Disease Incidence and Mortality among Older Americans and Europeans

Aïda Solé-Auró[1]; Pierre-Carl Michaud[2]; Michael Hurd[3]; Eileen M. Crimmins[4]

[1]INED- Institut National d'Études Démographiques, Paris
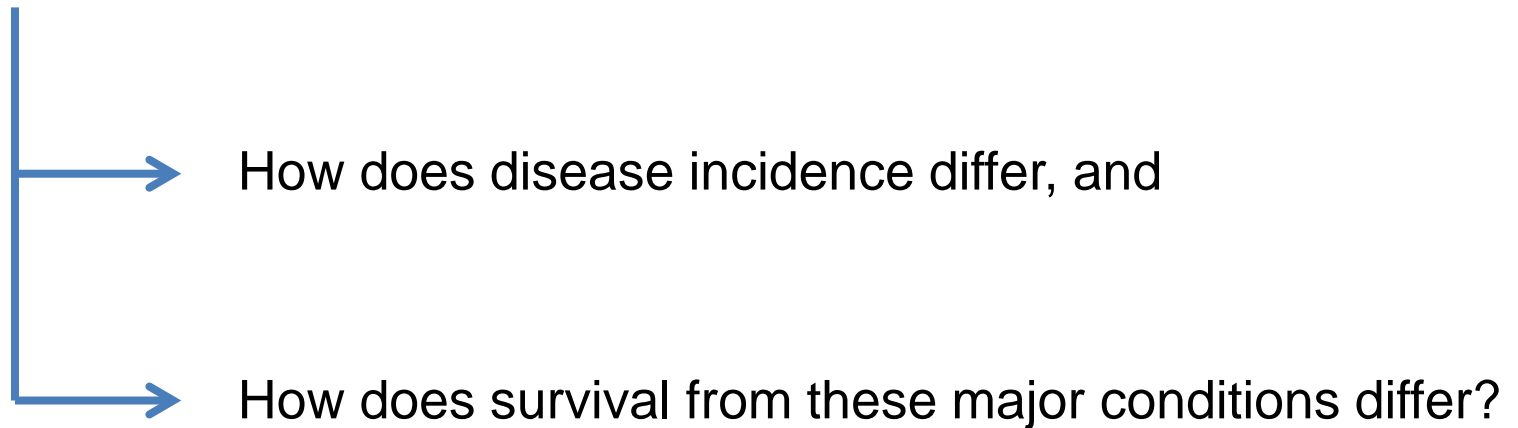[2]Université du Québec à Montréal & RAND
[3]RAND
[4]USC/UCLA Center on Biodemography and Population Health, Andrus Gerontology Center, University of Southern California
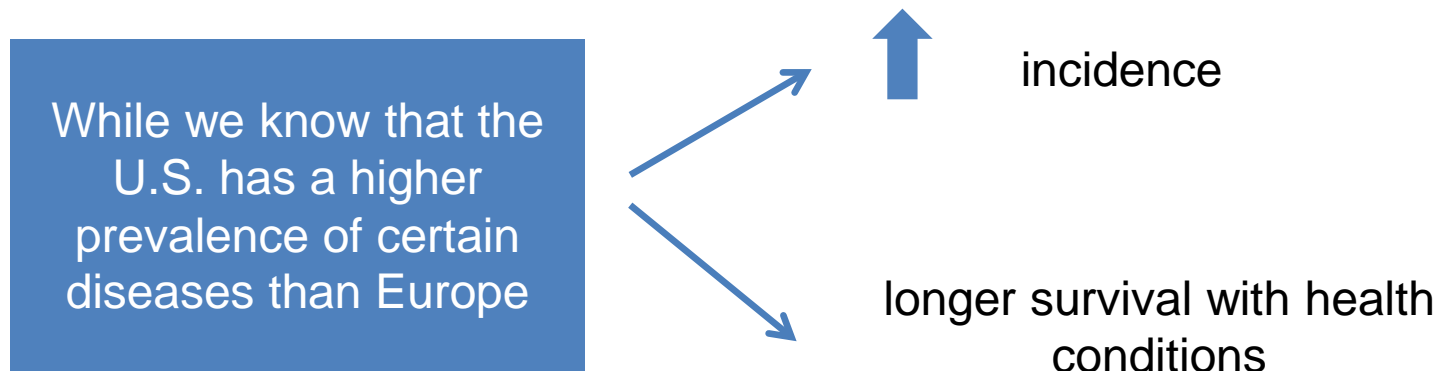
Why is there a widening gap in Life Expectancy at age 50 between Europe and the U.S.?

Disease prevalence differs between Europe and the U.S. but:

How does disease incidence differ, and

How does survival from these major conditions differ?

While we know that the U.S. has a higher prevalence of certain diseases than Europe

↑ incidence

longer survival with health conditions

Mortality differences between the U.S. and Europe disappear at older ages

We need *longitudinal* data to examine the meaning and causes of these differences

Purpose

Our work investigates:

Age-specific differences in:

- Disease prevalence

- Disease incidence

- Disease specific-mortality

from 2004 to 2006

**Longitudinal Data: This study is limited to individuals aged 50-79**

    Americans: Health and Retirement Study (HRS, 2004-2006)
                + 16,000 individuals

    Europeans: 5 European countries from the Survey of Health, Ageing
              and Retirement in Europe (SHARE, 2004-2006)
              + 11,000 individuals

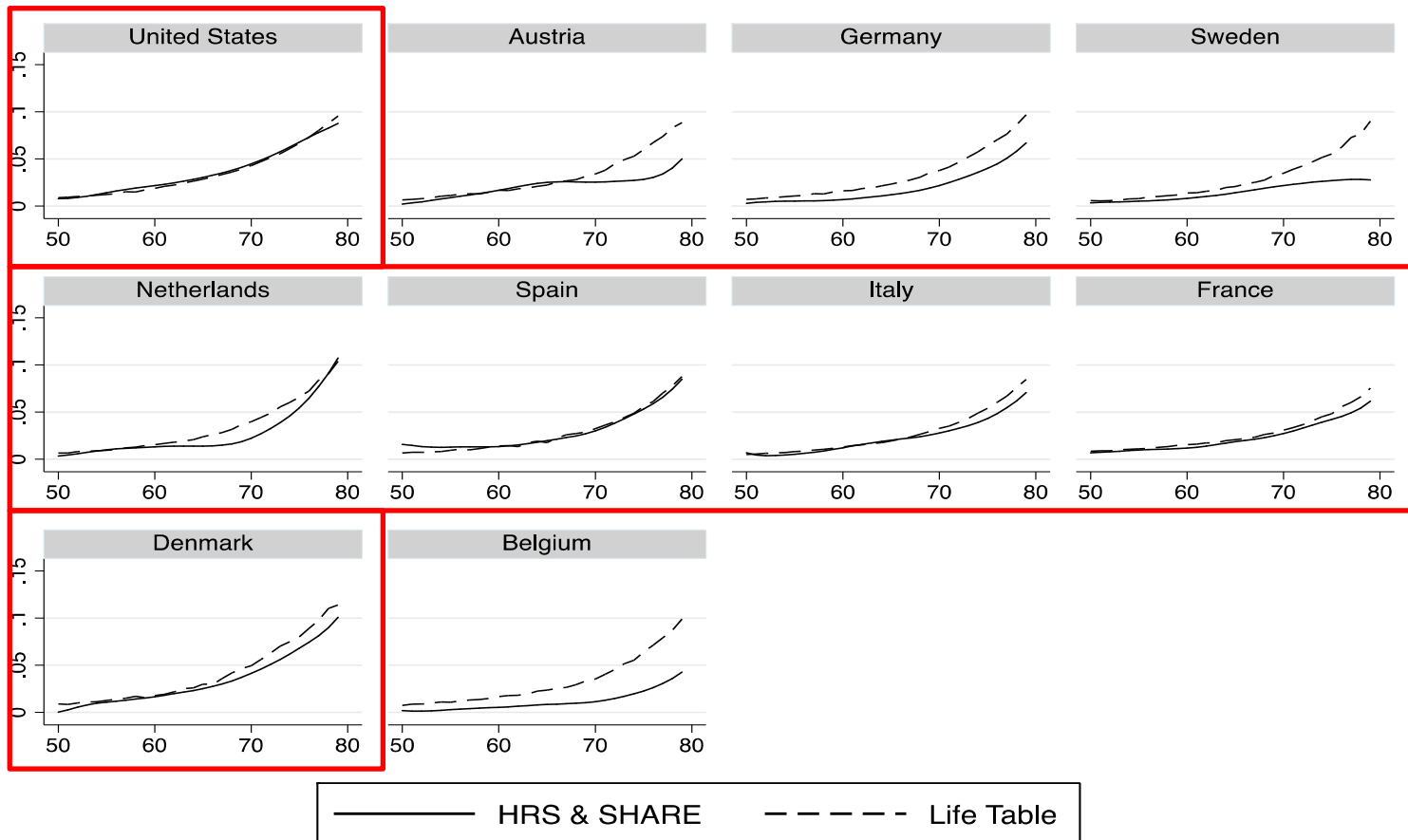*Mortality*: we use data from follow-up to the surveys.
- U.S.: Reports of survivors supplemented with NDI
- Europe: Reports at Re-interview for 5 countries
(Denmark, France, Italy, the Netherlands, and Spain)

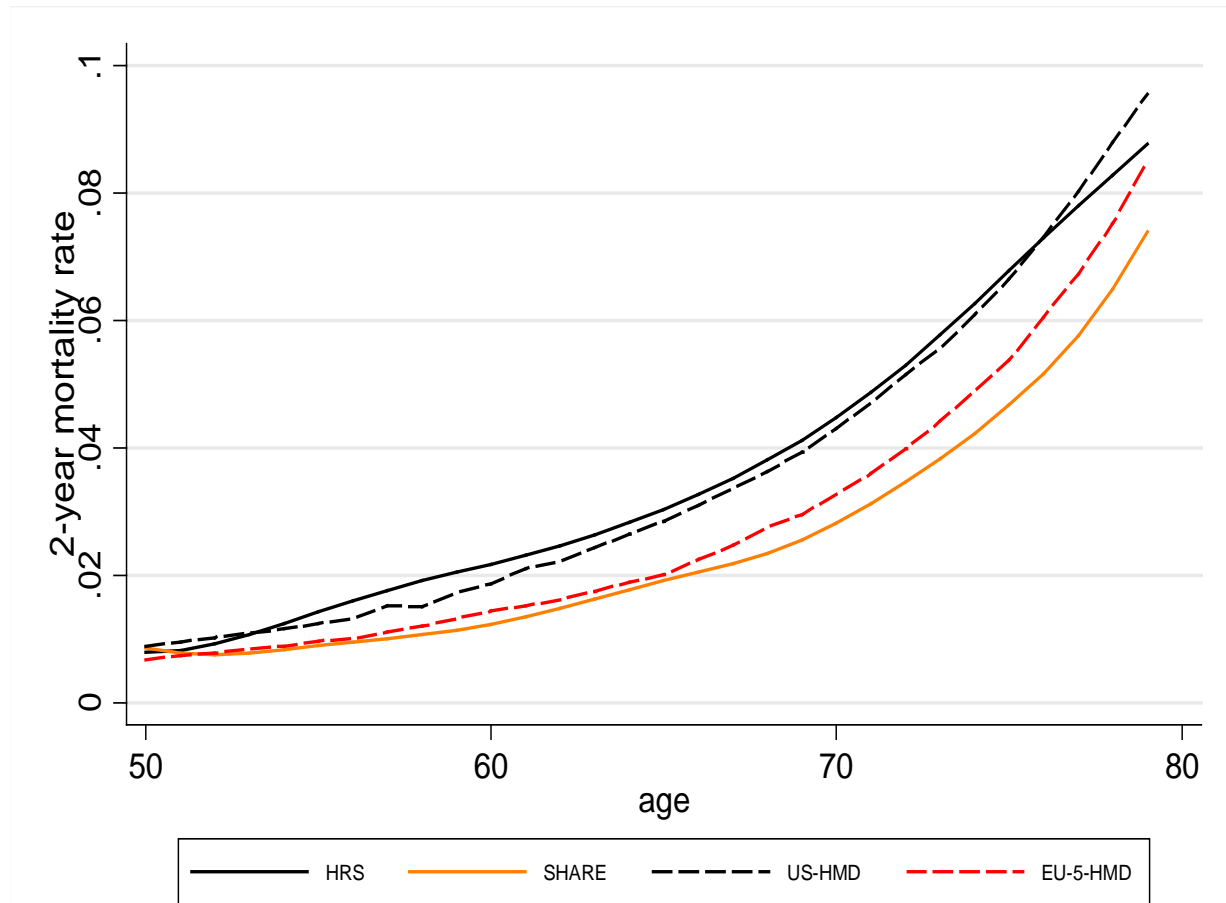## Evaluation of Mortality reports
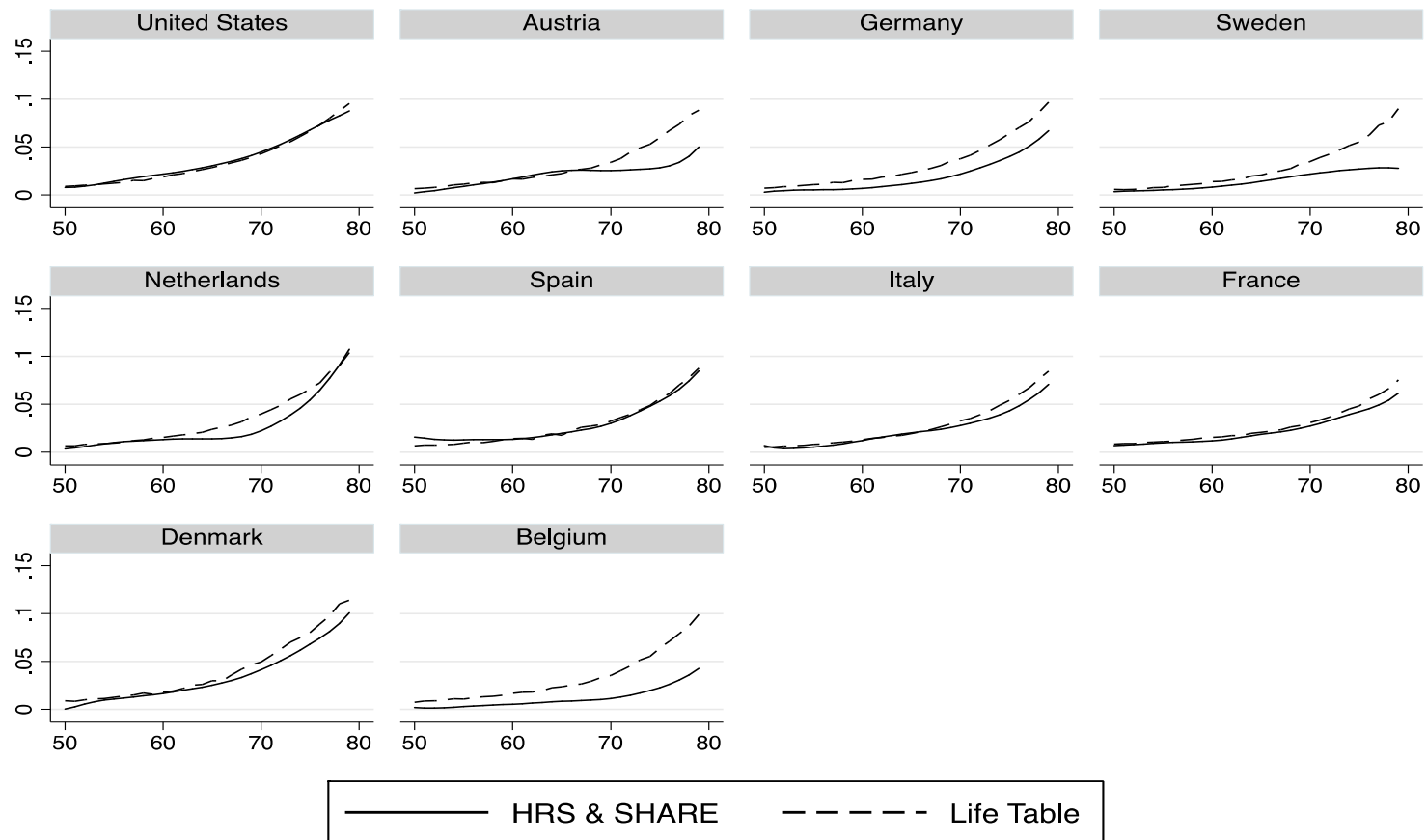
Source: HMD: U.S., Austria, Germany, Sweden, the Netherlands, Spain, Italy, France, Denmark, Belgium

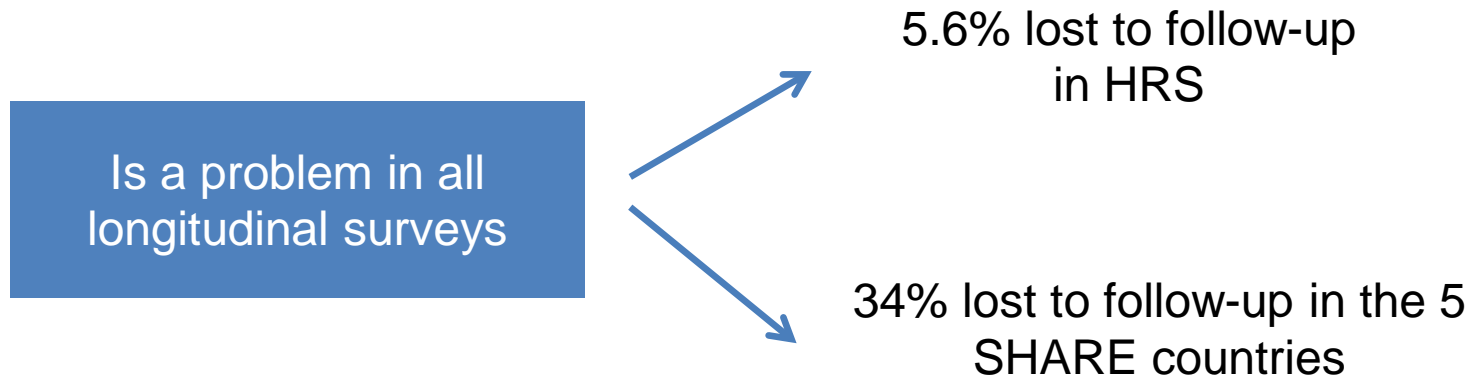## Evaluation of Mortality reports

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Evaluation of Mortality reports

Note: Curve of survey mortality rates smoothed using lowess filter and weighted using sampling weights
SHARE includes: Denmark, France, Italy, the Netherlands, and Spain

Non-response

Is a problem in all longitudinal surveys

5.6% lost to follow-up in HRS

34% lost to follow-up in the 5 SHARE countries

- The fact that mortality tracks life-tables relatively well shows that follow-up differences are unlikely to explain mortality differences

- *Non-response in SHARE*: we developed weights for non-response and compared them to the SHARE weights and conclude that SHARE weights provide appropriate weighting for missing respondents

Data and Methods

Measures

- *Self-reported Chronic conditions:* heart disease, stroke, lung disease, diabetes, hypertension, and cancer

- *Socio-Demographic characteristics:* age, gender, education

- *Health behaviors:* overweight and smoking

Methodology

We estimate two-year incidence of diseases using **hazard models** for each health condition at the initial interview

To study differences in mortality rates by disease across regions → We estimate **survival models** for those with specific diseases

Prevalence of disease in Europe and the U.S. in 2004, Age 50-79
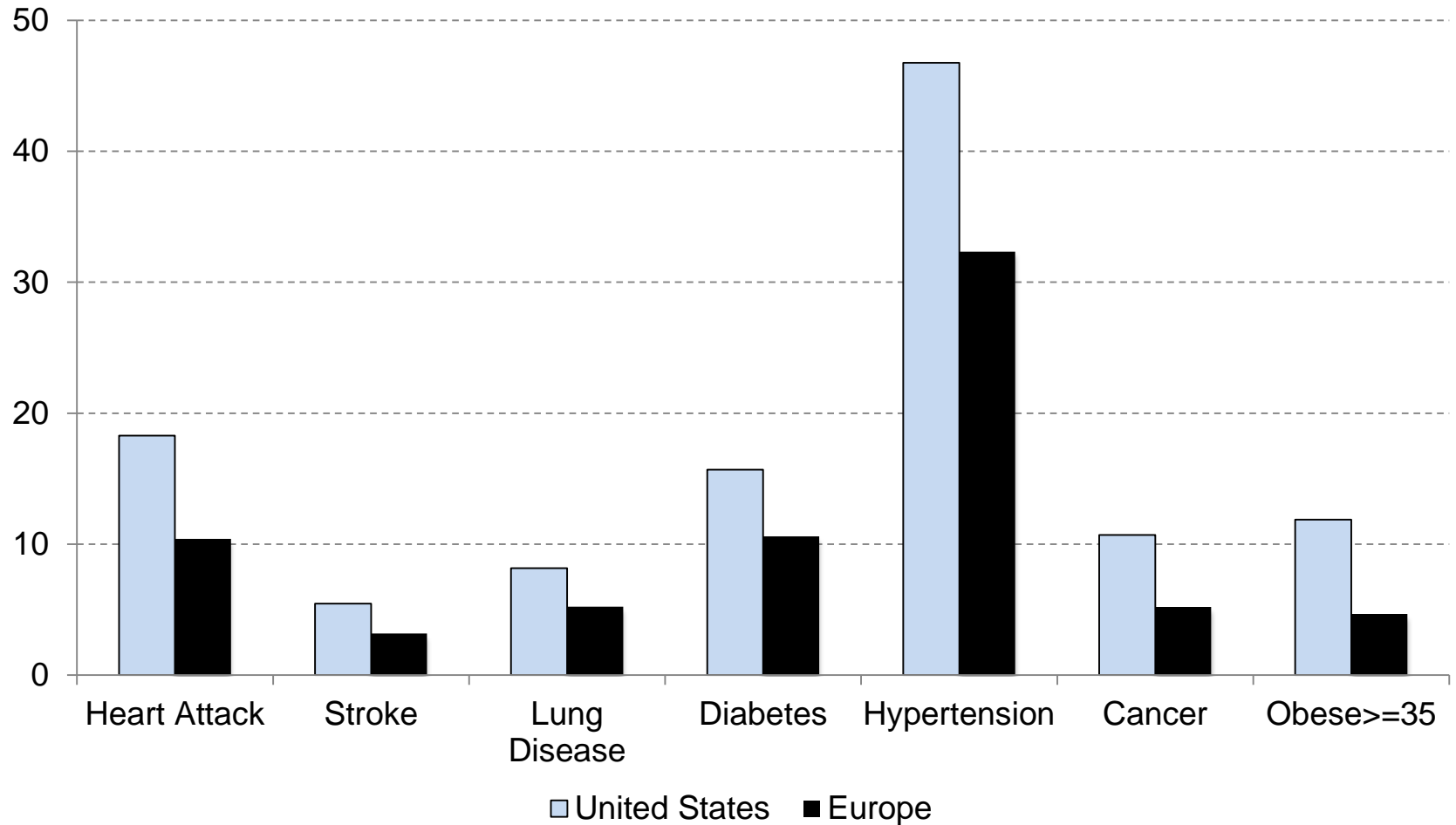
Incidence by age in the U.S. and 5 European countries
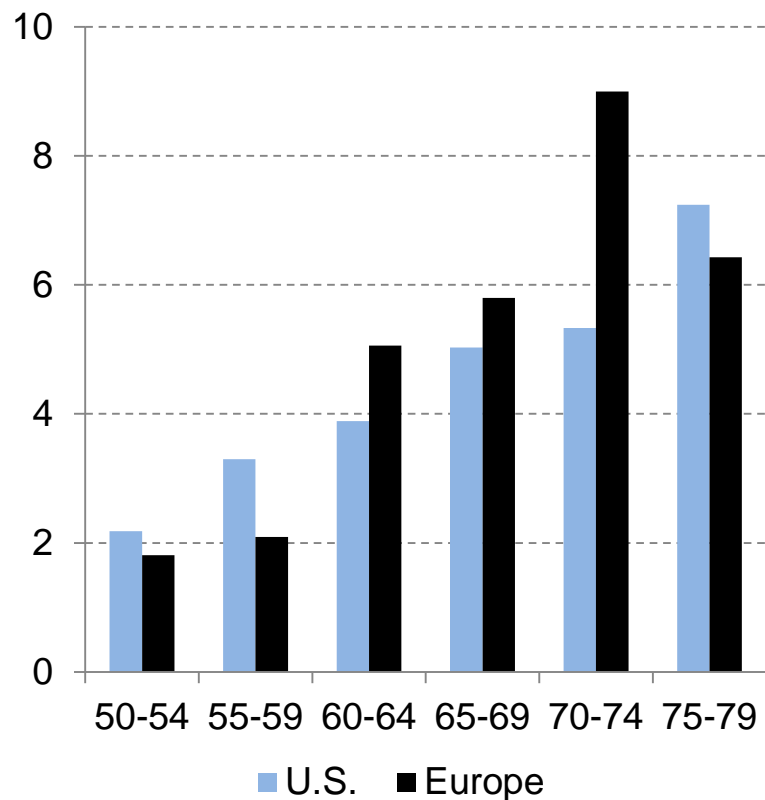
Heart Disease

Stroke

Incidence by age in the U.S. and 5 European countries

Heart Disease

Stroke

Incidence by age in the U.S. and 5 European countries

Lung Disease

Diabetes

Hypertension

Incidence rates are significantly ↑ in Europe after age 60, and the differences **increase with age**

Cancer

Obesity>=35

Disease Incidence Model Estimates

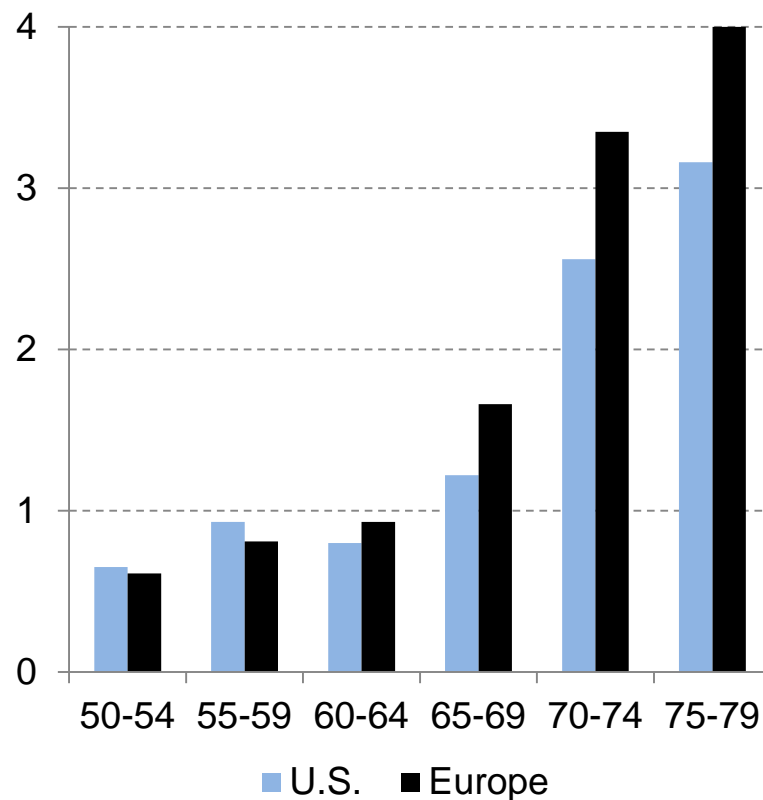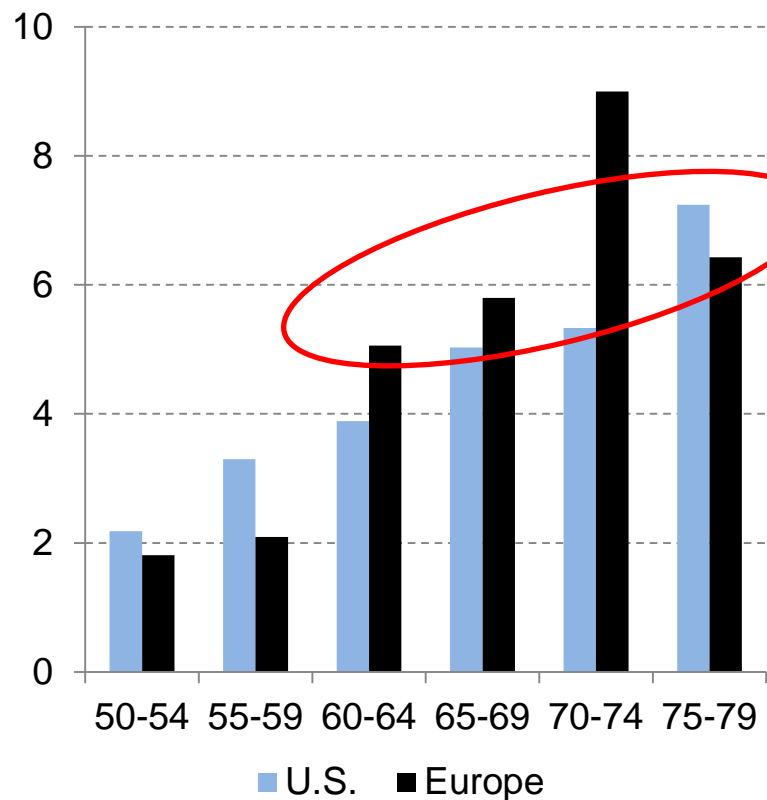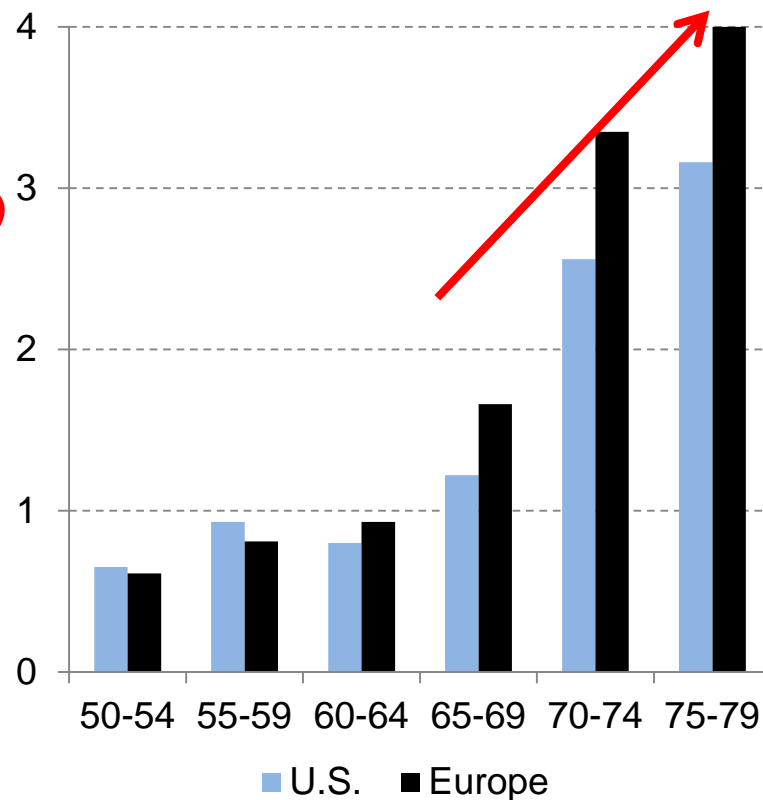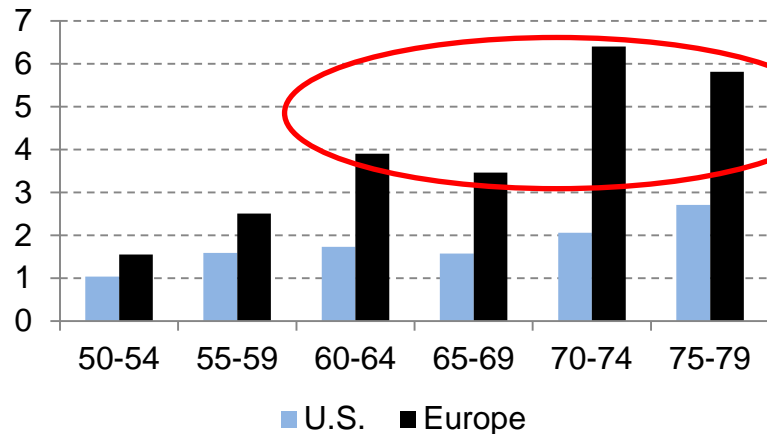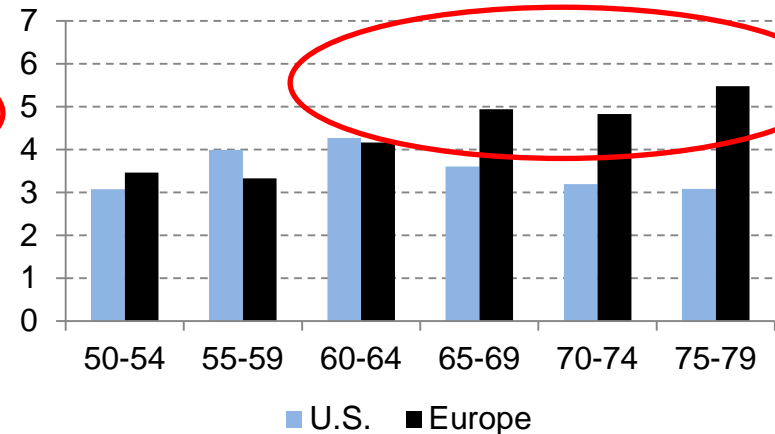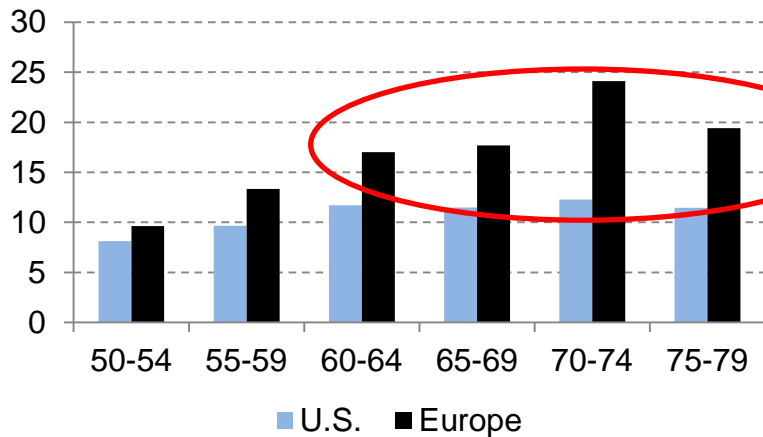|	Heart disease		Stroke		Lung disease	
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Proportion of dying in 2-years among those with a condition, age 50-79

Diseases	U.S.	Europe	Ratio, relative mortality risk (U.S. vs Europe)
Heart disease ($N_{U.S.}$= 3,273; N_E= 1,128)	0.067***	0.041	1.63
Stroke ($N_{U.S.}$= 1,026; N_E= 353)	0.092**	0.073	1.26
Lung disease ($N_{U.S.}$= 1,405; N_E= 668)	0.090***	0.052	1.73
Diabetes ($N_{U.S.}$= 2,852; N_E= 1,124)	0.064***	0.047	1.36
Hypertension ($N_{U.S.}$= 8,158; N_E=3,334)	0.039***	0.027	1.44
Cancer ($N_{U.S.}$= 1,905; N_E= 588)	0.078	0.018	4.33

Source: HRS and SHARE, sample weights used. Test of significance with condition (U.S. over Europe): * $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

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The effect on mortality of living in Europe vs the U.S. for those with specified diseases

Relative mortality risk: Coefficients indicating the effect of being in the European sample

	Model 1	Model 2	Model 3	Model 4
Heart disease (4,497)	-0.51 ***	-0.56 ***	-0.65 ***	-0.32 *
Stroke (1,449)	-0.29	-0.33	-0.47 **	-0.08
Lung disease (2,107)	-0.44 **	-0.42 **	-0.55 ***	-0.30
Diabetes (4,064)	-0.35 **	-0.36 **	-0.54 ***	-0.13
Hypertension (11,676)	-0.44 ***	-0.23 ***	-0.65 ***	-0.28 **
Cancer (2,535)	0.03	0.02	-0.19	-0.06

Source: HRS and SHARE, age 50-79, sample weights used. Gompertz models fitted by maximum likelihood.* $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Each model is run for those with one disease at a time. *Model 1:* Includes controls for age, and gender. *Model 2:* adds controls for college education. *Model 3:* adds controls for health behaviors. *Model 4:* adds controls for co-morbidities.

The effect on mortality of living in Europe vs the U.S. for those with specified diseases

Relative mortality risk: Coefficients indicating the effect of being in the European sample

	Model 1	Model 2	Model 3	Model 4
Heart disease (4,497)	-0.51 ***	-0.56 ***	-0.65 ***	-0.32 *
Stroke (1,449)	-0.29	-0.33	-0.47 **	-0.08
Lung disease (2,107)	-0.44 **	-0.42 **	-0.55 ***	-0.30
Diabetes (4,064)	-0.35 **	-0.36 **	-0.54 ***	-0.13
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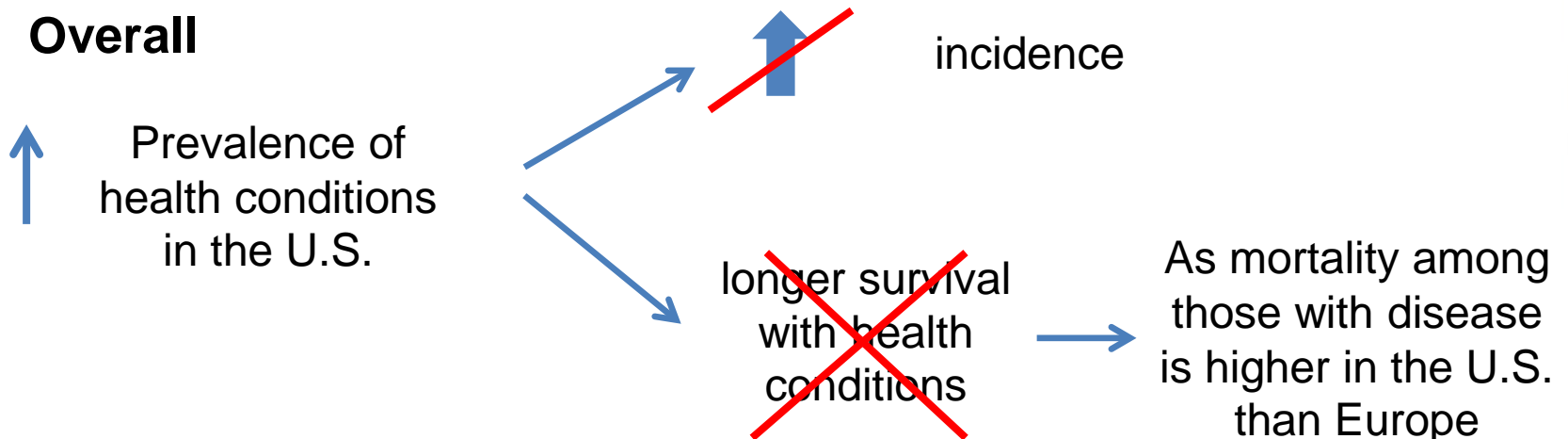
Conclusions

- Disease prevalence is higher in the U.S. than in Europe

- **Higher overall incidence rates in Europe; and for many conditions after age 60, except for cancer & obesity in the U.S.**

- Onset of chronic conditions among Americans appears earlier in the life cycle (may be related to the high levels of obesity & past smoking)

- **Higher mortality risk in the U.S. at younger old ages (50-59) for: stroke, lung disease, diabetes and hypertension**

- However, this higher mortality for most diseases among Americans disappears when co-morbidity is controlled; remains higher for those who have hypertension and heart disease

Conclusions

- **Limitations**:
    - SHARE under-estimates population mortality; whereas HRS mortality is very close to Life Table mortality
    - SHARE is a new survey, whereas HRS is a long-running survey
    - Our results do not consider the nursing home population
    - We use data for a relatively short time interval from both surveys

- **Overall**

↑ Prevalence of health conditions in the U.S.

↑ incidence (crossed out)

longer survival with health conditions (crossed out) → As mortality among those with disease is higher in the U.S. than Europe

THANK YOU