Mortality at Older Ages: Why Has the US Fallen Behind Our Peers?

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University of Pennsylvania
Population Studies Center

Technical Panel on Assumptions and Methods
Advisory Committee
US Social Security Administration
December 13, 2010

Penn
University of Pennsylvania

Outline

International Studies

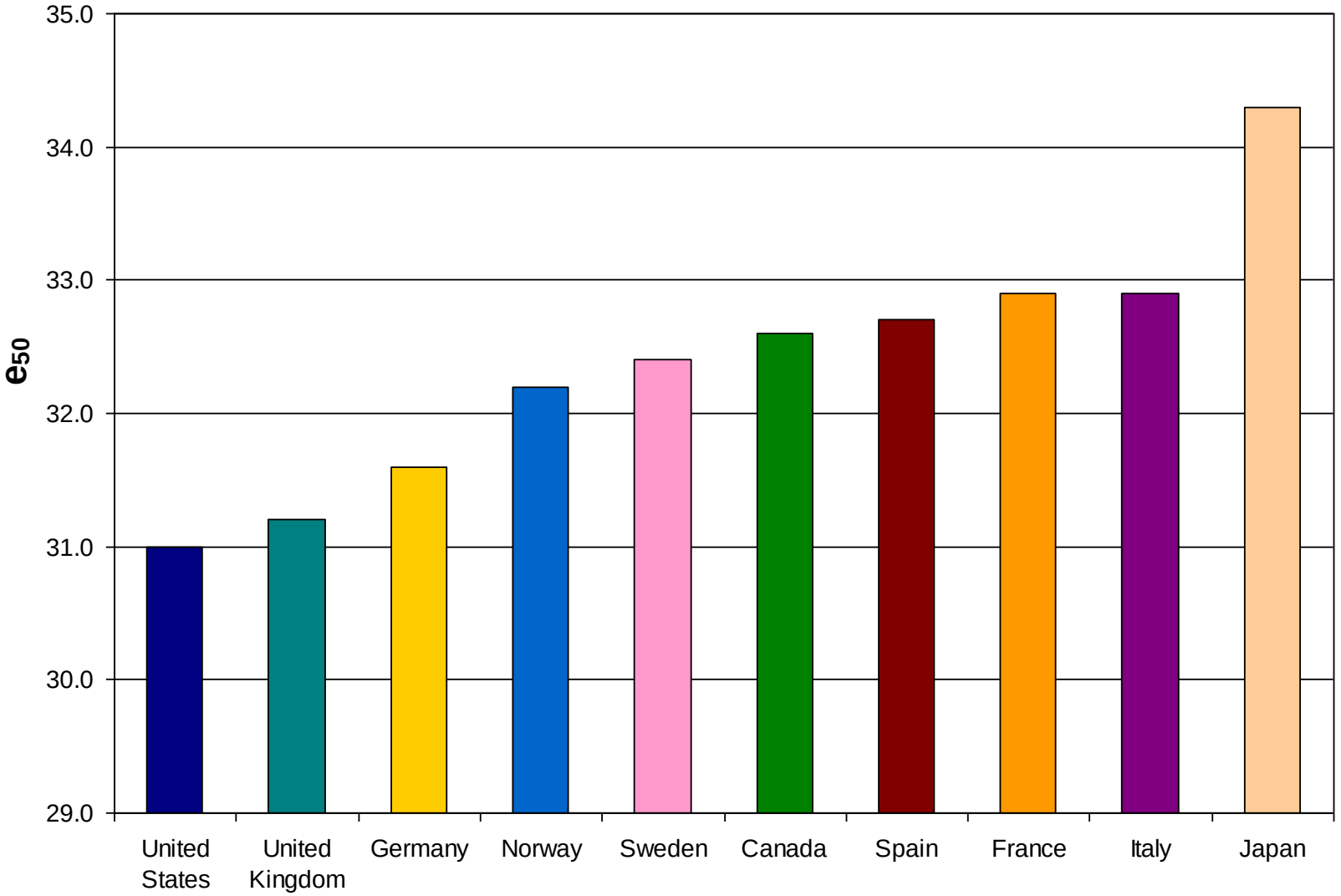
- Medical Systems?
- Smoking?
- Obesity? (Later)

US- Based Studies

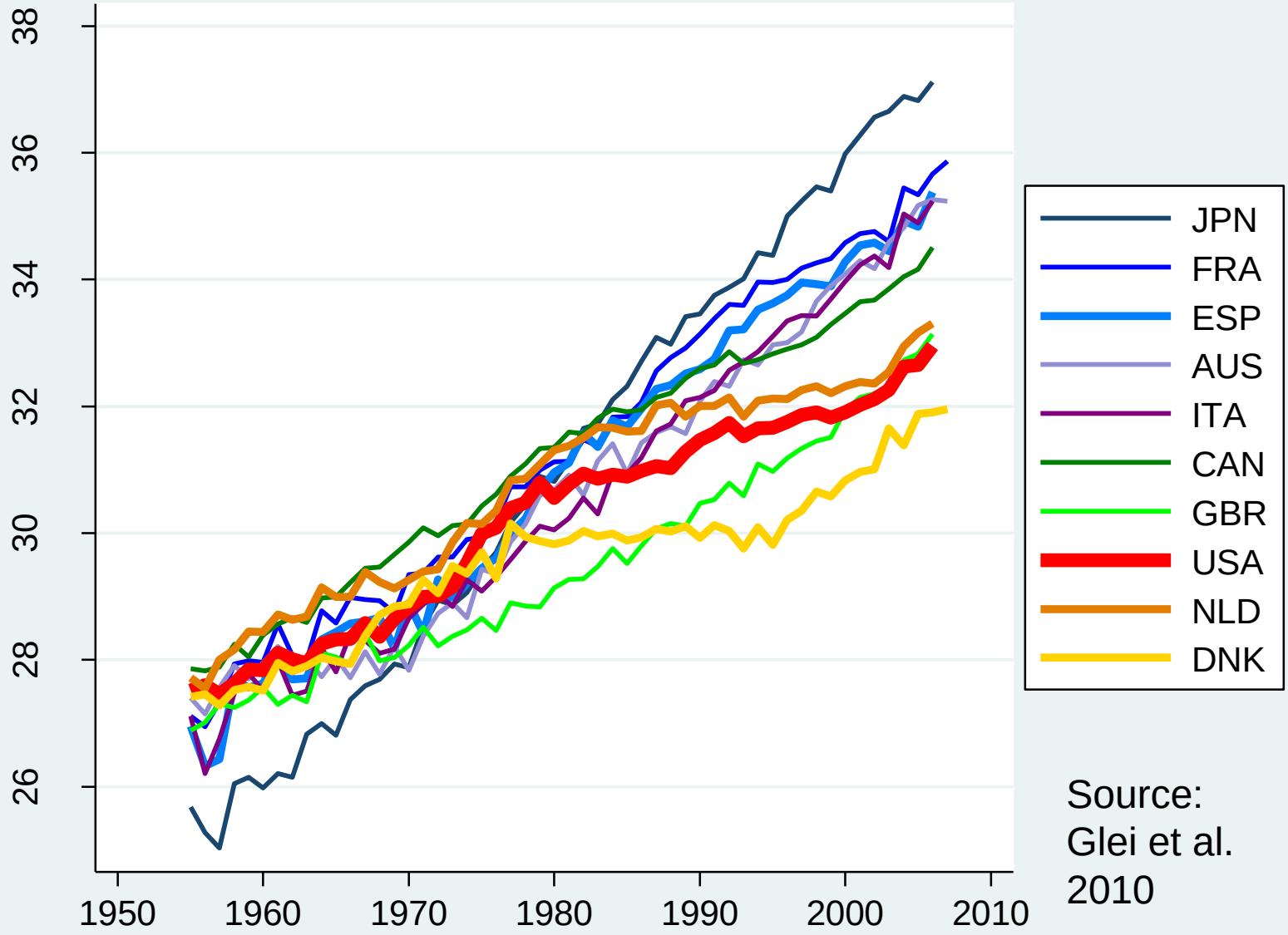
- Smoking
  - -- Analysis of the past
  - -- Possibilities for the future

“Today we are spending over $2 trillion a year on health care and yet for all of this spending…citizens in some countries that spend substantially less than we do are actually living longer.” President Barack Obama, address to American Medical Association, June 15, 2009.

Life Expectancy at Age 50 in 2006

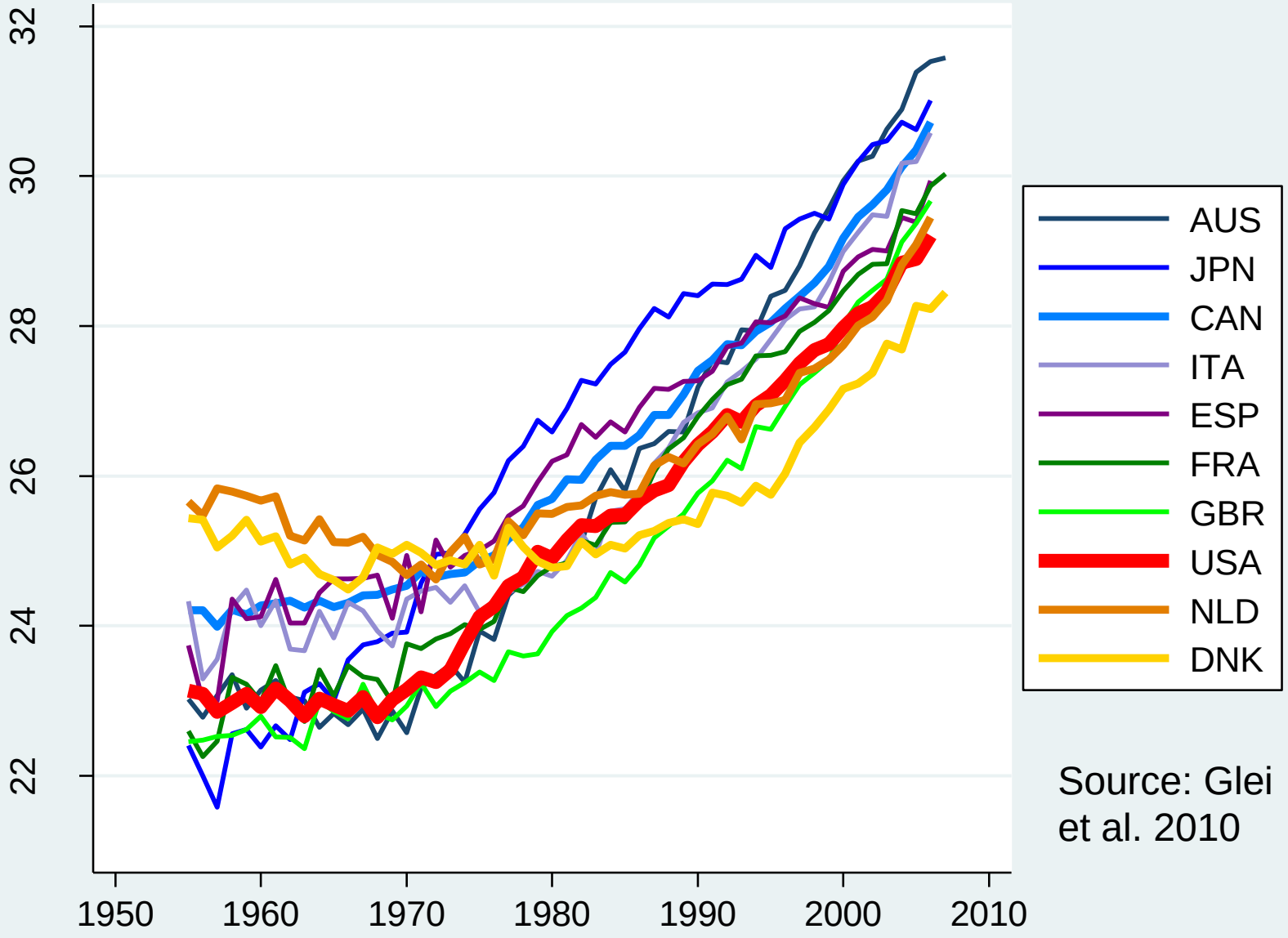


Trends in e_{50}, Females

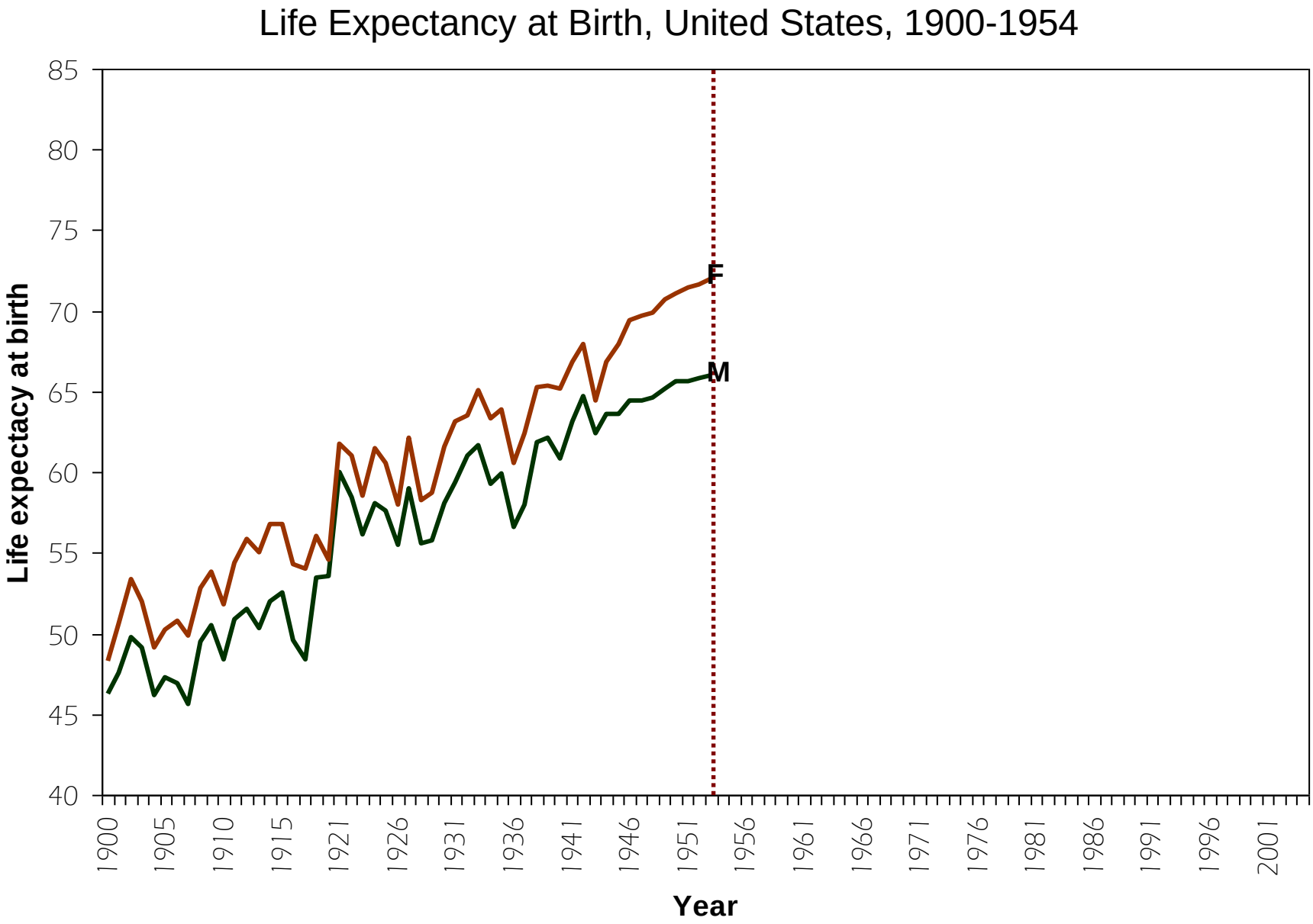


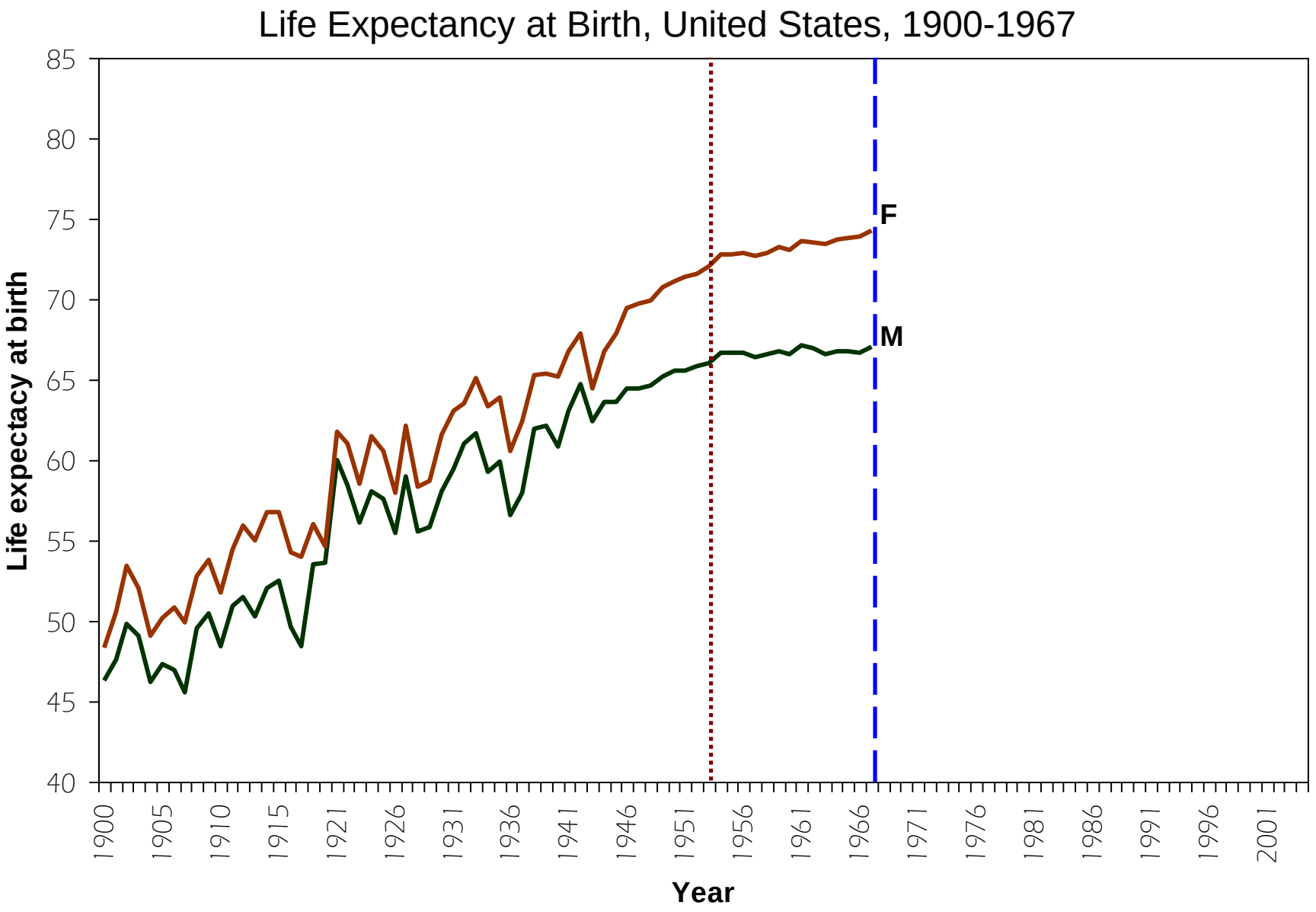
Source:
Glei et al.
2010

Trends in e_{50}, Males



Source: Glei et al. 2010


Life Expectancy at Birth, United States, 1900-1954
Life expectacy at birth
85
80
75
70
65
60
55
50
45
40
F
M
1900
1905
1910
1915
1921
1926
1931
1936
1941
1946
1951
1956
1961
1966
1971
1976
1981
1986
1991
1996
2001
Year


Life Expectancy at Birth, United States, 1900-1967
Life expectacy at birth
85
80
75
70
65
60
55
50
45
40
F
M
1900
1905
1910
1915
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1936
1941
1946
1951
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1961
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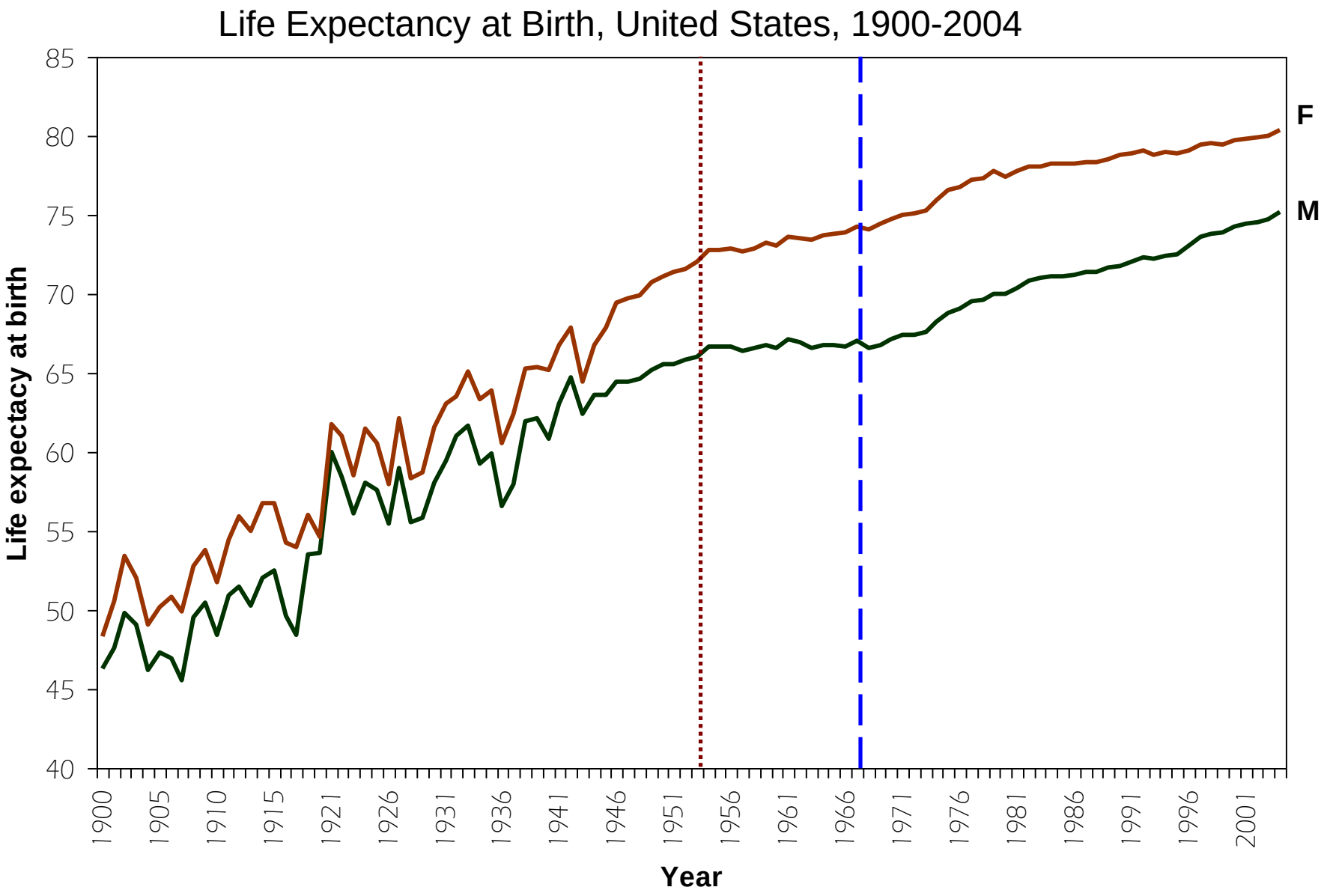
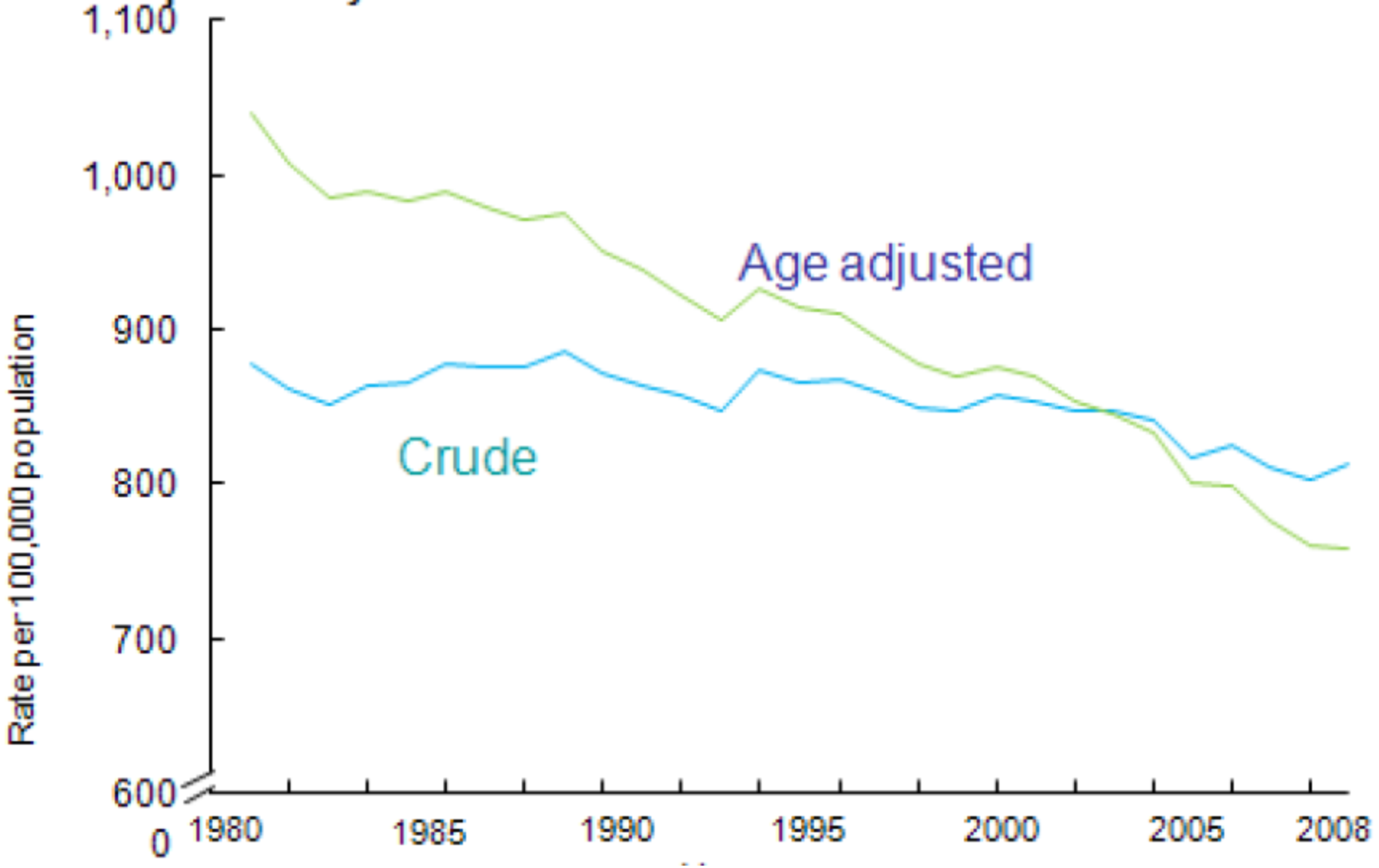
1971
1976
1981
1986
1991
1996
2001
Year


Life Expectancy at Birth, United States, 1900-2004
Life expectacy at birth
85
80
75
70
65
60
55
50
45
40
1900
1905
1910
1915
1921
1926
1931
1936
1941
1946
1951
1956
1961
1966
1971
1976
1981
1986
1991
1996
2001
Year
F
M

Issued Dec. 9, 2010

Figure 1. Crude and age-adjusted death rates: United States 1980-2007 final and 2008 preliminary



NBER WORKING PAPER SERIES

LOW LIFE EXPECTANCY IN THE UNITED STATES: IS THE HEALTH CARE SYSTEM AT FAULT?

Samuel H. Preston
Jessica Y. Ho

Working Paper 15213
http://www.nber.org/papers/w15213

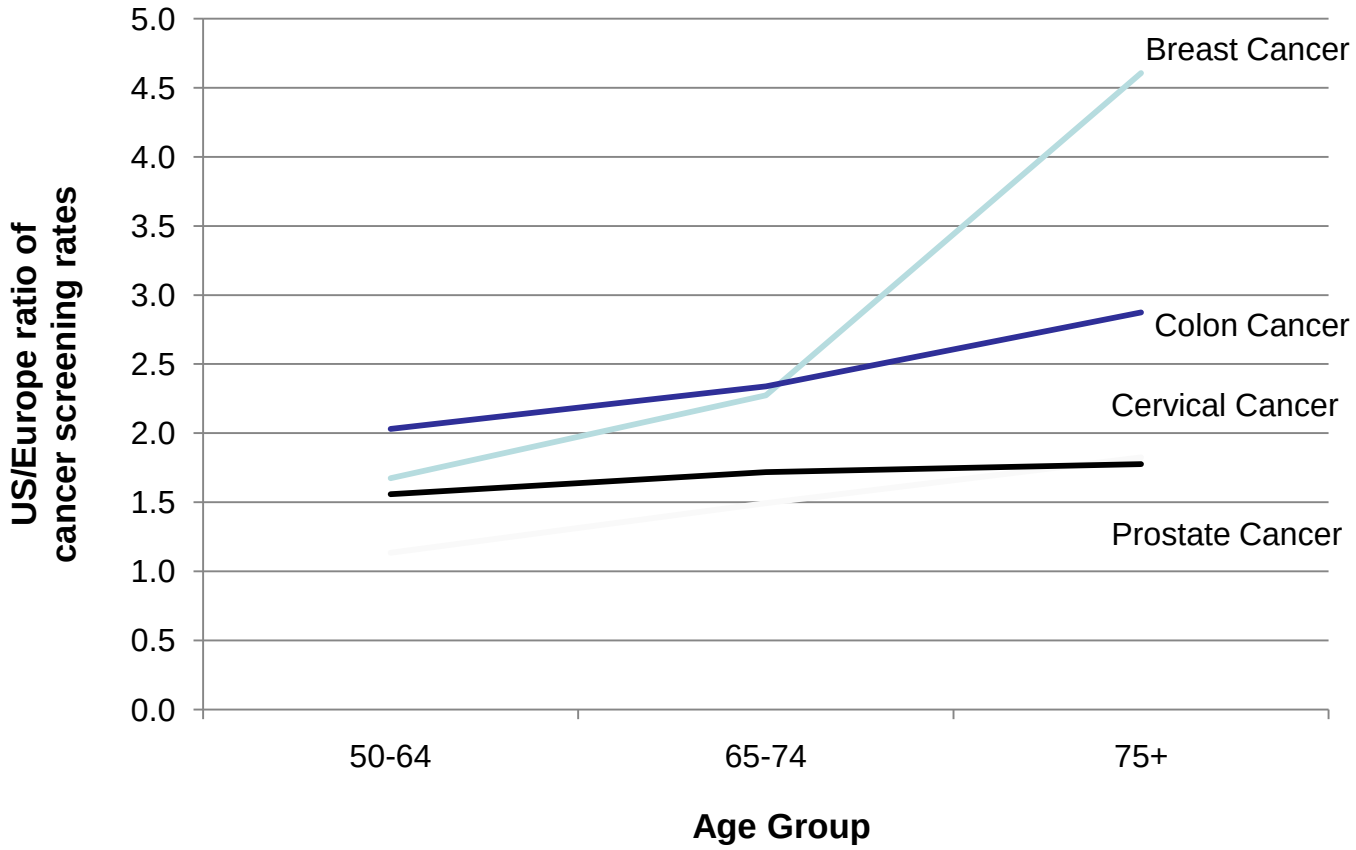
NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
July 2009

Compared to OECD countries and composites, the US does well in

- Screening for cancer
- Survival rates from cancer
- Survival rates after heart attacks
- Survival rates after strokes
- Medication for high blood pressure
- Medication for high cholesterol
- Vaccination against influenza
- Mortality from influenza and pneumonia

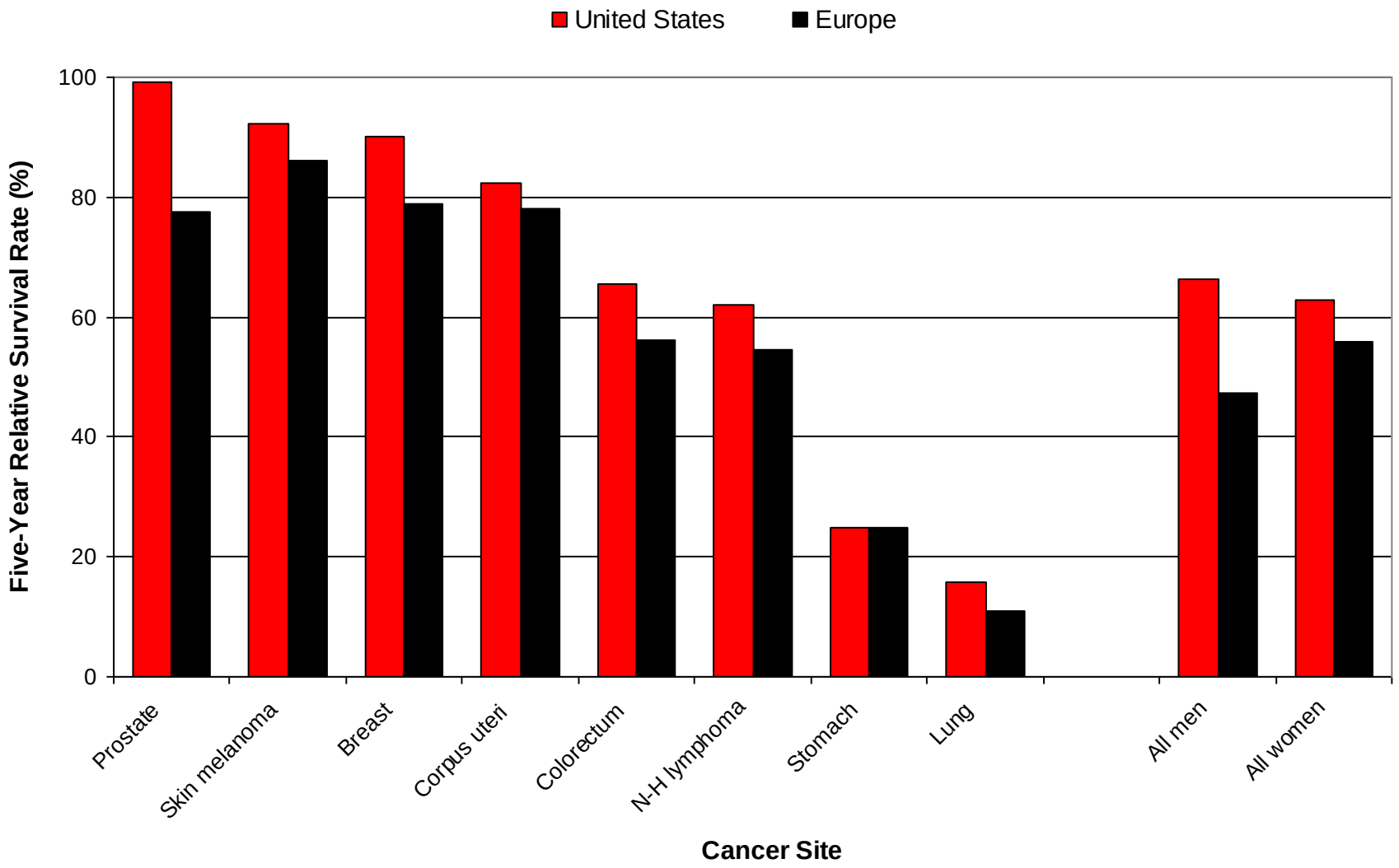
Health Care Systems: Cancer

Screening rates



Source: Howard, Richardson, and Thorpe (2009). Based on HRS/MEDS, SHARE, and ELSA.

Five-Year Relative Survival Rates for Cancer of Different Sites, US and European Cancer Registries

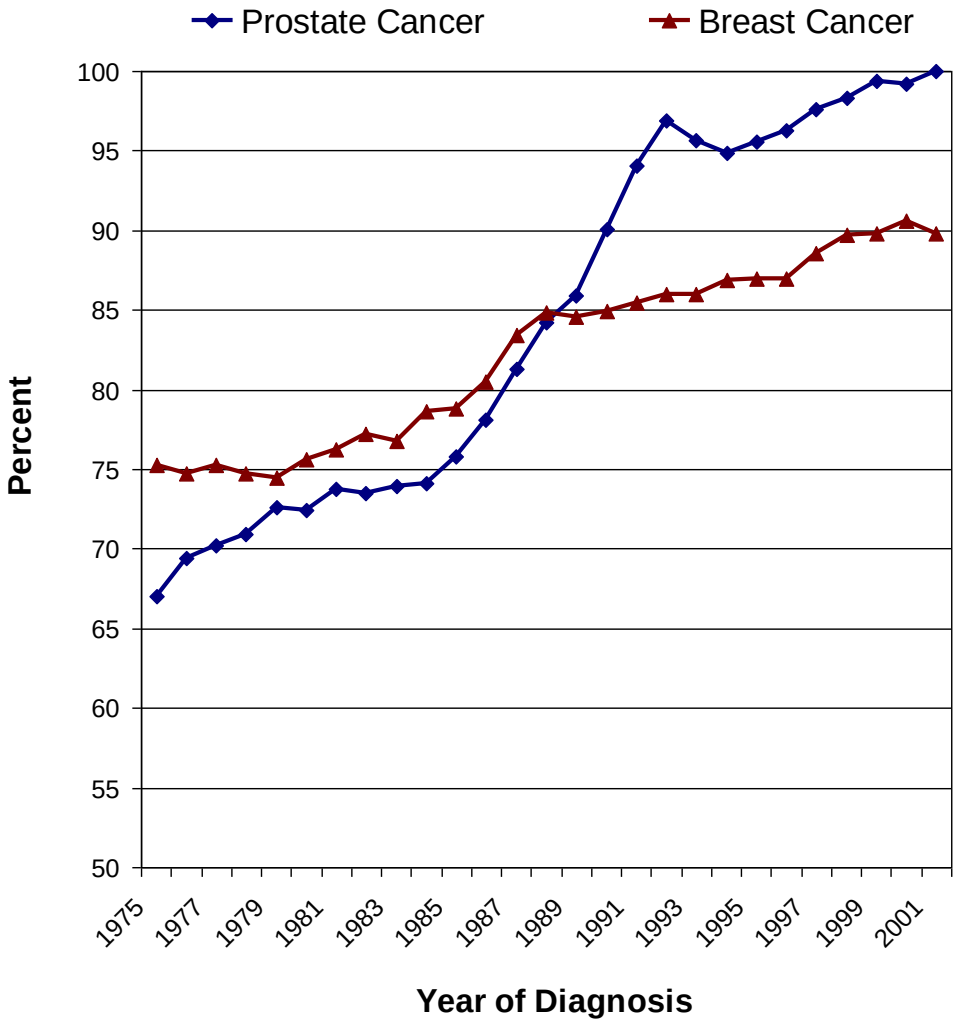


Source: Verdecchia et al. 2007

Analysis of Prostate Cancer and Breast Cancer

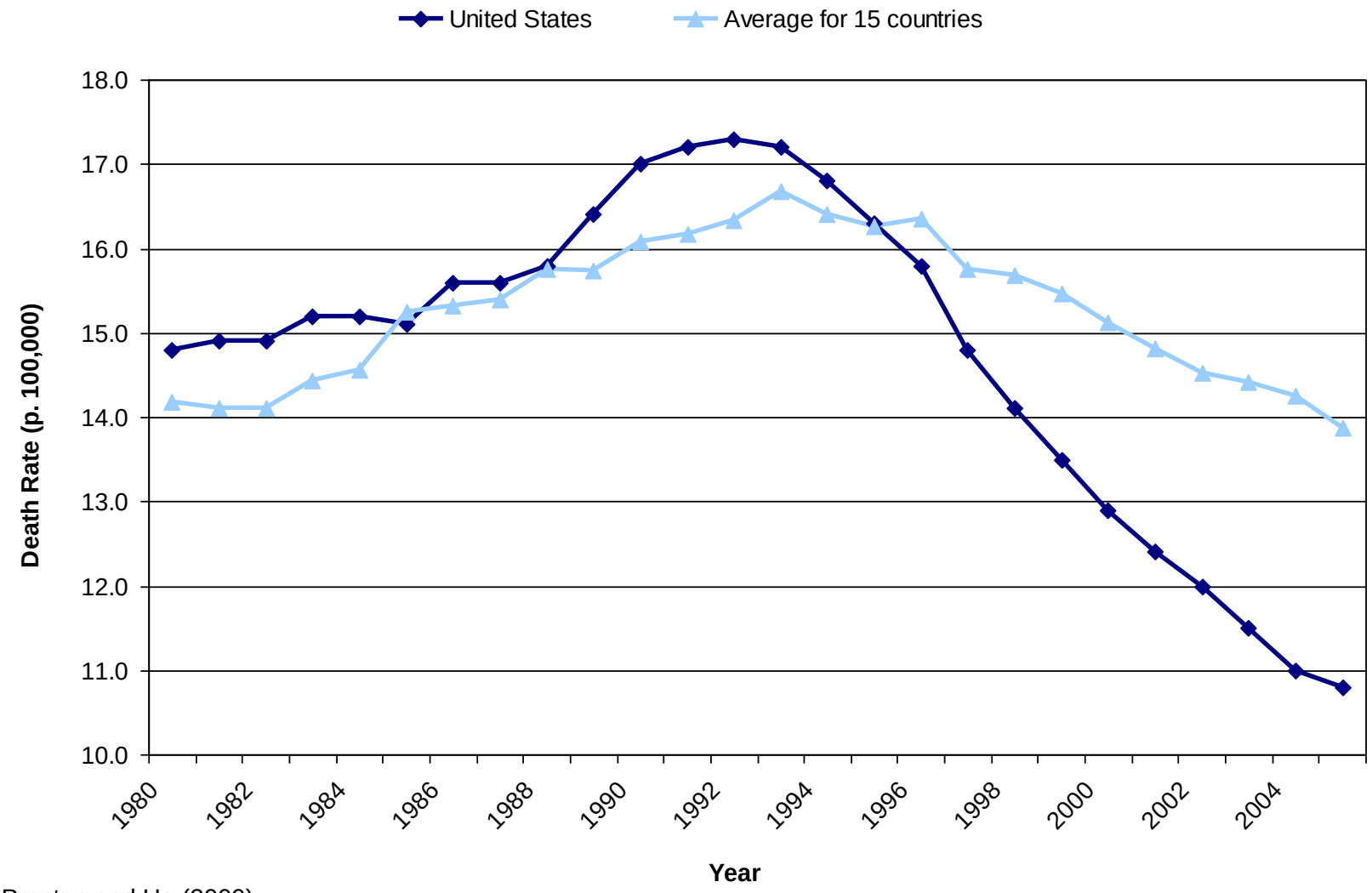
- Effective methods of screening for these diseases have recently developed;
- These diagnostic methods have been deployed earlier and more widely in the US than in comparison countries;
- Effective methods are being used to treat these diseases; and
- The US has had a significantly faster decline in mortality from these diseases than comparison countries

5-year Relative Survival Rate, Prostate and Breast Cancer, US



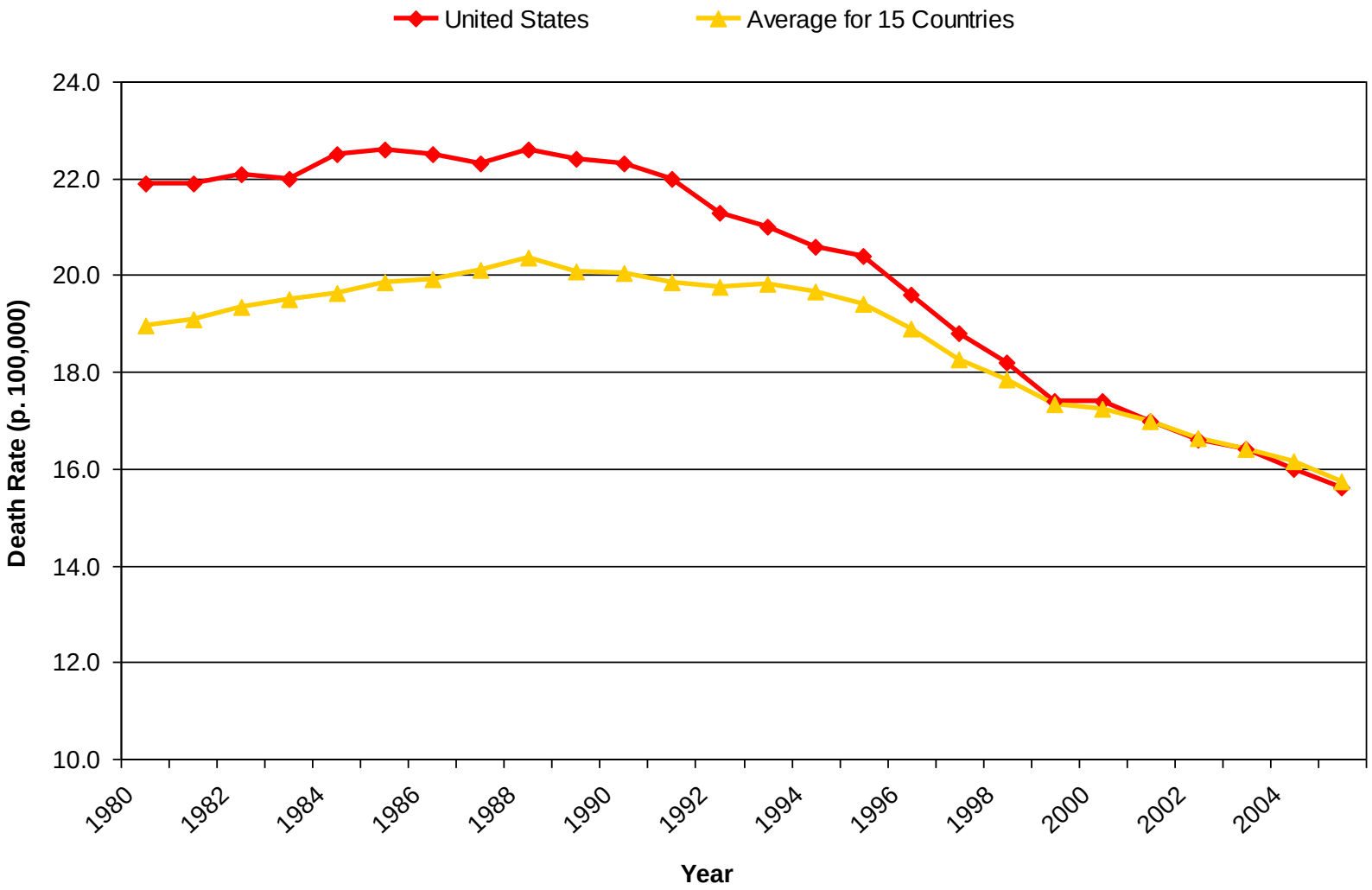
Source: Surveillance Epidemiology and End Results (SEER)

Age-Standardized Death Rates From Prostate Cancer, 1980-2005



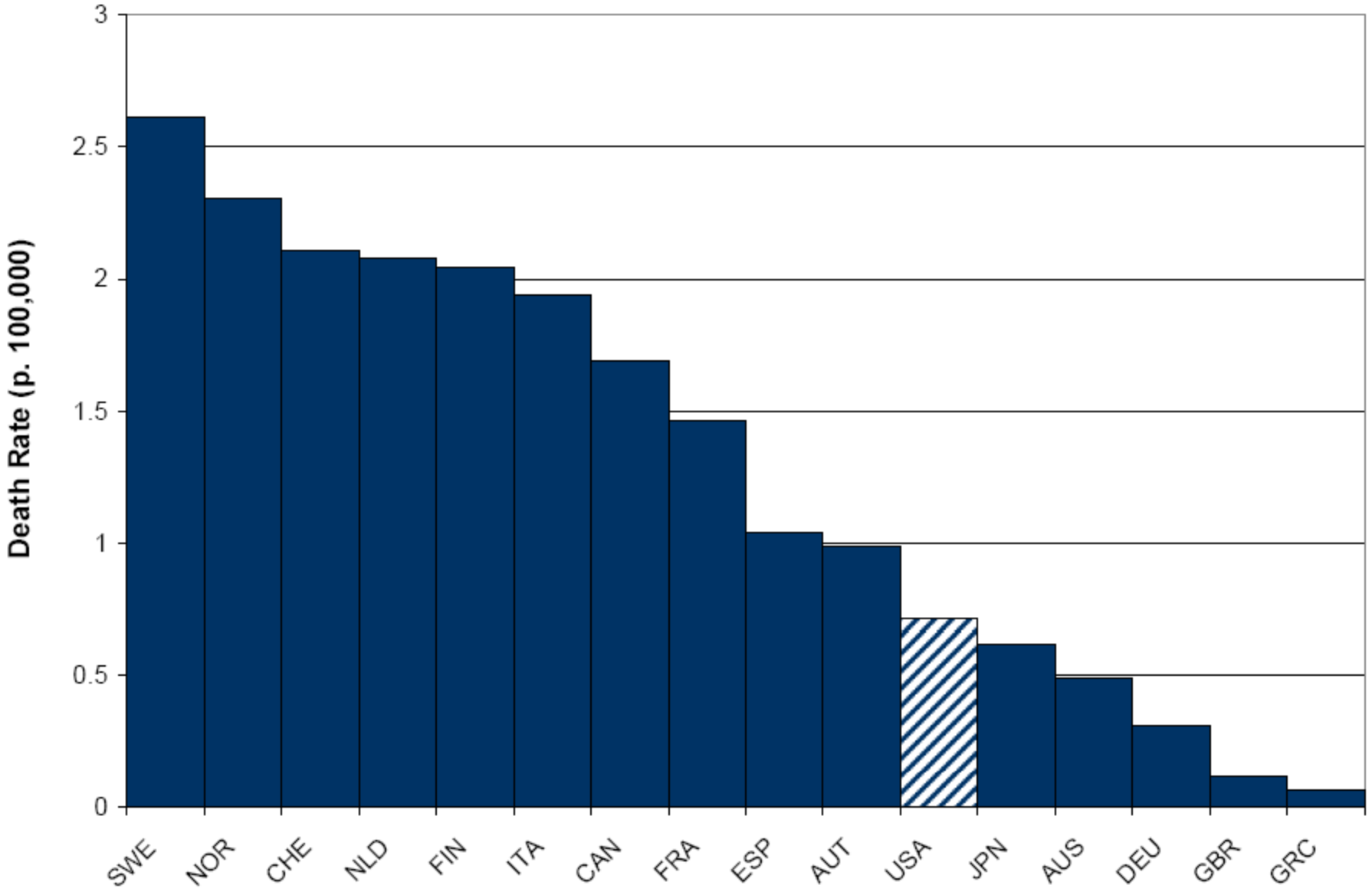
Source: Preston and Ho (2009)

Age-Standardized Death Rates From Breast Cancer, 1980-2005



Source: Preston and Ho (2009)

FIGURE 1 Age Standardized death rates at ages 50+ from influenza, 2000-2004.



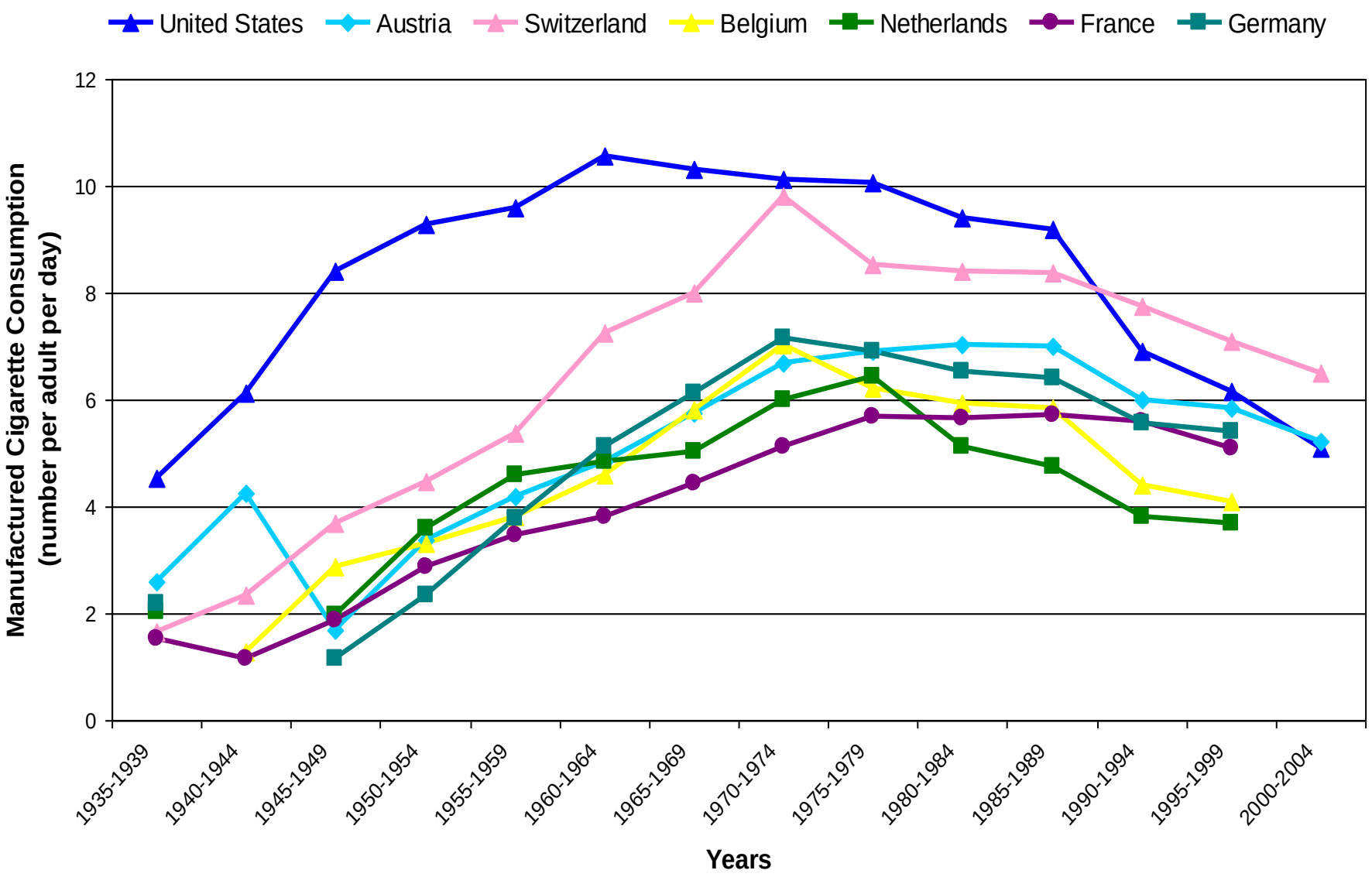
Contribution of Smoking to International Differences in Life Expectancy

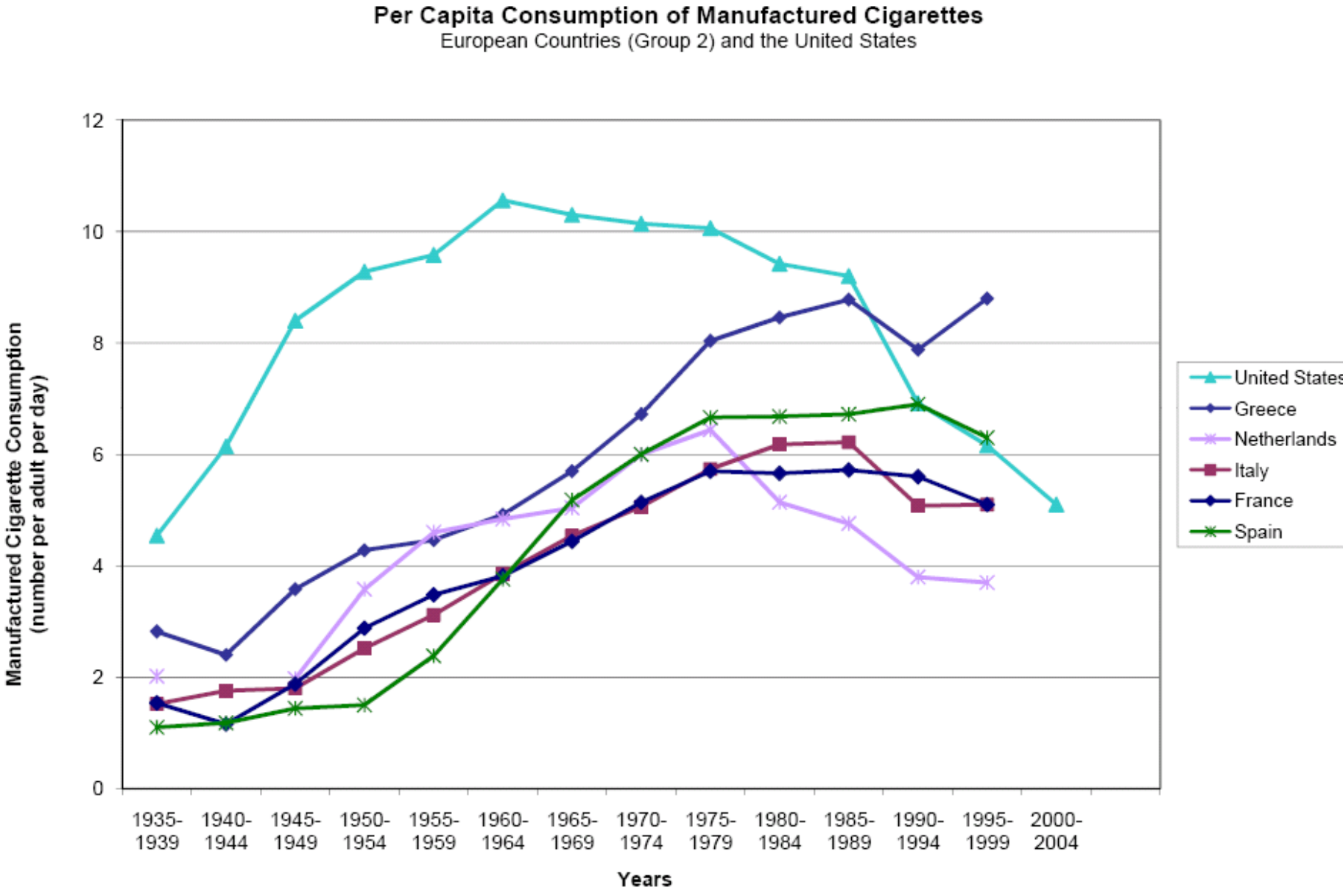
Samuel H. Preston
Dana A. Glei
John R. Wilmoth

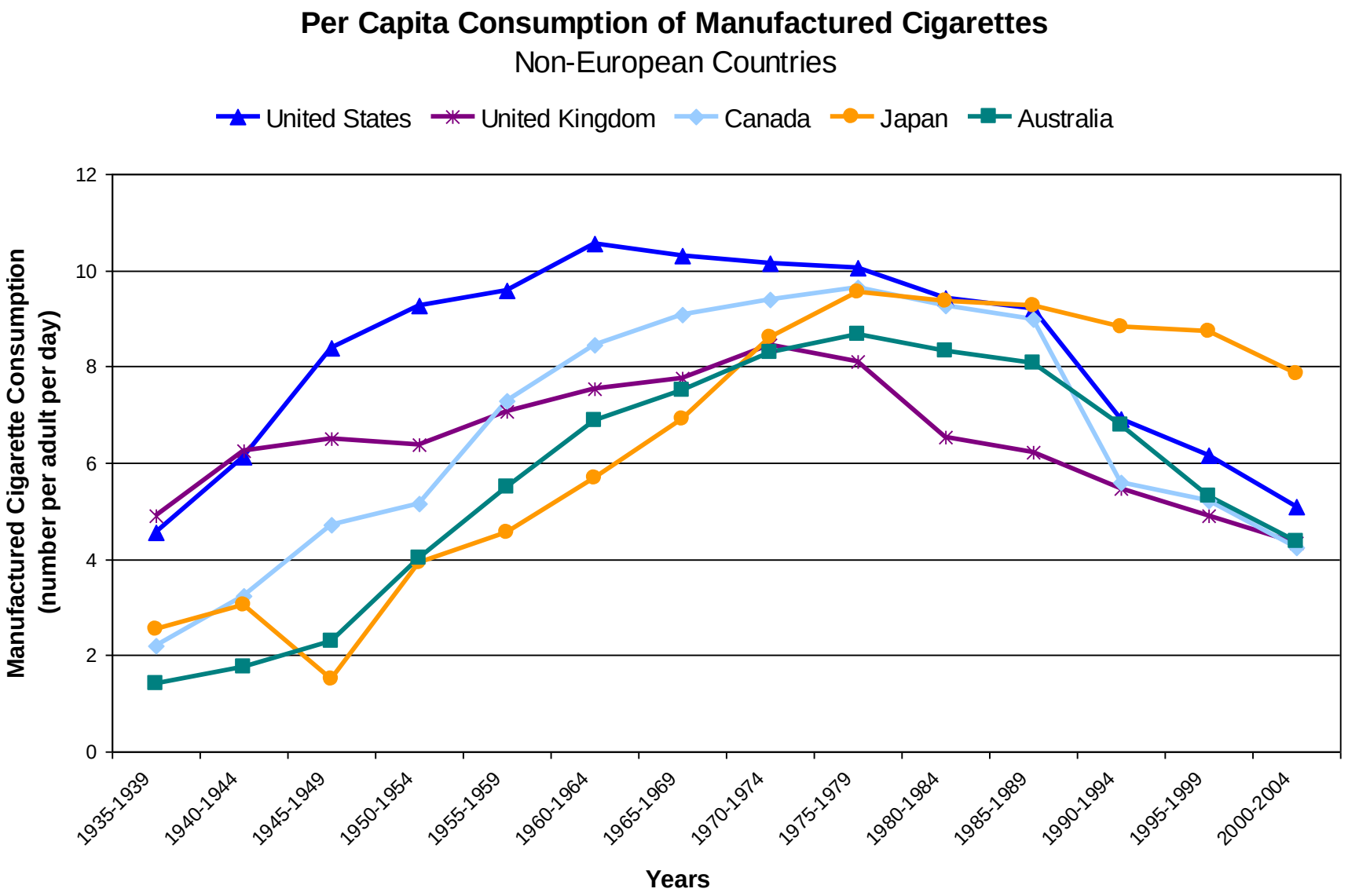
Panel on Divergent Trends in Longevity
National Research Council

Per Capita Consumption of Manufactured Cigarettes

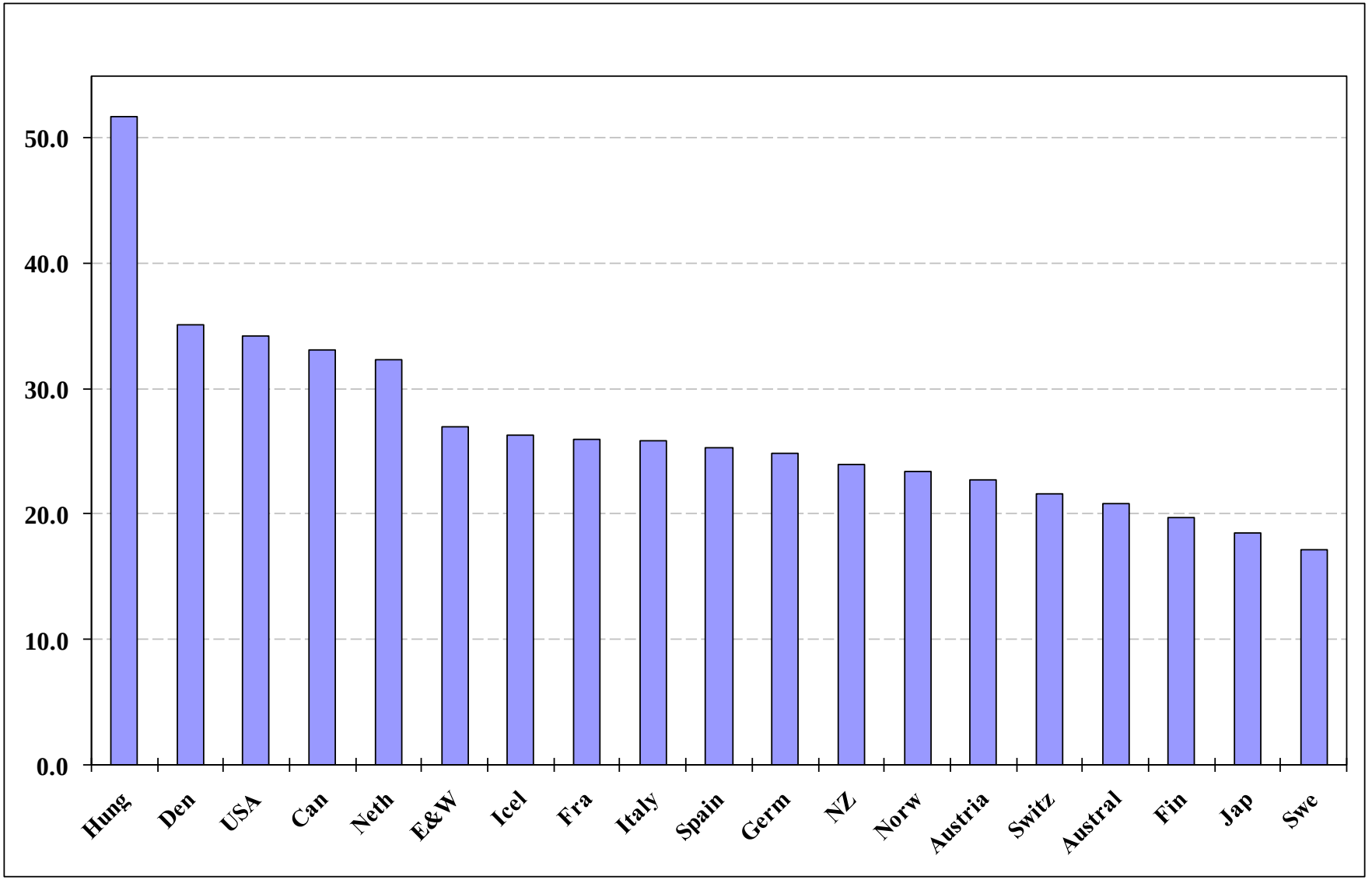
European Countries (Group 1) and the United States



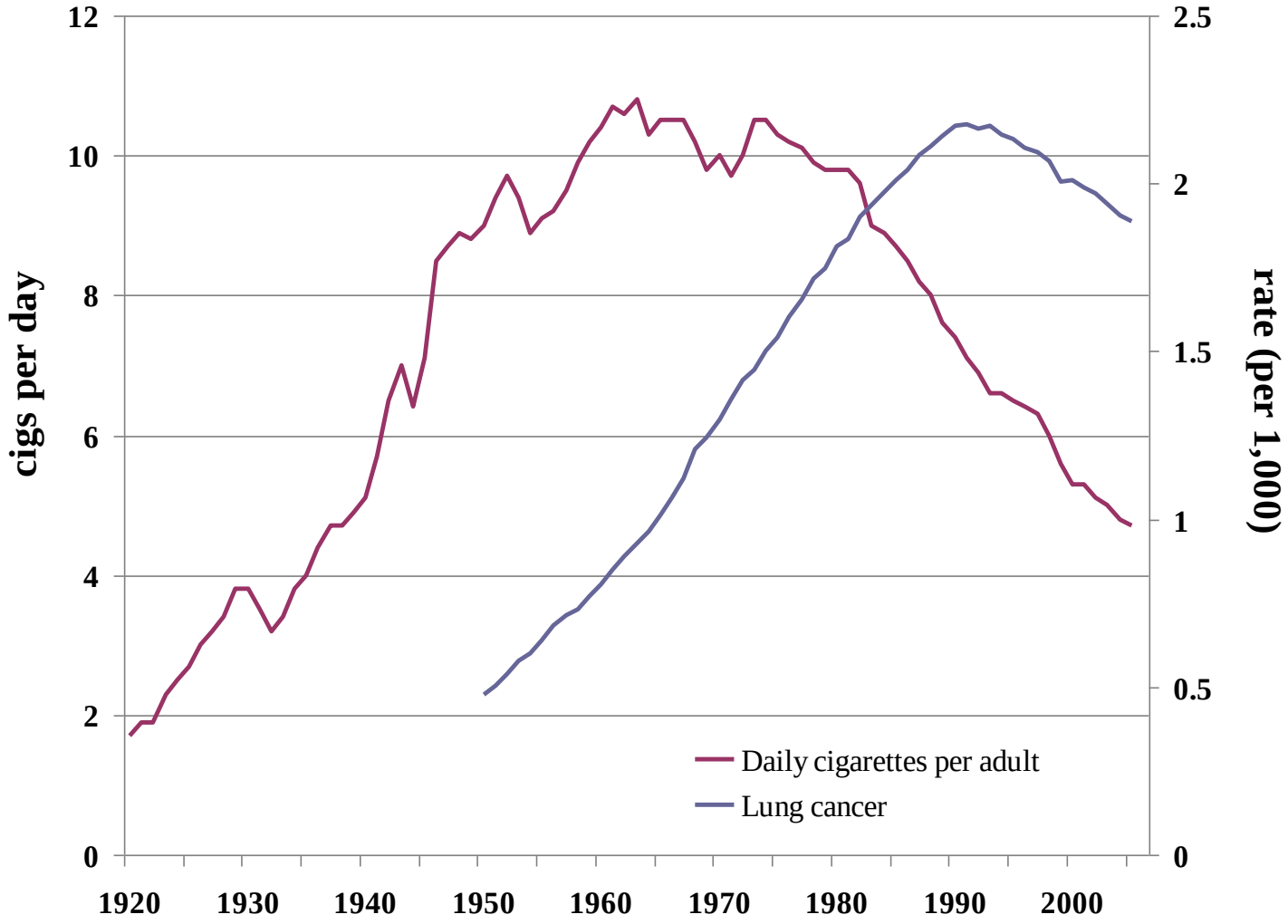

Per Capita Consumption of Manufactured Cigarettes
European Countries (Group 2) and the United States
Manufactured Cigarette Consumption
(number per adult per day)
12
10
8
6
4
2
0
1935-1939
1940-1944
1945-1949
1950-1954
1955-1959
1960-1964
1965-1969
1970-1974
1975-1979
1980-1984
1985-1989
1990-1994
1995-1999
2000-2004
Years
United States
Greece
Netherlands
Italy
France
Spain


Per Capita Consumption of Manufactured Cigarettes
Non-European Countries
United States
United Kingdom
Canada
Japan
Australia
Manufactured Cigarette Consumption (number per adult per day)
0
2
4
6
8
10
12
1935-1939
1940-1944
1945-1949
1950-1954
1955-1959
1960-1964
1965-1969
1970-1974
1975-1979
1980-1984
1985-1989
1990-1994
1995-1999
2000-2004
Years

Age-Adjusted Lung Cancer Death Rates in 2003, Mean, Male and Female



Daily Cigarettes Per Capita and Lung Cancer Mortality in the US



The Model

$$\ln M_0 = \beta_a X_a + \beta_t X_t + \beta_c X_c + \beta_{ct}(T \times X_c) + \beta_L M_L + \beta_{tL}(M_L \times T) + \beta_{aL}(M_L \times X_a)$$

M_0 is the death rate from causes other than lung cancer in a particular age/sex/period country category;

X_a is a set of dummy variables for each age group;

X_t is a set of dummy variables for each calendar year;

X_c is a set of dummy variables for each country;

(T x X_c) is a set of interactions between calendar year (linear) and each country dummy;

M_L is the death rate from lung cancer;

(M_L x T) is an interaction between M_L and year;

(M_L x X_a) is an interaction between M_L and the age dummies

Table 2. Estimated fraction of all deaths† attributable to smoking in 1955, 1980, 2003, by sex and country

	Males			Females		
Country	1955	1980	2003	1955	1980	2003
Australia	0.07	0.23	0.18	0.01	0.03	0.12
Austria	0.16	0.23	0.19	0.01	0.02	0.06
Belgium	0.09	0.32	0.34*	0.01	0.01	0.05*
Canada	0.07	0.24	0.26	0.01	0.05	0.22
Denmark	0.07	0.23	0.24*	0.01	0.05	0.19*
England and Wales	0.17	0.32	0.22	0.01	0.07	0.18
Finland	0.19	0.29	0.19	0.01	0.02	0.05
France	0.05	0.18	0.20	0.01	0.00	0.02
Hungary	0.07	0.23	0.33	0.01	0.04	0.15
Iceland	0.03	0.06	0.17	0.01	0.08	0.20
Italy	0.04	0.22	0.25	0.01	0.01	0.06
Japan	0.01	0.12	0.22	0.01	0.02	0.12
Netherlands	0.10	0.34	0.28	0.00	0.01	0.10
New Zealand	0.09	0.22	0.18	0.00	0.04	0.14
Norway	0.02	0.09	0.17	0.01	0.01	0.08
Portugal	0.02	0.07	0.13	0.01	0.00	0.01
Spain	0.04	0.15	0.23	0.01	0.00	0.00
Sweden	0.03	0.11	0.10	0.01	0.02	0.07
Switzerland	0.10	0.20	0.17	0.01	0.01	0.05
United States	0.09	0.24	0.24	0.01	0.07	0.23

† Includes deaths from all causes for ages 50+.

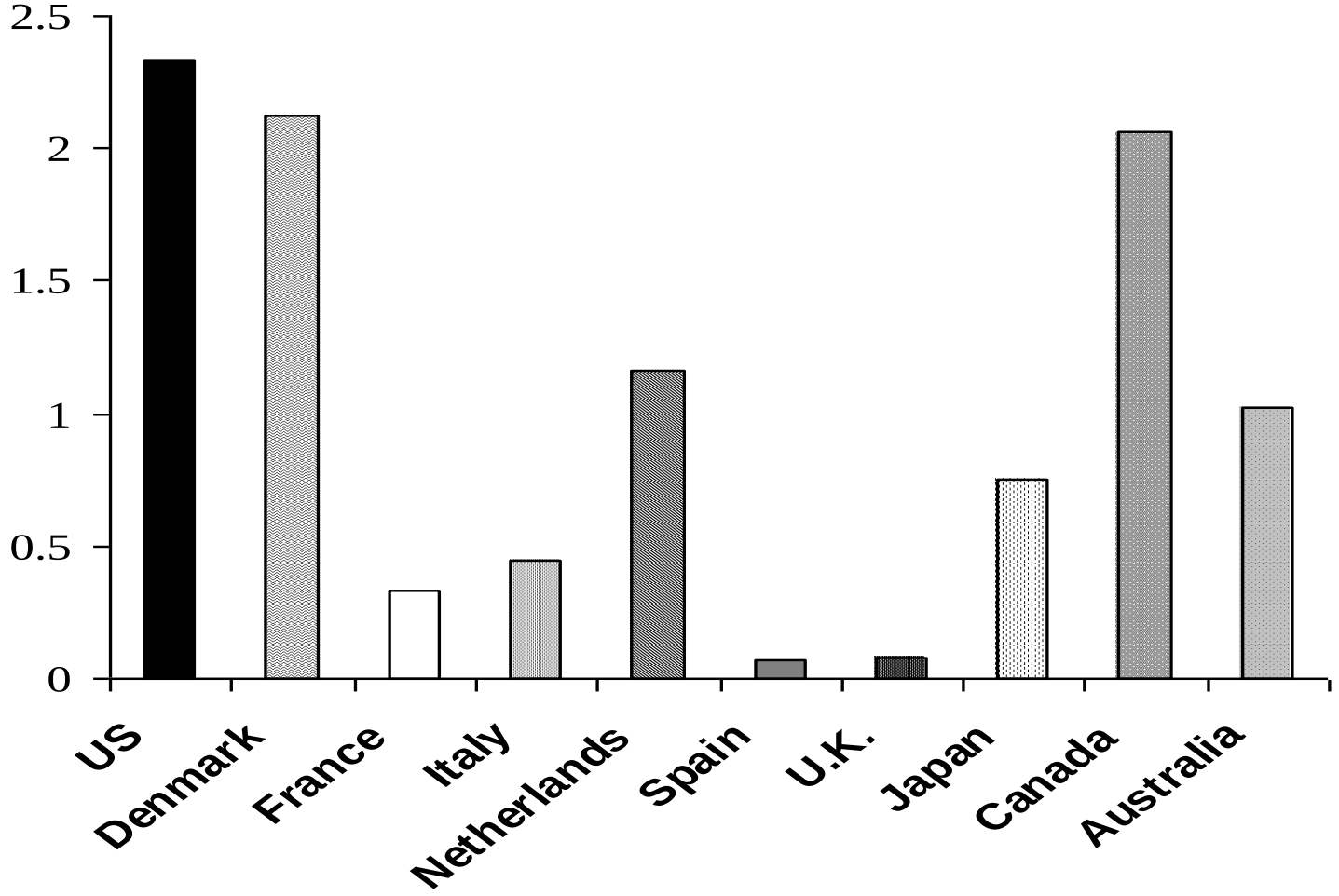
n/a = Data not available

* Estimates based on data from 1997 for Belgium and 2001 for Denmark.

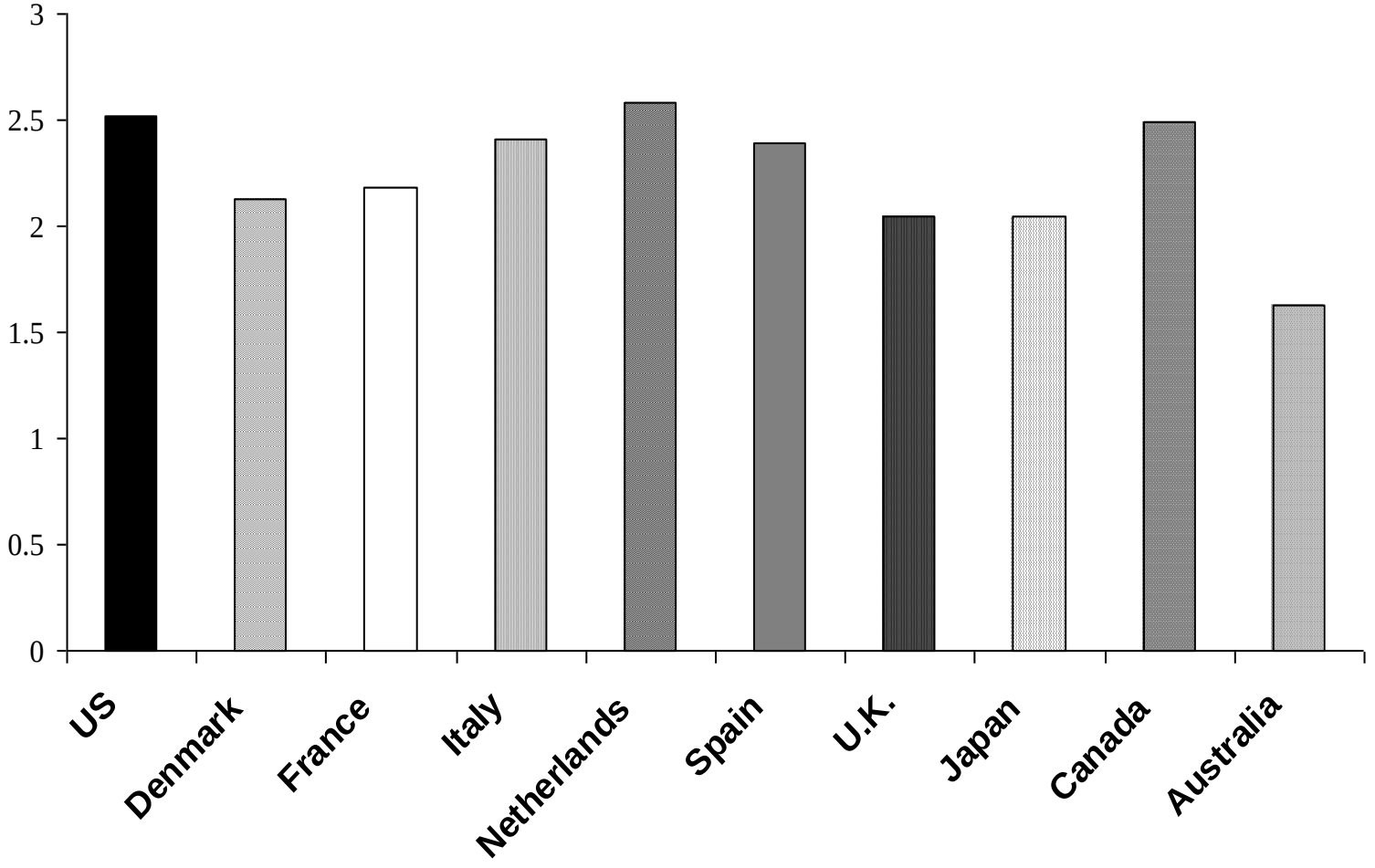
Table 3. Comparison of smoking-attributable fraction in 2000, by sex and country

Country	Males		Females	
	Based on Model† (ages 50+)	Peto/Lopez‡ (ages 35+)	Based on Model† (ages 50+)	Peto/Lopez‡ (ages 35+)
Australia	0.20	0.20	0.11	0.11
Austria	0.19	0.19	0.07	0.06
Belgium	0.34*	0.31	0.05*	0.05
Canada	0.25	0.25	0.19	0.18
Denmark	0.23	0.25	0.18	0.20
England and Wales	0.23	0.23§	0.15	0.16§
Finland	0.19	0.18	0.04	0.04
France	0.21	0.21	0.01	0.02
Hungary	0.32	0.31	0.12	0.12
Iceland	0.14	n/a	0.21	n/a
Italy	0.25	0.25	0.05	0.05
Japan	0.21	0.18	0.12	0.06
Netherlands	0.30	0.28	0.07	0.10
New Zealand	0.18	0.20	0.15	0.15
Norway	0.15	0.17	0.06	0.10
Portugal	0.12	0.15	0.01	0.01
Spain	0.22	0.25	0.00	0.00
Sweden	0.10	0.10	0.05	0.07
Switzerland	0.18	0.19	0.05	0.06
United States	0.25	0.24	0.21	0.20

Gains to female life expectancy at age 50 from eliminating smoking



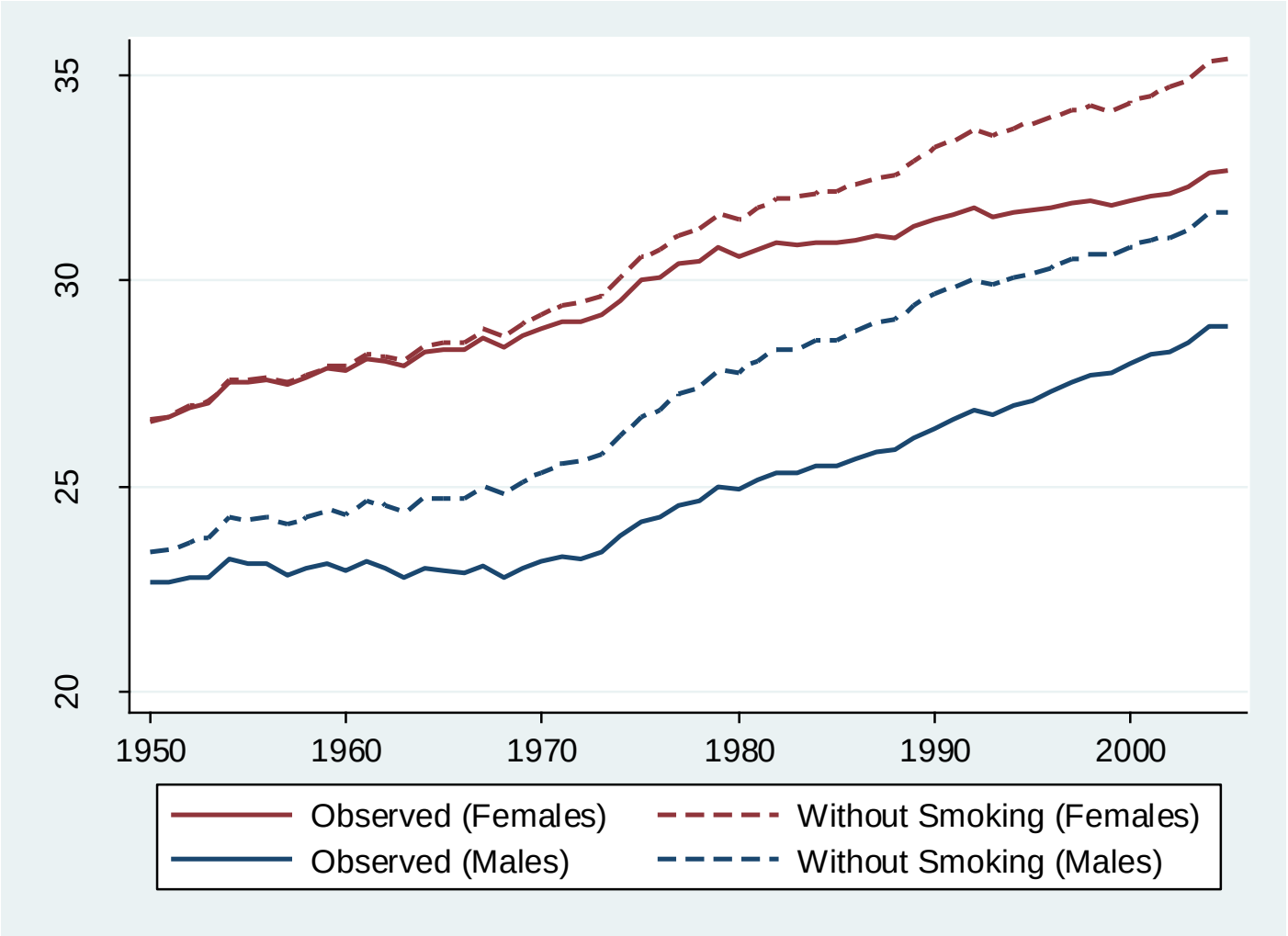
Gains to male life expectancy at age 50 from eliminating smoking



	Loss in Life Expectancy From Smoking			Life Expectancy Difference US – 9 Countries	Percent Explained
	US	9 Countries	*Difference*		
Women	2.33	1.07	1.26	1.61	78%
Men	2.52	2.21	0.31	0.76	41%

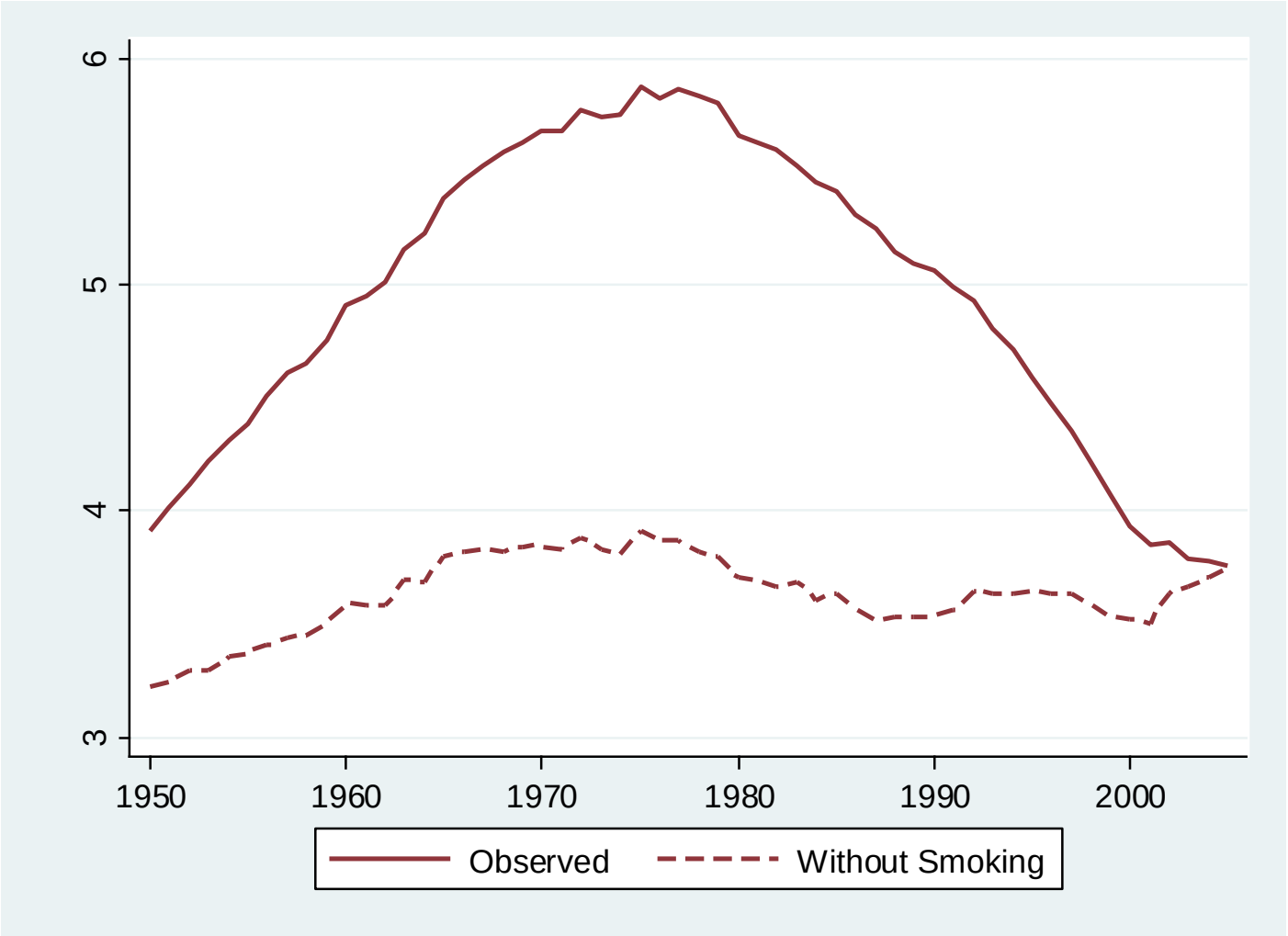
Source: Preston, Glei, Wilmoth 2010

FIGURE 1 U.S. trends in observed e_{50} and estimated e_{50} without smoking by sex.



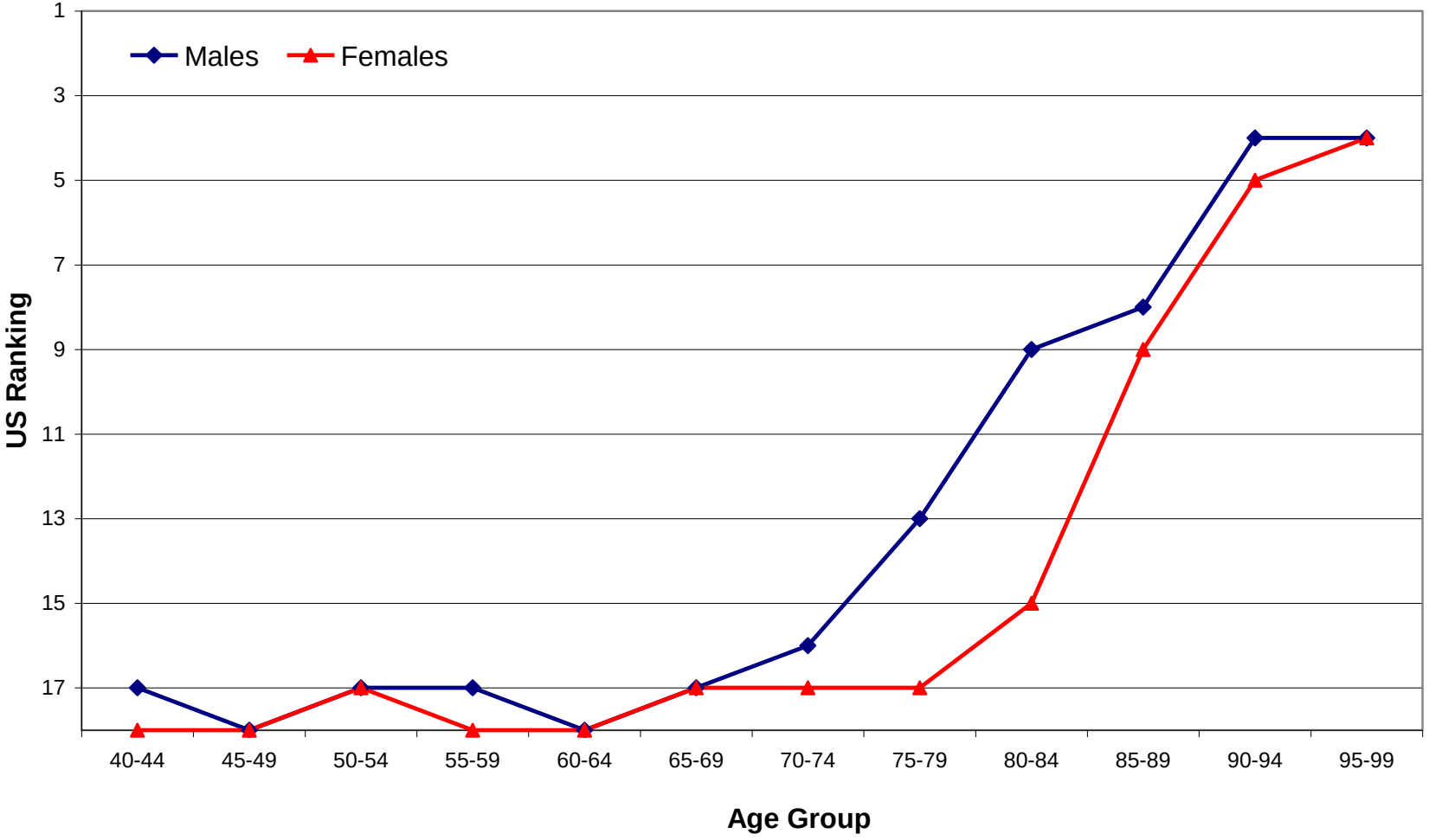
Source: Preston, Glei, and Wilmoth (2009)

FIGURE 2 U.S. trends in the observed sex difference in e_{50} and the estimated sex difference without smoking.

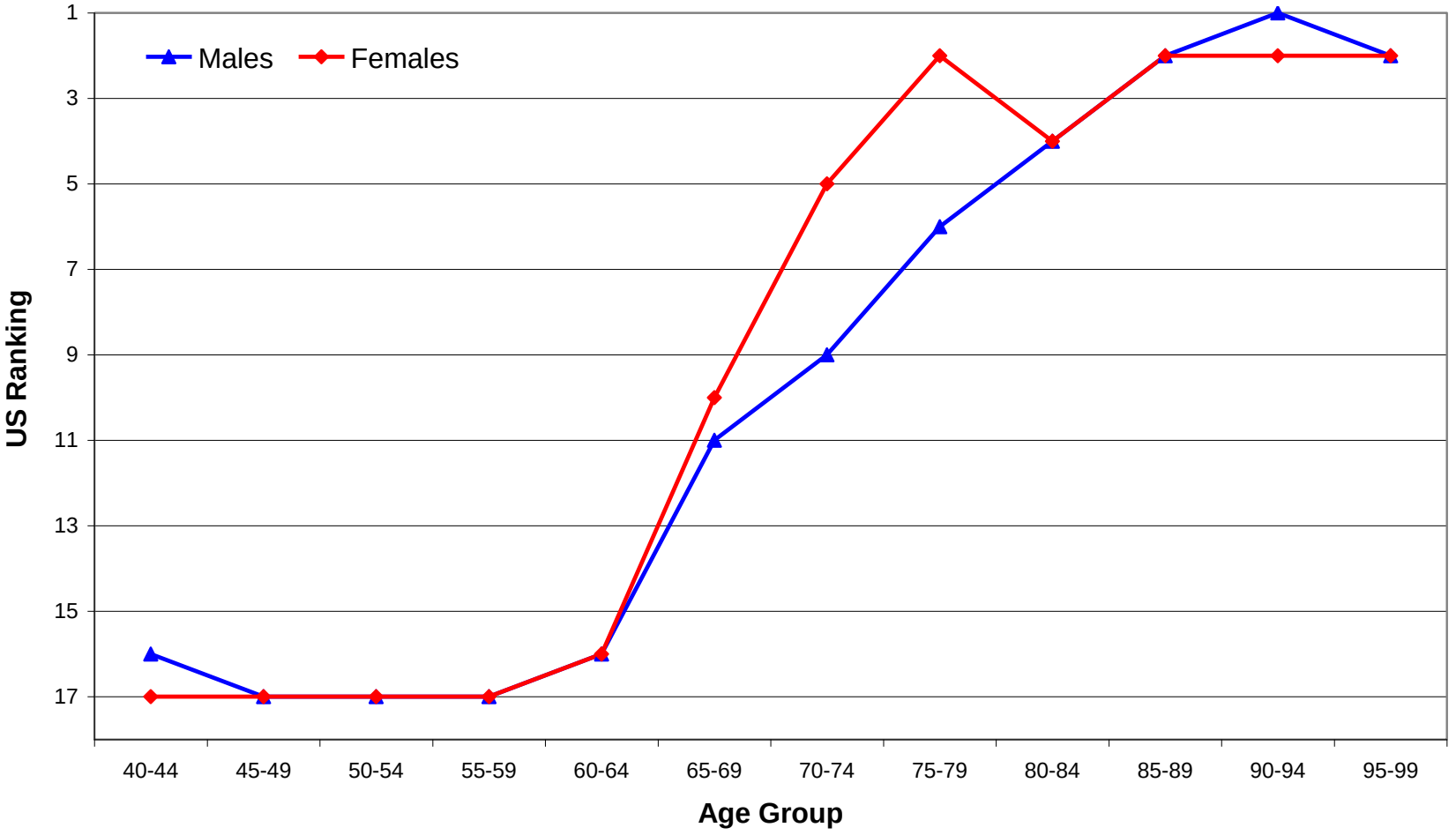


Source: Preston, Glei, and Wilmoth (2009)

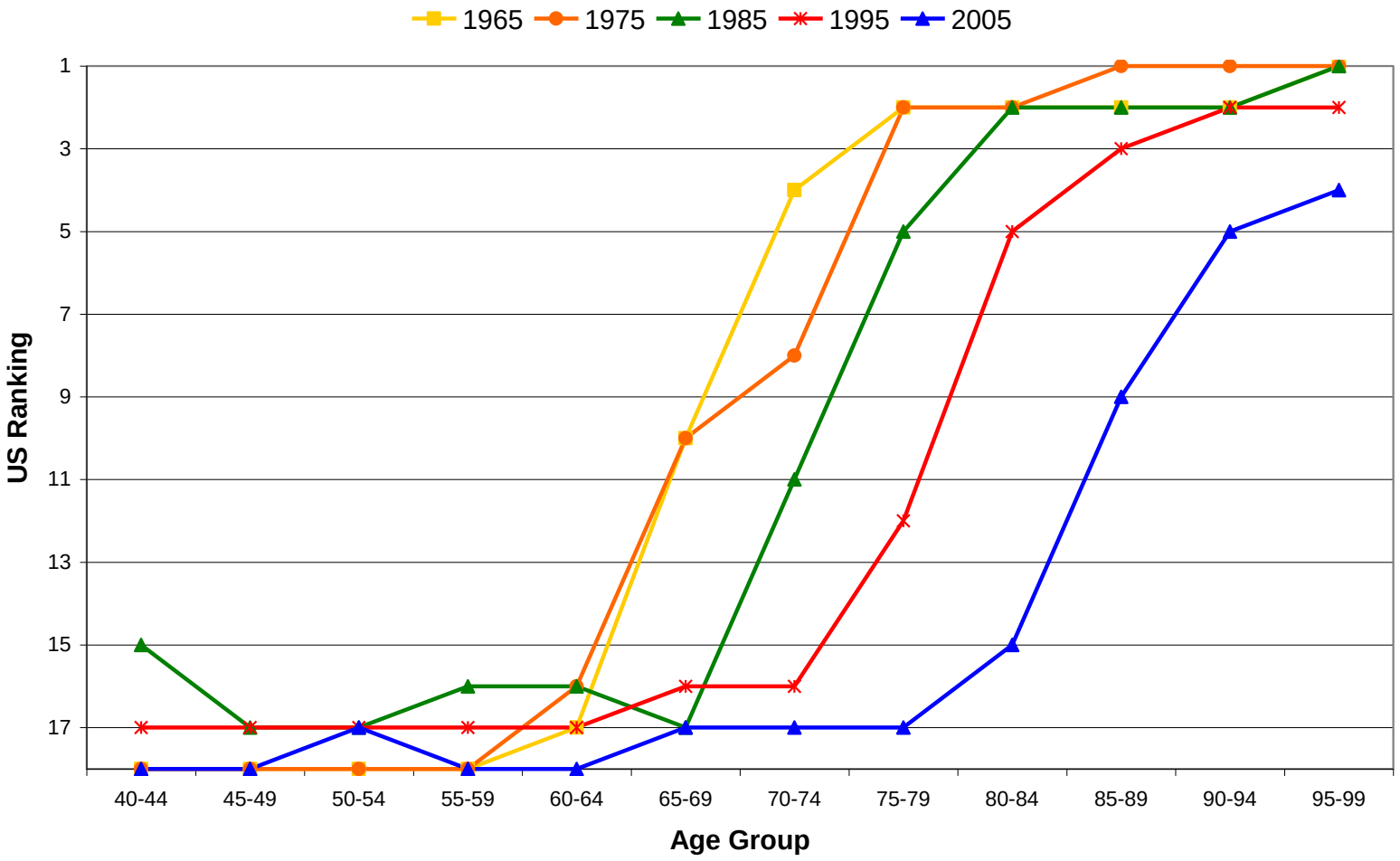
Ranking of US Age-Specific Death Rates Among 18 OECD Countries in 2005



Ranking of US Age-Specific Death Rates Among 18 OECD Countries in 1960



Ranking of US Female Age-Specific Death Rates Among 18 OECD Countries



Ratio of US Age-Specific Death Rates to the Average of17 OECD Countries in 2005

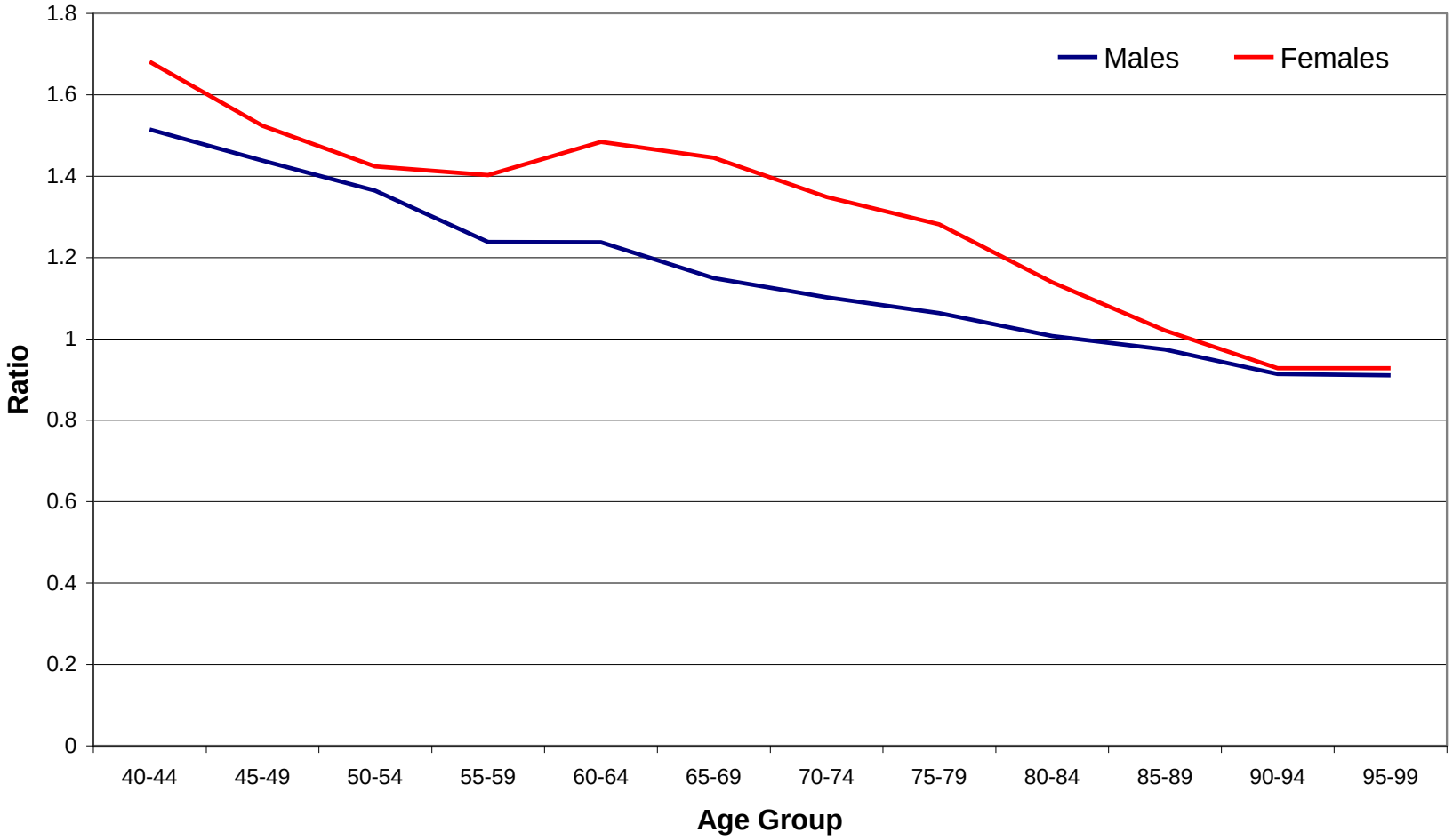
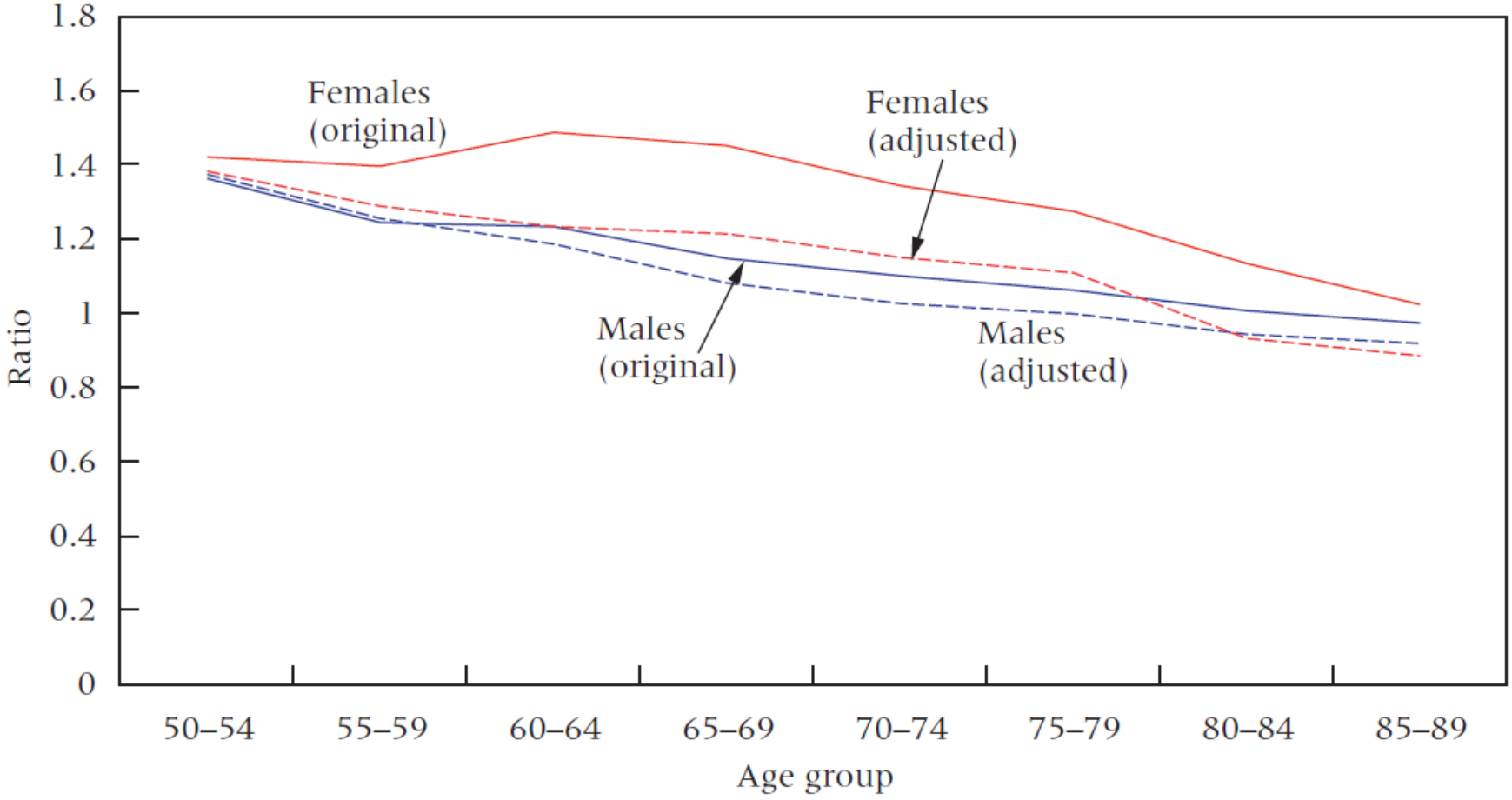


FIGURE 7 Ratio of US age-specific death rates to the average of 17 other OECD countries with and without adjustment for smoking-attributable deaths



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Sex Mortality Differentials in the United States: The Role of Cohort Smoking Patterns

Samuel H. Preston
Haidong Wang

This project was supported by National Institute of Aging grant P30 AG12836 and by the Boettner Center for Pensions and Retirement Security at the University of Pennsylvania. We are grateful to Donna Hoyert from the National Center for Health Statistics and to
David M. Burns of the University of California, San Diego for supplying certain of the data on which this study is based.

Table 1. Rates of Mortality Change for Men in the United States, by Age and Period, 1948–2003[a]

	Age Interval						
Period	50–54	55–59	60–64	65–69	70–74	75–79	80–84
1953–1948	–0.0715	–0.0606	–0.0232	–0.0005	–0.0338	–0.0625	0.0353
1958–1953	–0.0456	–0.0520	–0.0176	0.0091	–0.0052	–0.0131	–0.0195
1963–1958	–0.0071	0.0314	0.0010	0.0576	0.0421	0.0047	–0.0176
1968–1963	–0.0061	0.0064	0.0338	–0.0276	0.0645	0.0048	–0.0658
1973–1968	–0.0961	–0.0698	–0.0758	–0.0735	–0.0888	0.0184	0.0137
1978–1973	–0.1107	–0.1624	–0.1054	–0.1257	–0.1074	–0.0848	–0.0525
1983–1978	–0.1154	–0.0672	–0.1225	–0.0693	–0.0676	–0.0980	–0.0620
1988–1983	–0.0856	–0.0827	–0.0534	–0.0646	–0.0589	–0.0518	–0.0213
1993–1988	–0.0865	–0.1005	–0.0940	–0.0745	–0.1032	–0.0833	–0.0631
1998–1993	–0.1242	–0.1262	–0.1171	–0.1063	–0.0691	–0.0833	–0.0692
2003–1998	0.0339	–0.0610	–0.0926	–0.1067	–0.1064	–0.0704	–0.0850

Note: Shaded entries indicate rates of decline that are slower than the median value of –0.0658.

Sources: See footnote 1.

[a]Rates of mortality change for men are calculated as $\frac{M_i(t+5) - M_i(t)}{M_i(t)}$, where M_i = death rate for males in age interval i, year t.

Table 2. Rates of Mortality Change for Women in the United States, by Age and Period, 1948–2003[a]

	Age Interval						
Period	50–54	55–59	60–64	65–69	70–74	75–79	80–84
1953–1948	–0.0937	–0.1235	–0.1123	–0.0771	–0.0964	–0.1028	–0.0277
1958–1953	–0.1172	–0.0931	–0.0663	–0.0621	–0.0770	–0.0584	–0.0231
1963–1958	–0.0313	–0.0265	–0.0258	–0.0240	–0.0424	–0.0580	–0.0392
1968–1963	–0.0091	–0.0115	–0.0443	–0.0311	–0.0249	–0.0624	–0.0924
1973–1968	–0.0769	–0.0398	–0.0715	–0.1381	–0.0940	–0.0269	–0.0844
1978–1973	–0.1059	–0.1299	–0.0579	–0.1139	–0.1365	–0.1173	–0.1000
1983–1978	–0.0793	–0.0471	–0.0686	–0.0065	–0.0451	–0.1382	–0.0841
1988–1983	–0.0611	–0.0293	–0.0183	–0.0120	–0.0174	–0.0719	–0.0219
1993–1988	–0.0836	–0.0693	–0.0501	–0.0366	–0.0420	–0.0413	–0.0601
1998–1993	–0.0859	–0.0845	–0.0667	–0.0448	–0.0214	–0.0324	–0.0130
2003–1998	0.0045	–0.0506	–0.0579	–0.0635	–0.0588	–0.0199	–0.0335

Note: Shaded entries indicate rates of decline that are slower than the median value of –0.0584.

Sources: See footnote 1.

[a]Rates of mortality change for women are calculated as $\frac{F_i(t+5) - F_i(t)}{F_i(t)}$, where F_i = death rate for females in age interval i, year t.

Table 3. Sex Differences in Rates of Mortality Change in the United States, by Age and Period, 1948–2003[a]

	Age Interval						
Period	50–54	55–59	60–64	65–69	70–74	75–79	80–84
1953–1948	0.0221	0.0629	0.0891	0.0765	0.0625	0.0404	0.0630
1958–1953	0.0716	0.0410	0.0487	0.0712	0.0718	0.0452	0.0036
1963–1958	0.0243	0.0579	0.0269	0.0816	0.0844	0.0627	0.0216
1968–1963	0.0029	0.0179	0.0781	0.0035	0.0894	0.0672	0.0265
1973–1968	–0.0192	–0.0299	–0.0043	0.0646	0.0052	0.0453	0.0981
1978–1973	–0.0048	–0.0325	–0.0475	–0.0118	0.0291	0.0324	0.0475
1983–1978	–0.0361	–0.0201	–0.0540	–0.0628	–0.0224	0.0402	0.0220
1988–1983	–0.0245	–0.0534	–0.0350	–0.0526	–0.0415	–0.0339	0.0006
1993–1988	–0.0029	–0.0312	–0.0438	–0.0378	–0.0612	–0.0419	–0.0030
1998–1993	–0.0383	–0.0418	–0.0504	–0.0615	–0.0478	–0.0509	–0.0562
2003–1998	0.0294	–0.0104	–0.0347	–0.0431	–0.0476	–0.0505	–0.0515

Note: Shaded entries indicate positive values, indicating that men's mortality rose relative to women's.

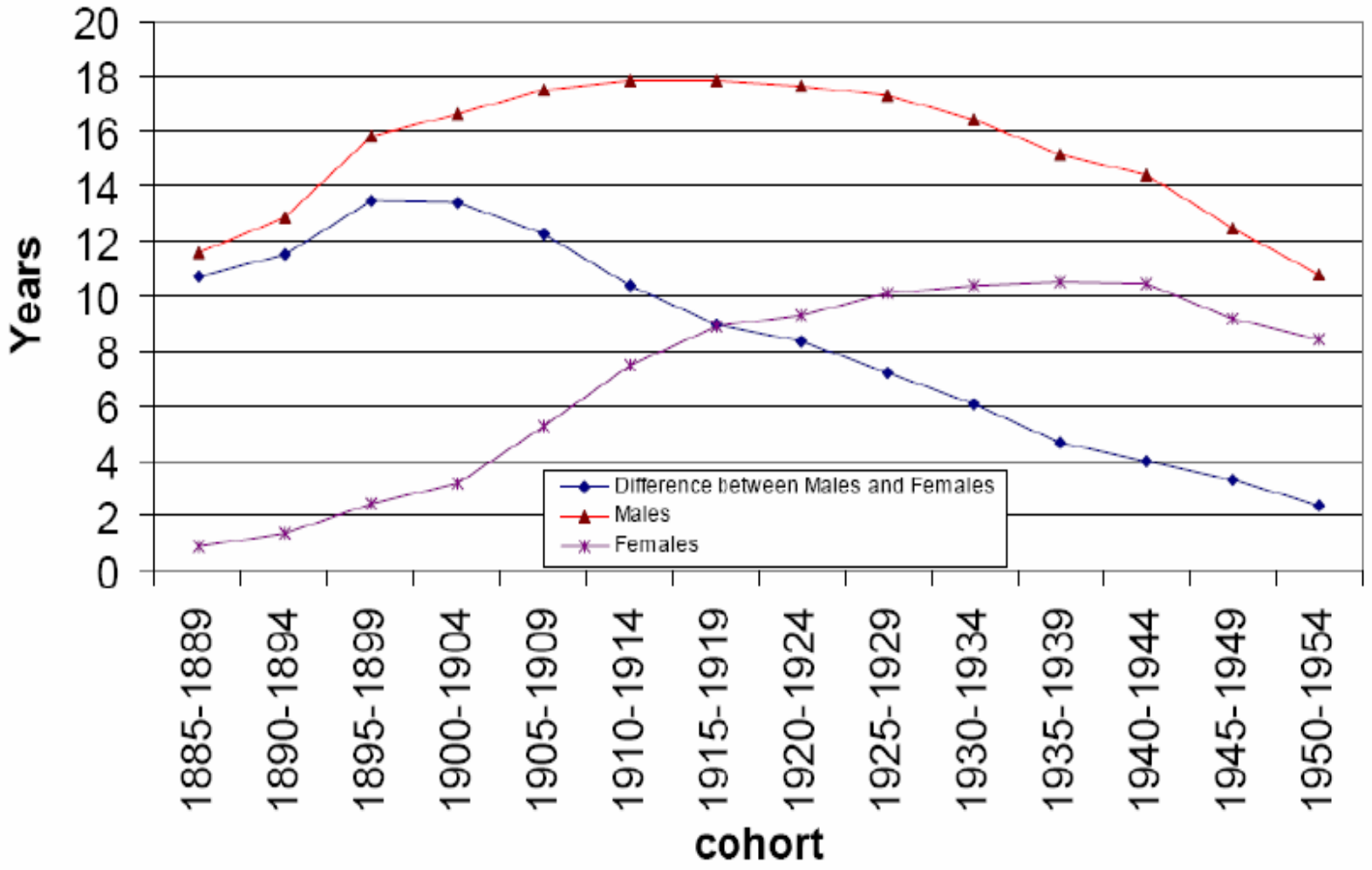
Sources: See footnote 1.

[a]Sex differences in rates of mortality change are calculated as

$$\frac{M_i(t+5)-M_i(t)}{M_i(t)}-\frac{F_i(t+5)-F_i(t)}{F_i(t)},$$

where M_i = death rate for males in age interval i, year t. F_i = death rate for females in age interval i, year t.

Figure 1. Average Number of Years Spent as Cigarette Smoker Prior to Age 40 among Men and Women in Different Birth Cohorts

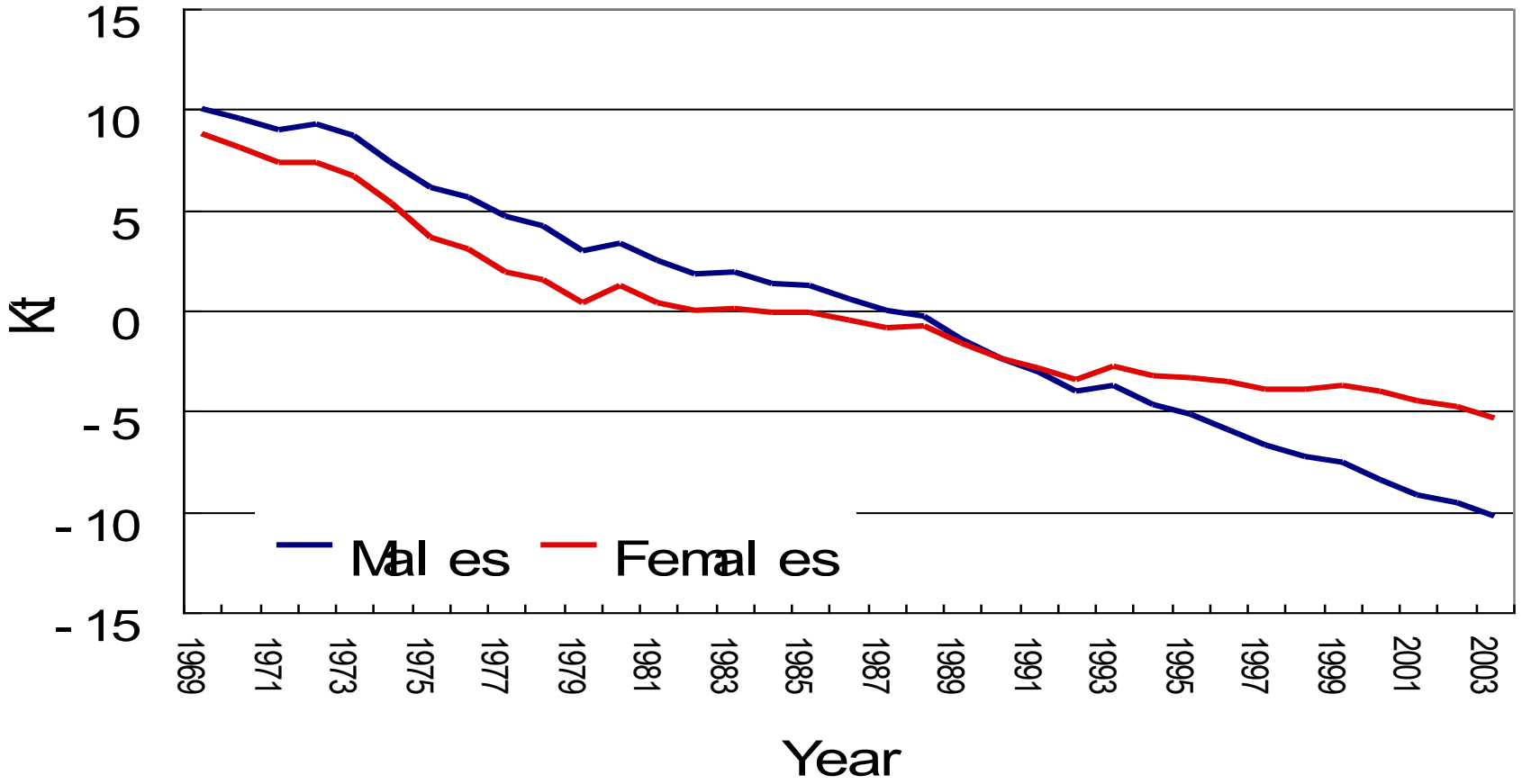


Lee-Carter Model

$$\ln(M_{x,t}) = a_x + b_x \cdot k_t + \varepsilon_{x,t}$$

- $M_{x,t}$: central mortality rate for age x at time t,
- a_x: mortality profile by age, which is constant over time,
- K_t: temporal trend of mortality changes over time,
- b_x : changes in the mortality rates at age x in response to
- changes in K_t over time,
- $\varepsilon_{x,t}$: error term, which depicts the age-specific historical
- influences that are not explained by the model.

K_t by sex estimated using Lee-Carter Model: United States, 1969-2003



Source: Human Mortality Database, www.mortality.org

Our Model

(Lee-Carter Model with Cohort Smoking Histories)

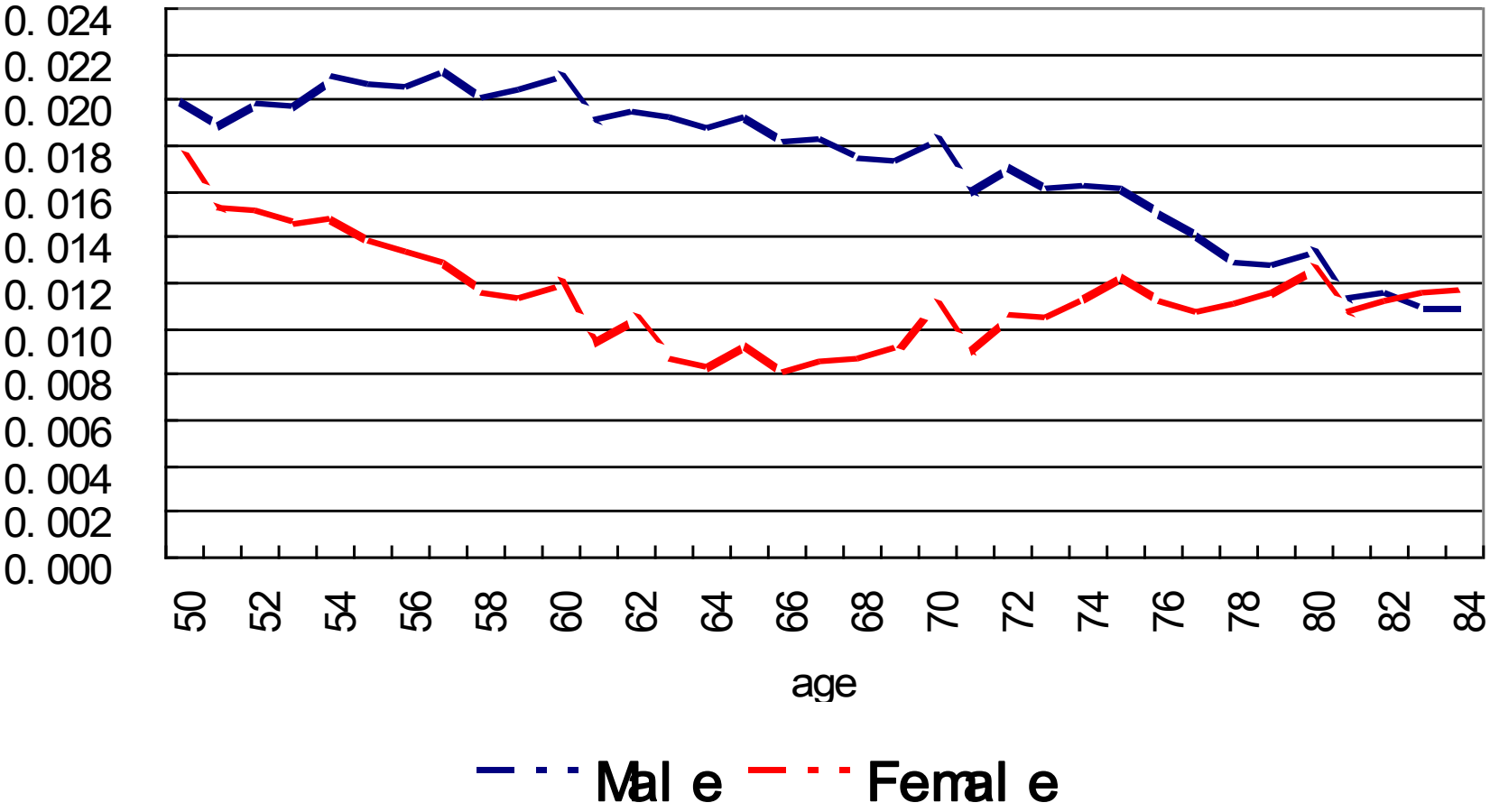
$$\begin{cases} \ln(M_{x,t}^{Male}) = a_x^{Male} + b_x^{Male} \cdot k_t + c \cdot S_{x,t}^{M} + \varepsilon_{x,t}^{Male} \\ \ln(M_{x,t}^{Female}) = a_x^{Female} + b_x^{Female} \cdot k_t + w \cdot S_{x,t}^{F} + \varepsilon_{x,t}^{Female} \end{cases}$$

$S_{x,t}^{F}$ is the matrix of cohort smoking histories by age and year for females

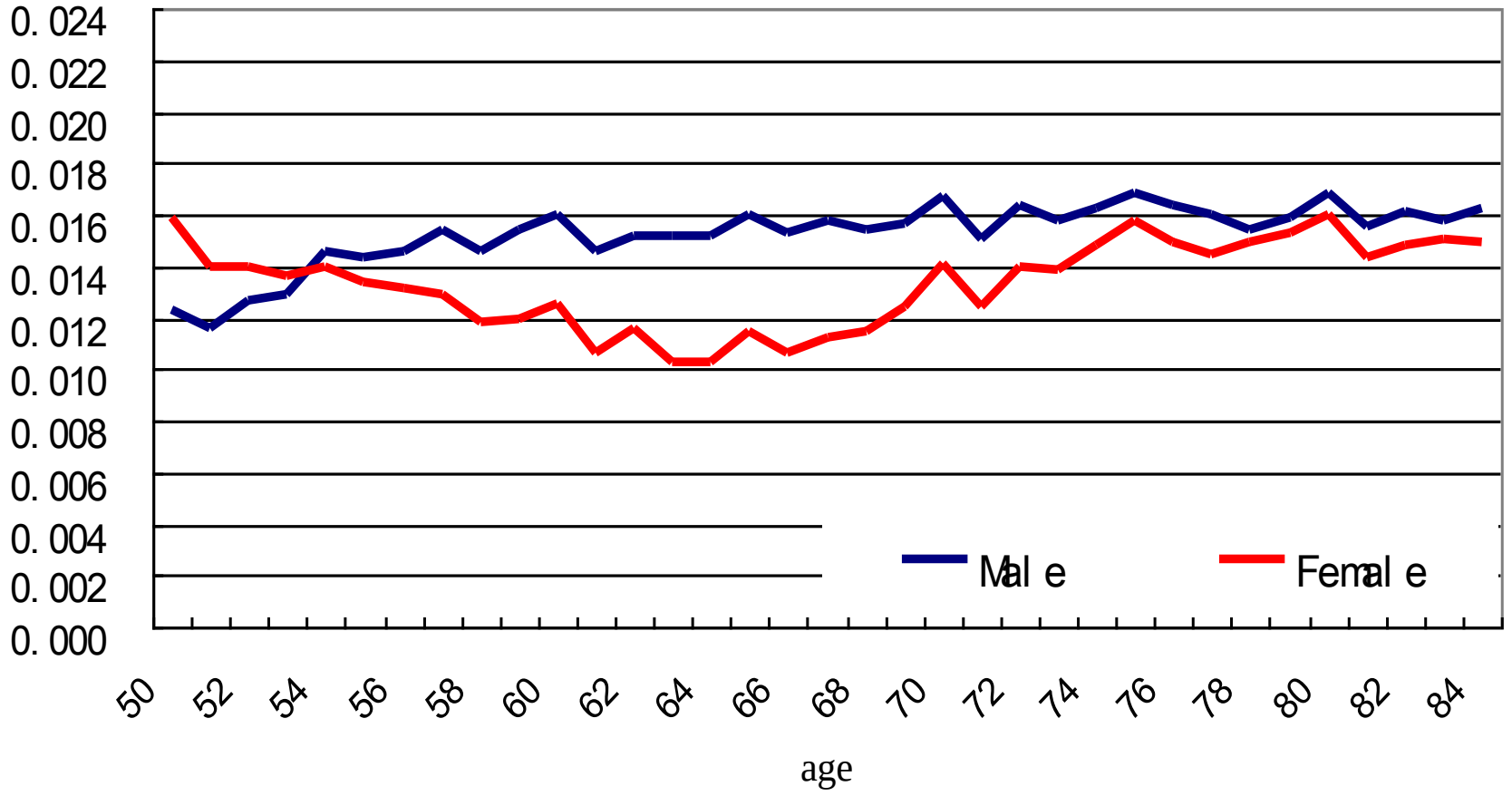
$S_{x,t}^{M}$ is the matrix of cohort smoking histories by age and year for males

C and *w* are corresponding coefficients for the smoking matrices

Estimated b_x by sex from Original Lee-Carter model



Estimated b_x by sex from Lee-Carter model with cohort smoking histories



Projections

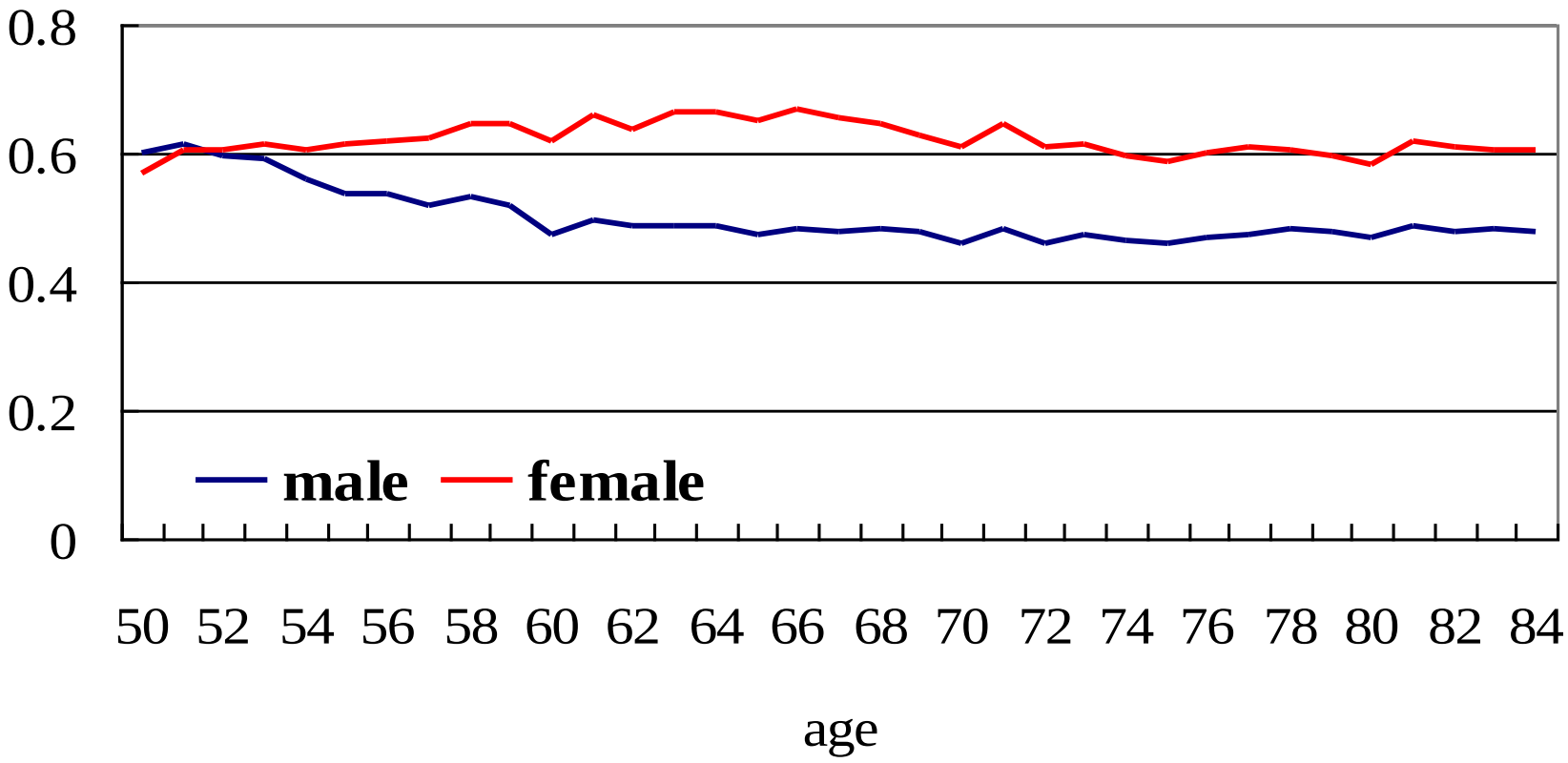
- We project age specific mortality rates for age group 50-84 to year 2034.

$$\ln(M_{x,t}^{Female}) = a_x^{Female} + b_x^{Female} \cdot k_t + w' \cdot S_{x,t}^{F}$$

- Projection of K_t
- Model: ARIMA (0,1,0)-random walk with a drift.

- Projection of Cohort Smoking Histories by Sex
  - Projection of Cohort Smoking Histories by Sex for Whites for cohorts born between 1965 and 1984
  - Using values of the Whites as the total Population for cohorts born between 1965 and 1985

Ratio of projected age specific mortality rates in 2034 to age specific mortality rates in 2003

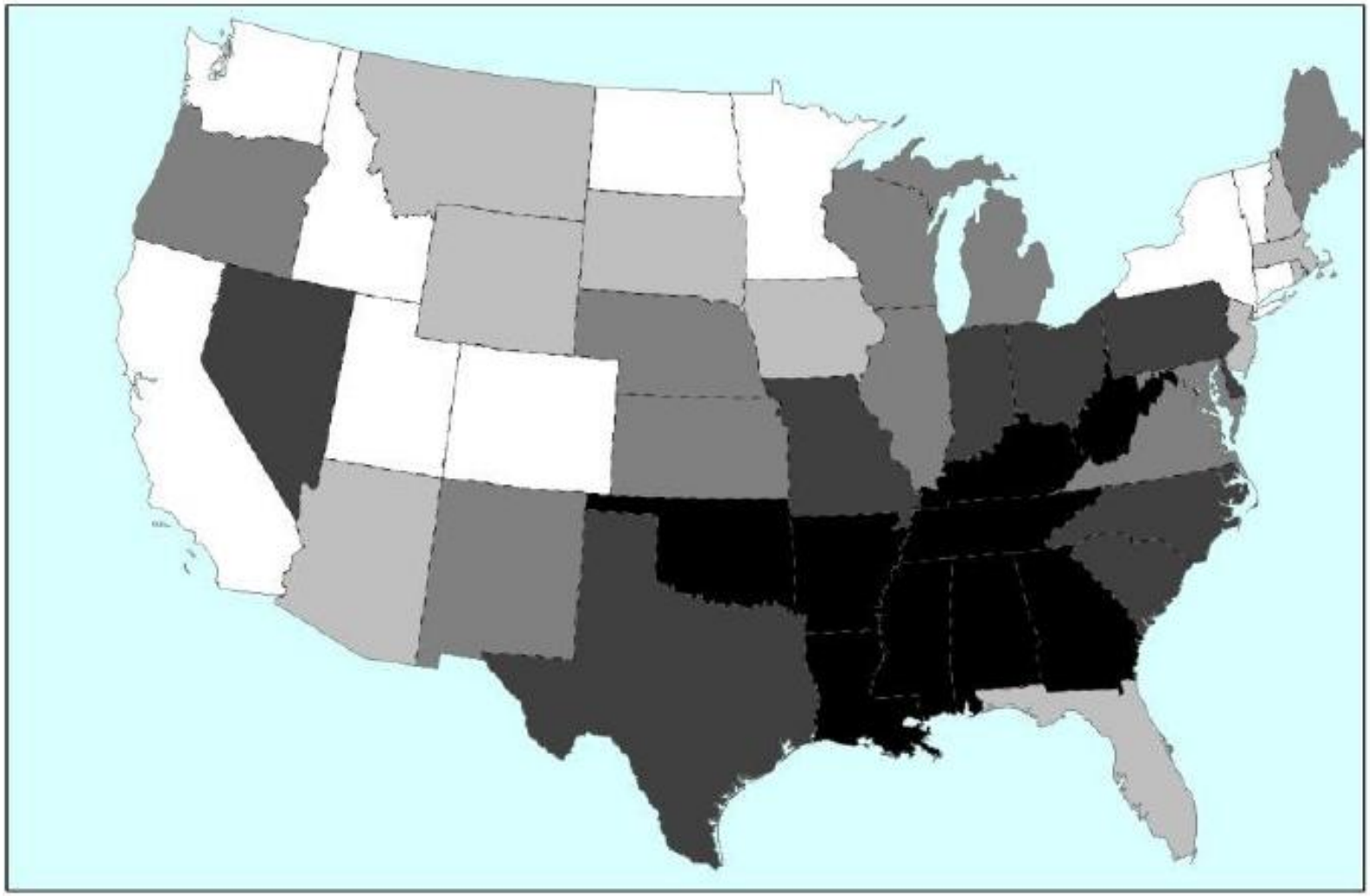


Comparison of ${}_{35}P_{50}$ from different projections

	Lee Carter Model With Projected Smoking Histories		Original Lee-Carter Model		Social Security Administration*	
	Male	Female	Male	Female	Male	Female
2010	0.3679	0.5029	0.3450	0.5008	0.3211	0.4532
2020	0.4575	0.5567	0.3984	0.5385	0.3535	0.4815
2030	0.5454	0.6116	0.4509	0.5745	0.3853	0.5104

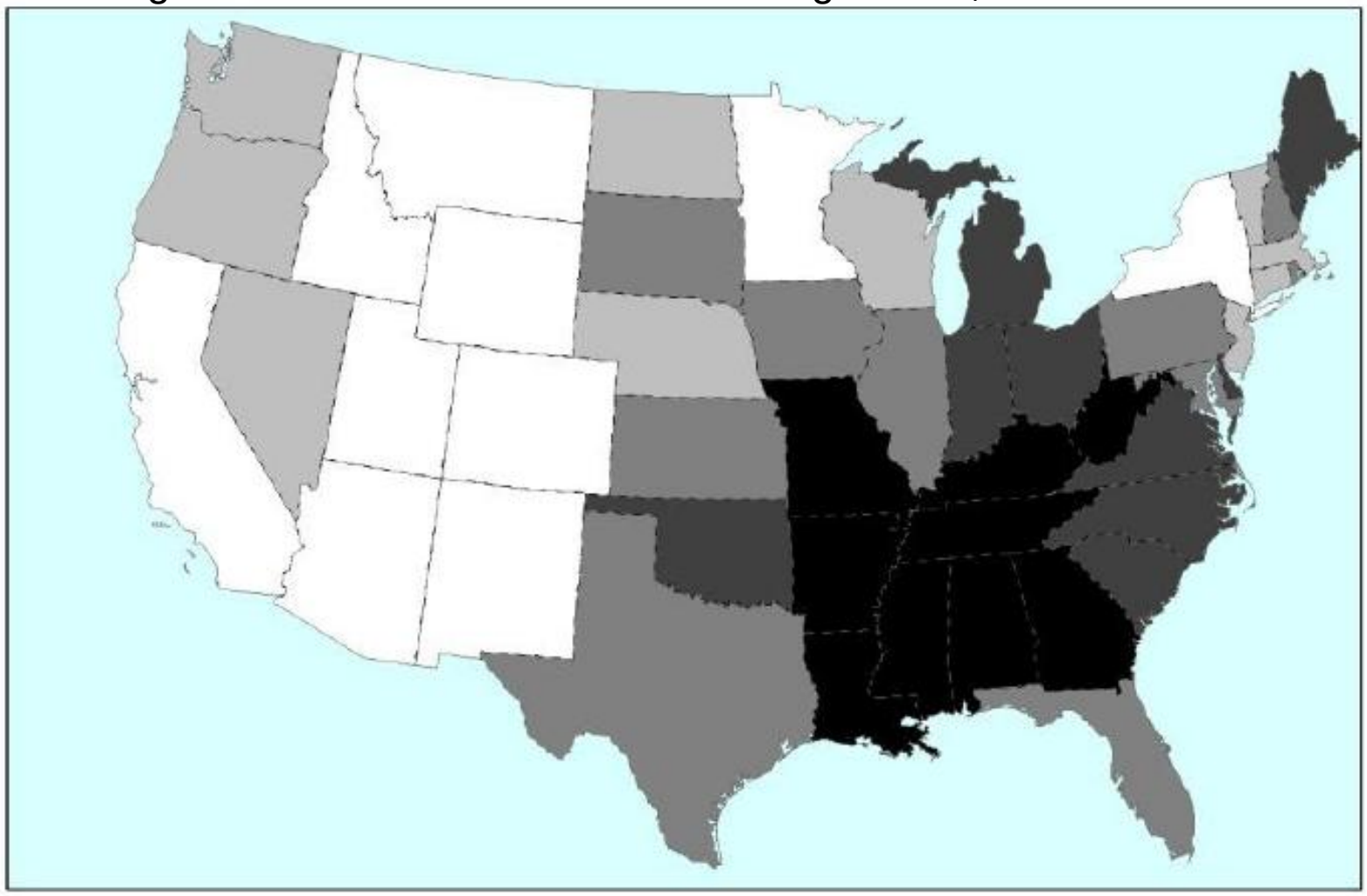
* Bell, Felicite C. and Michael L. Miller, 2006. *Life Tables for the United States Social Security Area 1900-2100.* Actuarial Study # 120. Social Security Administration. Updated February 7, 2006.

Age-standardized death rate, U.S. Males, 2004



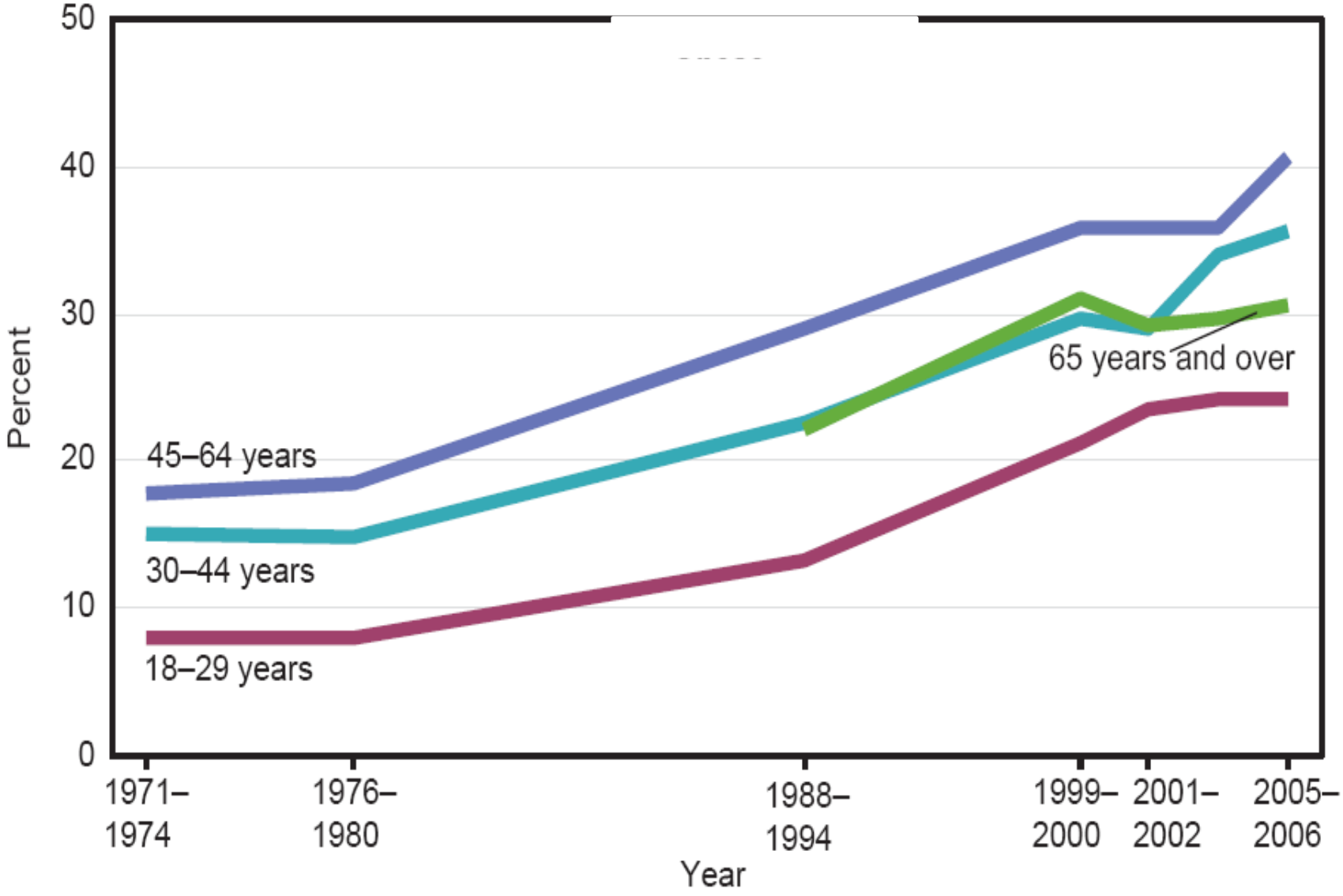
Fenelon, 2009

Age-standardized death rate from lung cancer, US males 2004

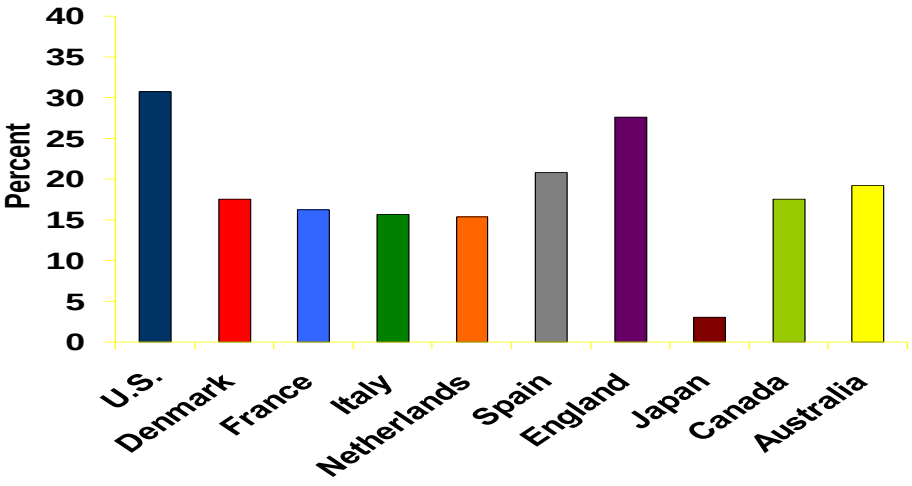


Fenelon, 2009

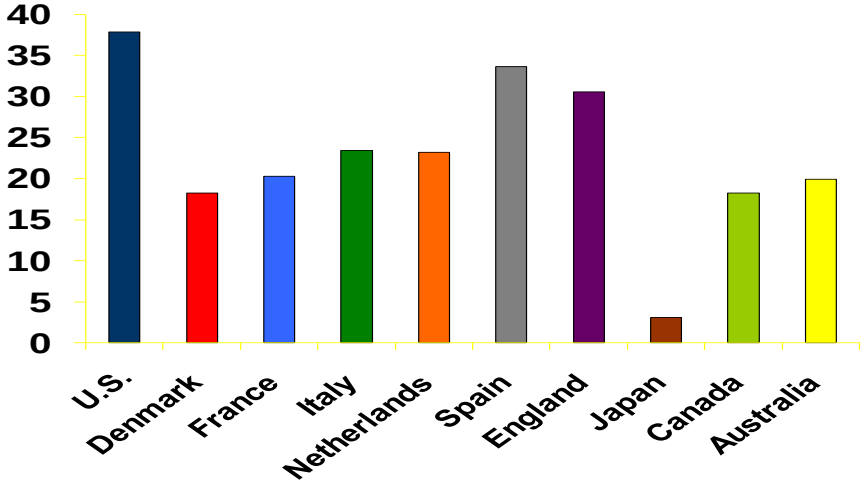
Trends in Obesity: United States 1971-2006



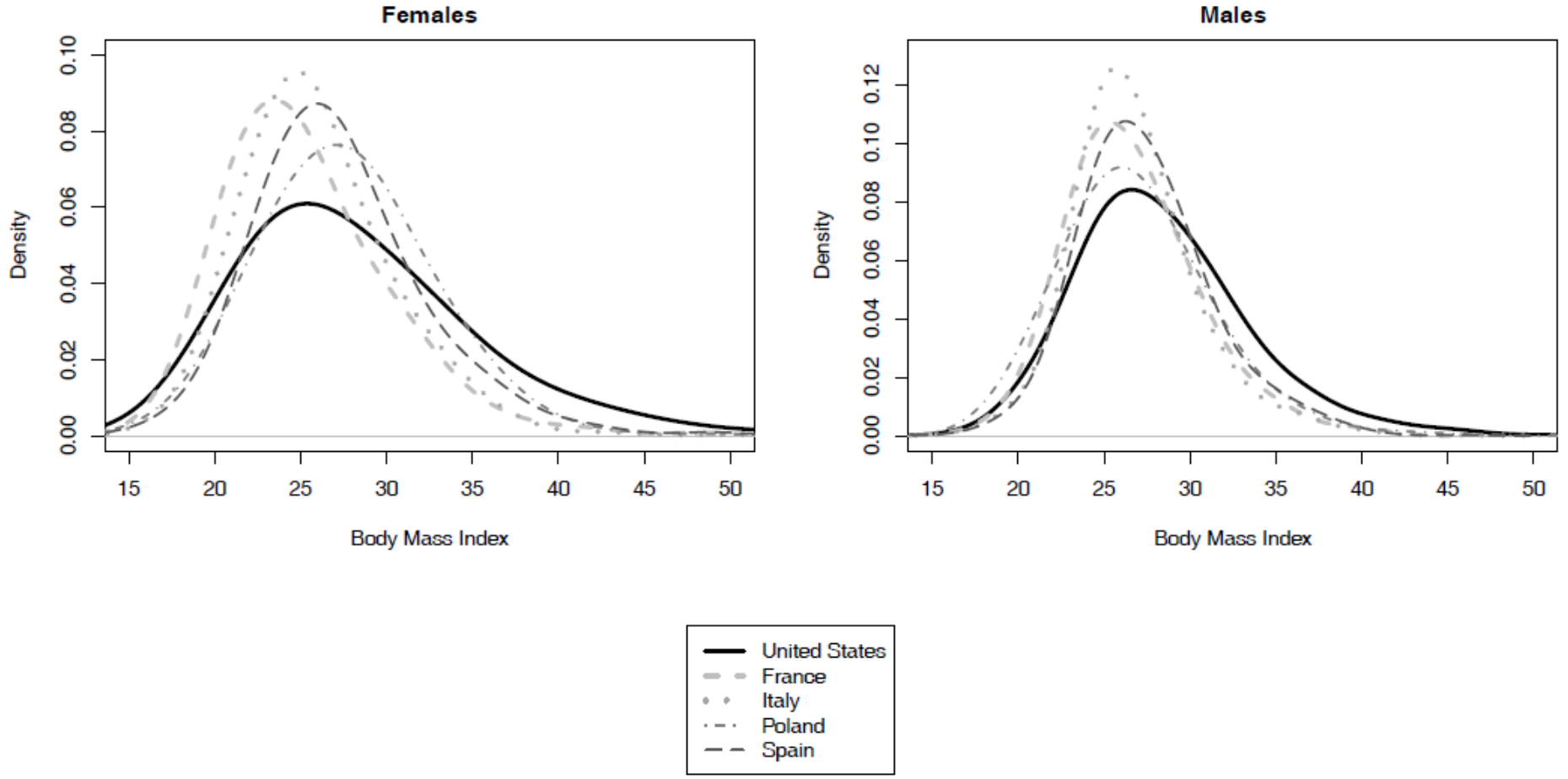
Prevalence of obesity (BMI ≥ 30): Age 50+



Males



Females



Preston and Stokes 2010

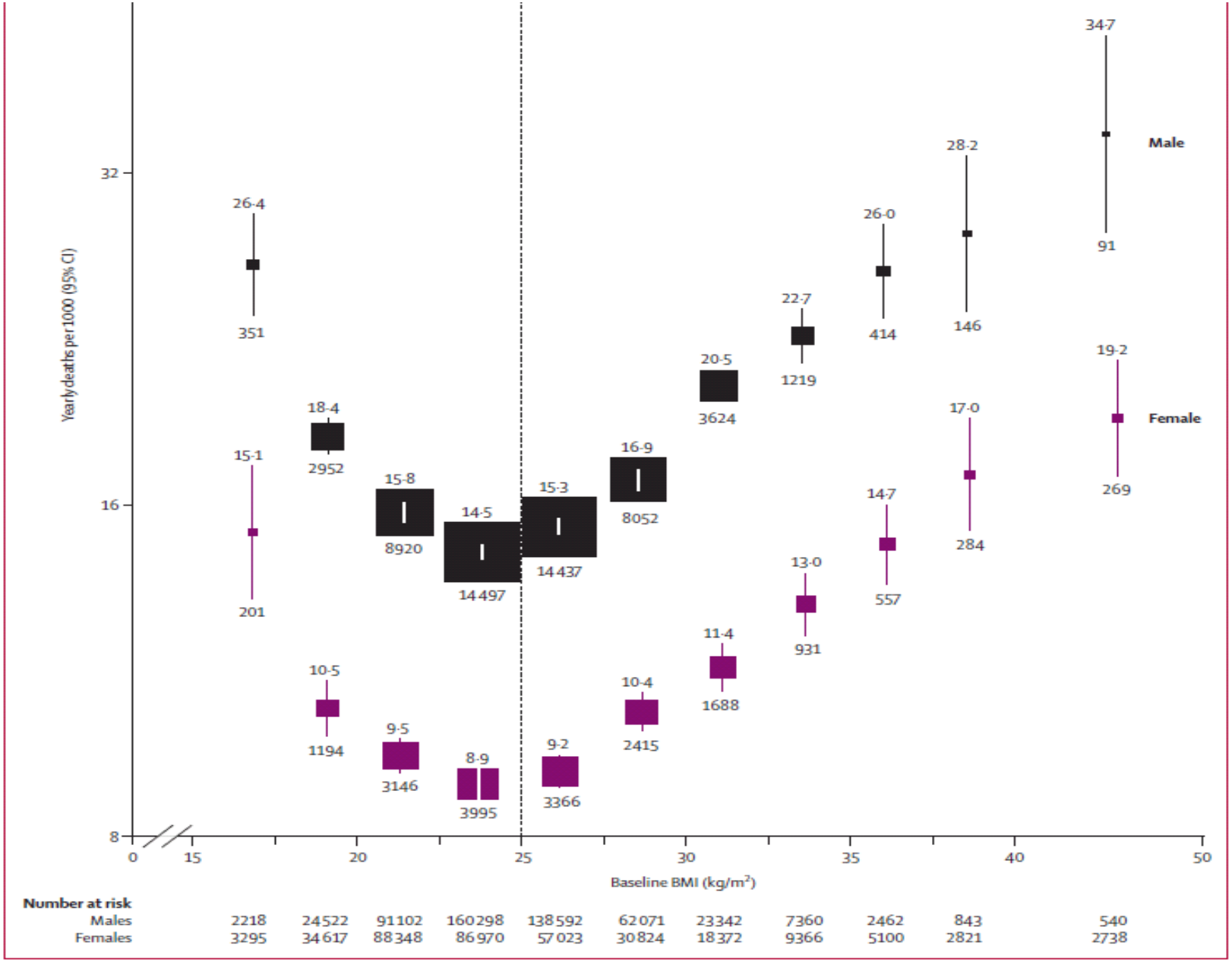
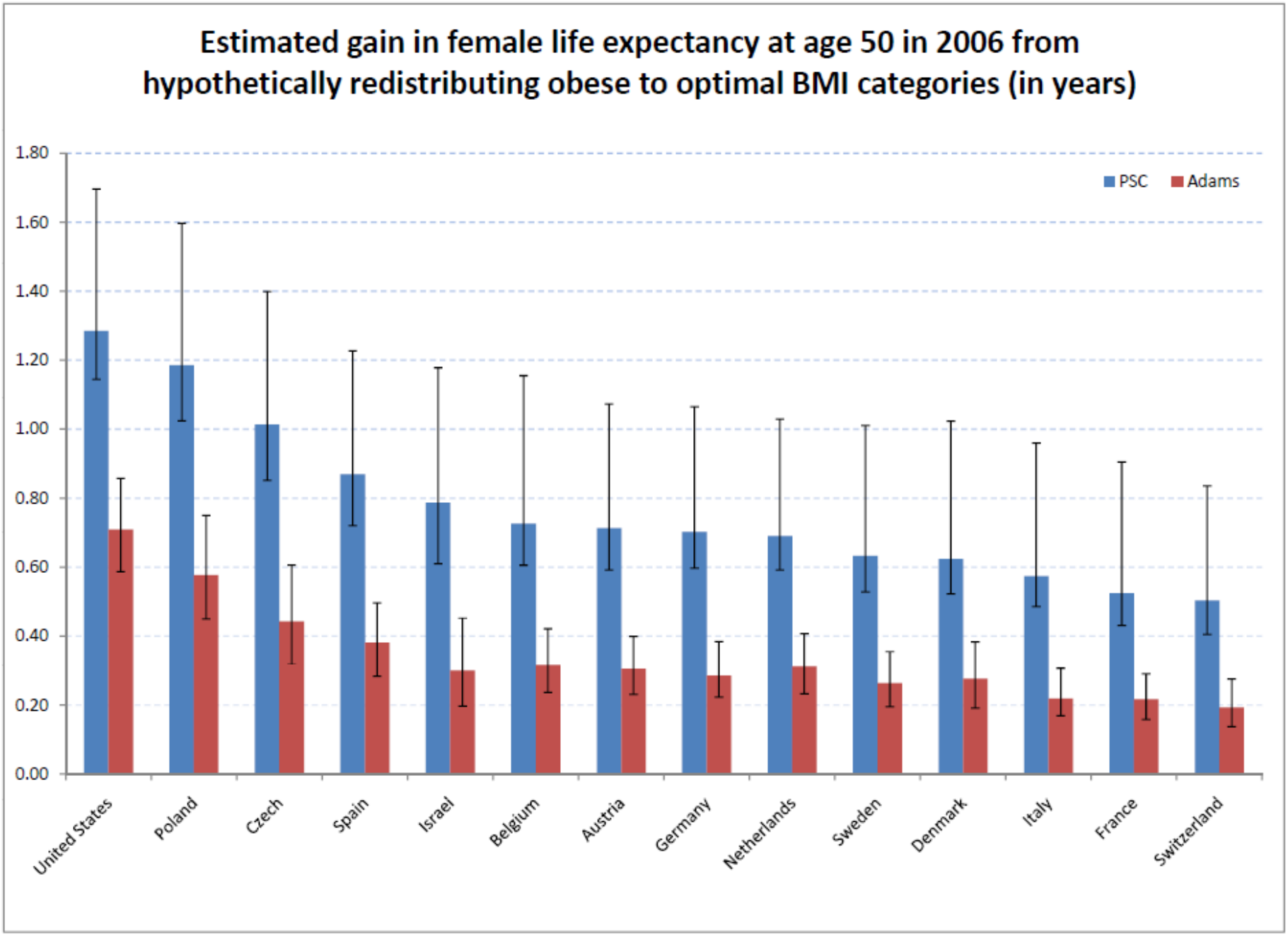


Figure 2: **All-cause mortality versus BMI for each sex in the range 15–50 kg/m² (excluding the first 5 years of follow-up)**
Relative risks at ages 35–89 years, adjusted for age at risk, smoking, and study, were multiplied by a common factor (ie, floated) to make the weighted average match the PSC mortality rate at ages 35–79 years. Floated mortality rates shown above each square and numbers of deaths below. Area of square is inversely proportional to the variance of the log risk. Boundaries of BMI groups are indicated by tick marks. 95% CIs for floated rates reflect uncertainty in the log risk for each single rate. Dotted vertical line indicates 25 kg/m² (boundary between upper and lower BMI ranges in this report).


Estimated gain in female life expectancy at age 50 in 2006 from hypothetically redistributing obese to optimal BMI categories (in years)
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
PSC
Adams
United States
Poland
Czech
Spain
Israel
Belgium
Austria
Germany
Netherlands
Sweden
Denmark
Italy
France
Switzerland

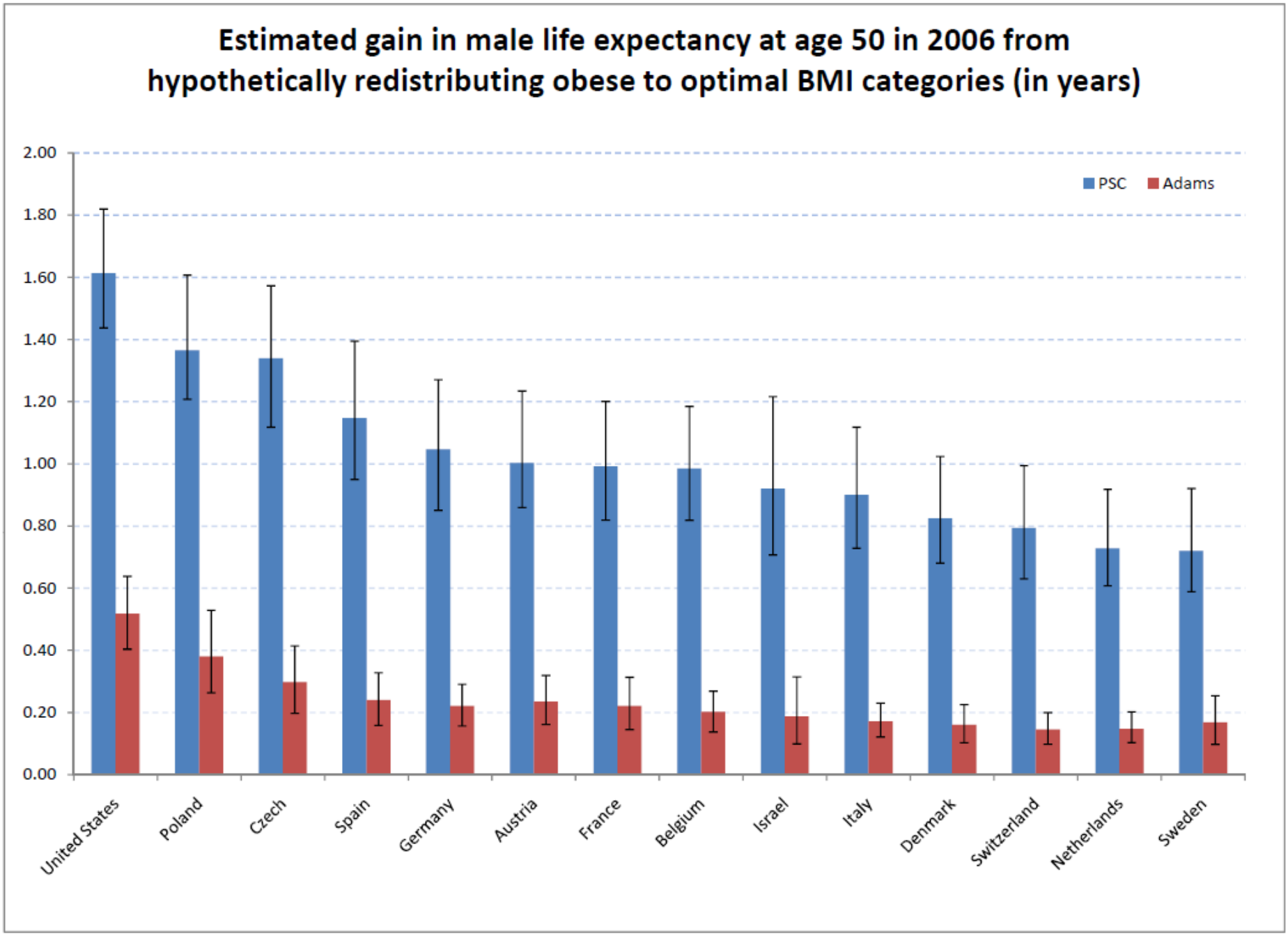

Estimated gain in male life expectancy at age 50 in 2006 from hypothetically redistributing obese to optimal BMI categories (in years)
2.00
1.80
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
PSC
Adams
United States
Poland
Czech
Spain
Germany
Austria
France
Belgium
Israel
Italy
Denmark
Switzerland
Netherlands
Sweden

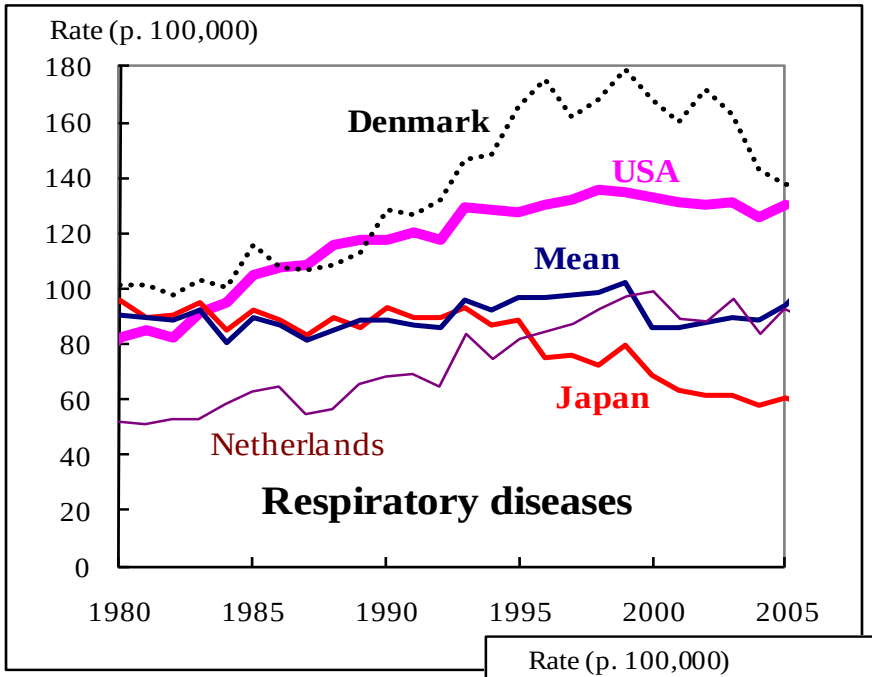
TABLE 2 Average difference in the fraction of mortality attributable to obesity between the US and 13 comparison countries

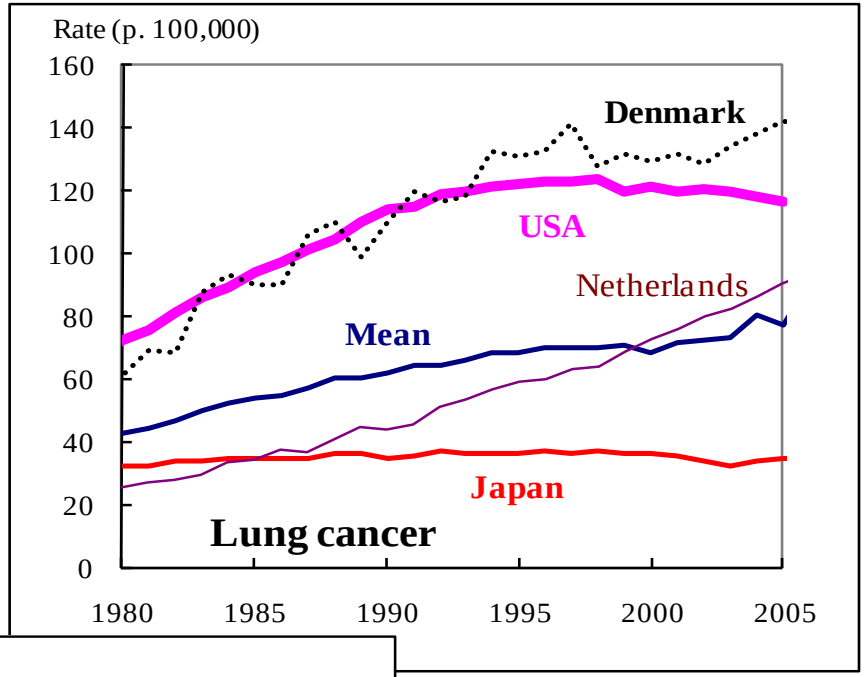
Age group	Males	Females
50–59	0.103	0.118
60–69	0.090	0.094
70–79	0.063	0.051
80–89	0.019	0.020

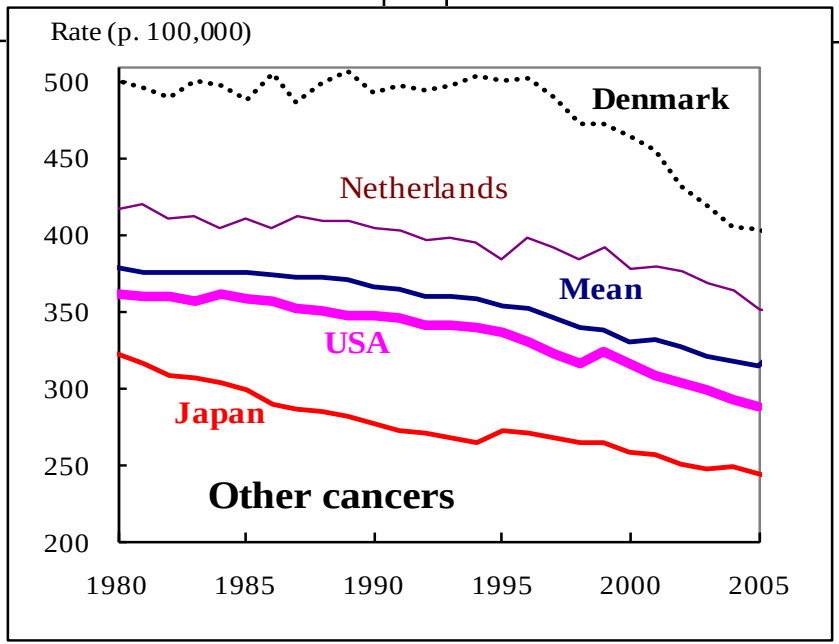
SOURCE: Compiled from Preston and Stokes (2010).

Note: these estimates are based upon the Prospective Studies Collaboration (2009) and are higher than would be obtained with several other sets of relative risks of mortality from obesity.

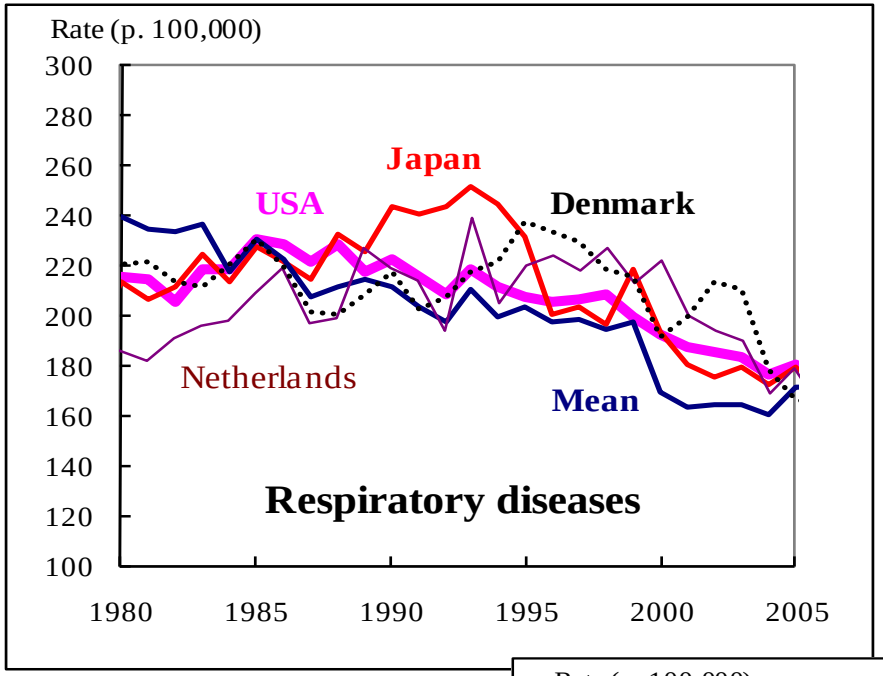
Females

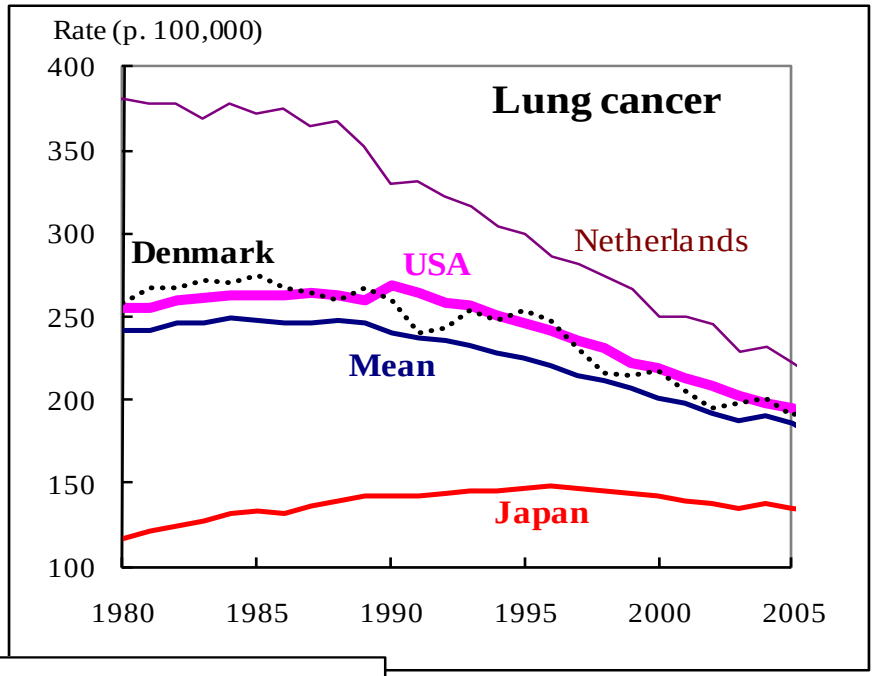

Rate (p. 100,000)
180
160
140
120
100
80
60
40
20
0
1980
1985
1990
1995
2000
2005
Denmark
USA
Mean
Japan
Netherlands
Respiratory diseases

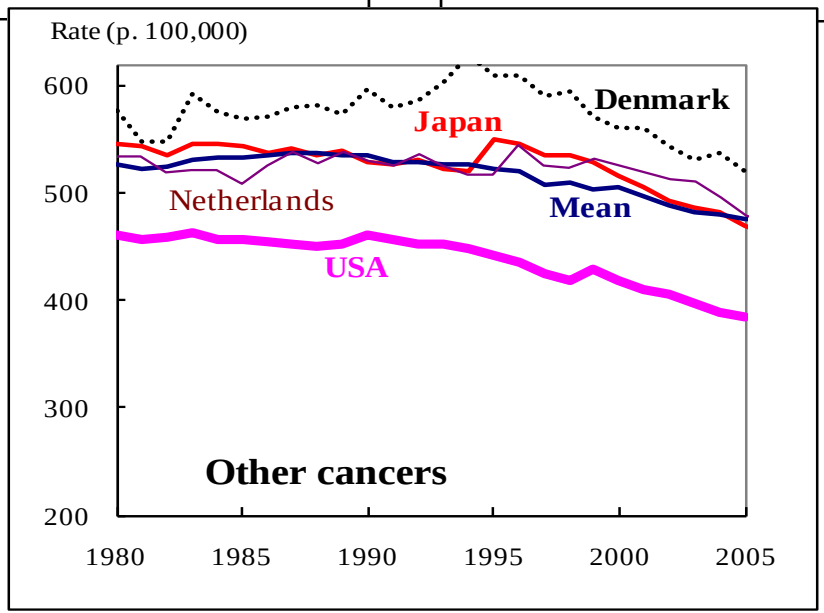

Rate (p. 100,000)
160
140
120
100
80
60
40
20
0
1980
1985
1990
1995
2000
2005
Denmark
USA
Netherlands
Mean
Japan
Lung cancer


Rate (p. 100,000)
500
450
400
350
300
250
200
1980
1985
1990
1995
2000
2005
Denmark
Netherlands
Mean
USA
Japan
Other cancers

Males

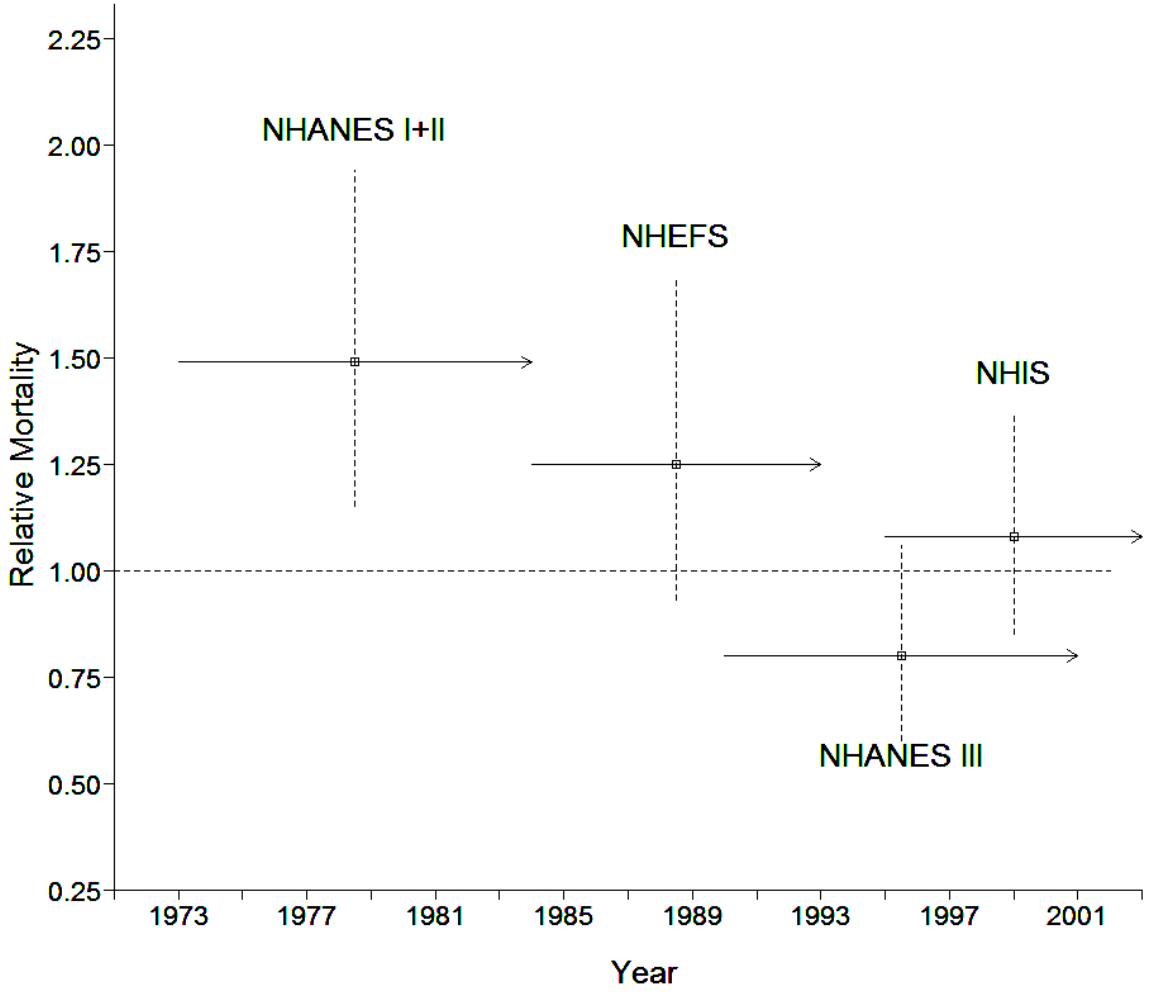

Rate (p. 100,000)
300
280
260
240
220
200
180
160
140
120
100
1980
1985
1990
1995
2000
2005
Japan
USA
Denmark
Netherlands
Mean
Respiratory diseases


Rate (p. 100,000)
400
350
300
250
200
150
100
1980
1985
1990
1995
2000
2005
Lung cancer
Netherlands
Denmark
USA
Mean
Japan


Rate (p. 100,000)
600
500
400
300
200
1980
1985
1990
1995
2000
2005
Denmark
Japan
Netherlands
Mean
USA
Other cancers

Mortality of Obese Individuals (BMI 30-35) Relative to Lower BMI (18.8-25)

Ages 50-70 (baseline)



Mehta 2009

Table 2. Indicators of Frequency of PSA Testing Among Males

A. Percent of Men Ever Receiving a PSA Test

Country	Percentage of Men Ever Receiving a PSA Test	Year	Age Group	Source
Australia	49%	2003	40+	1
Austria	54.6%	2006-2007	40+	2
Canada	47.5%	2000-2001	50+	3
France	36%	2005	40-74	4
Italy	31.4%	2003	50+	5
Netherlands (Rotterdam)	12.7%	1994	55-74	6
Switzerland (Vaud and Neuchâtel Cantons)	10%	"Early 1990s"	65+	7
United States	75% (BRFSS) 62.7% (NHIS)	2001 2005	50+ 50-79	8 9

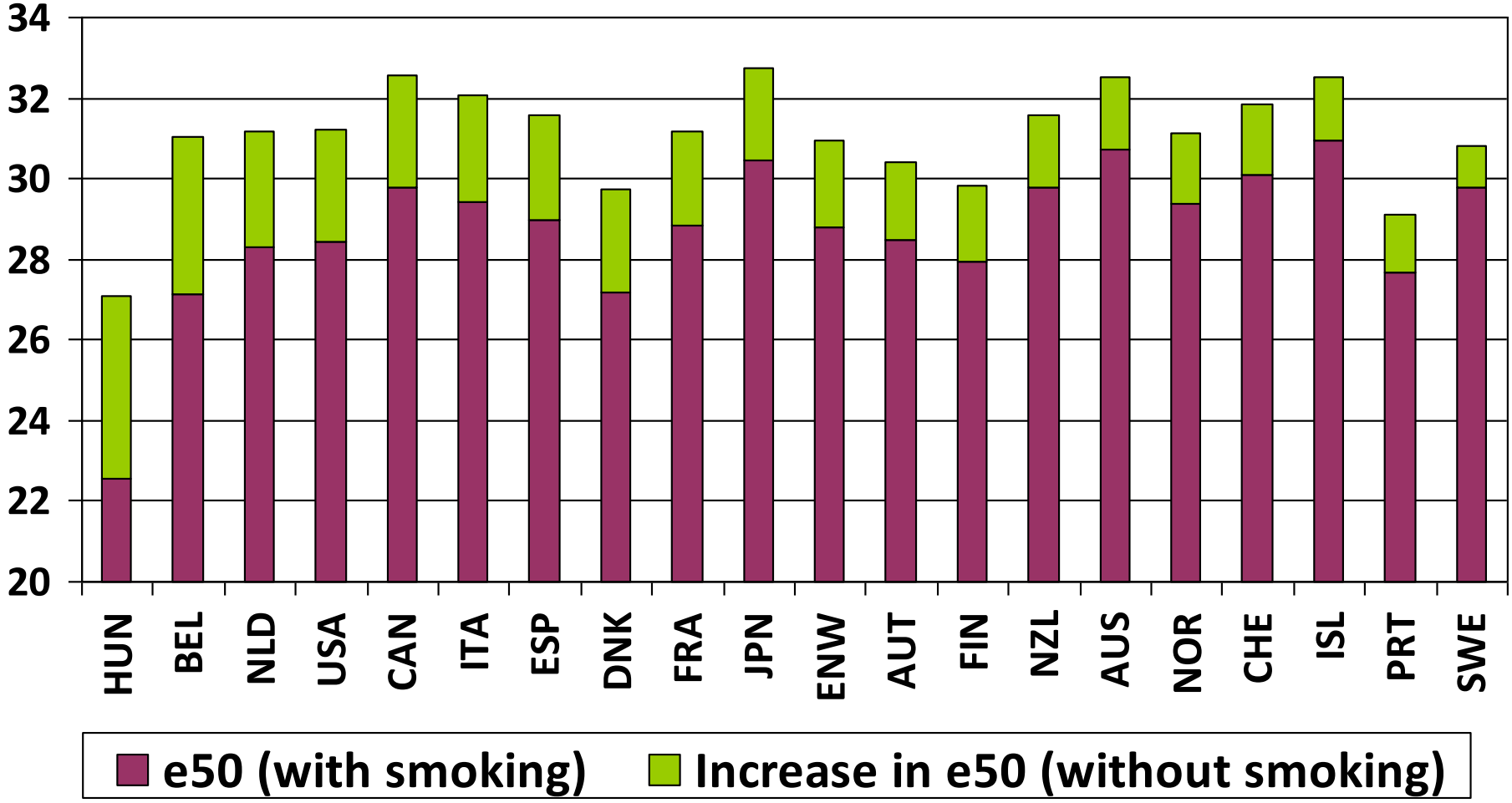
Source: Preston and Ho (2009)

Table 6. Effect of removing smoking-related deaths on gains in e_{50}, 1980-2003*

	Males			Females		
	Gain in e_{50}			Gain in e_{50}		
Country	Actual	After removing smoking deaths	Difference in e_{50} Gain	Actual	After removing smoking deaths	Difference in e_{50} Gain
Australia	5.77	5.02	0.75	4.00	4.79	-0.79
Austria	4.58	4.10	0.49	4.18	4.65	-0.46
Belgium*	3.21	3.25	-0.03	3.00	3.40	-0.40
Canada	4.12	4.09	0.04	2.50	4.26	-1.76
Denmark*	2.44	2.31	0.13	1.14	2.79	-1.64
England and Wales	4.73	3.32	1.41	3.07	3.93	-0.86
Finland	4.82	3.32	1.51	3.42	3.76	-0.33
France	4.05	4.28	-0.22	3.48	3.76	-0.28
Hungary	1.04	2.85	-1.81	2.57	3.86	-1.30
Iceland	3.54	4.53	-0.98	1.90	3.15	-1.25
Italy	4.79	4.86	-0.07	4.14	4.51	-0.38
Japan	3.88	5.03	-1.16	5.84	6.70	-0.86
Netherlands	2.84	1.56	1.27	1.23	2.27	-1.04
New Zealand	5.61	5.01	0.60	4.27	5.17	-0.90
Norway	3.65	4.30	-0.65	2.35	3.24	-0.89
Portugal	3.27	3.93	-0.66	3.29	3.36	-0.07
Spain	2.80	3.85	-1.05	3.48	3.53	-0.05
Sweden	3.80	3.68	0.11	2.73	3.41	-0.68
Switzerland	4.19	3.62	0.57	3.34	3.82	-0.48
United States	3.57	3.41	0.16	1.70	3.43	-1.73
Non-US Average	3.85	3.84	0.01	3.15	3.91	-0.76

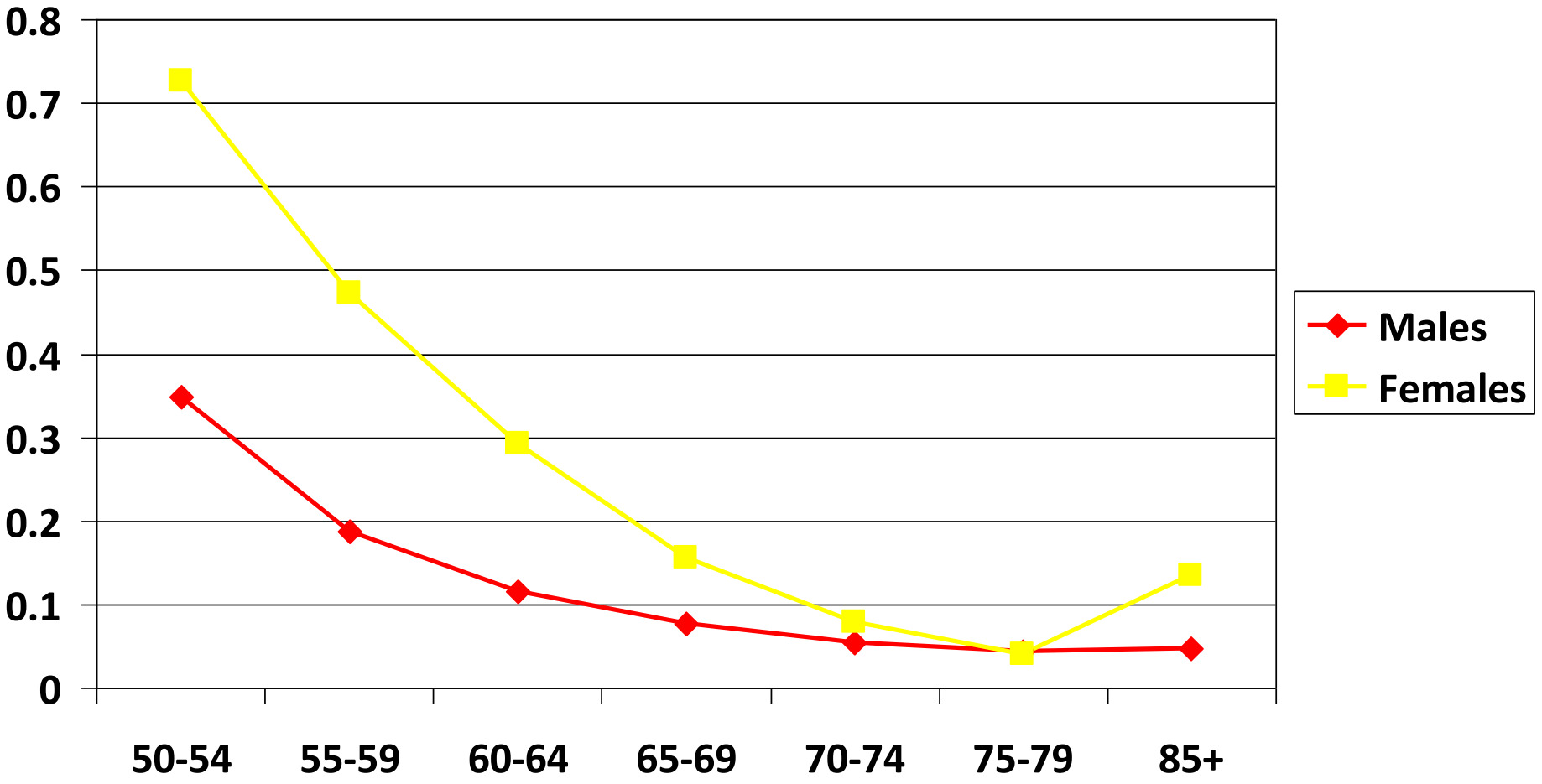
* 1980-1997 for Belgium; 1980-2001 for Denmark.

Life expectancy at age 50 in 2003* before/after removal smoking deaths, Males

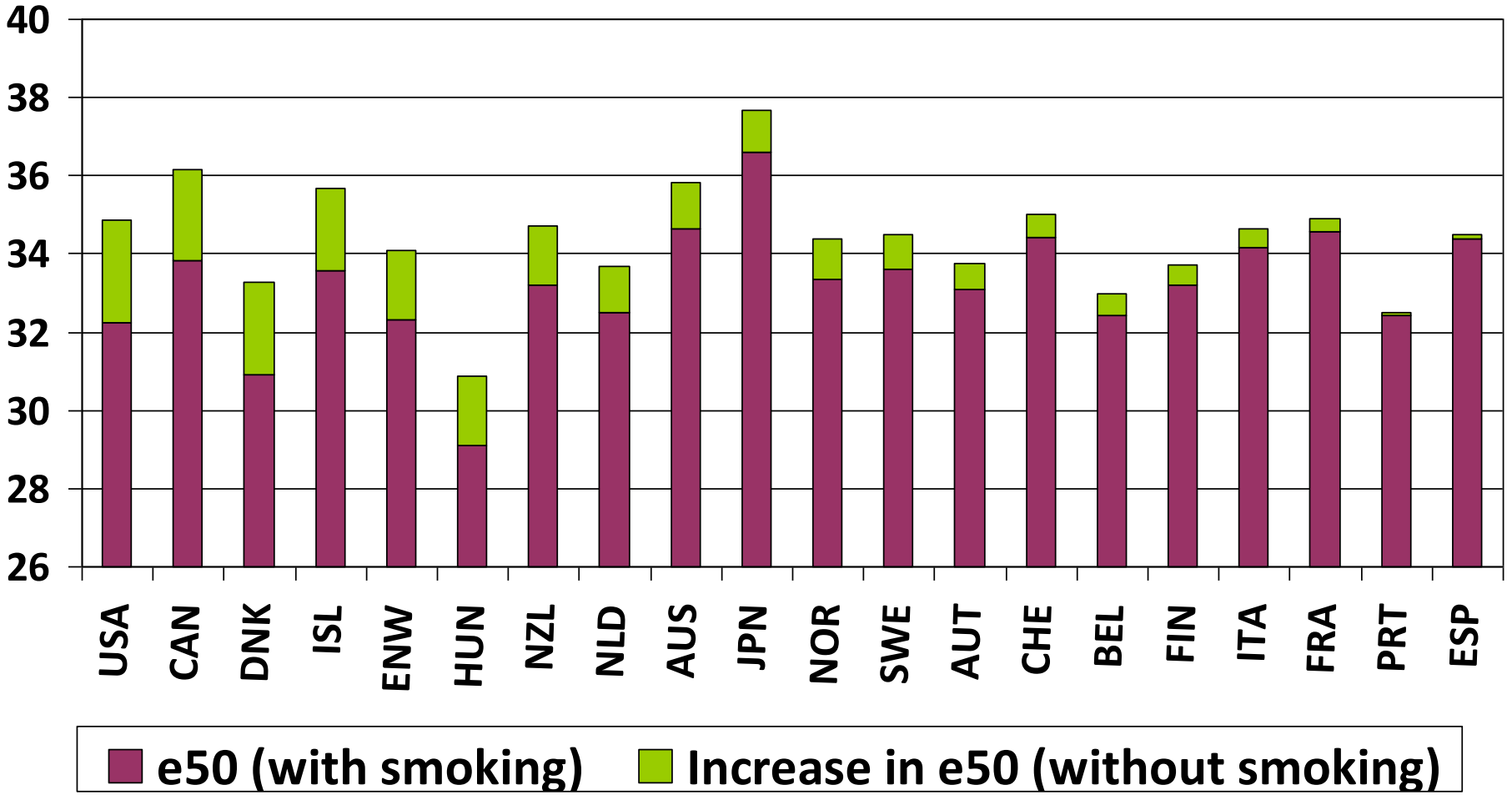


* 1997 for Belgium; 2001 for Denmark.

Model Coefficients for Lung Cancer Rate (per 1,000) in 2003

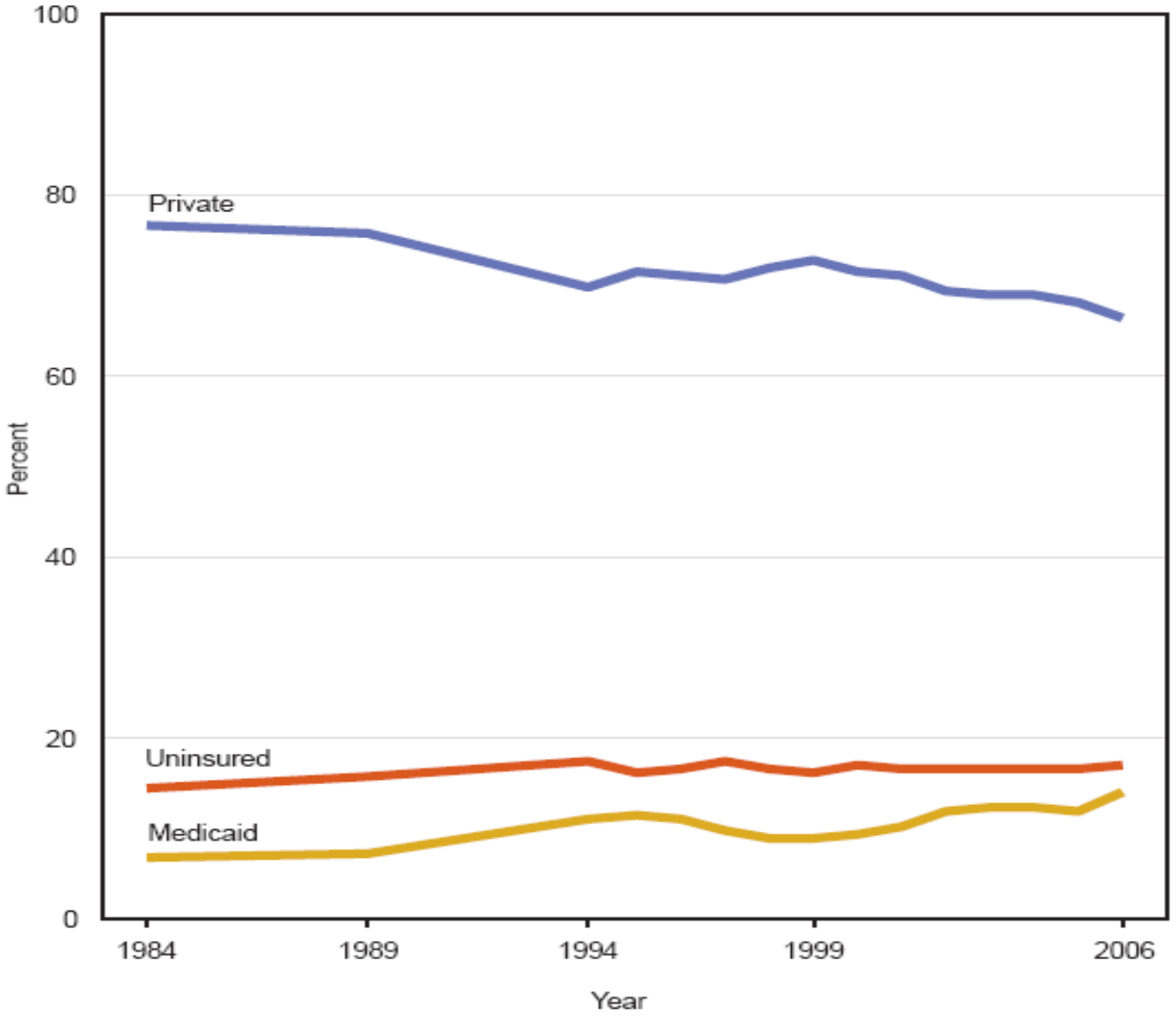


Life expectancy at age 50 in 2003* before/after removal smoking deaths, Females

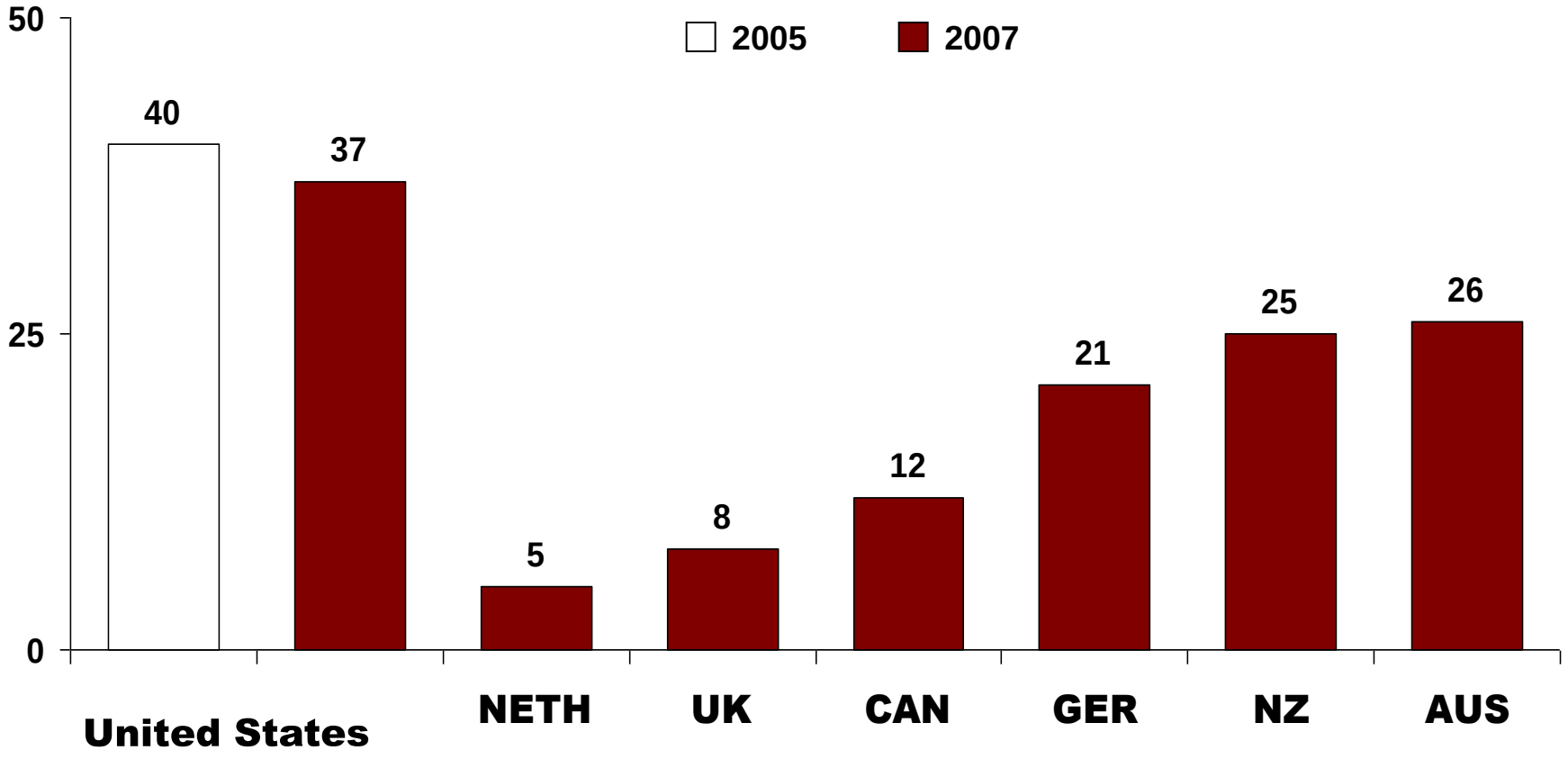


* 1997 for Belgium; 2001 for Denmark.

Health insurance coverage among persons under 65 years of age: United States



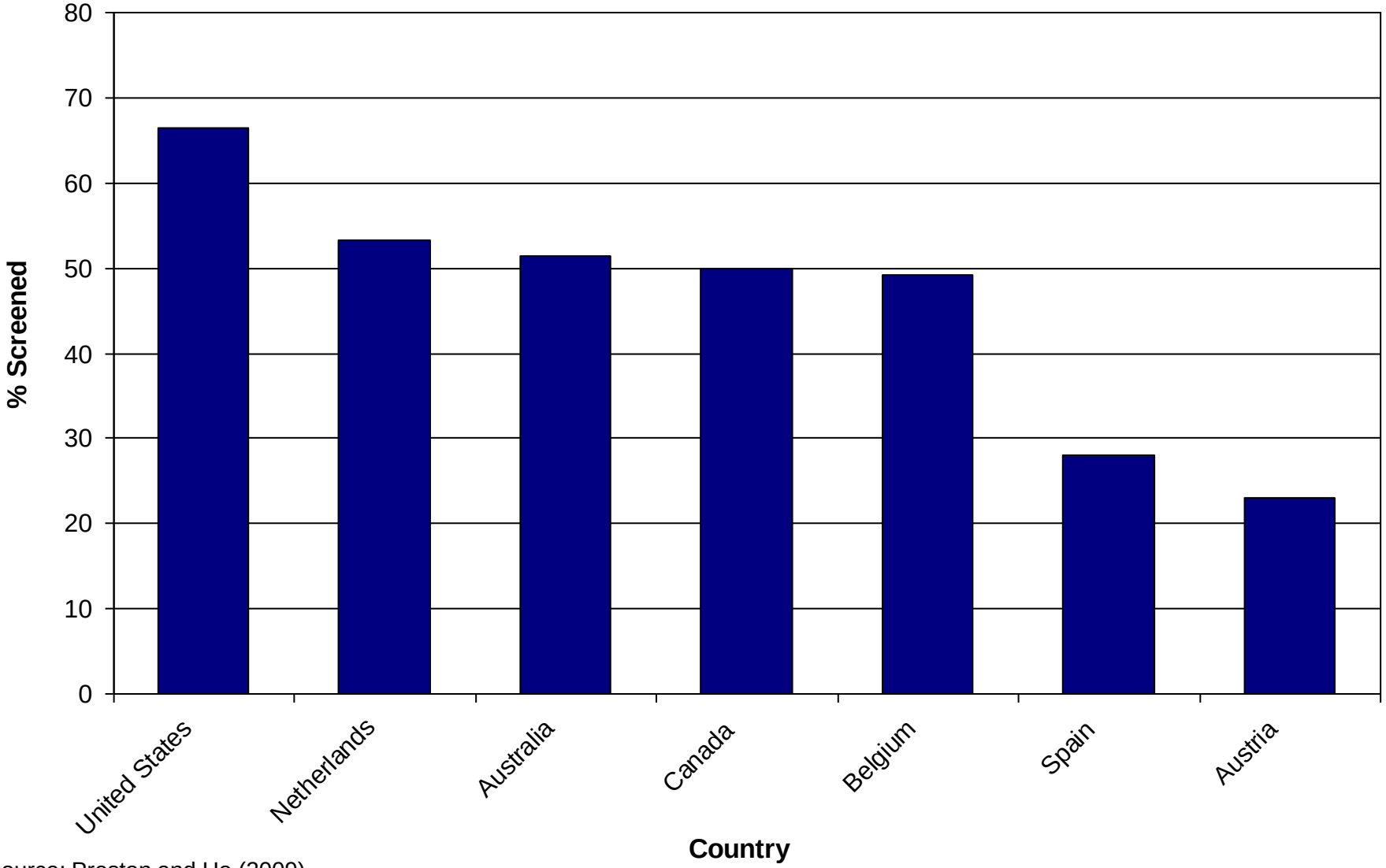
Percent of adults with access problems* in past year because of costs



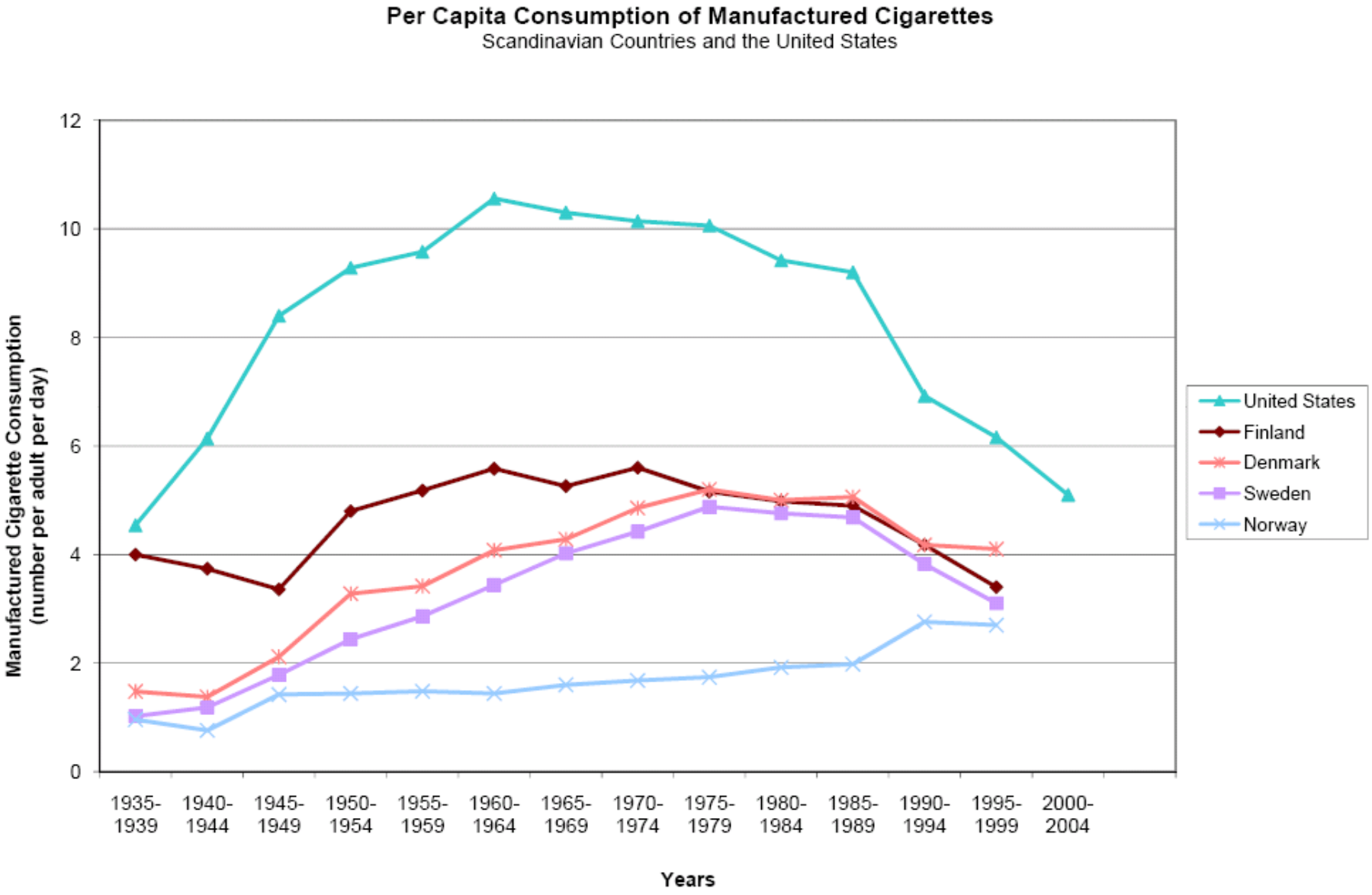
* Did not get medical care because of cost of doctor's visit, skipped medical test, treatment, or follow-up because of cost, or did not fill Rx or skipped doses because of cost.
AUS=Australia; CAN=Canada; GER=Germany; NETH=Netherlands; NZ=New Zealand; UK=United Kingdom.
Data: 2005 and 2007 Commonwealth Fund International Health Policy Survey.

Source: Commonwealth Fund National Scorecard on U.S. Health System Performance, 2008

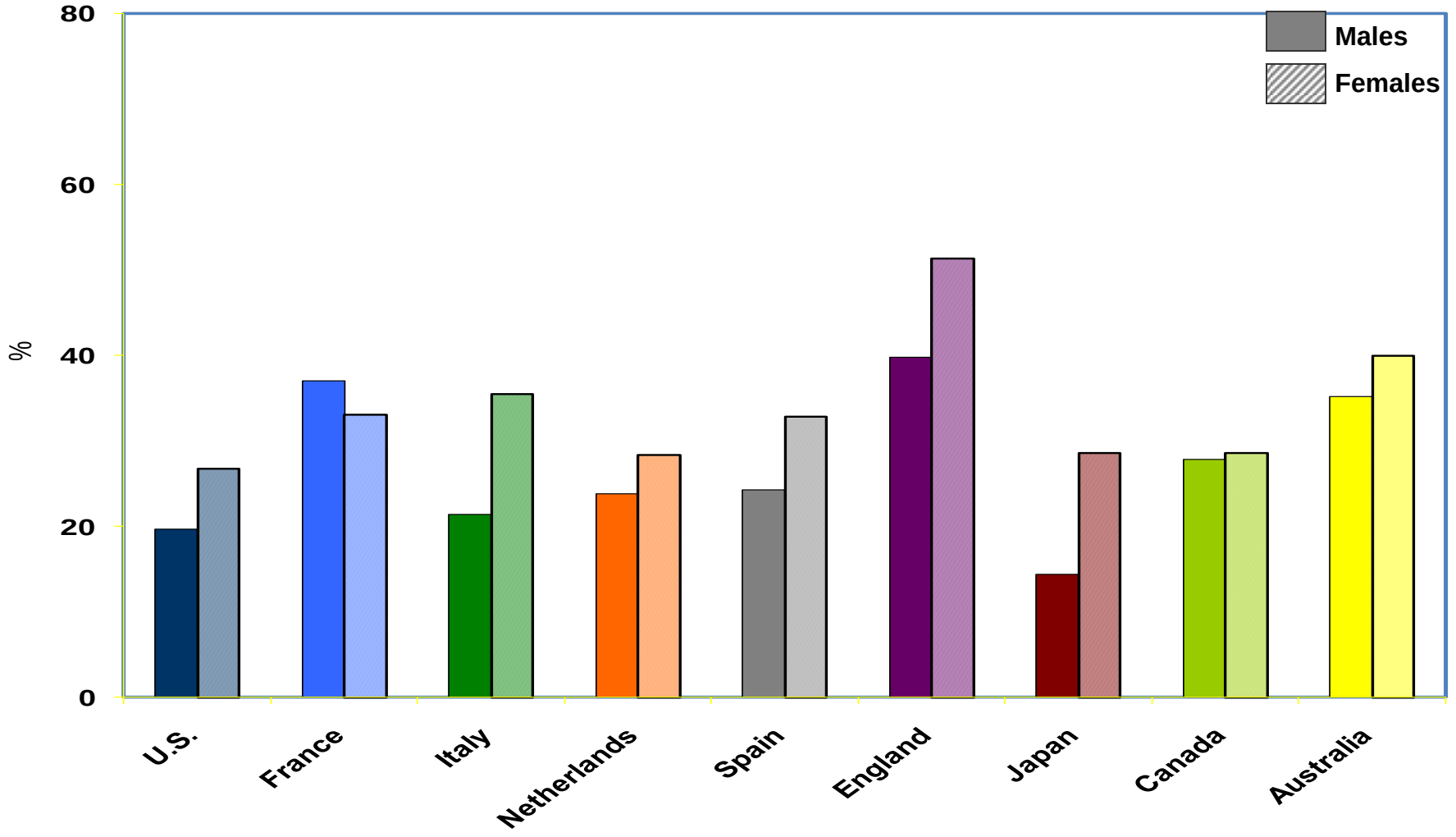
Percentage of Women Aged 50-64 Receiving a Mammogram in Previous Two Years in 1994



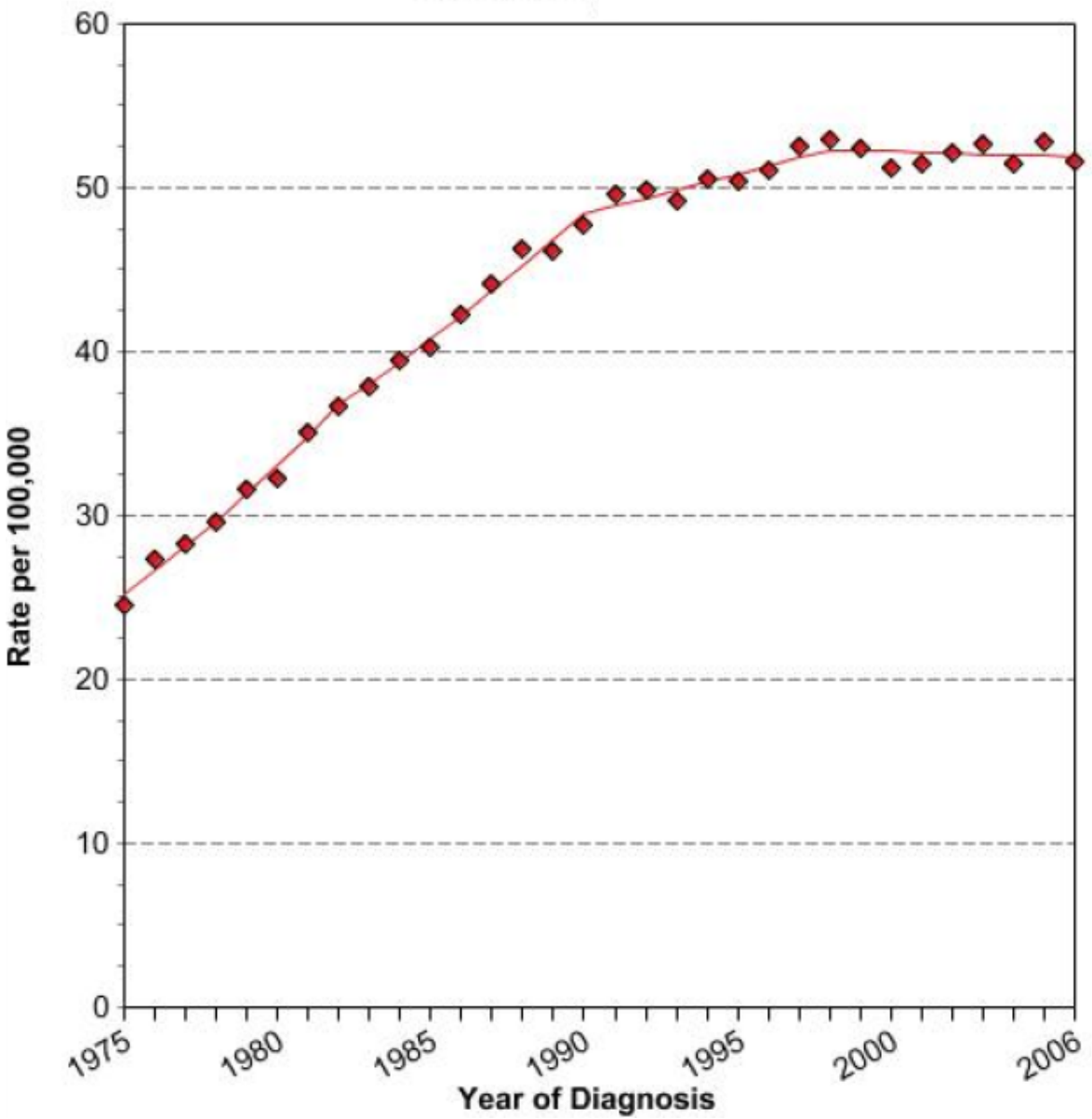
Source: Preston and Ho (2009)


Per Capita Consumption of Manufactured Cigarettes
Scandinavian Countries and the United States
Manufactured Cigarette Consumption (number per adult per day)
12
10
8
6
4
2
0
1935-1939
1940-1944
1945-1949
1950-1954
1955-1959
1960-1964
1965-1969
1970-1974
1975-1979
1980-1984
1985-1989
1990-1994
1995-1999
2000-2004
Years
United States
Finland
Denmark
Sweden
Norway

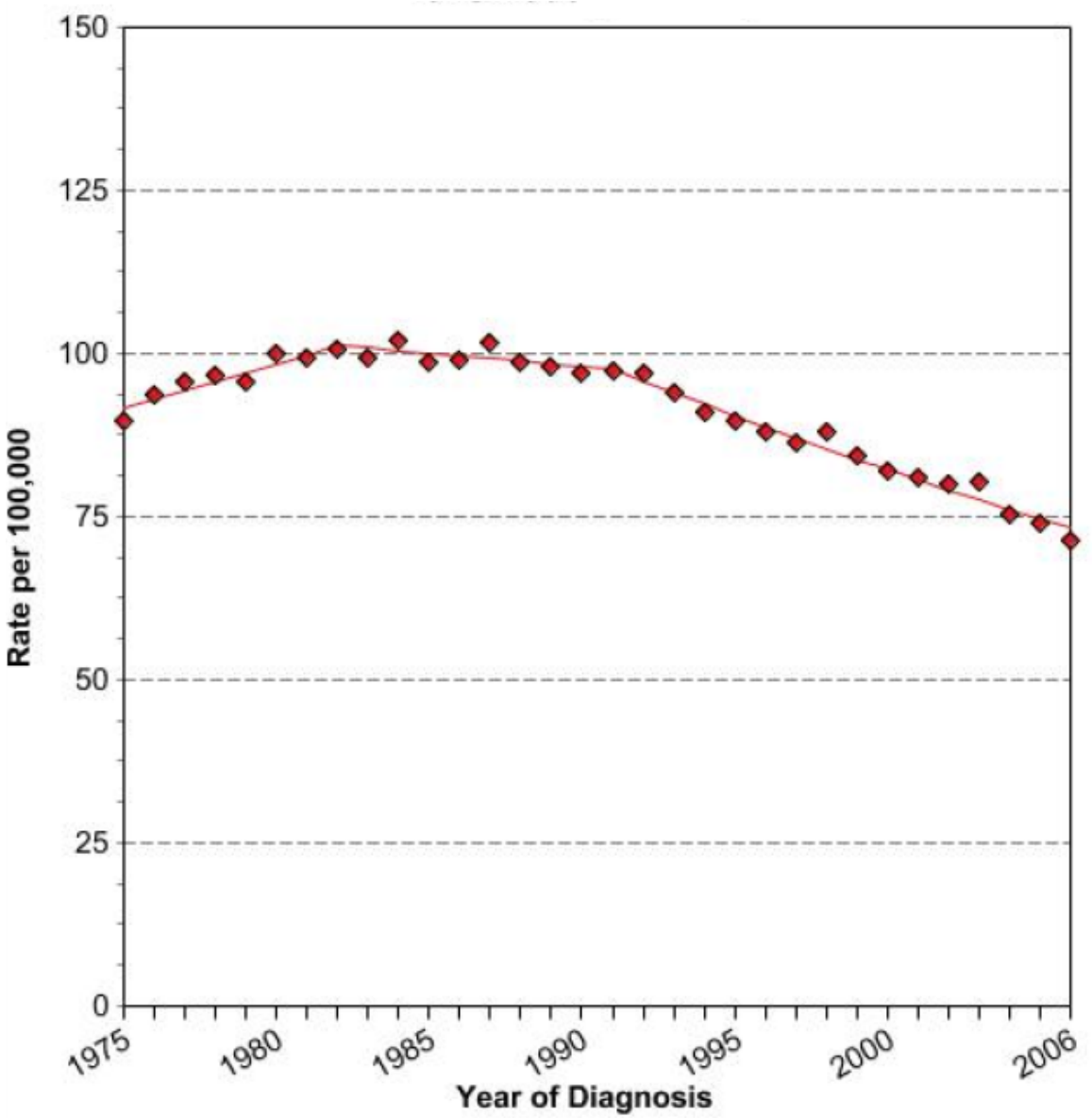
Prevalence of raised cholesterol (≥240mg/dl): Age 50-64



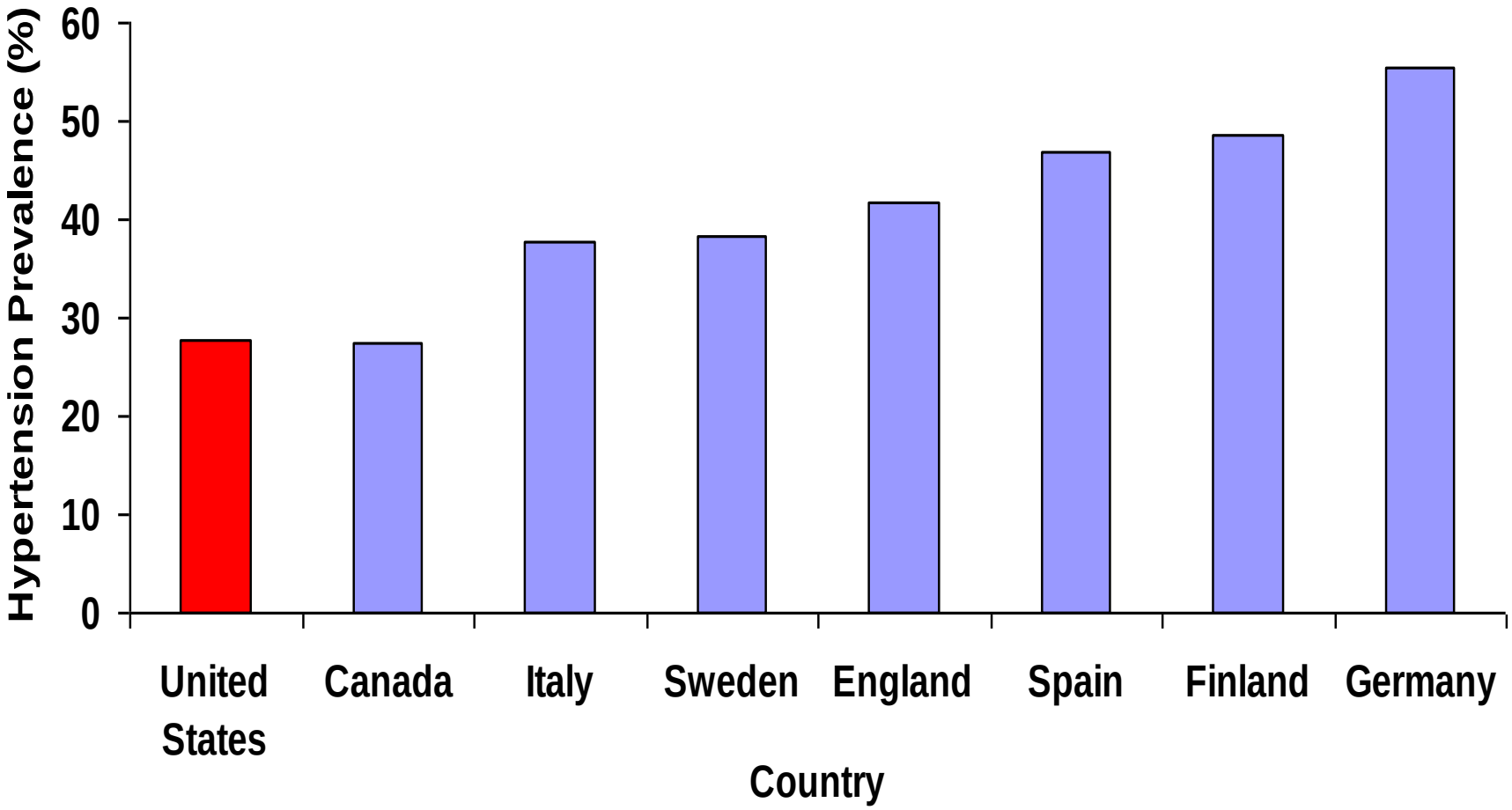
Age-Adjusted Lung Cancer Incidence Rate, US Females



Age-Adjusted Lung Cancer Incidence Rate, US Males



Hypertension Prevalence by Country, Persons 35-64 Years



*Hypertension defined as a BP of 140/90mm Hg or higher or current use of antihypertensive medication.

Source: Wolf-Maier, K., et al. (2003).