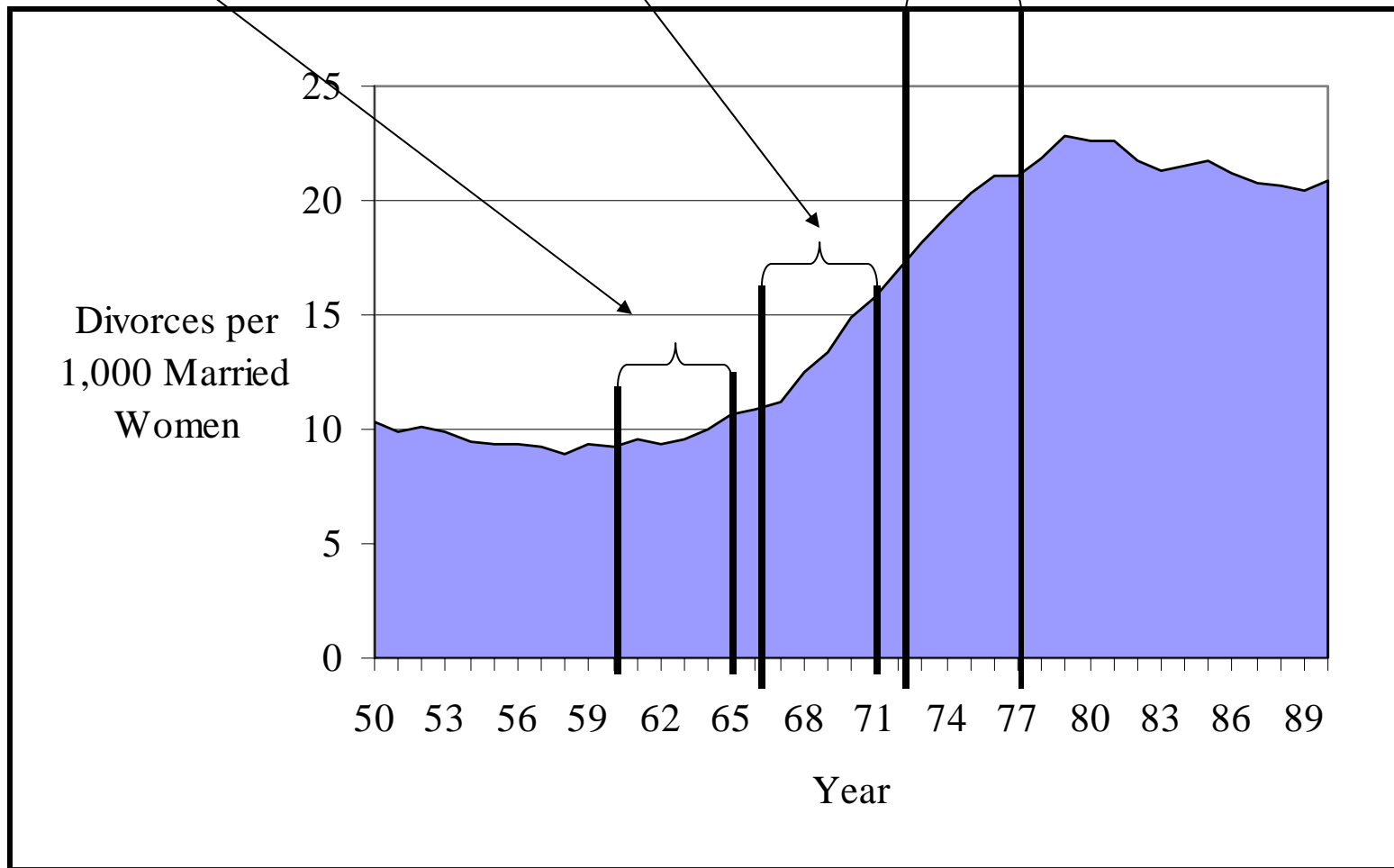
Year

Growth in Educational Attainment in Successive Cohorts in HRS

Average Years of Schooling by Birth Cohort



Source: Computations from Health and Retirement Study

Aging of the Boomers
and Population Age Structure

**1975
age 10-25**

Figure 2-4.
**Population by Age and Sex: 1975**

Baby Boom

Male — Age — **Female**
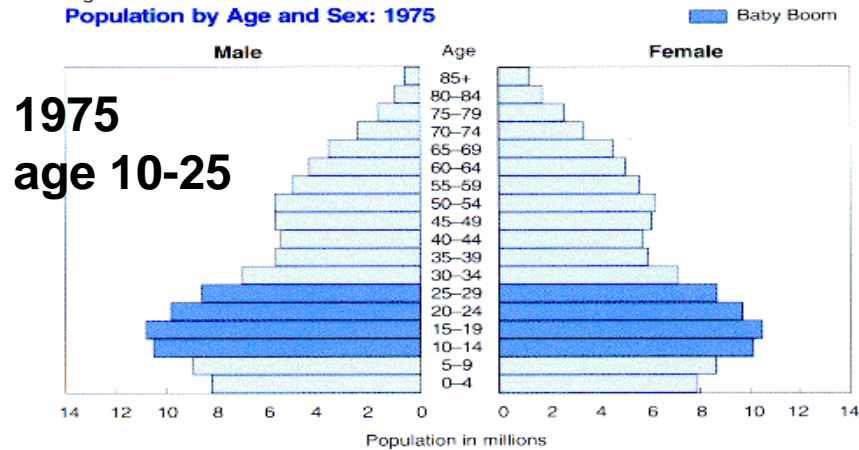
Source: U.S. Bureau of the Census, *Preliminary Estimates of the Population of the United States, by Age, Sex, and Race: 1970 to 1981*, Current Population Reports, Series P-25, No. 917. U.S. Government Printing Office, Washington DC, 1982.

**2030
age 65-80**

Figure 2-6.
Projected Population by Age and Sex: 2030
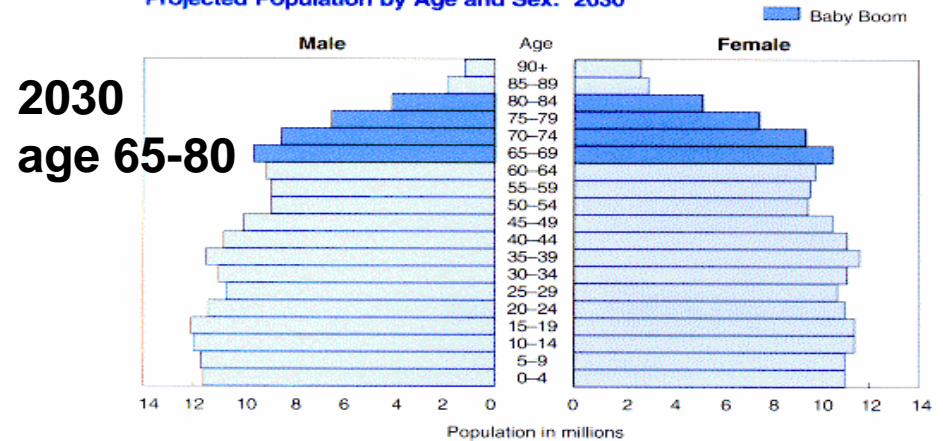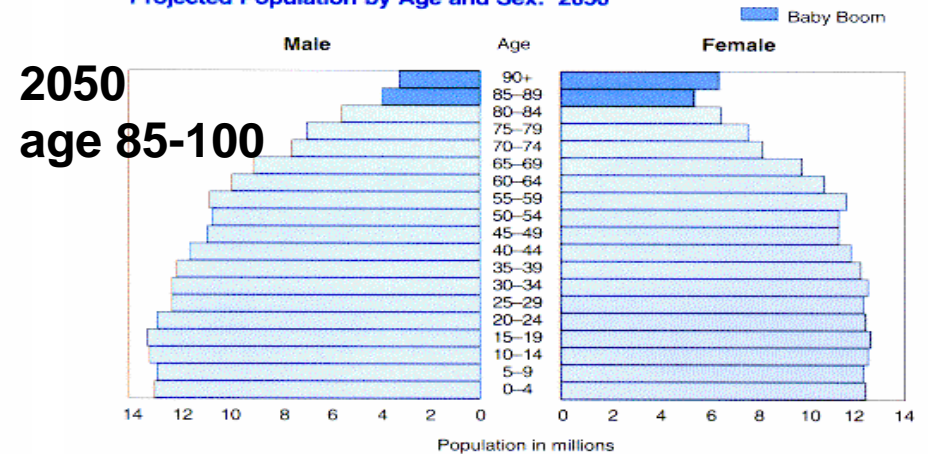
Baby Boom

Male — Age — **Female**

Source: Jennifer C. Day, U.S. Bureau of the Census, *Population Projections of the United States, by Age, Sex, Race, and Hispanic Origin: 1993 to 2050*, Current Population Reports, P25-1104. U.S. Government Printing Office, Washington, DC, 1993 (middle series projections).

**2010
age 45-64**

Figure 2-5.
Projected Population by Age and Sex: 2010
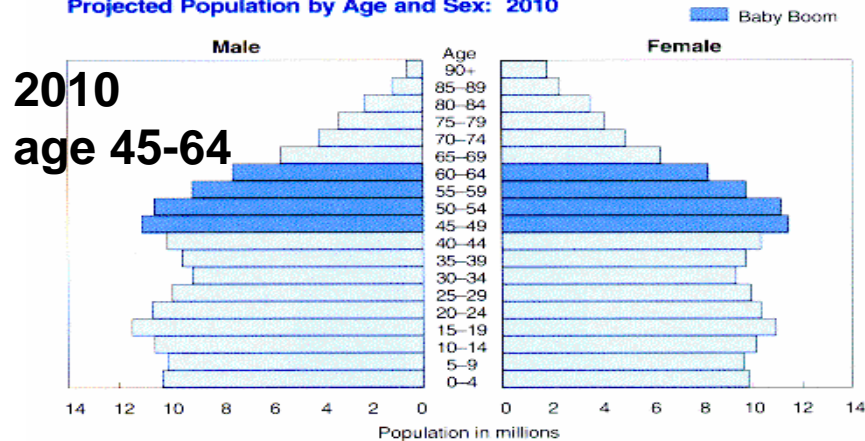
Baby Boom

Male — Age — **Female**

Source: Jennifer C. Day, U.S. Bureau of the Census, *Population Projections of the United States, by Age, Sex, Race, and Hispanic Origin: 1993 to 2050*, Current Population Reports, P25-1104. U.S. Government Printing Office, Washington, DC, 1993 (middle series projections).

**2050
age 85-100**

Figure 2-7.
Projected Population by Age and Sex: 2050

Baby Boom

Male — Age — **Female**

Source: Jennifer C. Day, U.S. Bureau of the Census, *Population Projections of the United States, by Age, Sex, Race, and Hispanic Origin: 1993 to 2050*, Current Population Reports, P25-1104. U.S. Government Printing Office, Washington, DC, 1993 (middle series projections).

The U.S. in Global Context

- **Rapid Population Aging Throughout the world**

- **Consequence of world-wide**
  - fertility decline
  - increasing longevity

- **U.S. experiencing less rapid change than many countries**

Fraction of Population over 65:
U.S. Not in Top 20 of Aging Societies

Proportion of Population over 65

source: U.S. Census International Data Base, 2004
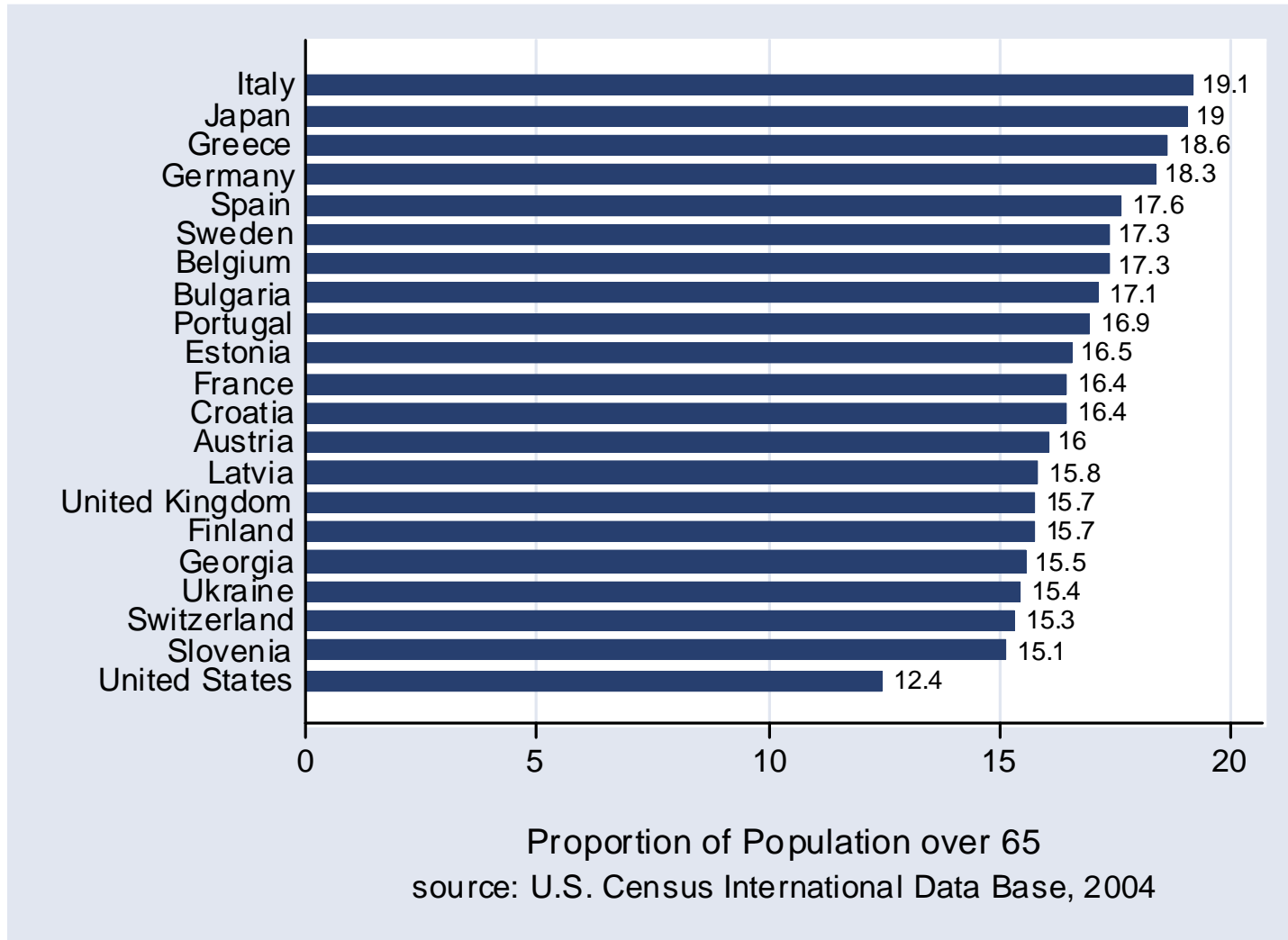
World-Wide Fertility Decline

FIGURE 2   Period total fertility rates, selected low-fertility countries, 1960–97
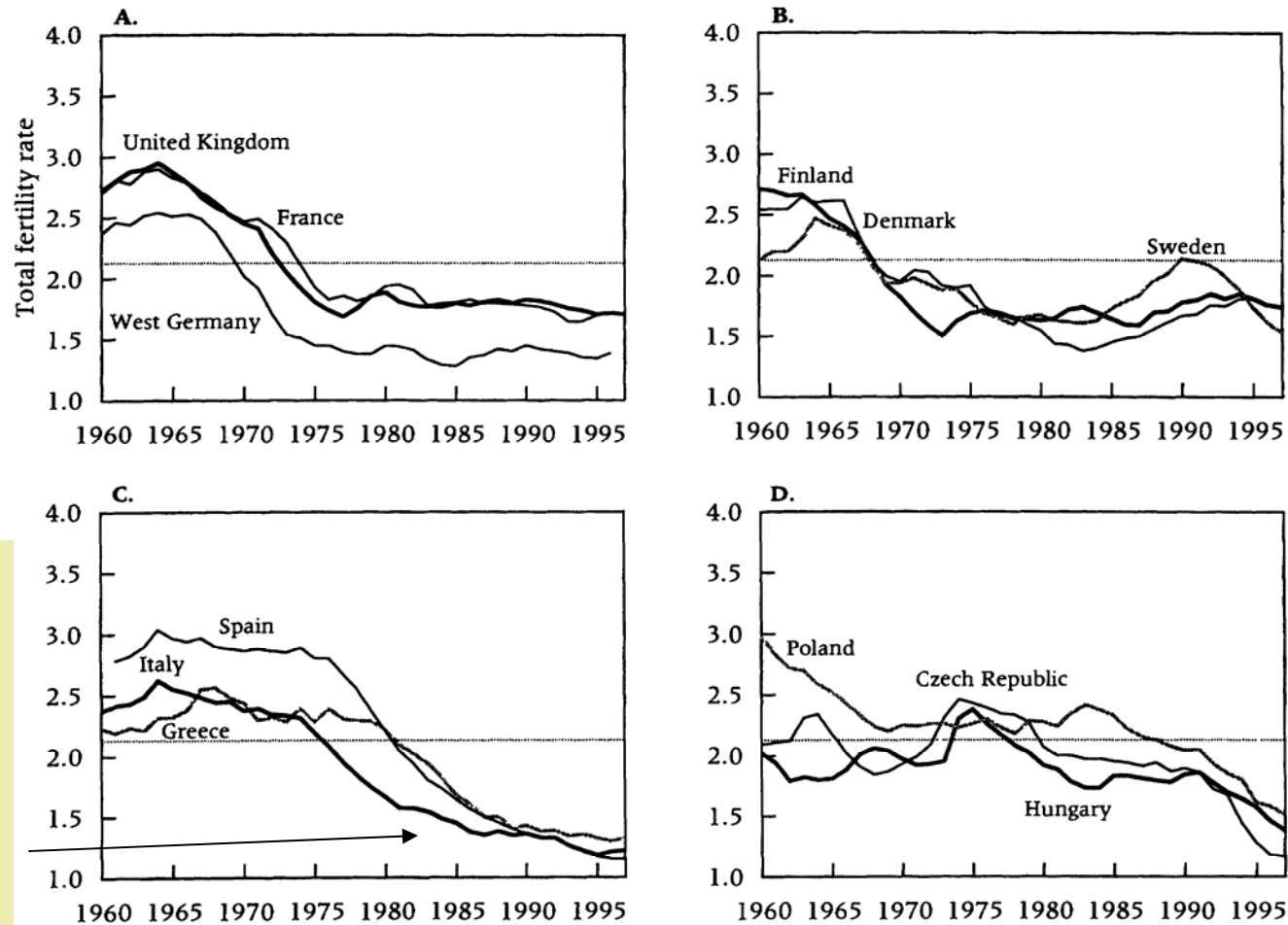
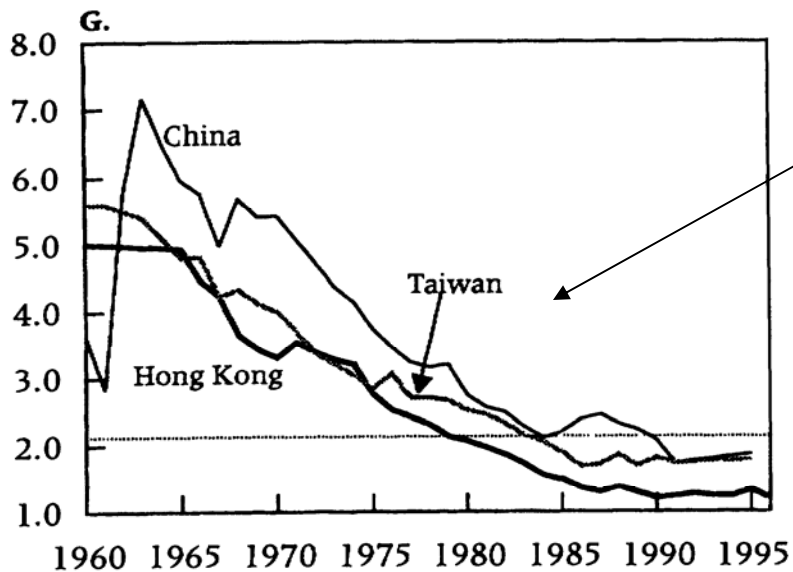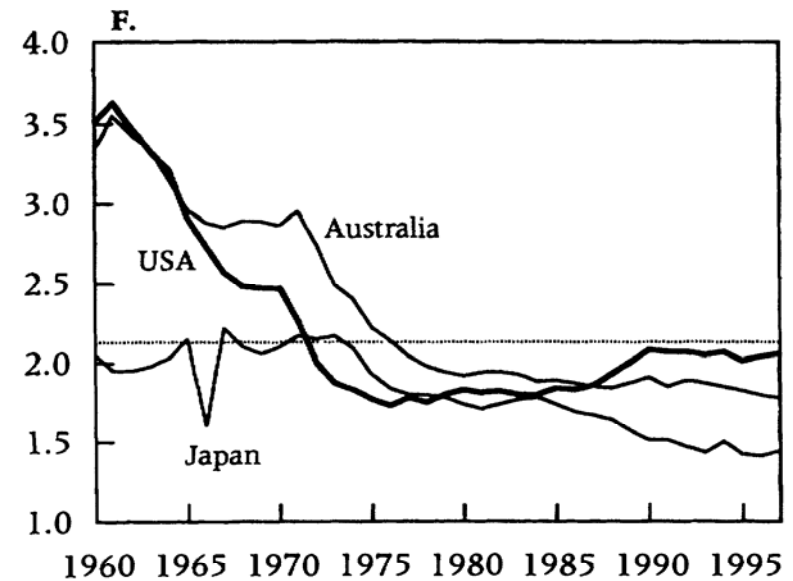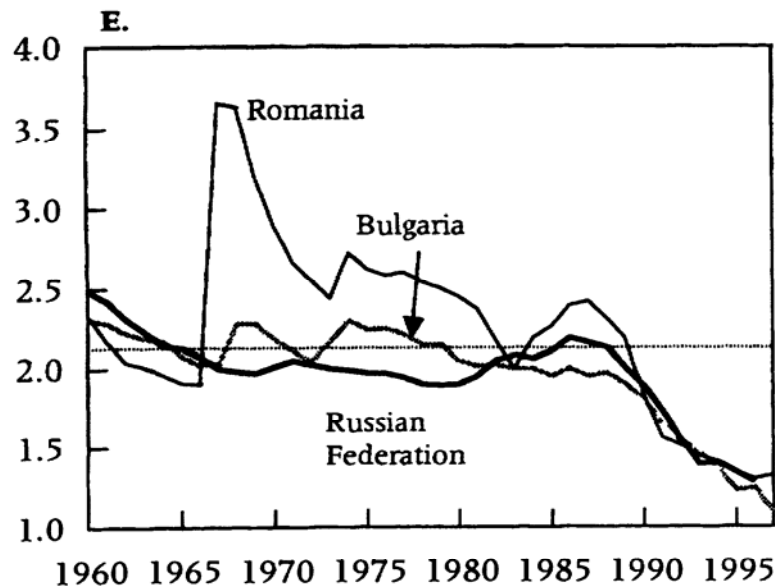"Italians are like pandas; they're an endangered species"

Guliermo Weber

Source: Tomas Frejka and John Ross, "**Paths to Subreplacement Fertility: The Empirical Evidence**"
Population and Development Review, Vol. *27,* Supplement: Global Fertility Transition *(2001), 213-254.*

E.

F.
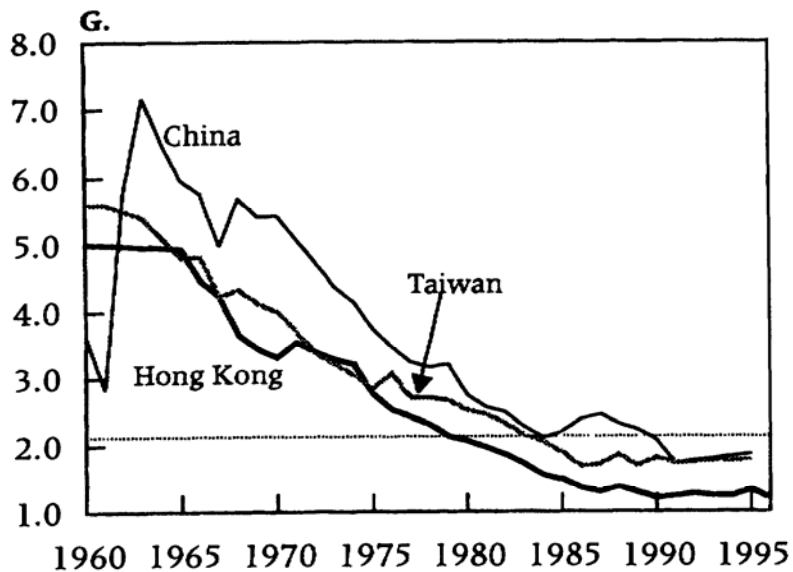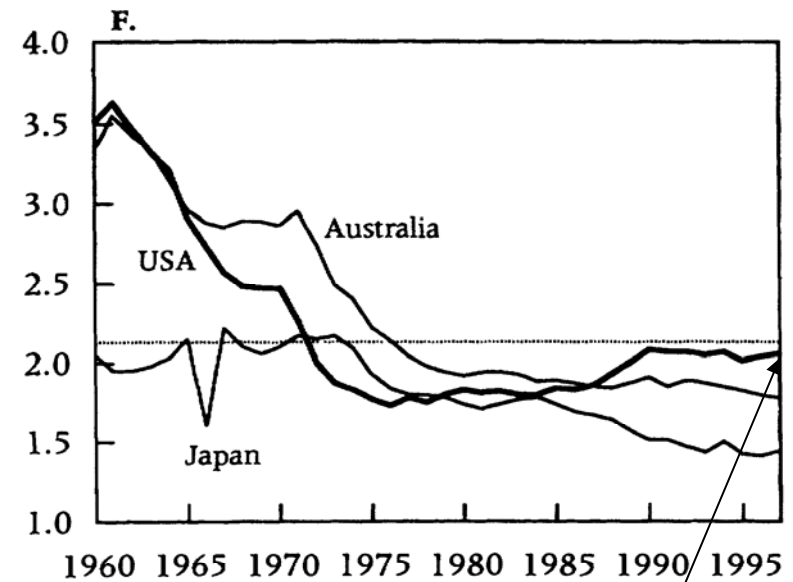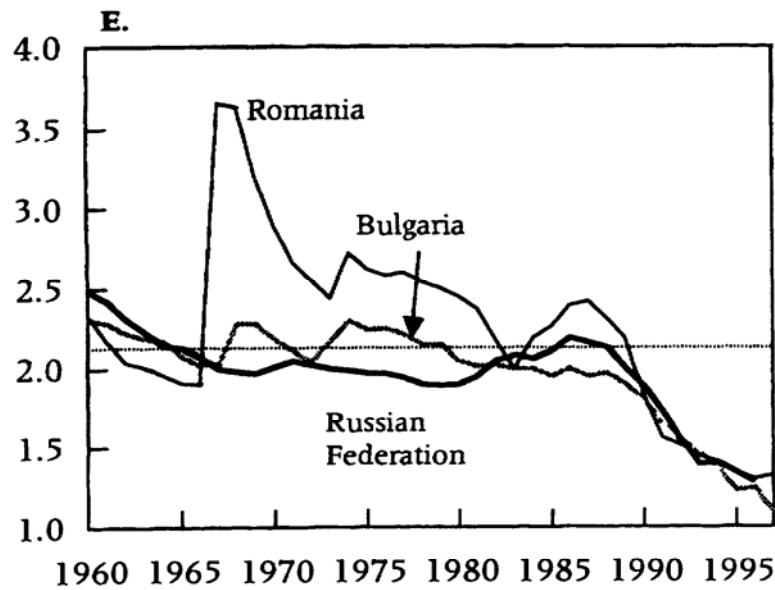
During last decade (1995-2005) U.S. is only industrialized country with fertility above replacement. (May have dropped below 2.0 in 2003)

G.

Source: Tomas Frejka and John Ross, "**Paths to Subreplacement Fertility: The Empirical Evidence**" *Population and Development Review,* Vol. *27,* Supplement: Global Fertility Transition *(2001), 213-254.*

E.

F.

G.

Extraordinarily rapid and deep decline in fertility in Asia will create most rapid aging.

These societies have almost no legacy of Welfare State programs. They are searching for policies to confront aging in not too distant future
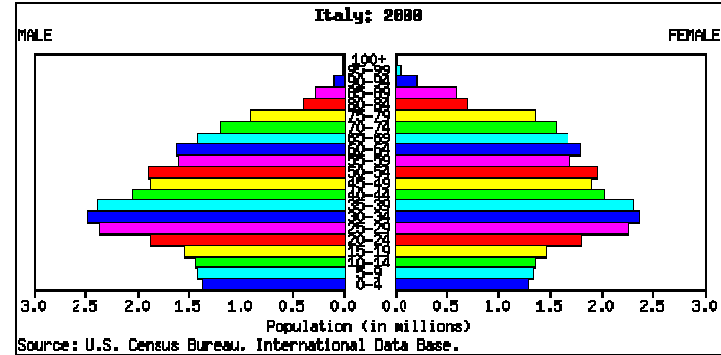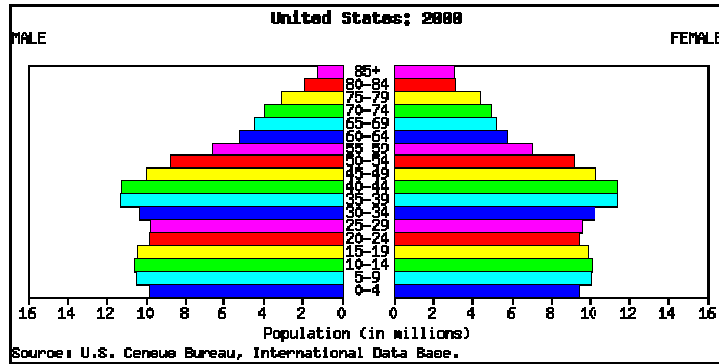
Source: Tomas Frejka and John Ross, "**Paths to Subreplacement Fertility: The Empirical Evidence**" *Population and Development Review,* Vol. *27,* Supplement: Global Fertility Transition *(2001), 213-254.*

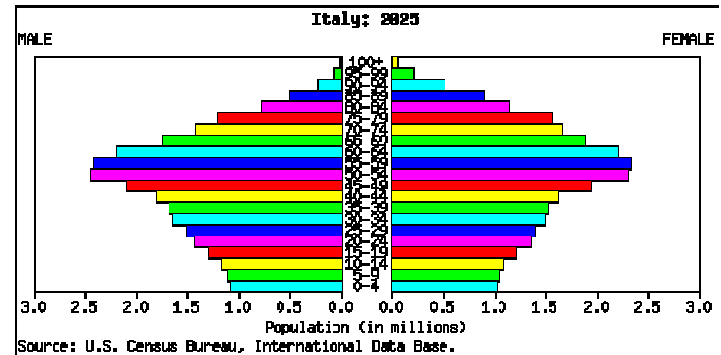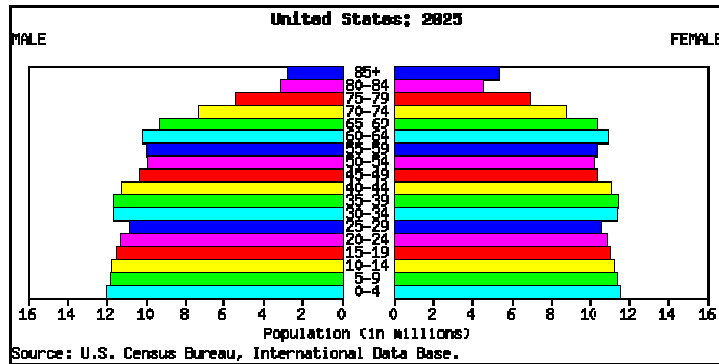# Figure 6: Projected Age Distributions in the U.S. and Italy

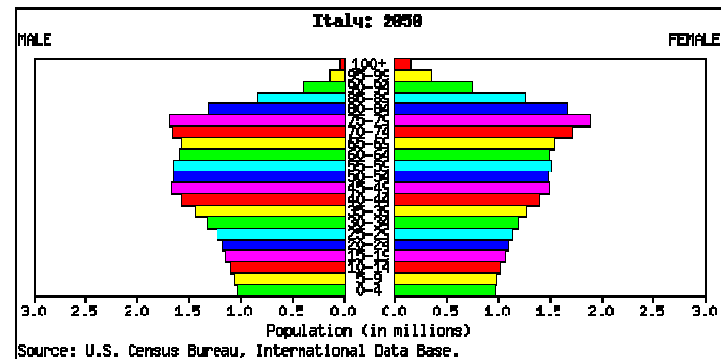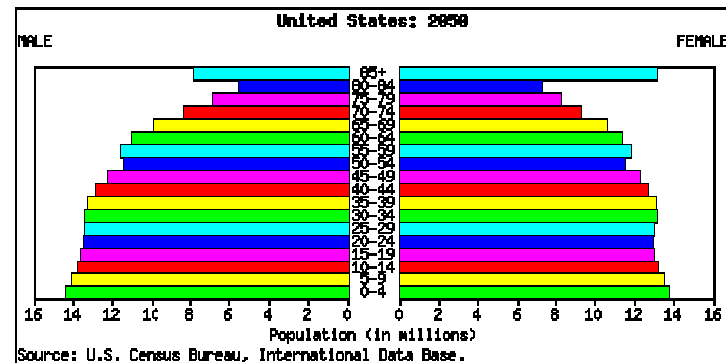## United States

Italy

Mortality Decline and Life Expectancy

Growth in U.S. Life Expectancy

Life Expectancy

Source: National Vital Statistics Reports, Vol. 52, No. 14, February 18, 2004

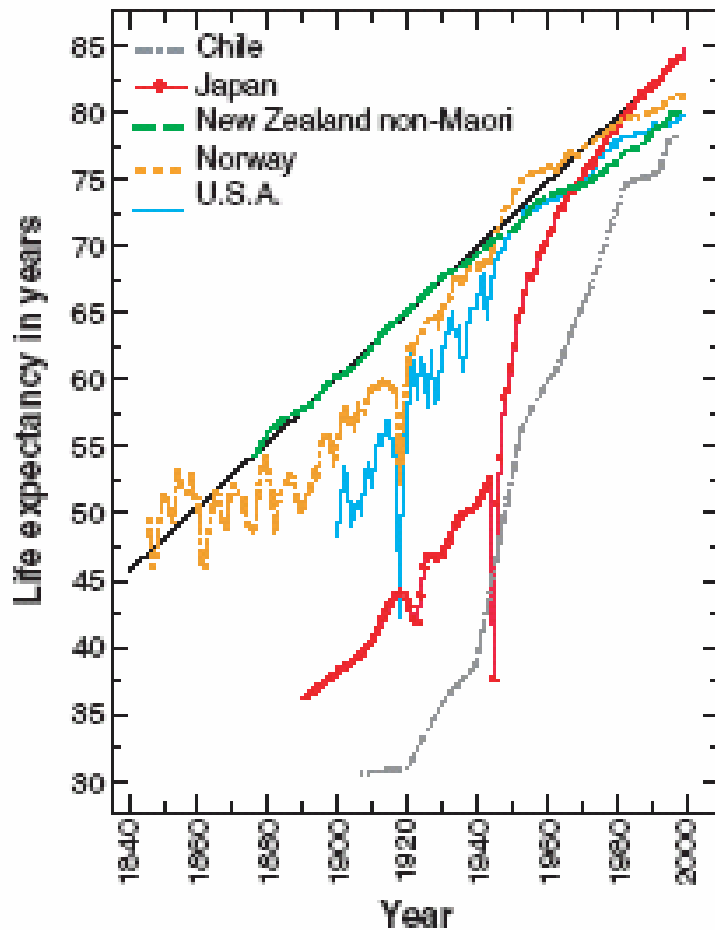Male Life Expectancy   Female Life Expectancy
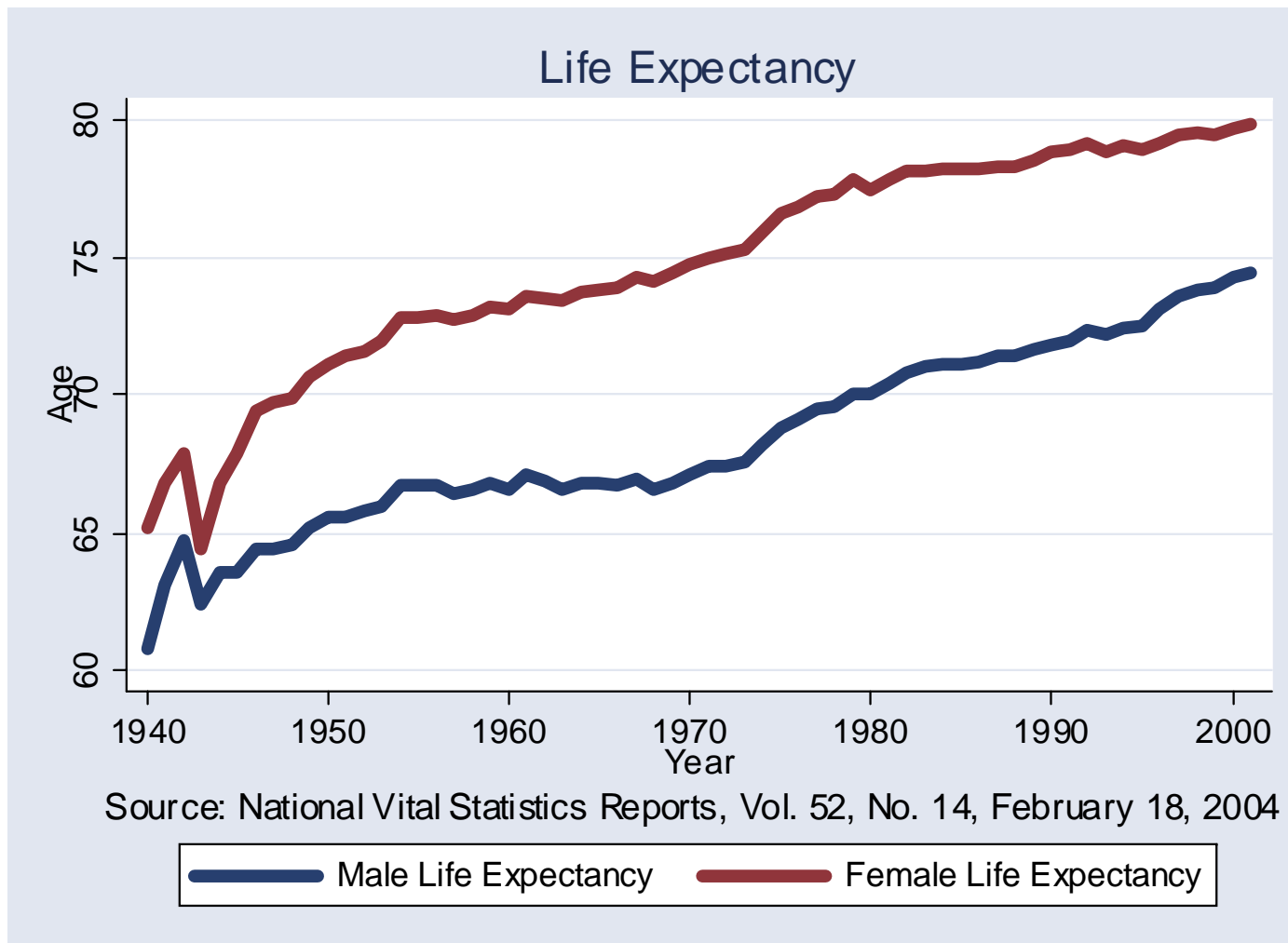
Fig. 2. Female life expectancy in Chile, Japan, New Zealand (non-Maori), Norway, and the United States compared with the trend in record life expectancy.

What is the Future of Life Expectancy in the U.S.?

•U.S. life expectancy grew rapidly in the first part of 20th Century, came close to world's best about 1950.

•Since then advances in life expectancy in U.S. have slowed relative to other countries and new "world leaders" have emerged, most recently Japan.

•In 1960, Japanese female aged 65 had 1/1000 chance of surviving to 100. In 2000, she would have a 1/20 chance

•Growth in "best practice" life expectancy seems to be linear with a gain of about 40 years over 160 years or about 3 months per year for females.

•If U.S. follows this linear increase, female life expectancy would increase from 80 to 90 years by 2040. In 1998, SSA projects 81.8 by 2080.

Increased Length of Life During 21st Century Will Add Almost All Years After 65

Figure 2

Probabilities of Survival from Birth to Each Age in 1994 and Projected to 2065, and Their Difference

Note: Person years gained is given by the difference between the two survival curves. The area under the person years gained line equals the gain in life expectancy between 1994 and 2065, which is 10.5 years. The survival curves are from period life tables for sexes combined.
Source: Calculated from Lee and Carter (1992) and Office of the Actuary (1996).
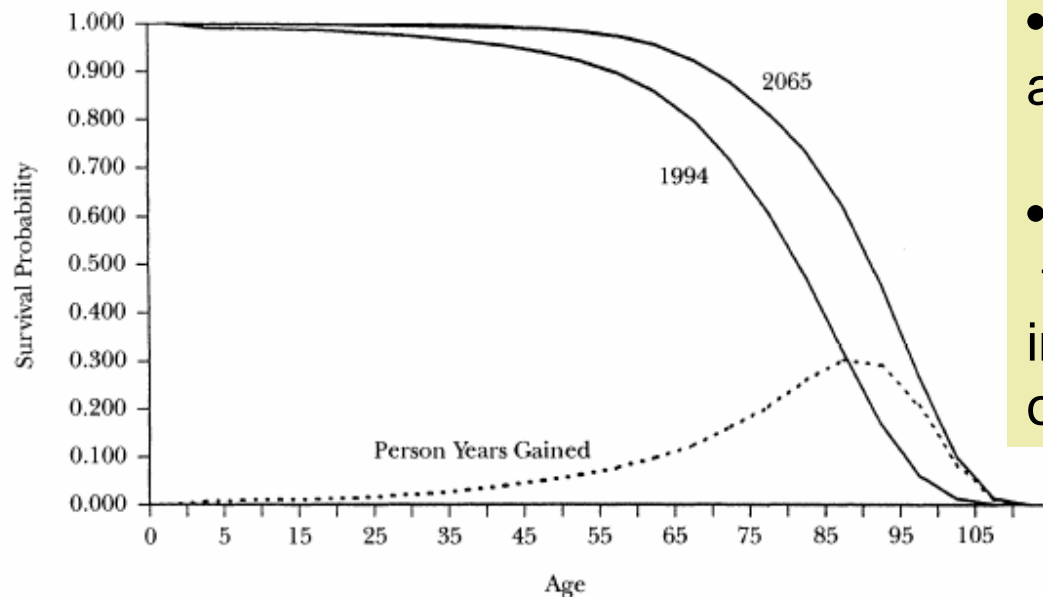
- Evidence that delay of death also delays onset of disability.

- However, increased survival to an advanced age increases the risk of ending one's life with dementia

Source: R. Lee and J. Skinner, "Will Aging Baby Boomers Bust the Federal Budget" *Journal of Economic Perspectives,* 13(1), 1999: pp. 117-140.

Risk of Severe Cognitive Limitation
by Age and Gender
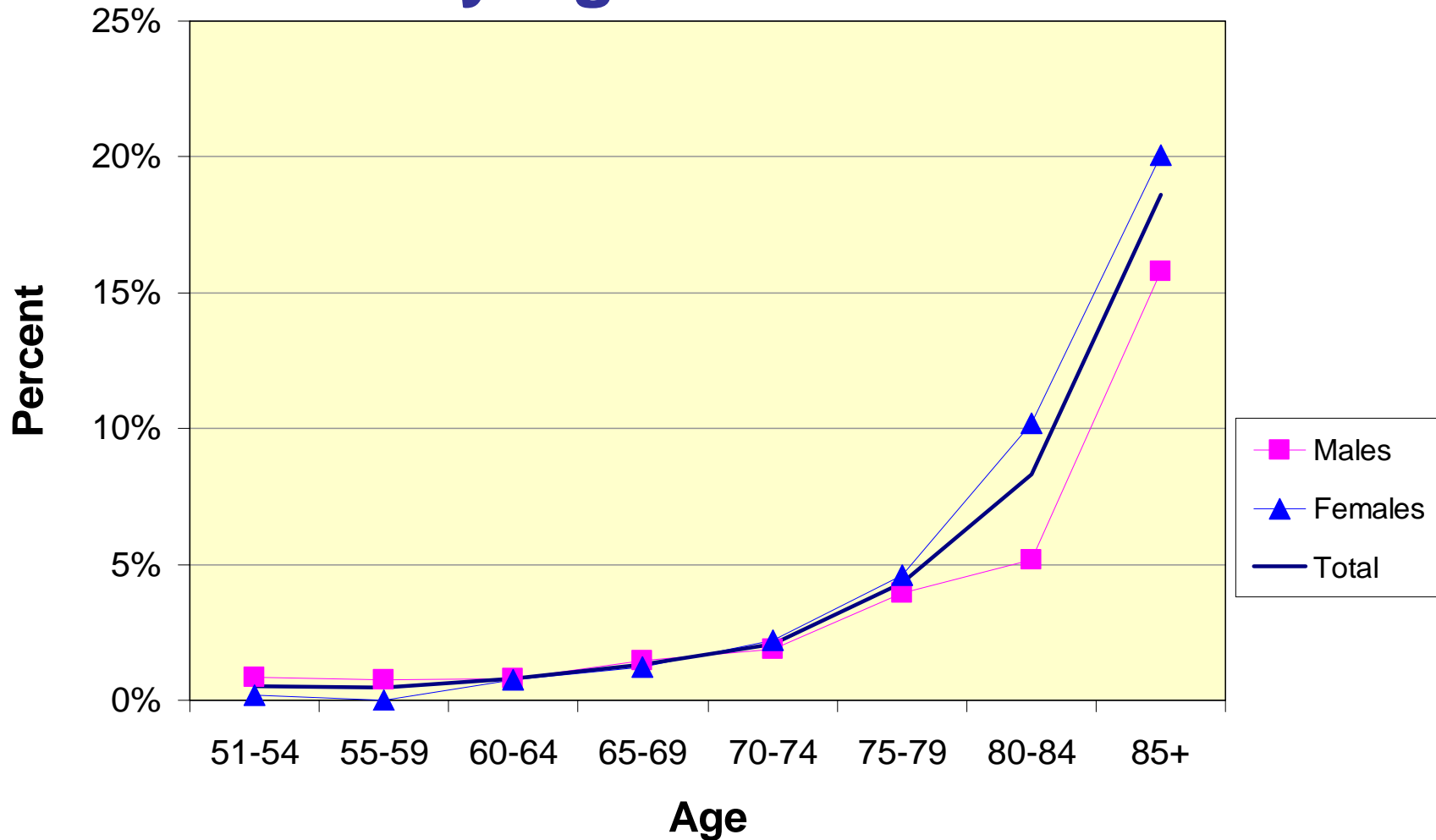
Source: Health and Retirement Survey 1998 (N= 13,093) Definition of severe cognitive impairment: Errors on half or more of 9 very easy items from a standard geriatric screen for mental status for self-respondents; IQCODE score of 3.9 or higher on Jorm proxy assessment.

Informal Care: Adjusted Weekly Hours,
by Severity of Cognitive Limitation

Informal Care: Adjusted Weekly Hours,
by Severity of Cognitive Limitation

These costs do not appear in our National Accounts.

But they may in the future for people without children or for divorced fathers who have lost contact with children

Hours of Care

45
40
35
30
25
20
15
10
5
0

Normal Cognition | Mild | Moderate | Severe

Severity of Cognitive Limitation

So, What's The Problem?

- **In general, trends in fertility and mortality are potentially welfare enhancing**
  - At macro-level low rate of population growth permits
    - higher capital-labor ratios
    - higher levels of human capital per worker
    - higher per capita income
  - At family-level
    - Parents freely choosing fewer children (China aside)
    - Investing more in each child's education and health
    - Higher lifetime incomes of successive generations
    - Longer length of life

What's The Problem? (cont.)

- **Changing Age Structure is a Challenge because**
  - Aged individuals face decreasing health and productivity
  - Great uncertainty at individual level
  - Diminished capacity to respond to shocks at older ages

Social Institutions to Deal With Aging are Sensitive to Age Distribution

- **Intergenerational transfers from young to old more costly as population ages**
  - Family: old age support by children
  - State: Social Security, Medicare
    - **Welfare states create legacy costs that make transition to market alternatives difficult**

- **Market Alternatives**
  - Saving and private pensions
  - Private insurance and annuities
  - Life cycle labor supply

Government Benefits
by Program and Age

Amount
in 2000
dollars

20,000

15,000

10,000

5,000

0

Medicare

Social
Security

Medicaid

Education

Other benefits such as public assistance

0   20   40   60   80

Age
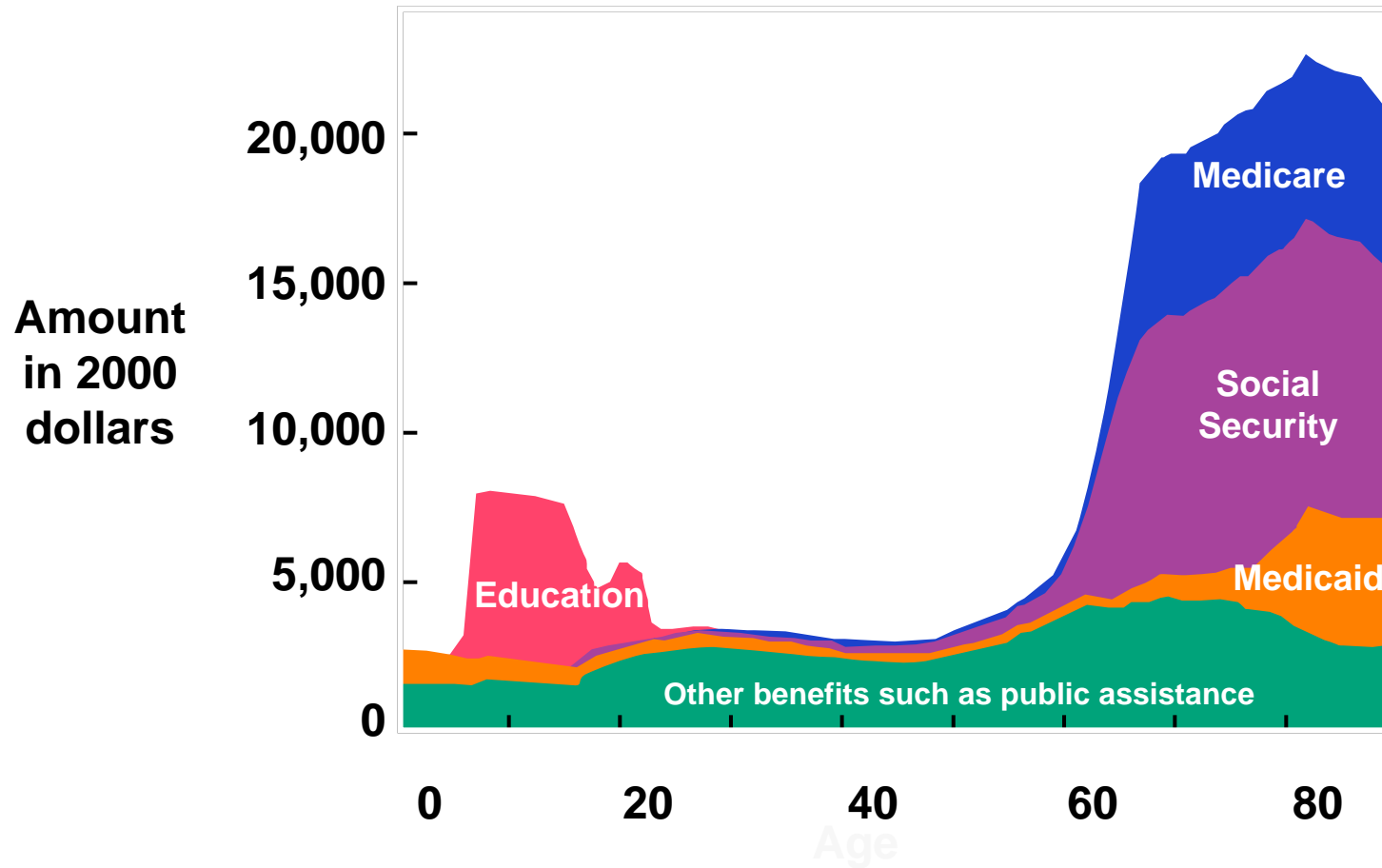
Source: Ron Lee

via Jim Smith

Taxes Paid by Age

Amount in 2000 dollars

15,000

10,000

5,000

0

Income

Payroll

Sales

Property

Other taxes including federal corporate tax charges/fees

0   20   40   60   80

Age
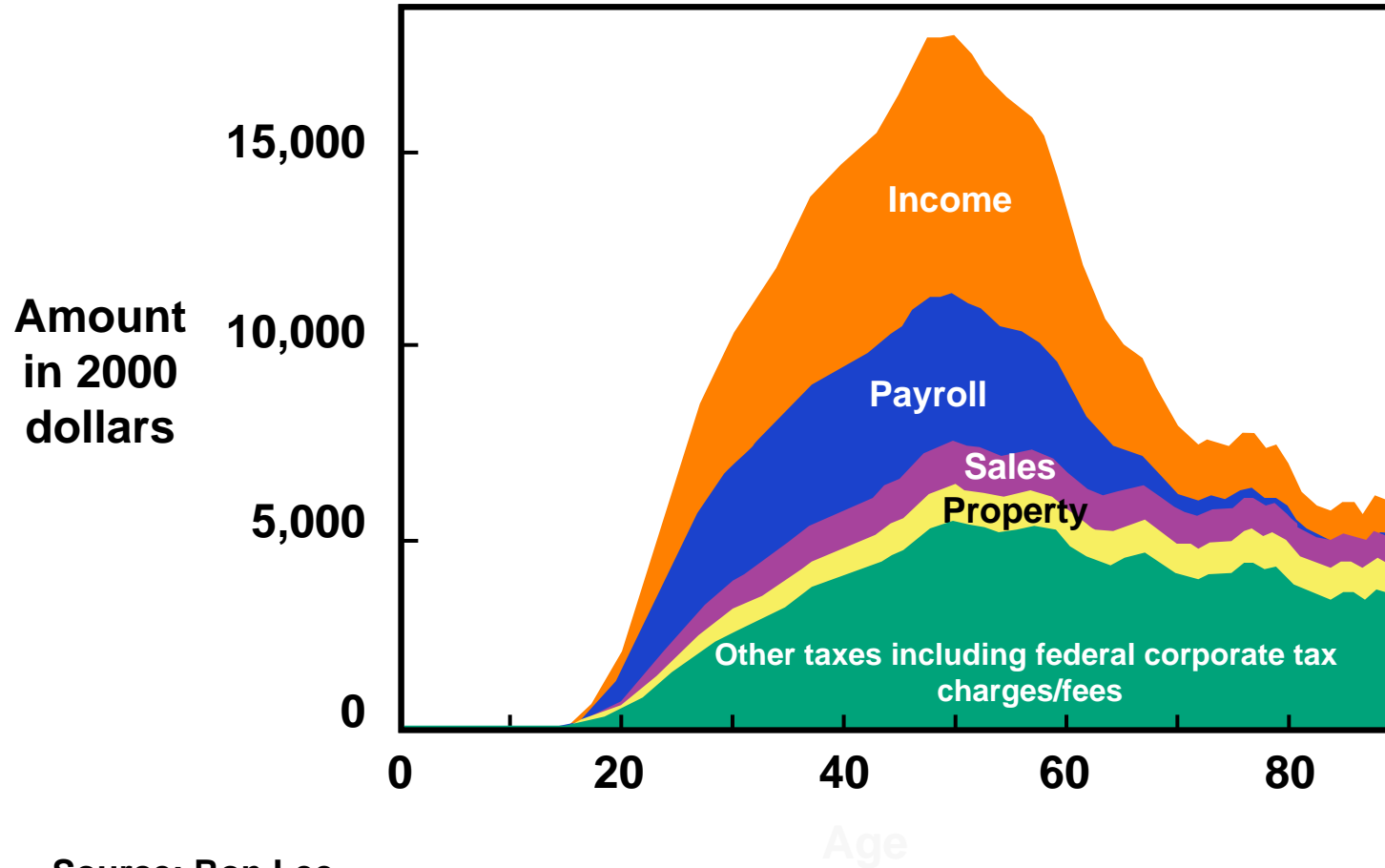
Source: Ron Lee

via Jim Smith

Direction of Intergenerational Transfers Within Families and in the Public Sector

Within Families

Figure 2. Familial Transfers in the United States (Data from the 1980s).

Bequests

Gifts/transfers

Higher Ed

Child Costs

Source: Ronald D. Lee (1994) "Population Age Structure, Intergenerational Transfers, and Wealth." *Journal of Human Resources* 29(4), Fall: 1027-1063.

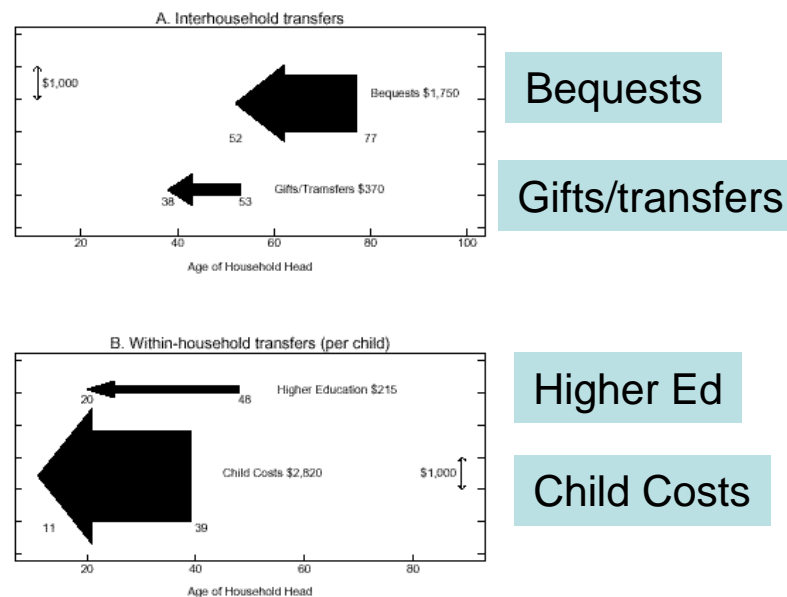NOTE: The top panel describes flows of transfers between households; the bottom panel describes flows of transfers within households. The tail of each arrow is located at the average age of making each kind of transfer in the population, and the head of the arrow is located at the average age of receiving each kind of transfer in the population. The thickness of each arrow represents the per capita (or per household) flow of each kind of transfer, indicated by the number below each label. The area of each arrow equals the average net transfer of each kind expected to be received by the average person or household over the remaining life time, and is negative if the arrow points to the left. For sources of data and further details, see Lee, 1994b.

Public Sector

Figure 3. Public Sector Transfers to and from Households in the United States (Data from the 1980s).
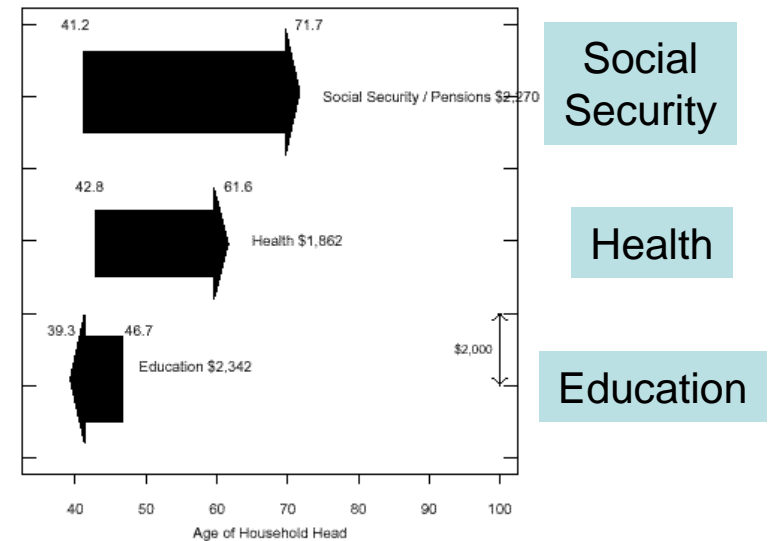

Social Security

Health

Education

Source: Ronald D. Lee (1994) "Population Age Structure, Intergenerational Transfers, and Wealth." *Journal of Human Resources* 29(4), Fall: 1027-1063.

NOTE: See the note to Figure 3. The tail of the arrow is located at the average age of paying taxes in support of each kind of transfer, and the head at the average age of receiving each kind of transfer, in each case based on the age of the household reference person. Data combine federal, state and local transfers.
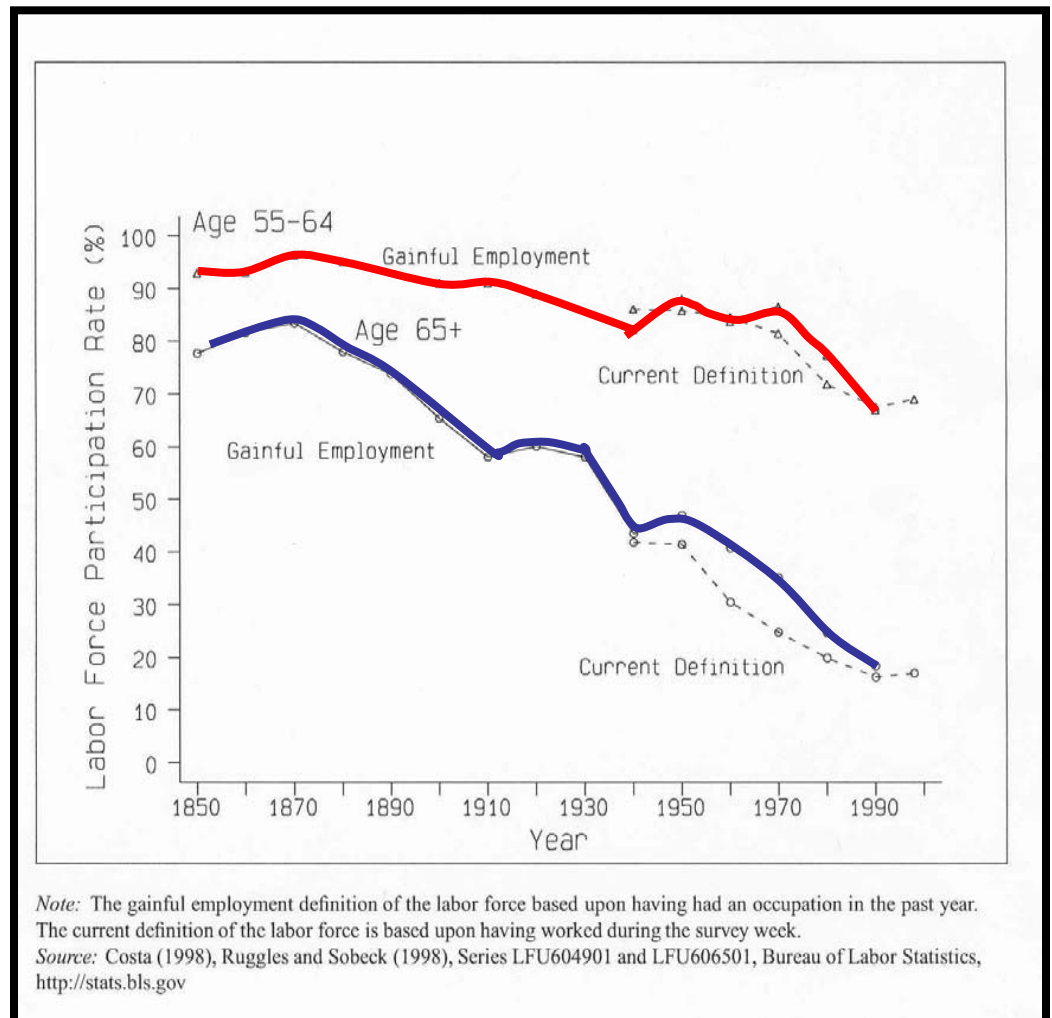
Work and Retirement

- Pressure on intergenerational transfers would be relieved if people would choose to work longer
- ...or if they are forced to work longer
- As compared to the past, people delay entry into the labor force to obtain education and training
- Given extended length of life, it makes sense to assume that people may wish to also extend the length of working life
- The alternative is to choose lower levels of consumption at younger and/or older ages

The Future of Work and Retirement

- Changes in the dependency ratio may be exacerbated or offset by the work and retirement decisions of individuals

- Increases in the length of individuals' lives after 65 lead to questions about
    - how to finance a longer retirement
   - or whether it is desirable to spend much of one's life in retirement

What Will Happen to Retirement for the Early Boomers?

- Long term trend in U.S. from 1850 to 1990 has been toward earlier retirement.

Note: The gainful employment definition of the labor force based upon having had an occupation in the past year. The current definition of the labor force is based upon having worked during the survey week.

Source: Costa (1998), Ruggles and Sobeck (1998), Series LFU604901 and LFU606501, Bureau of Labor Statistics, http://stats.bls.gov
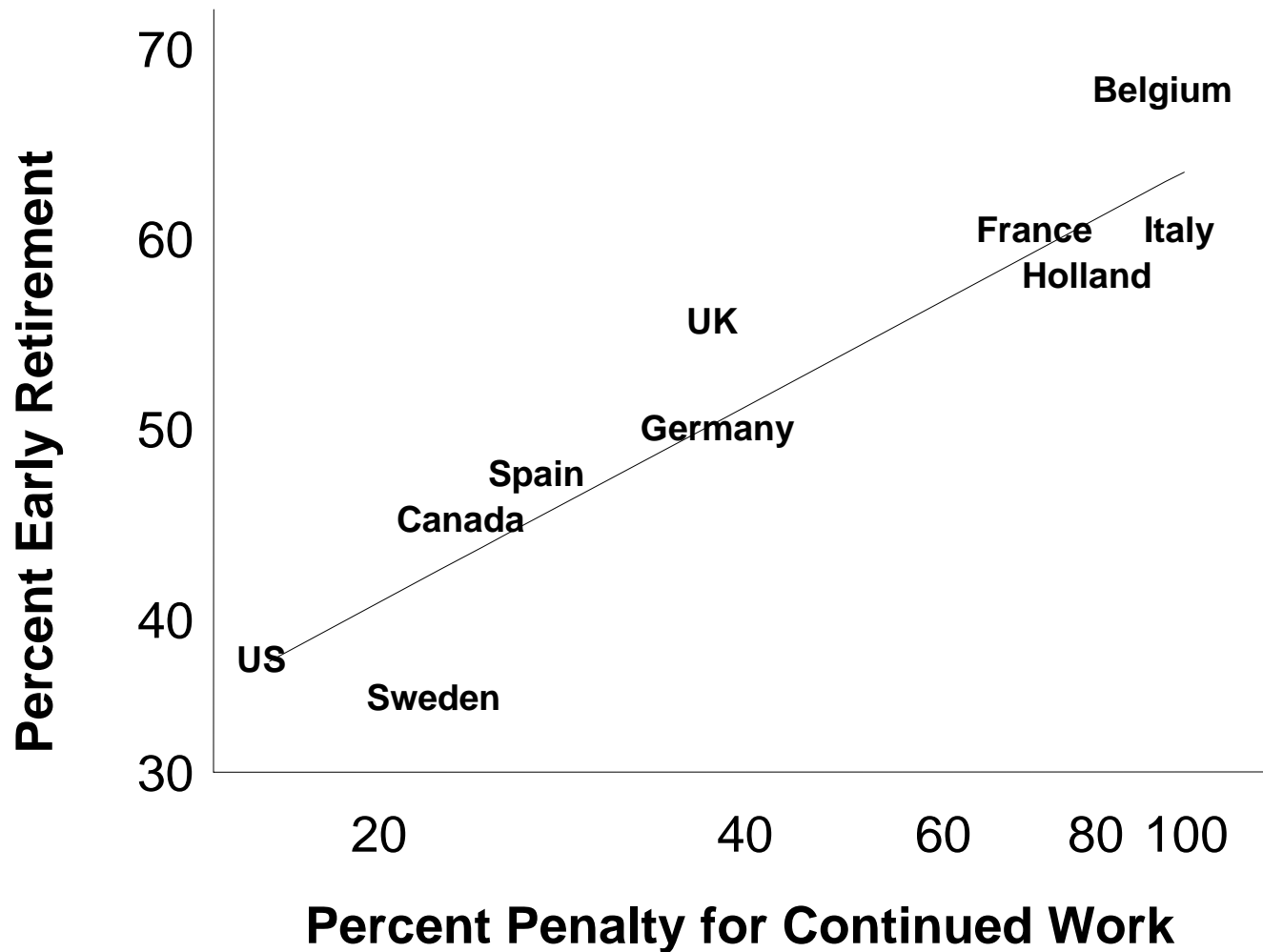
What Will Happen to Retirement for the Early Boomers? (cont.)

- Trend toward lower labor force participation at older ages is much sharper in a number of European countries

LFP Trends for Men 60 to 64

Legend: Japan, Sweden, US, UK, Germany, Belgium
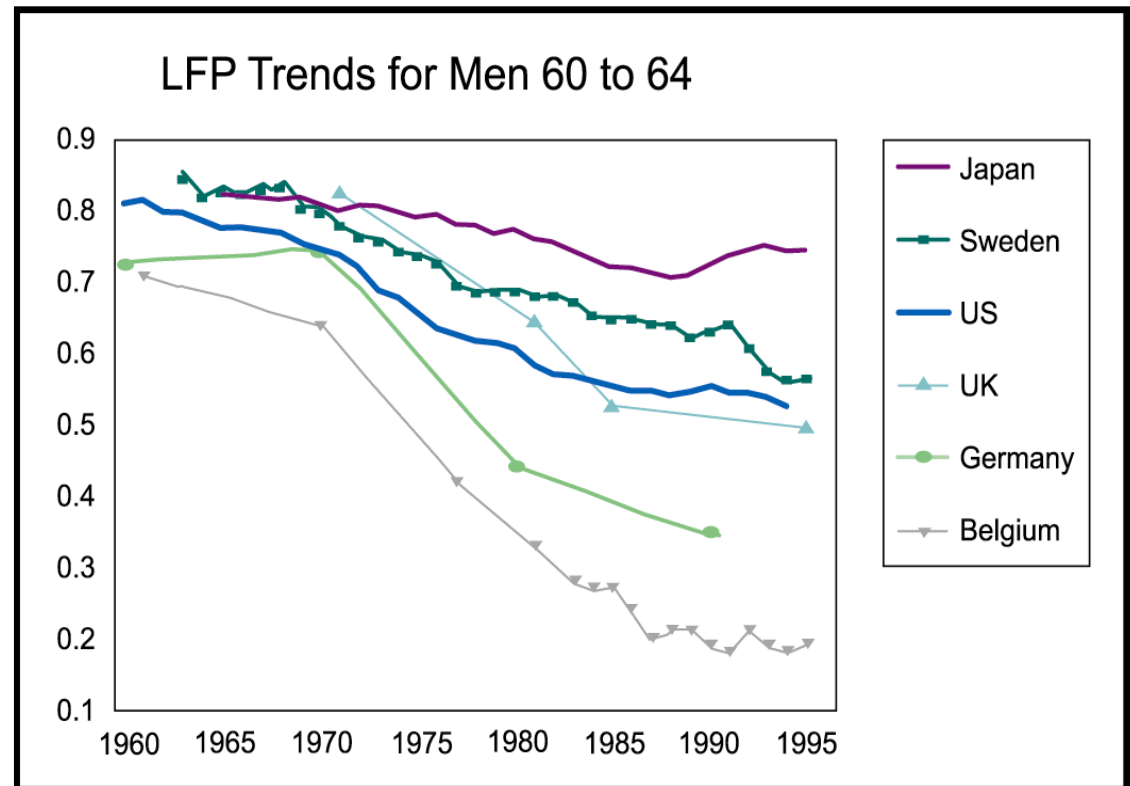
Source: J. Gruber and D. Wise, Social Security Programs and Retirement Around the World, U. Chicago Press, 1999.
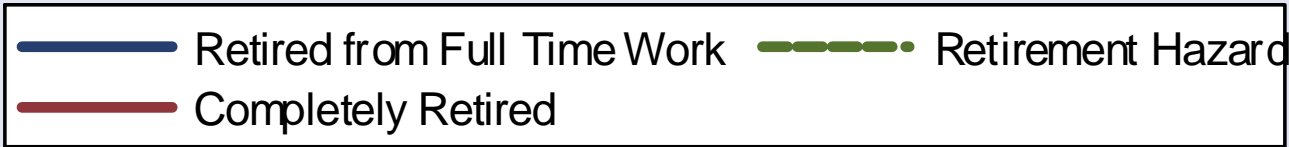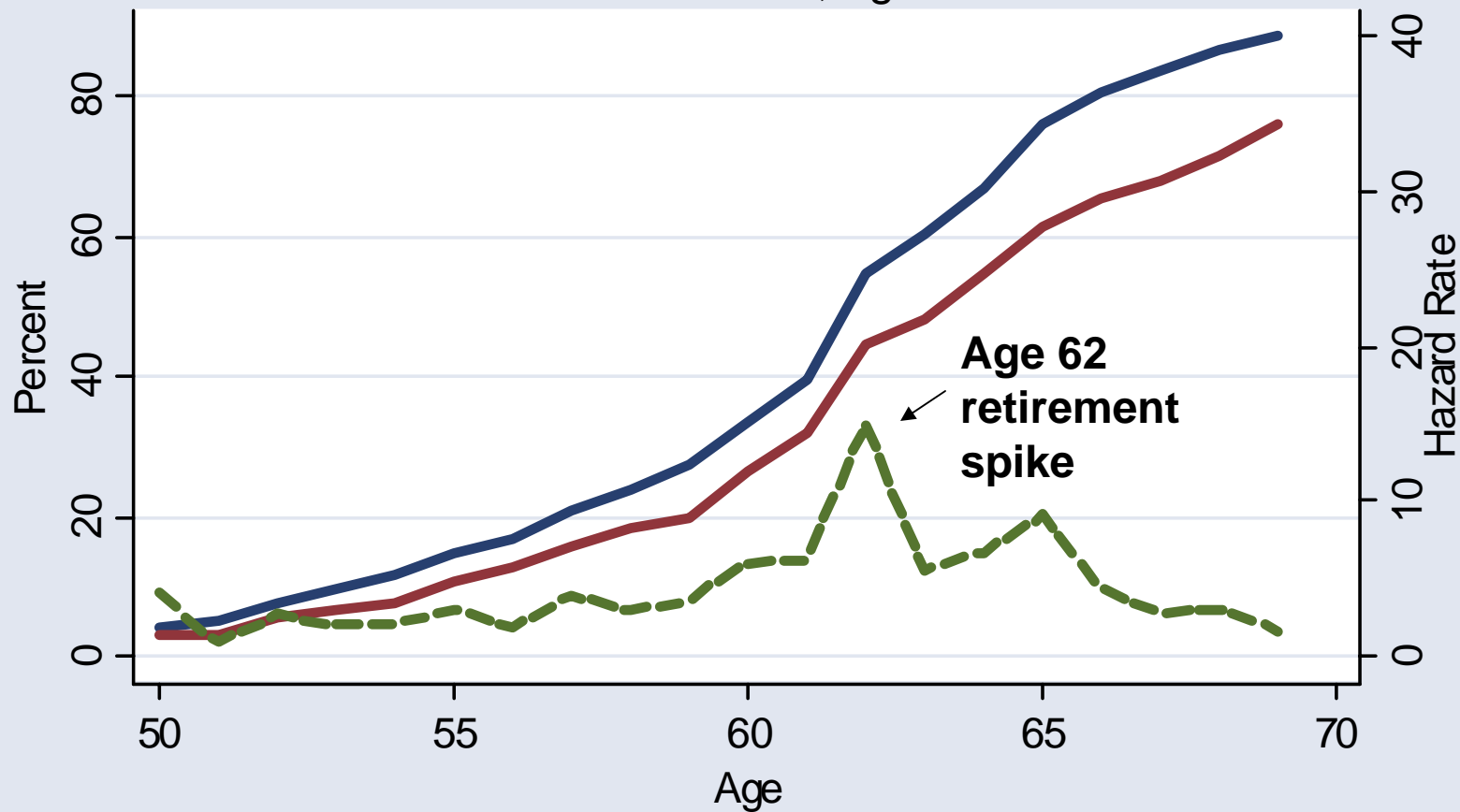
Retirement Policy Shapes Retirement Behavior

Retirement of Original HRS Cohort
Married Men Born 1931-41, Age 51-61 in 1992

Age 62 retirement spike

Legend:
- Retired from Full Time Work
- Completely Retired
- Retirement Hazard

Downward Trend in Labor Force Participation in U.S. Began to Reverse Itself around 1985. Is the Reversal Permanent?

Males

Females

Figure 11
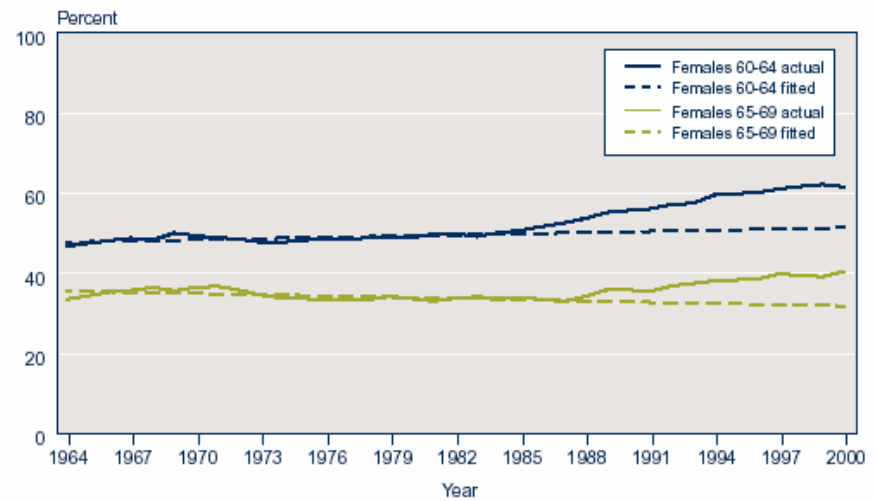Labor Force Participation Rates

Percent

Males 60-64 actual
Males 60-64 fitted
Males 65-69 actual
Males 65-69 fitted

Year
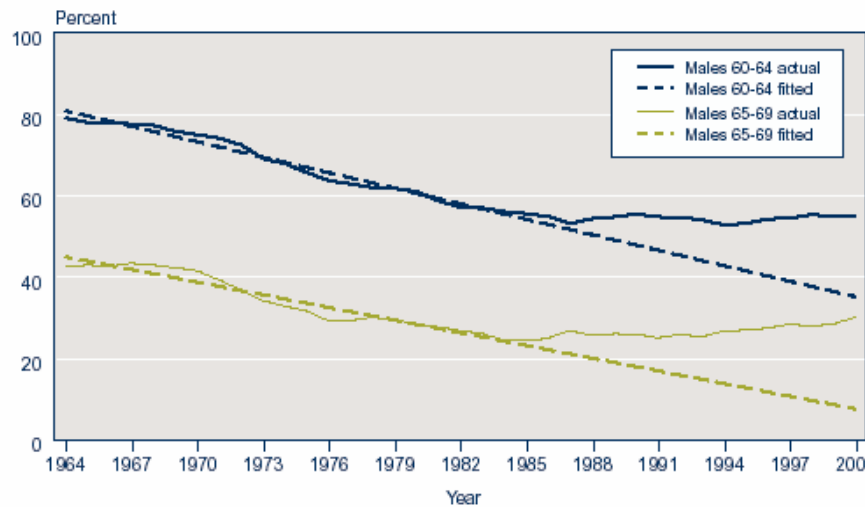
Source: Joseph Quinn, Boston College, from Current Population Survey data.

Figure 12
Labor Force Participation Rates

Percent

Females 60-64 actual
Females 60-64 fitted
Females 65-69 actual
Females 65-69 fitted

Year

Source: Joseph Quinn, Boston College, from Current Population Survey Data.

What Do the Early Boomers Expect?

- HRS has pioneered asking questions about expectations on a wide variety of topics including survival to a given age, bequests, stock market returns and work and retirement expectations

- Researchers have used the work expectation questions in earlier waves and have found them to be useful predictors of actual work and retirement in later waves

- We can now obtain a look at what the Early Boomers, aged 51-56 in 2004 say they will be doing at age 62, 65 and their age at retirement as compared to earlier cohorts at the same age.

- Note that these questions offer a window into the future about ten years hence!

Signs of Reversal of Long Term Trend toward Early Retirement

Expectations of Working After Age 65
Males and Females Age 51-56
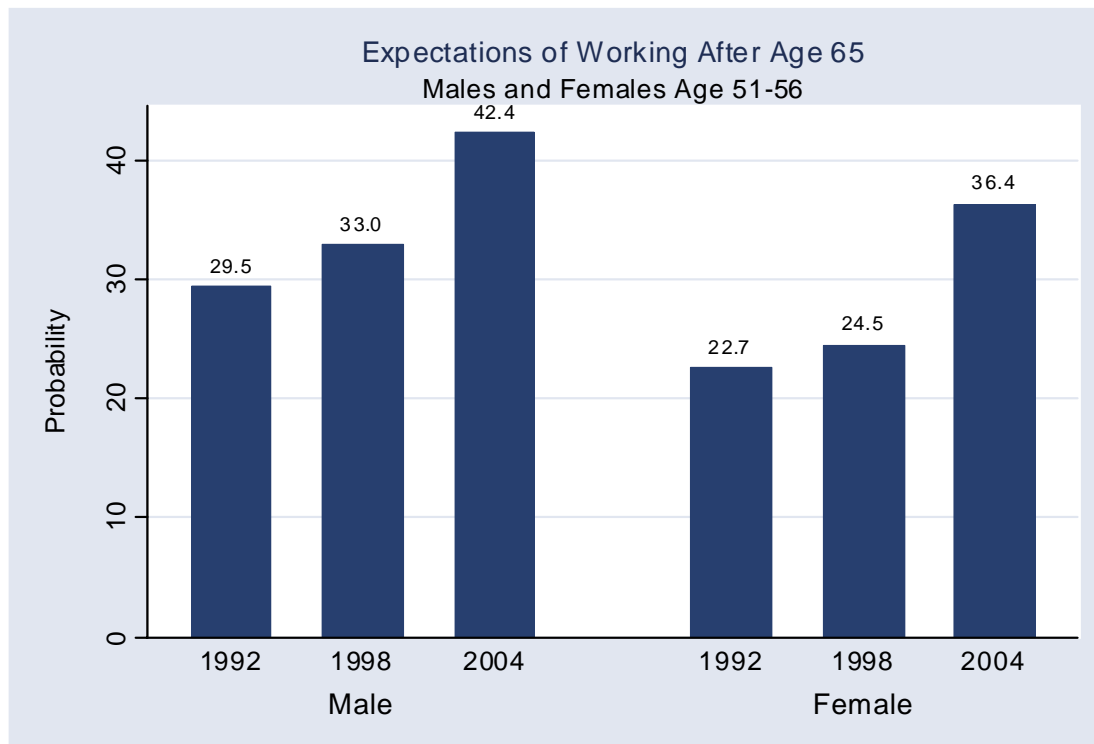
- Historical trend toward earlier Retirement from 1850's through mid-1980's

- Labor force participation at older ages flat since then

- Possible reversal: Early boomer cohort in HRS (born 1948-53) expects to work more than earlier Cohorts

Source: Health and Retirement Study

Are Retirement Savings Adequate?

Adequacy of Retirement Wealth

Figure 1: Median DB Pension Wealth, Social Security Wealth, and Net Worth (excluding DB Pensions) by Lifetime Income Decile, (1992 dollars)
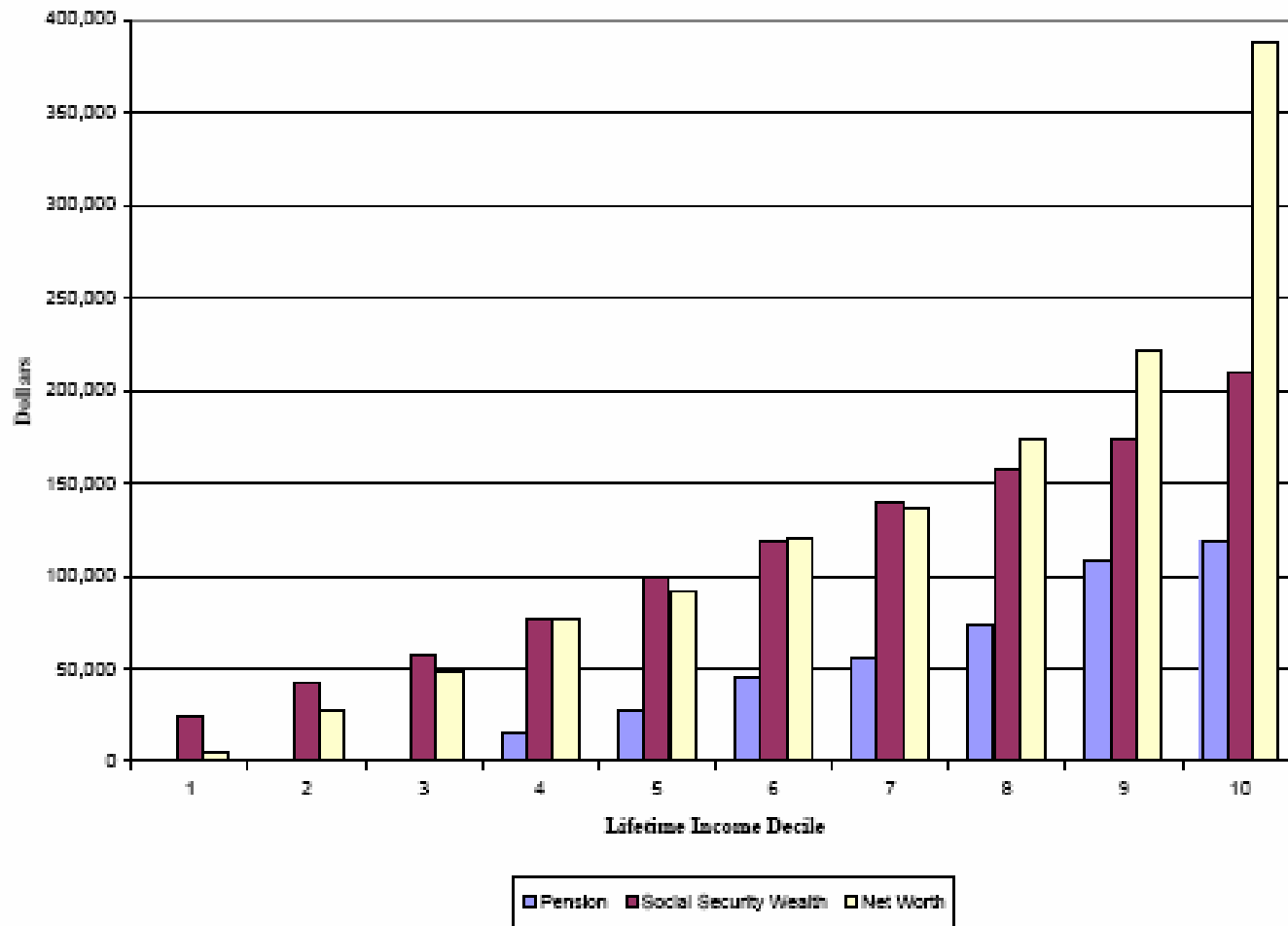
Source:Scholz, Seshadri and Khitatrakun, JPE (2006)
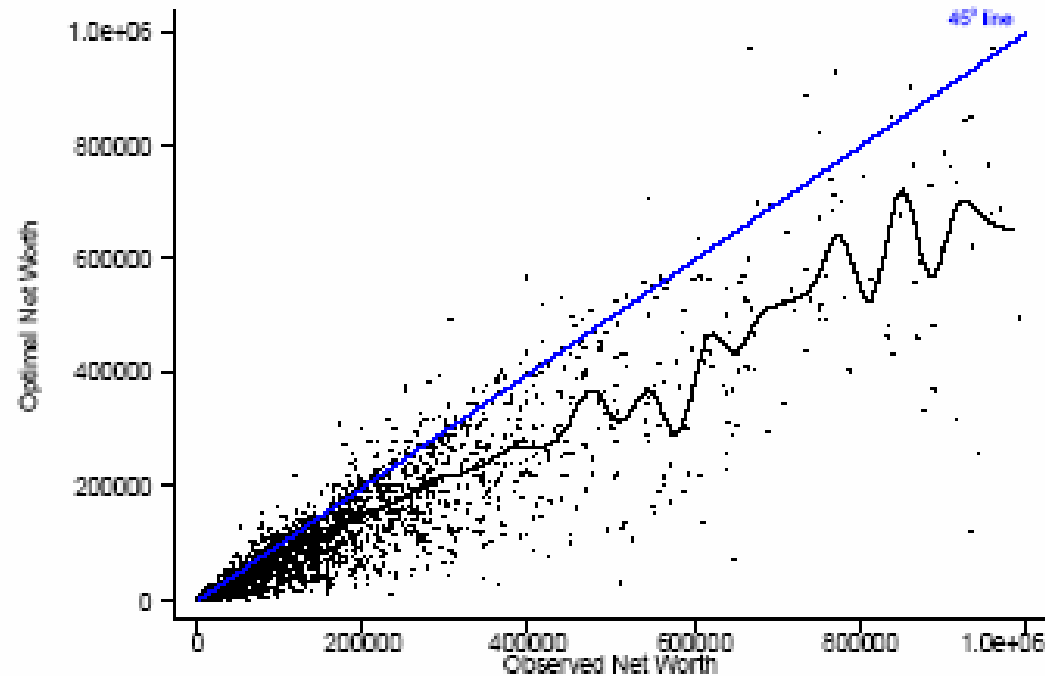
Adequacy of Retirement Wealth

Figure 2: Scatterplot of Optimal and Actual Wealth

Source: Observed net worth is constructed from the 1992 HRS. Optimal net worth comes from solving the baseline model described in the text.

Source:Scholz, Seshadri and Khitatrakun JPE (2006)

Conclusions

- Population aging poses many challenges to the U.S. and the rest of the world
- Meeting these challenges requires advances in understanding of what determines the economic, health, family and psychological well being and behavior of older people
- The HRS and its sister studies throughout the world are creating a data infrastructure that will enable us to harness the scientific creativity of an interdisciplinary and international research community to address these challenges.
- **Canada needs data like these!**