

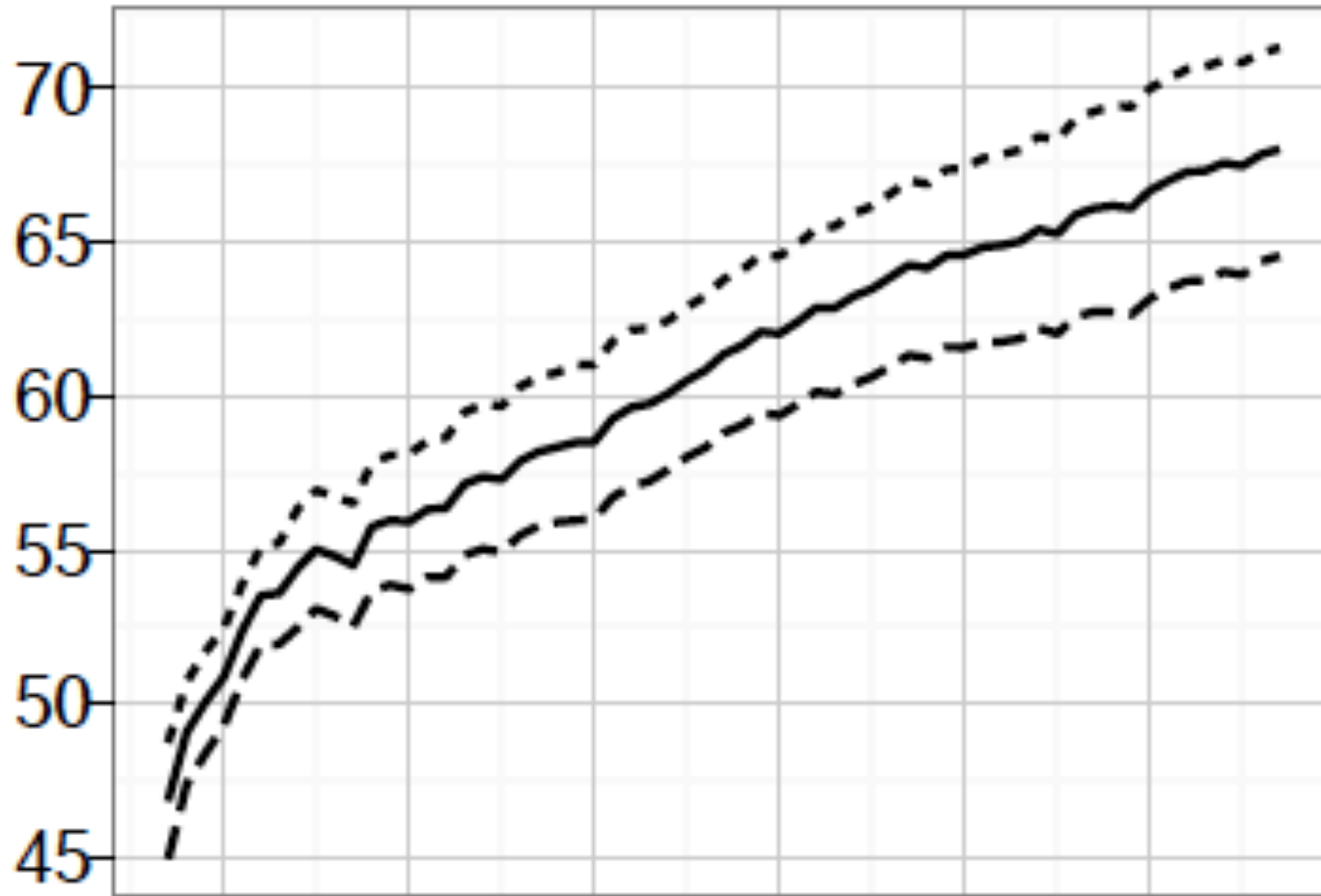
How and Why Mortality Change Varies Between Sexes and Countries

Shripad Tuljapurkar
Biology and Population Studies
Stanford University
USA

Talk at Longevity 9
Beijing, China
September 2013

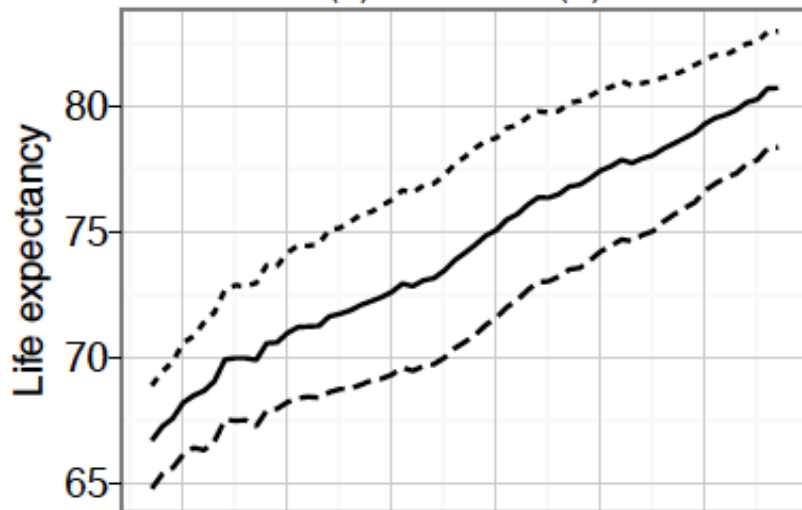
LONGER LIVES: A FAMILIAR TALE

(a) Japan $e(0)$
(b) Japan $e(15)$

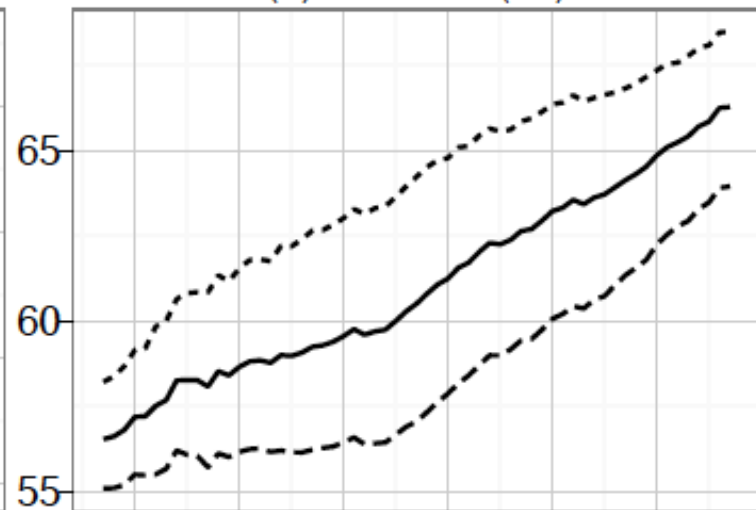


AND – HAPPENS (ALMOST) EVERYWHERE

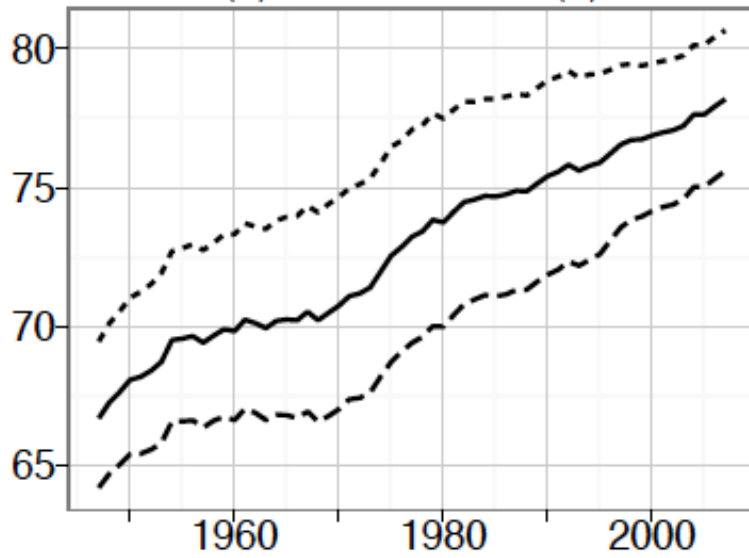
(c) Canada e(0)



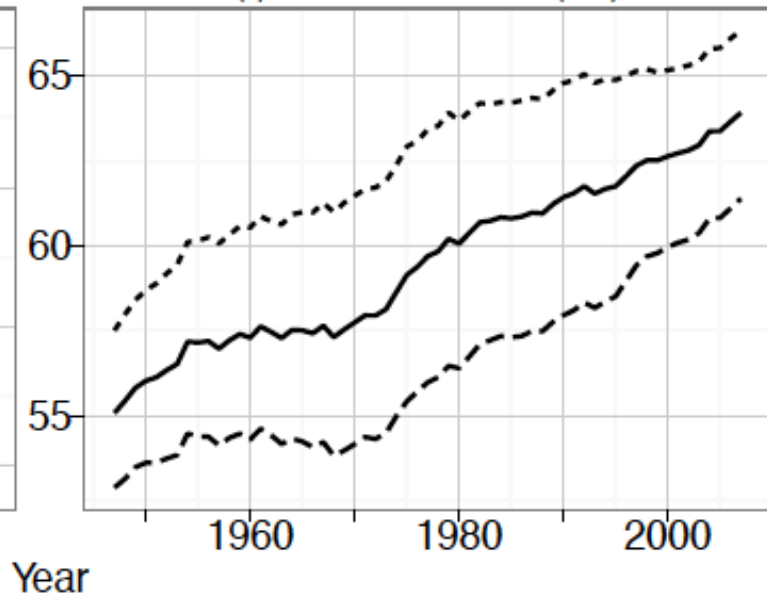
(d) Canada e(15)



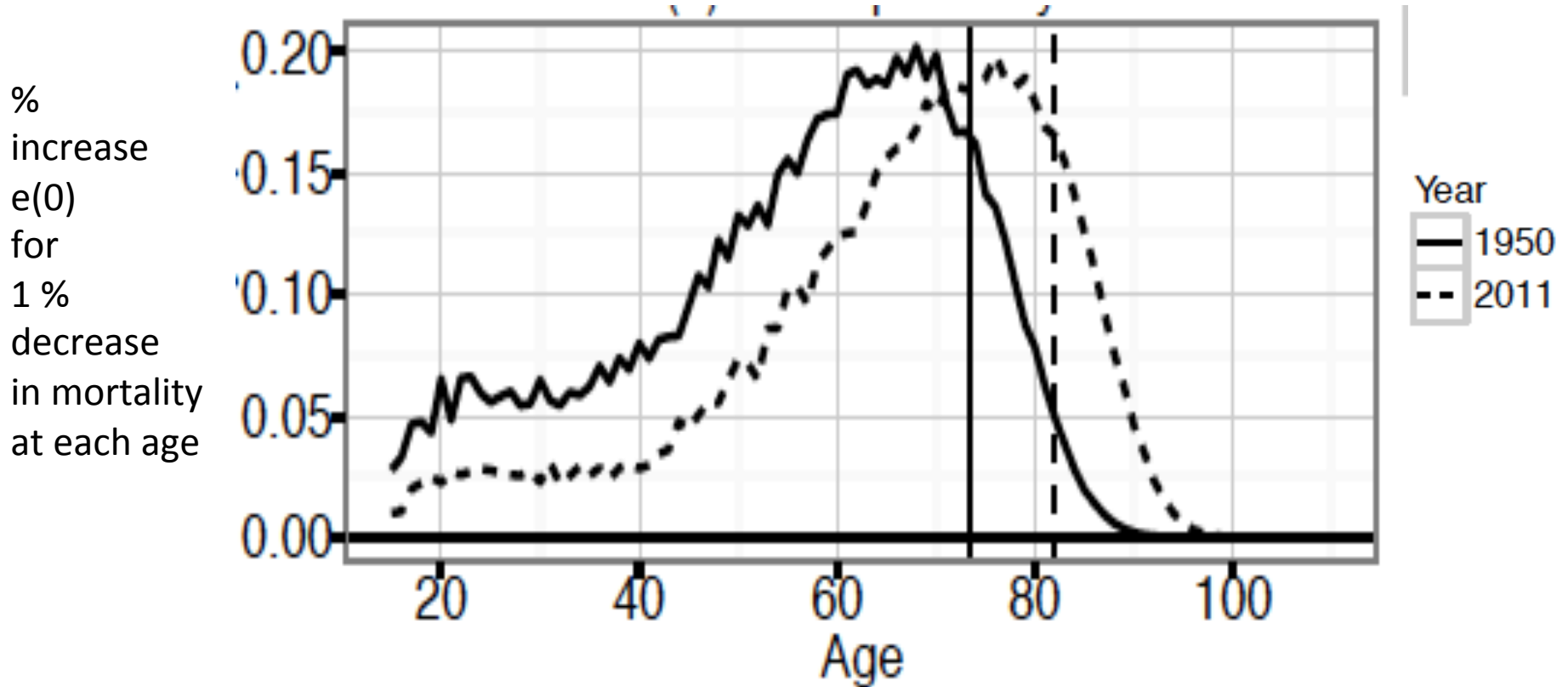
(e) United States e(0)



(f) United States e(15)

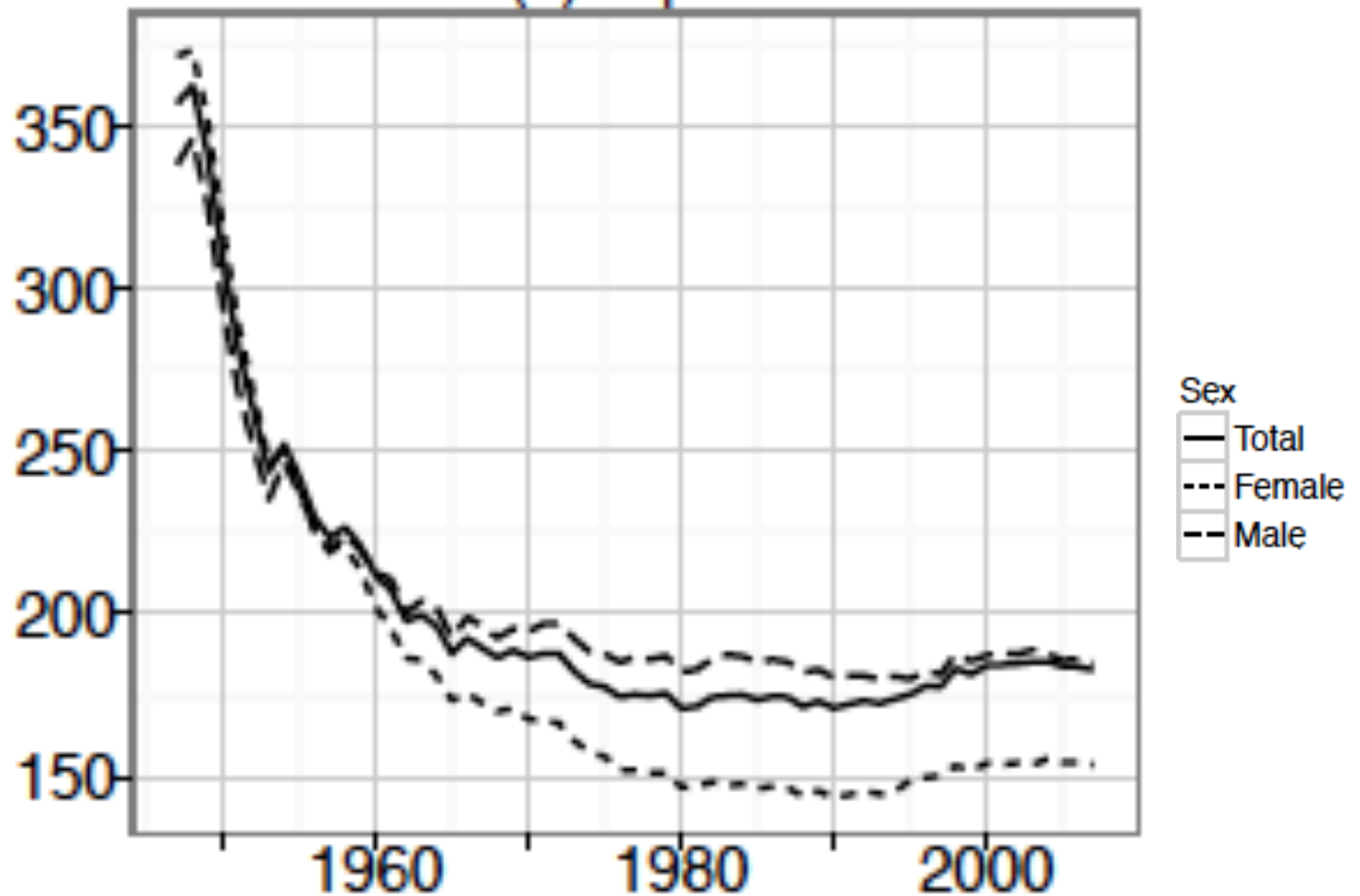


REDUCE MORTALITY AT ANY AGE →
increase life expectancy



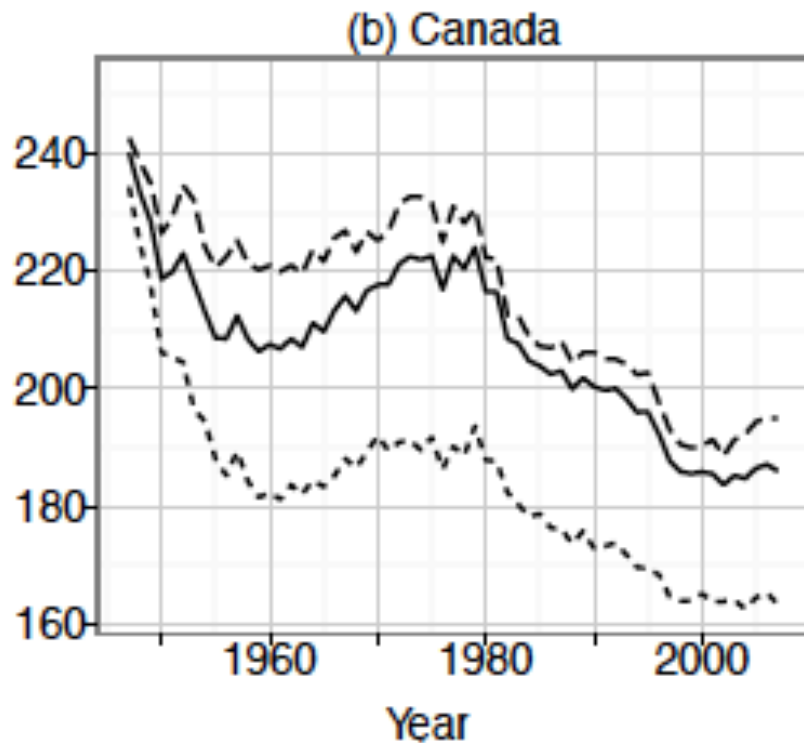
WHAT ABOUT VARIANCE IN AGE AT DEATH?

(a) Japan

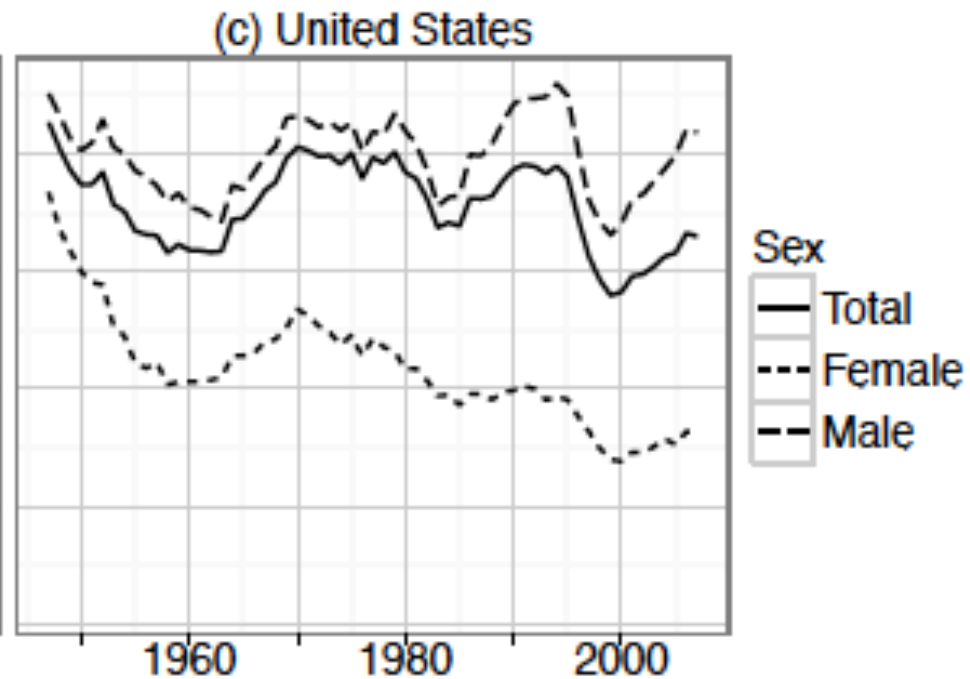


VARIANCE
IN AGE OF
DEATH
(AFTER AGE
15)

*RAPID DECLINE TILL 1960, SLOWER DECLINE TILL 1980, THEN
STABLE or TRENDING UP*

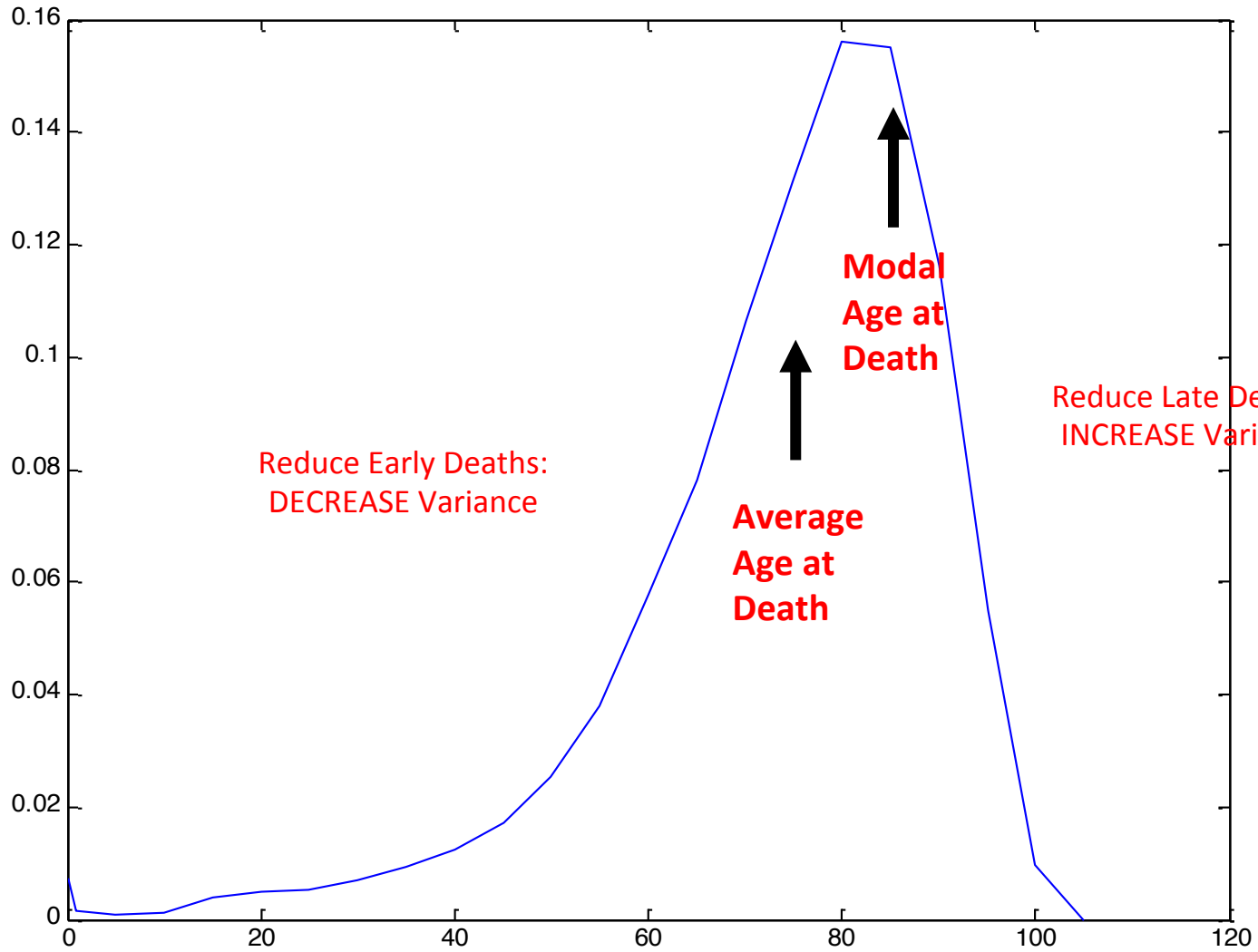


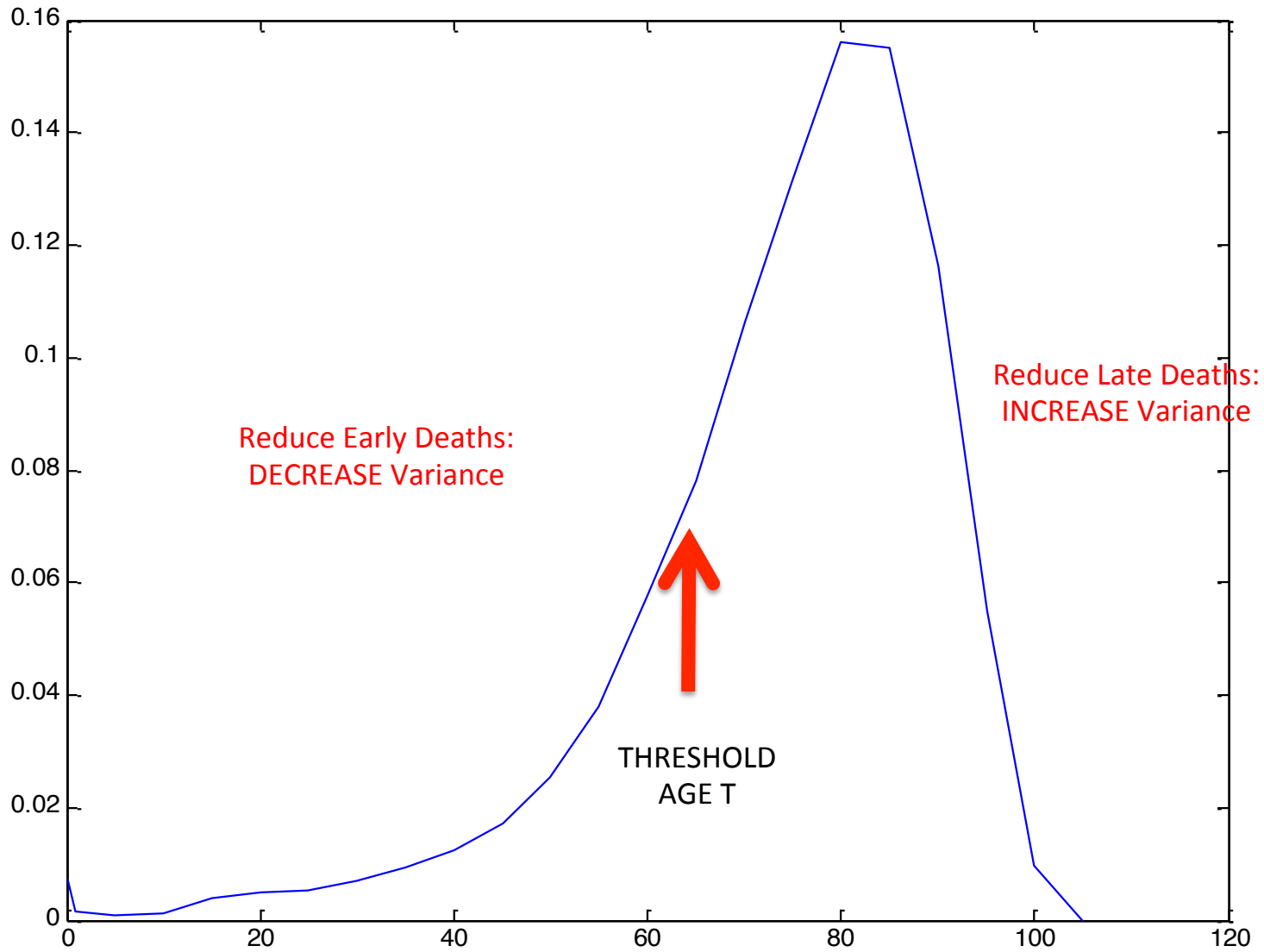
***RAPID DECLINE TILL 1960,
LITTLE CHANGE TILL 1980,
THEN FAIRLY RAPID DECLINE***



***RAPID DECLINE TILL 1960,
LITTLE CHANGE TILL 1980,
THEN VERY SLIGHT DECLINE***

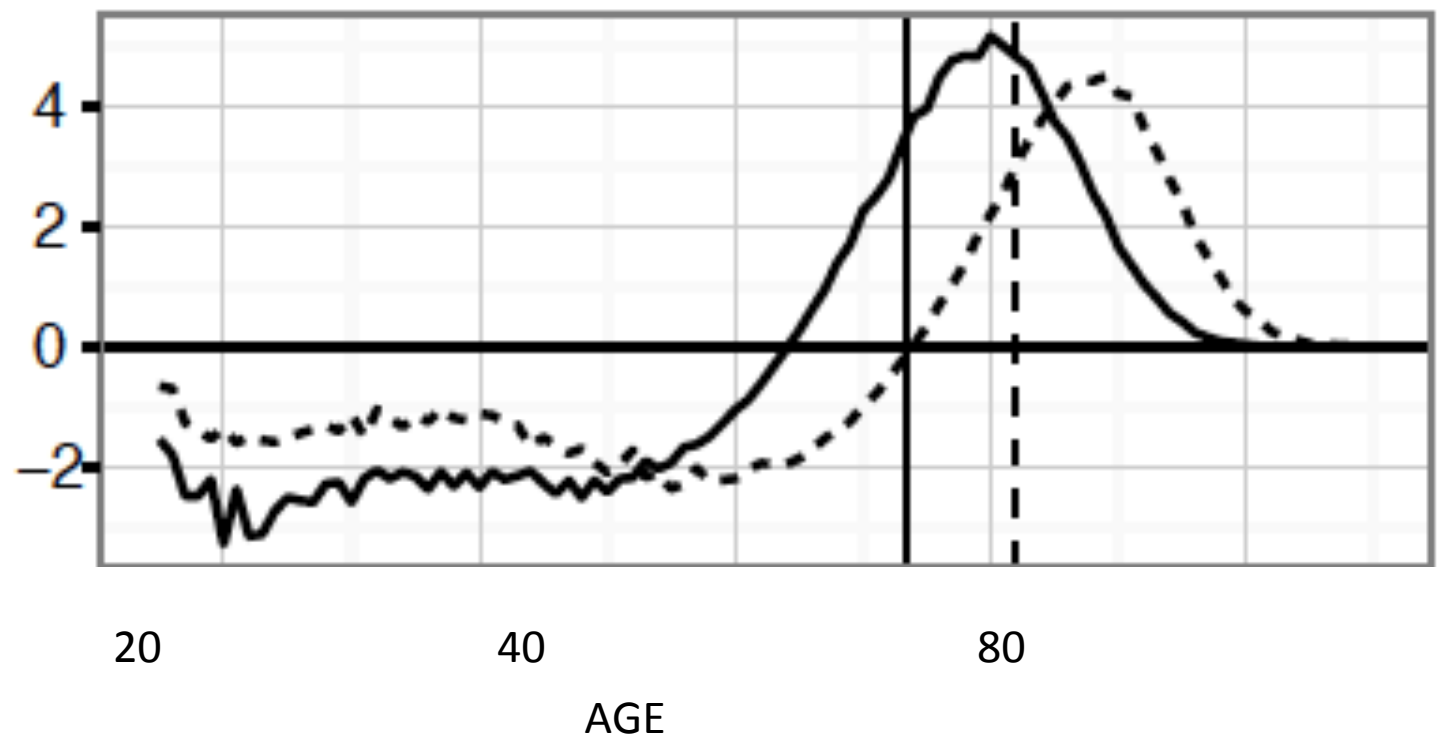
THE SHAPE OF DEATH





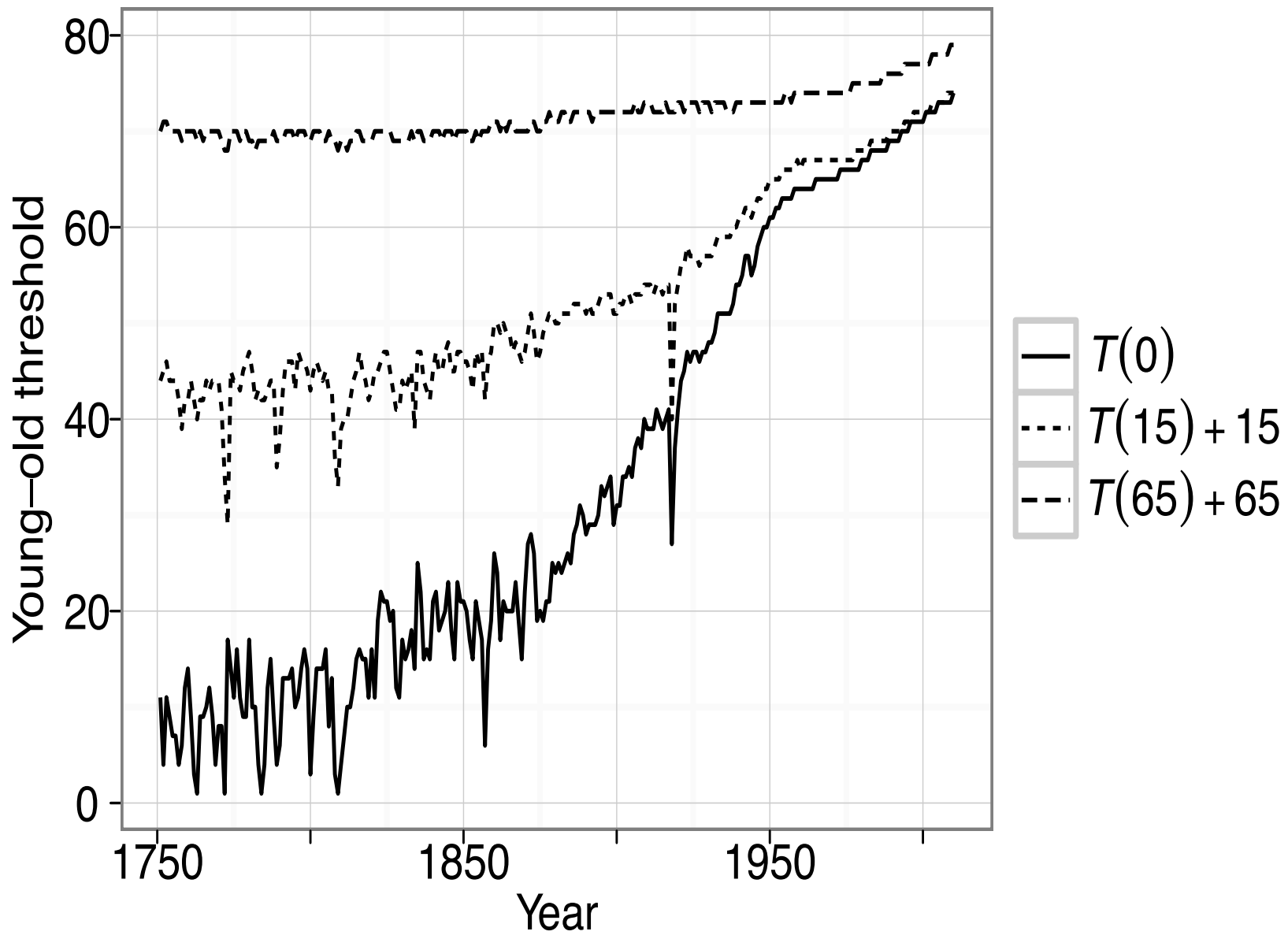
Year
— 1950
- - 2011

%
increase
VARIANCE(15)
for
1 %
decrease
in mortality
at each age



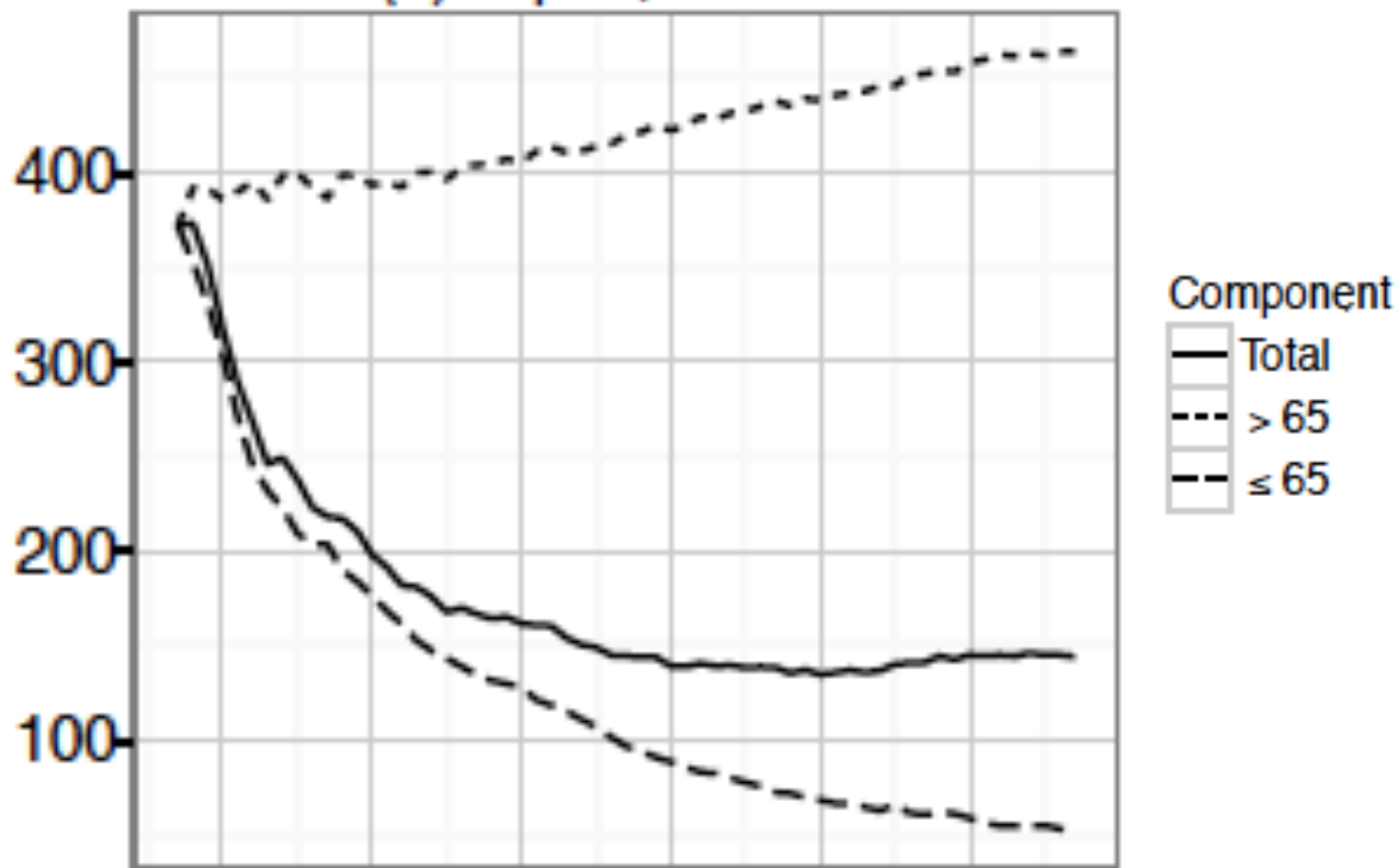
REDUCE MORTALITY AT YOUNG
AGE →
Decrease Variance

REDUCE MORTALITY AT OLD
AGE →
Increase Variance

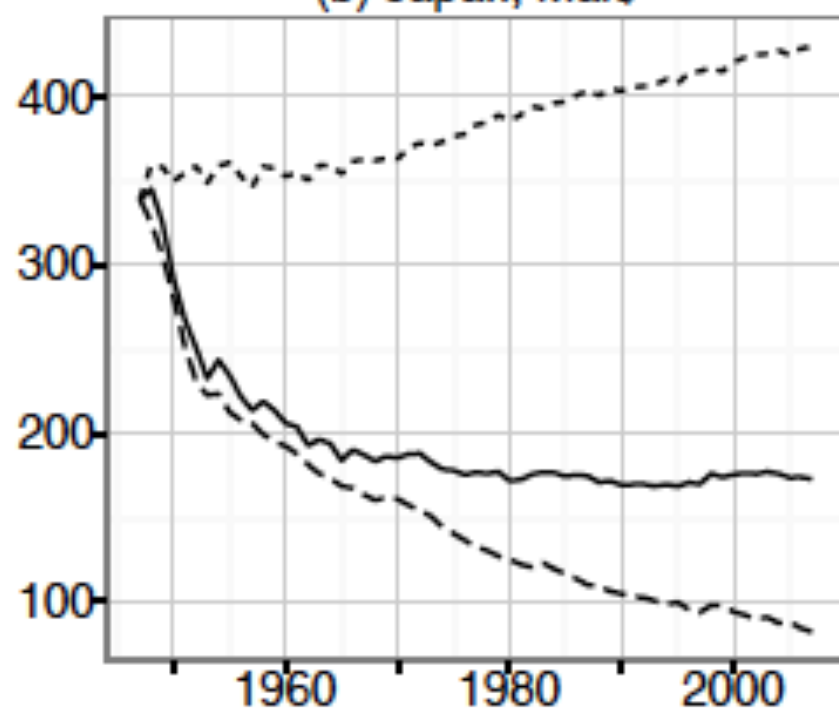


PROGRESS AGAINST YOUNG & OLD MORTALITY

(a) Japan, Female



(b) Japan, Male



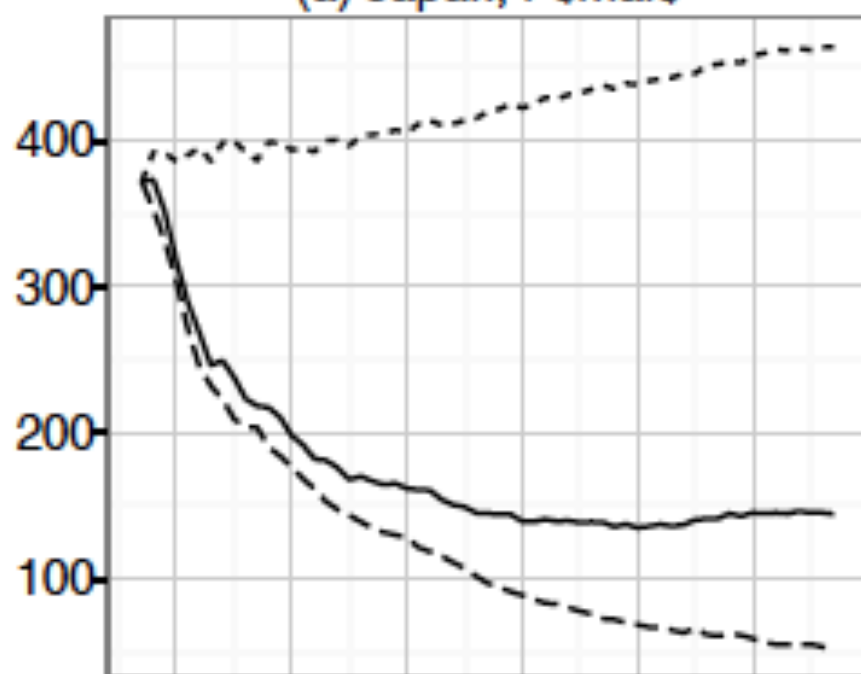
Component

— Total

- - - > 65

- · - · ≤ 65

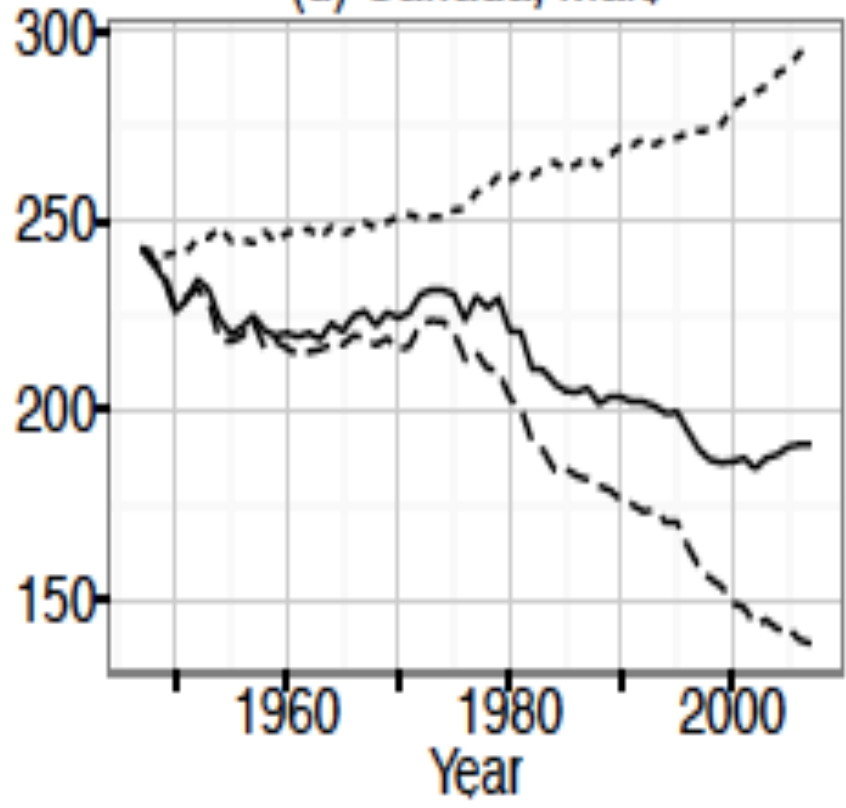
(a) Japan, Female



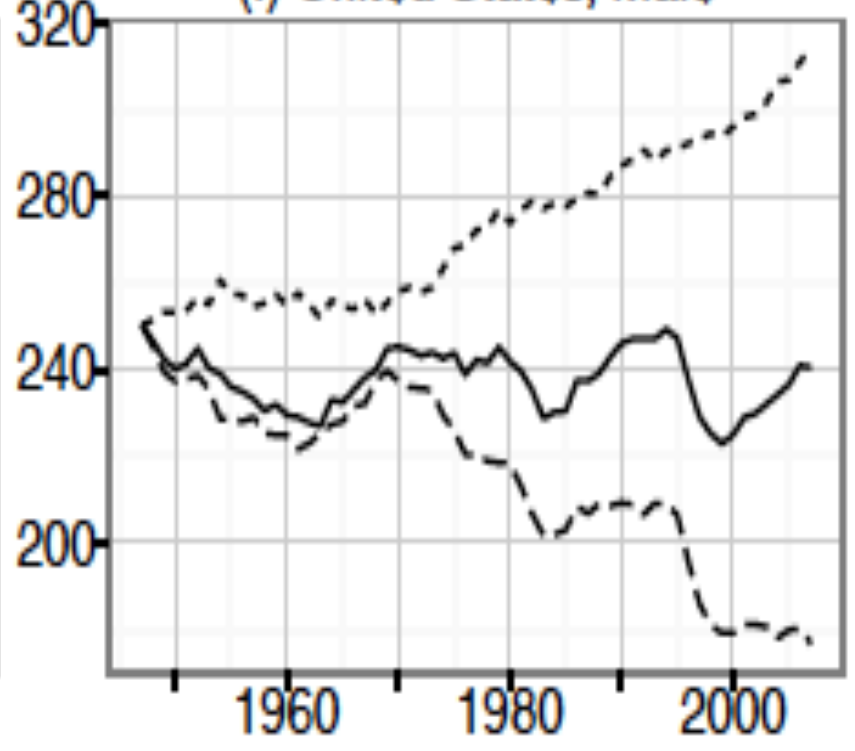
Component

- Total
- - - > 65
- · - ≤ 65

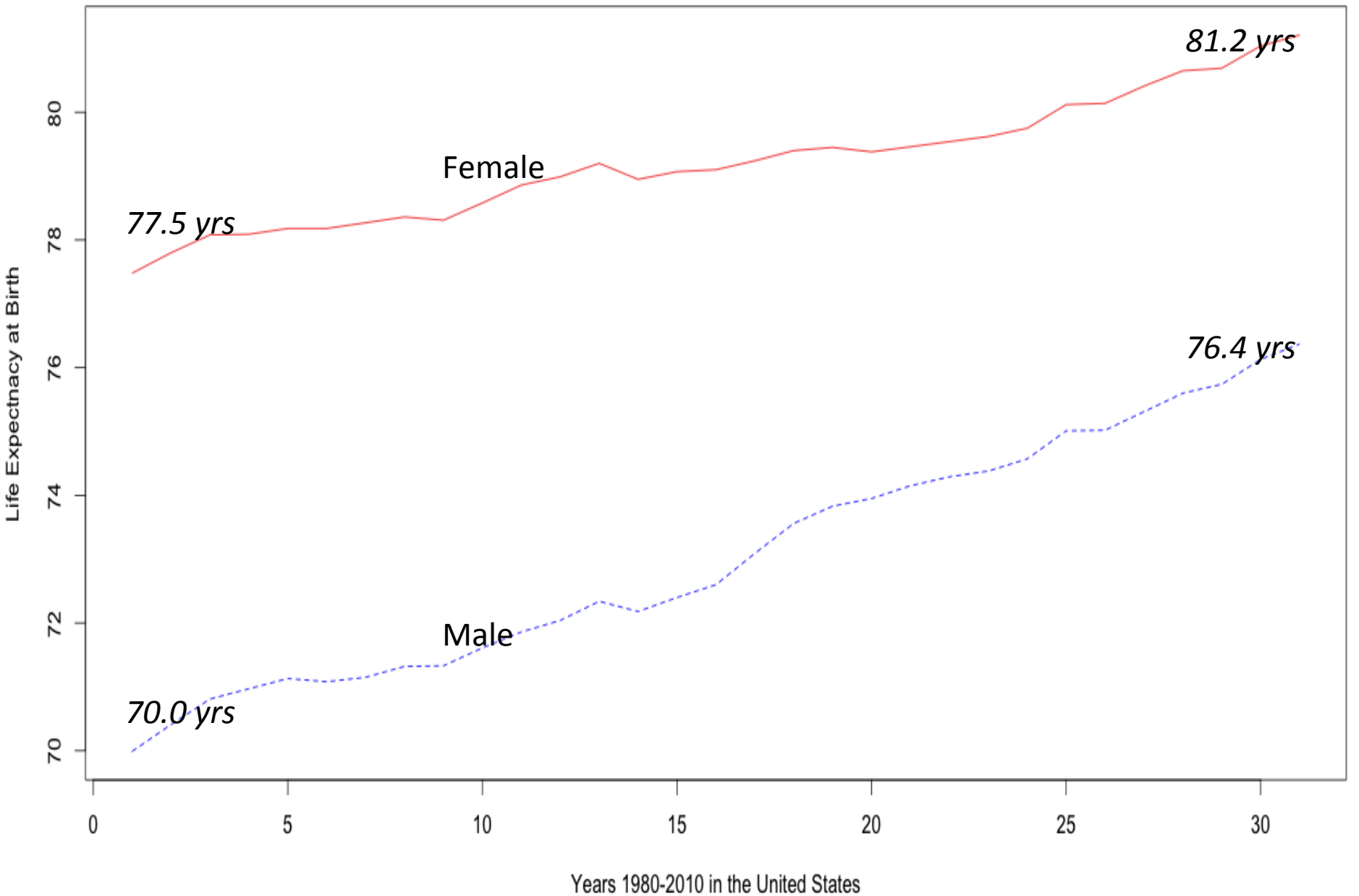
(d) Canada, Male



(f) United States, Male

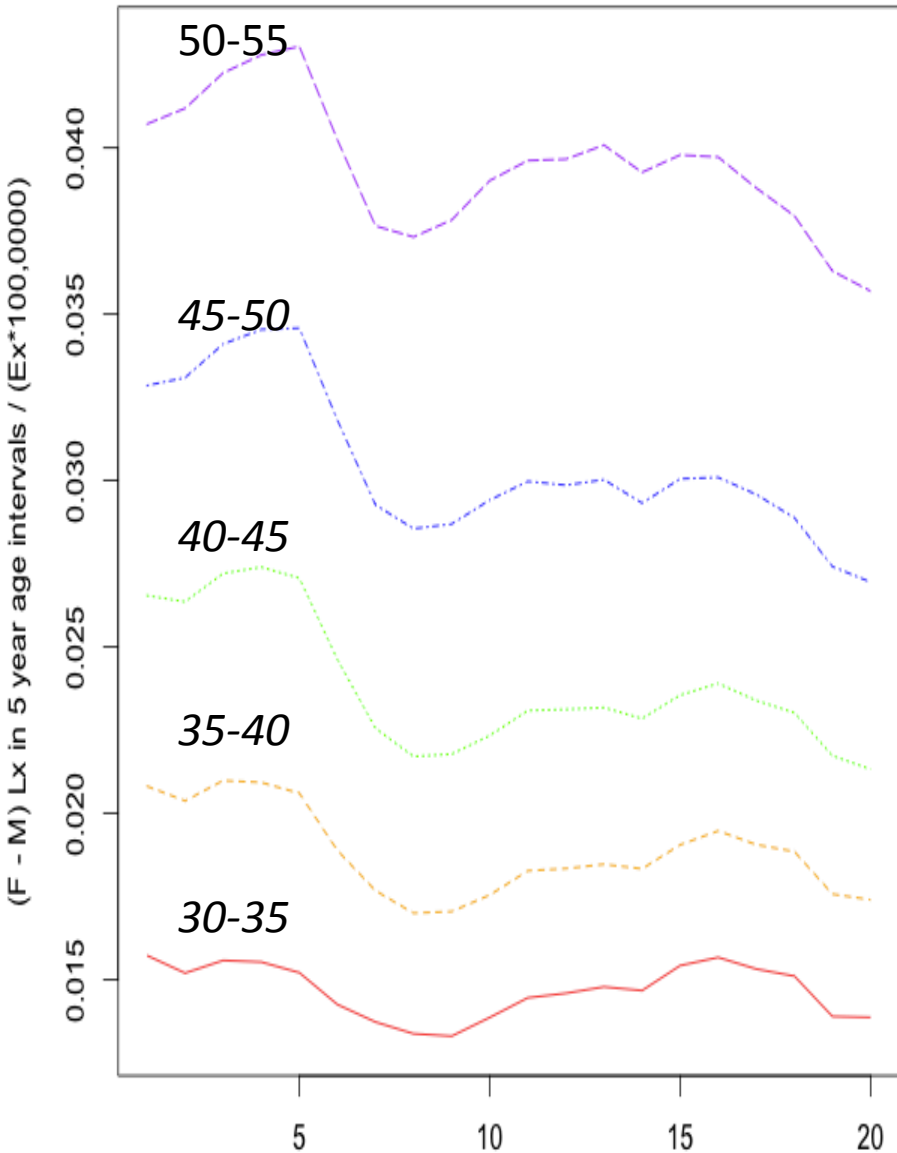


Life Expectancy at Birth in the United States

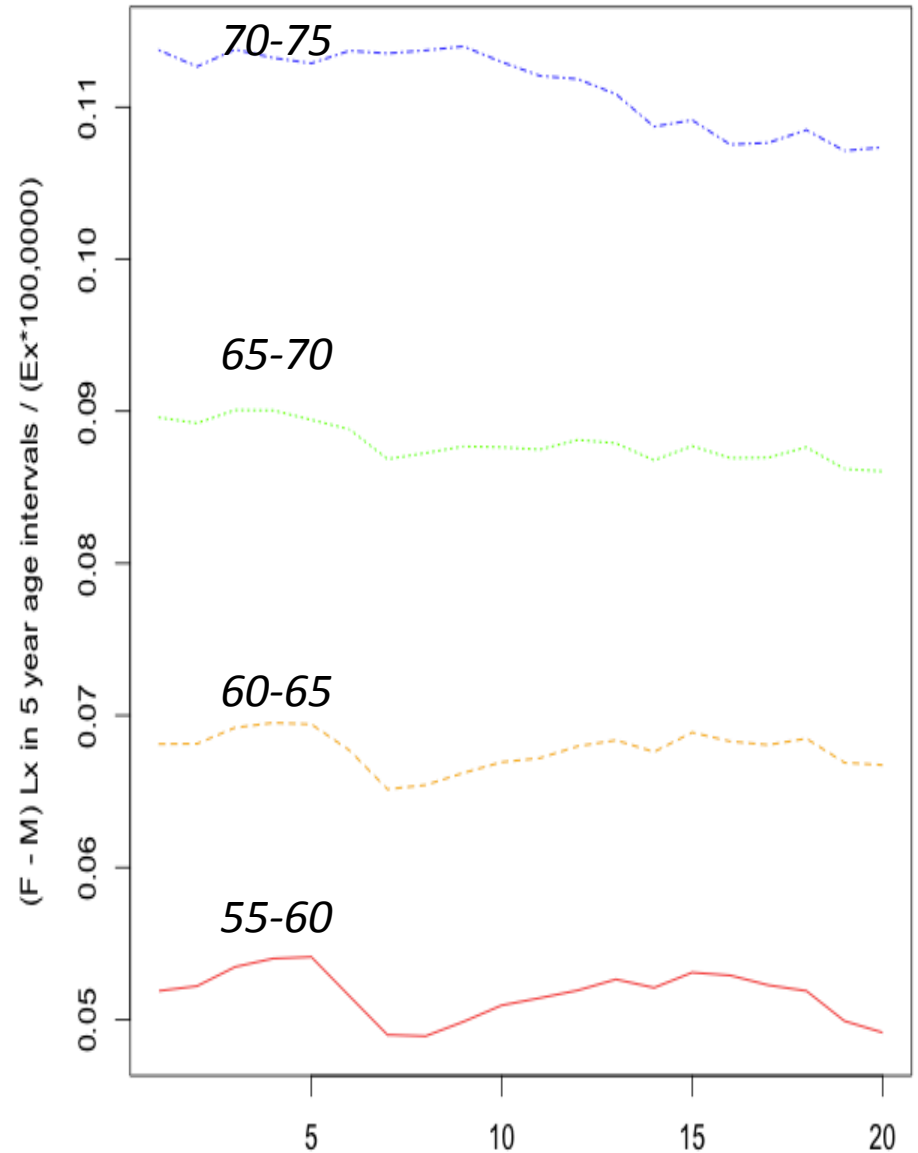


MORTALITY DECLINES AT EVERY AGE CONTRIBUTE
TO NARROWING FEMALE – MALE GAP

In the **United States**, amount each age group is contributing to the sex disparity in life expectancy over the past two decades

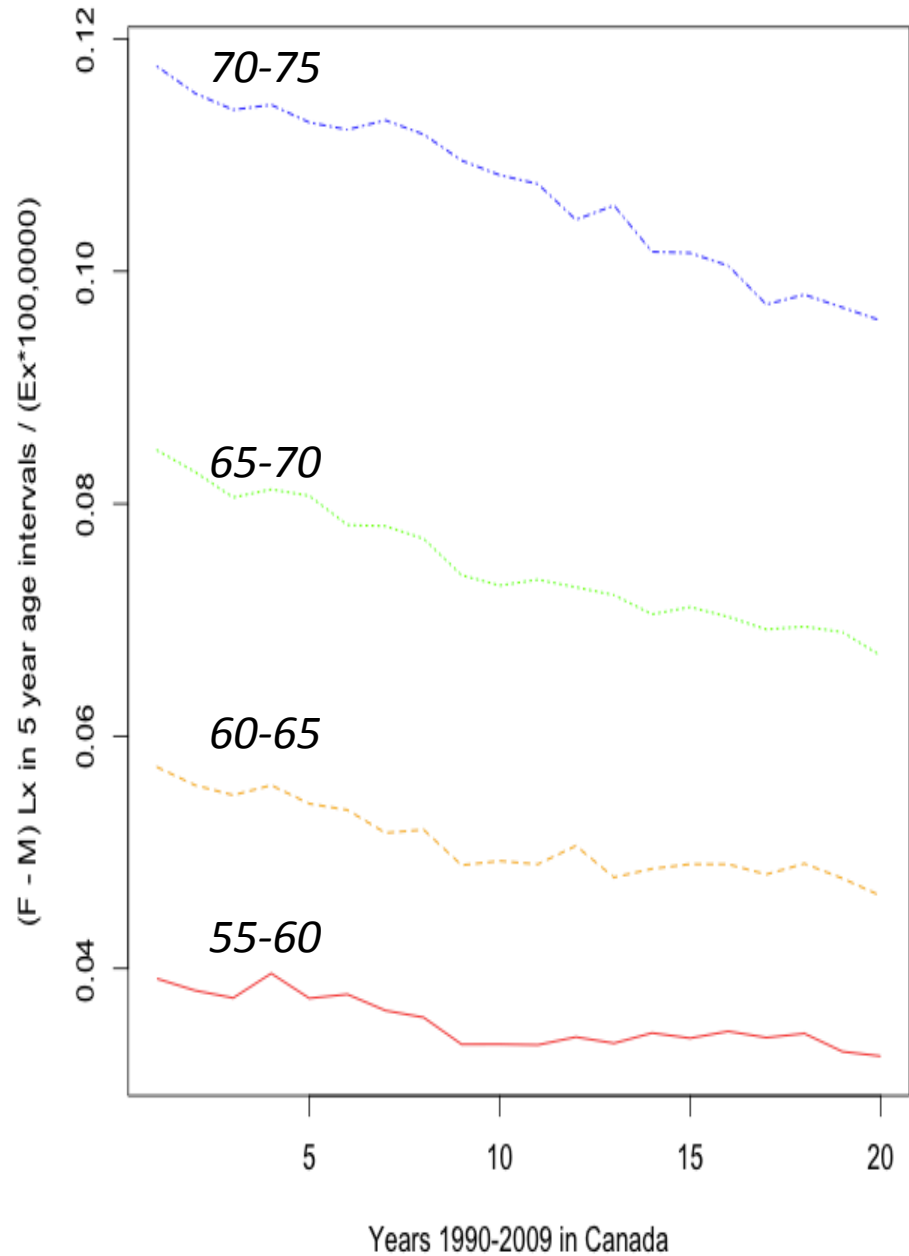
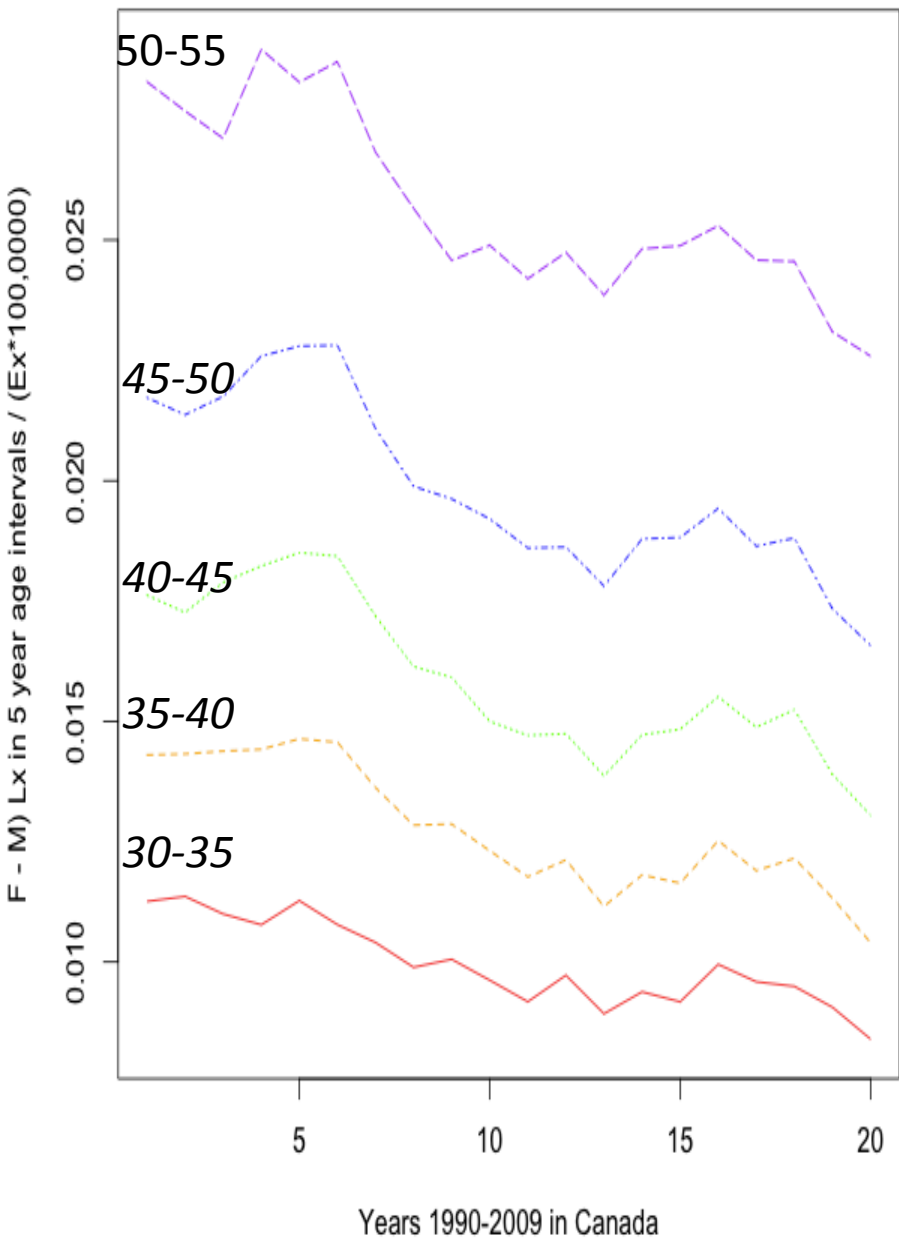


Years 1991-2010 in the United States

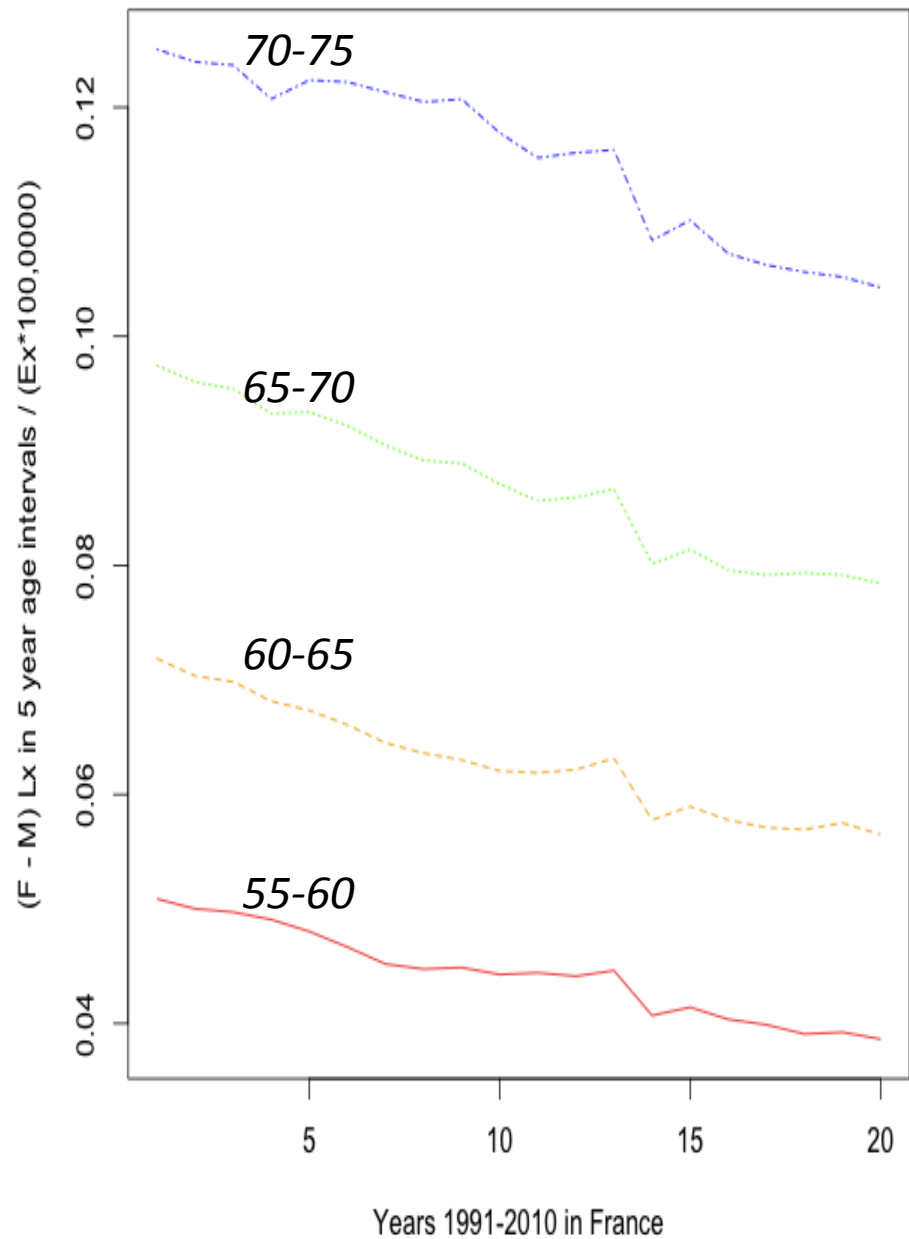
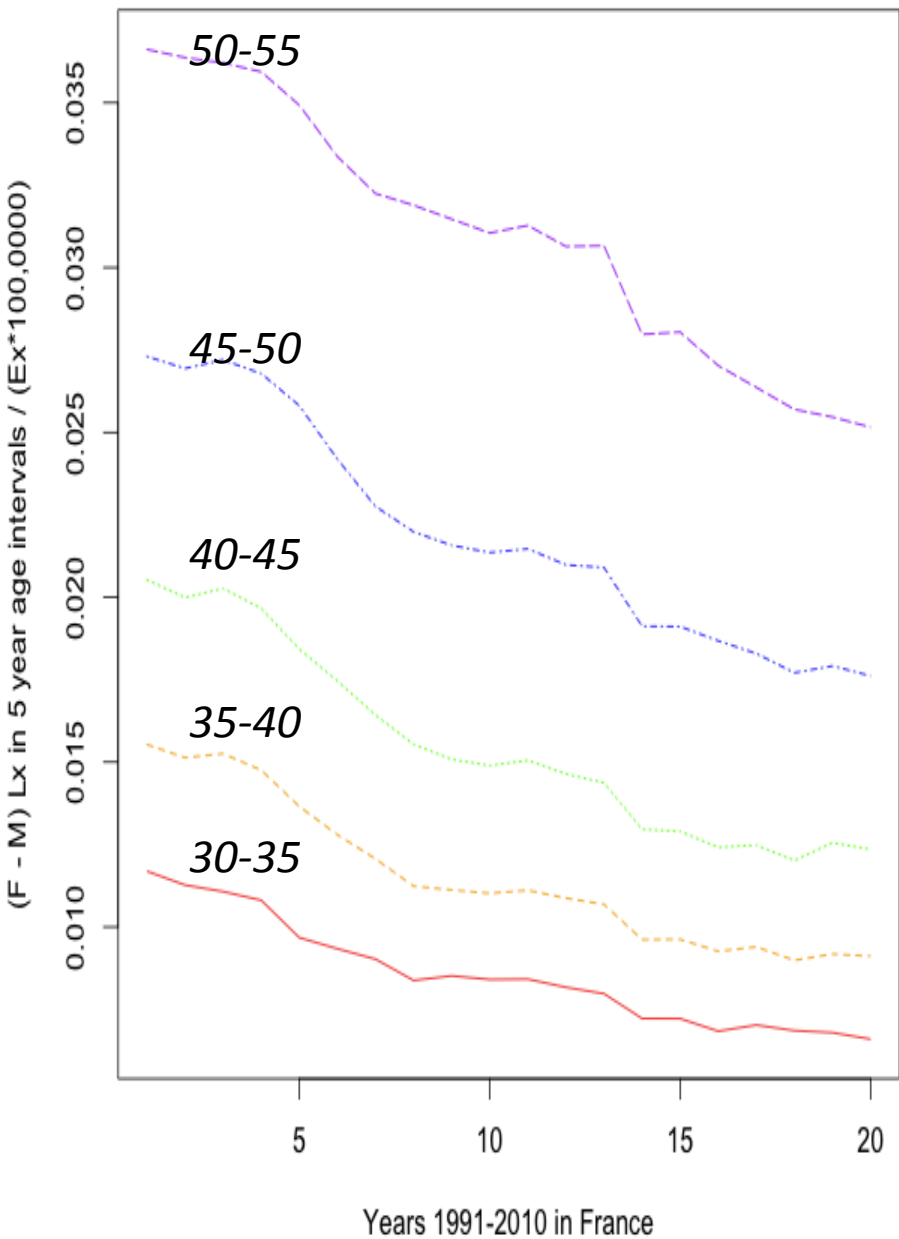


Years 1991-2010 in the United States

*In **Canada**, amount each age group is contributing to the sex disparity in life expectancy over the past two decades*



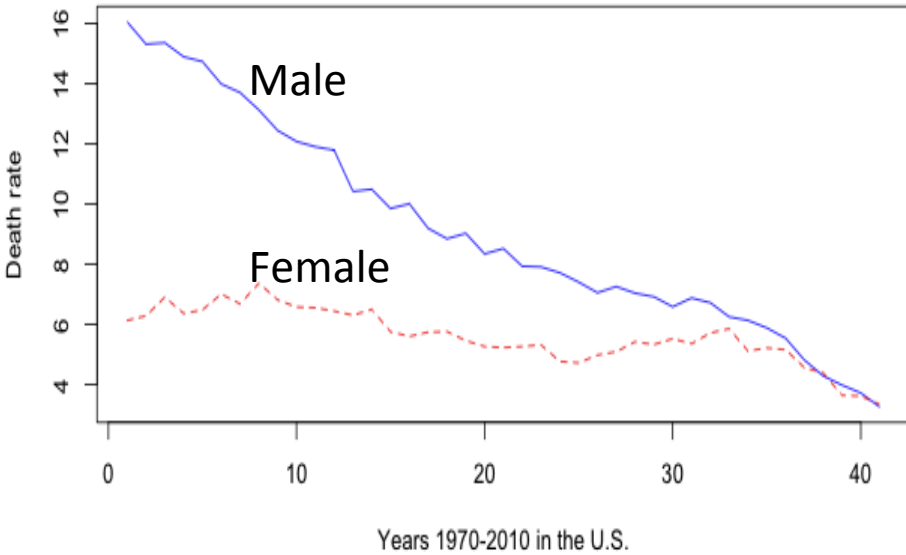
In France, amount each age group is contributing to the sex disparity in life expectancy over the past two decades



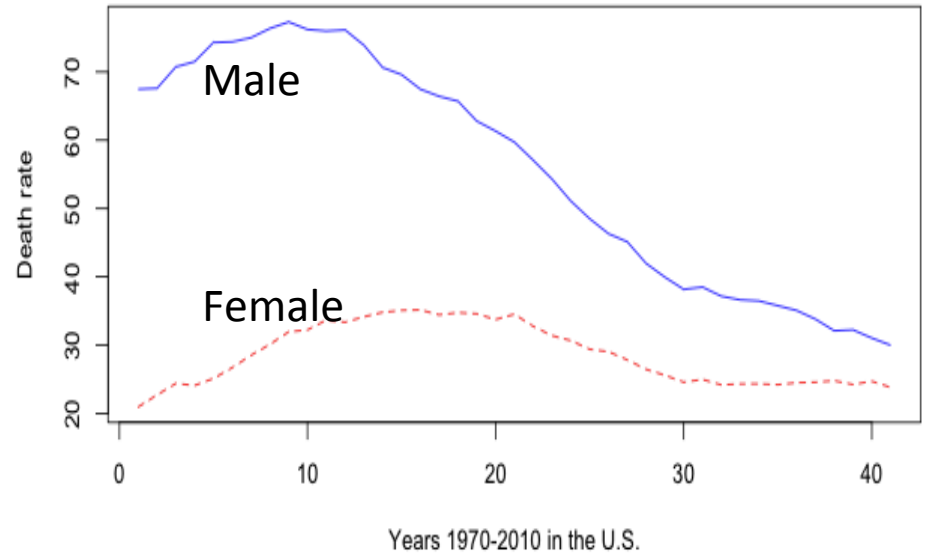
THE SMOKING GUN?

PRESTON'S FINDINGS

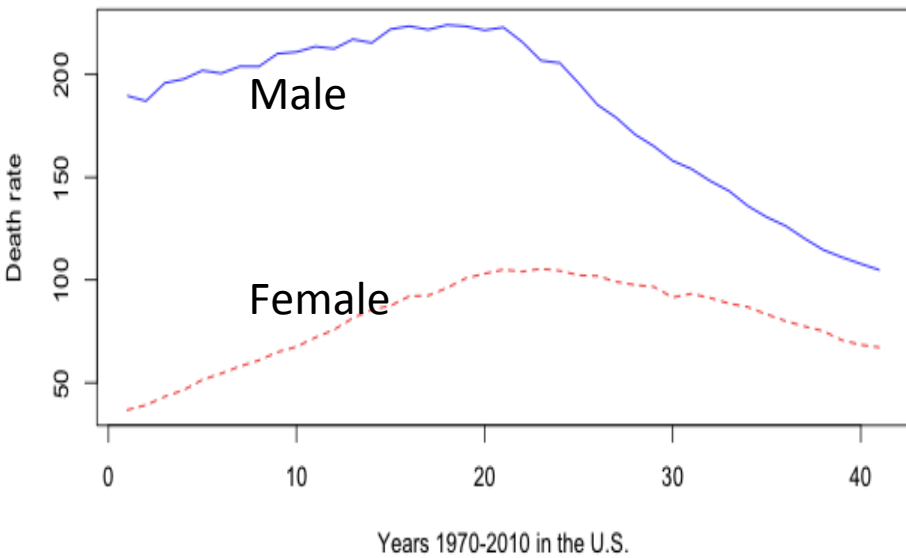
Male and Female Lung Cancer Death Rates for 35-44 age group



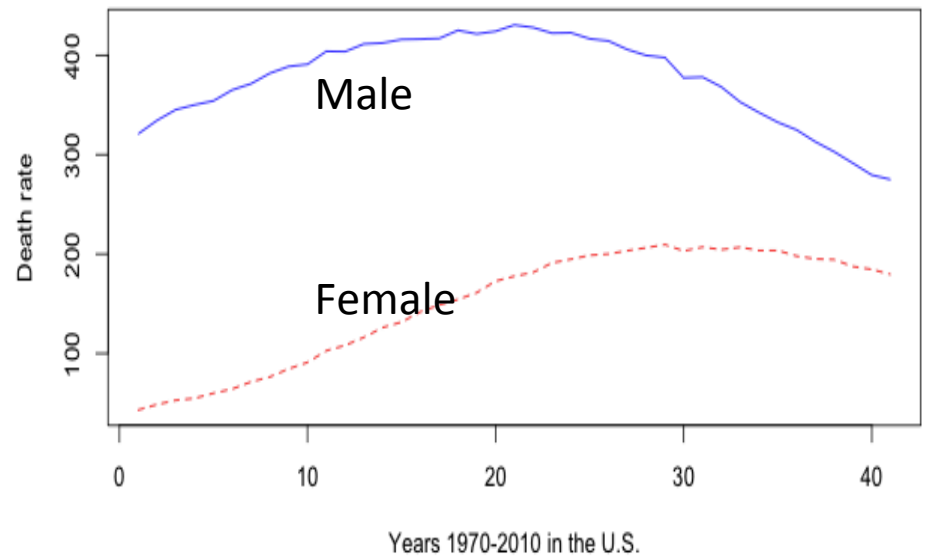
Male and Female Lung Cancer Death Rates for 45-54 age group



Male and Female Lung Cancer Death Rates for 55-64 age group



Male and Female Lung Cancer Death Rates for 65-74 age group



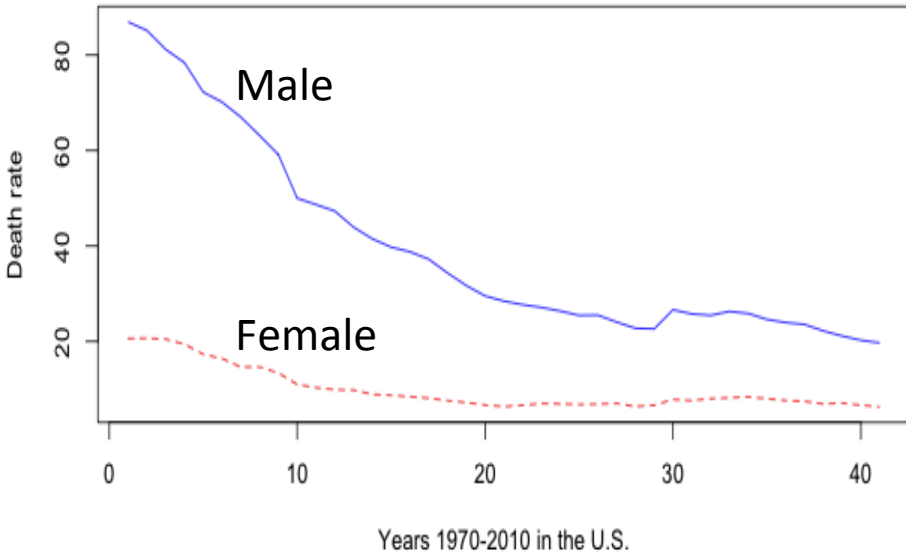
SMOKING DIFFERENCES ARE
COHORT EFFECTS

BUT ...

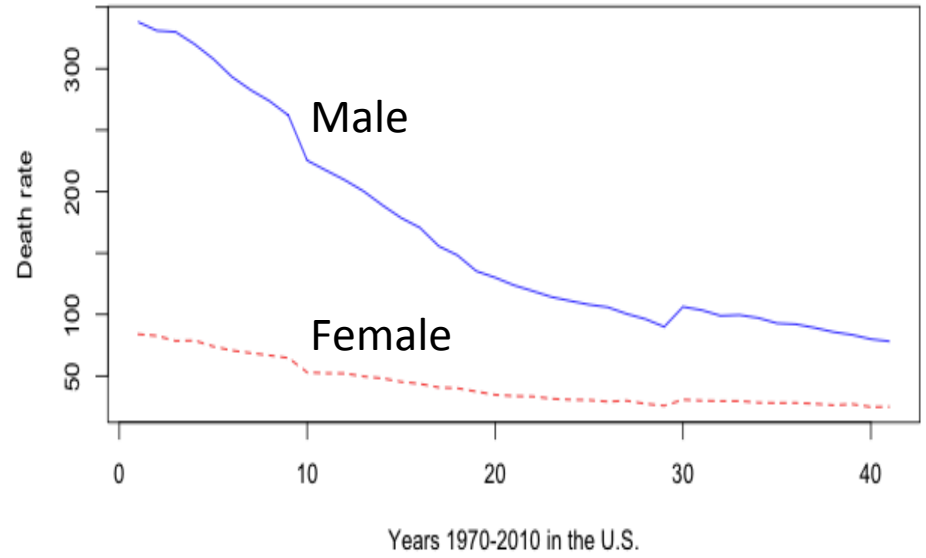
LUNG CANCER (AND HENCE SMOKING) ARE ONLY A SMALL
COMPONENT OF DEATH RATES

WHAT OF HEART DISEASE, SAY?

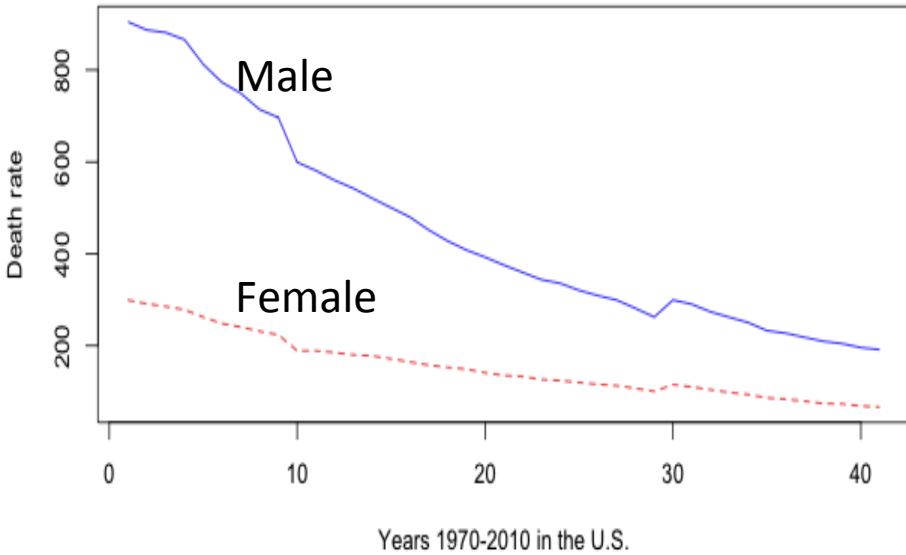
Male and Female Ischemic Heart Disease Death Rates for 35-44 age group



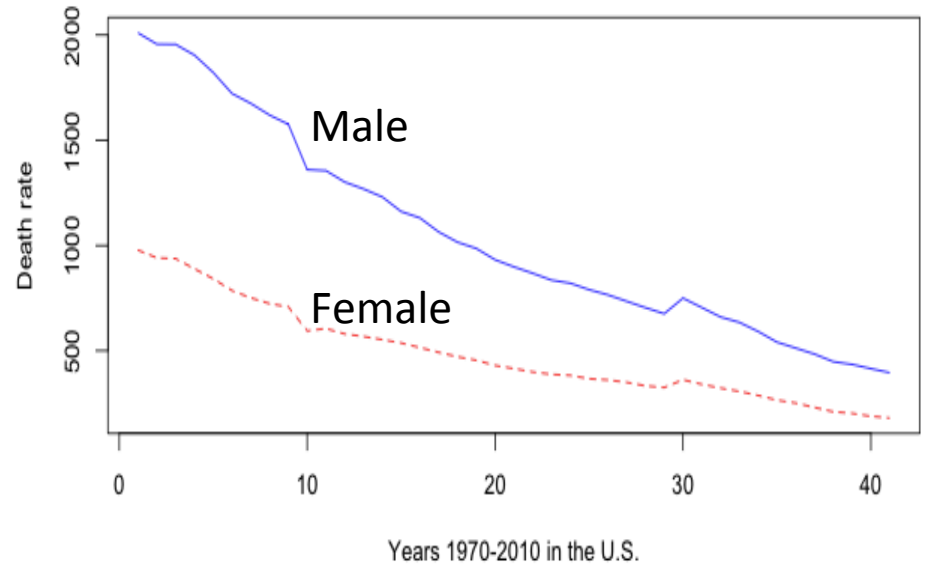
Male and Female Ischemic Heart Disease Death Rates for 45-54 age group



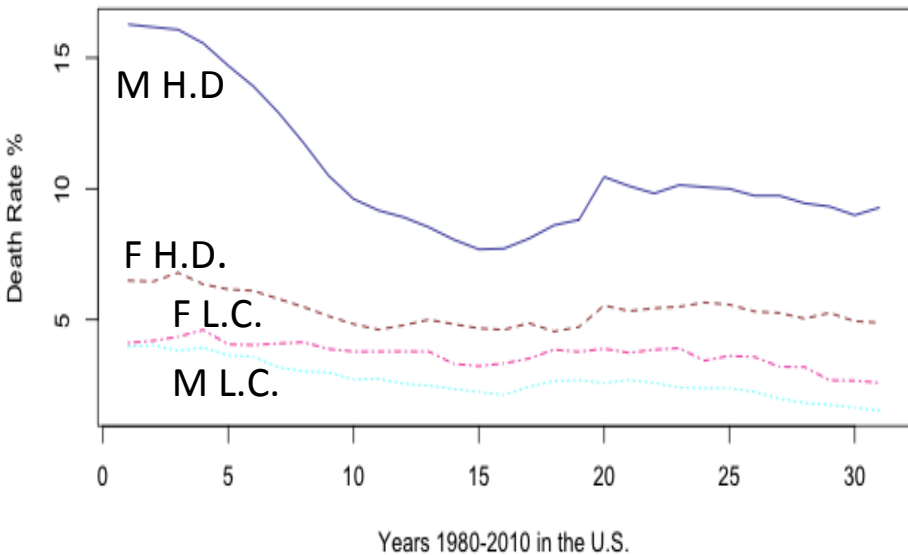
Male and Female Ischemic Heart Disease Death Rates for 55-64 age group



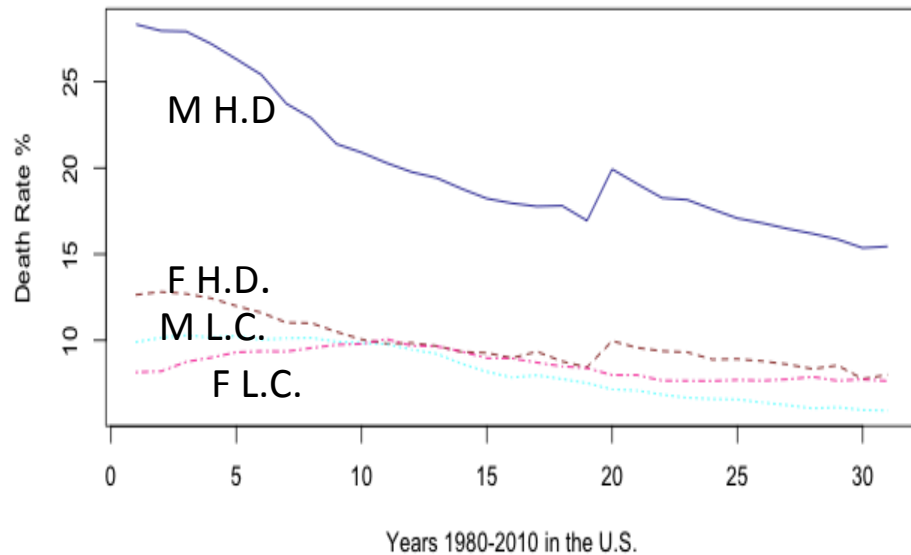
Male and Female Ischemic Heart Disease Death Rates for 65-74 age group



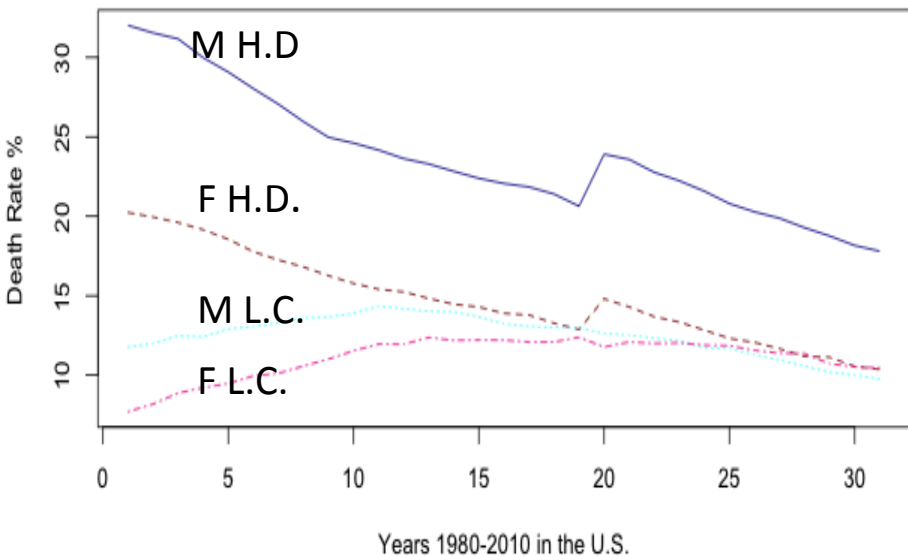
% Ischemic H.D. and L.C. Contributing to Overall Death Rate for Age 35-44



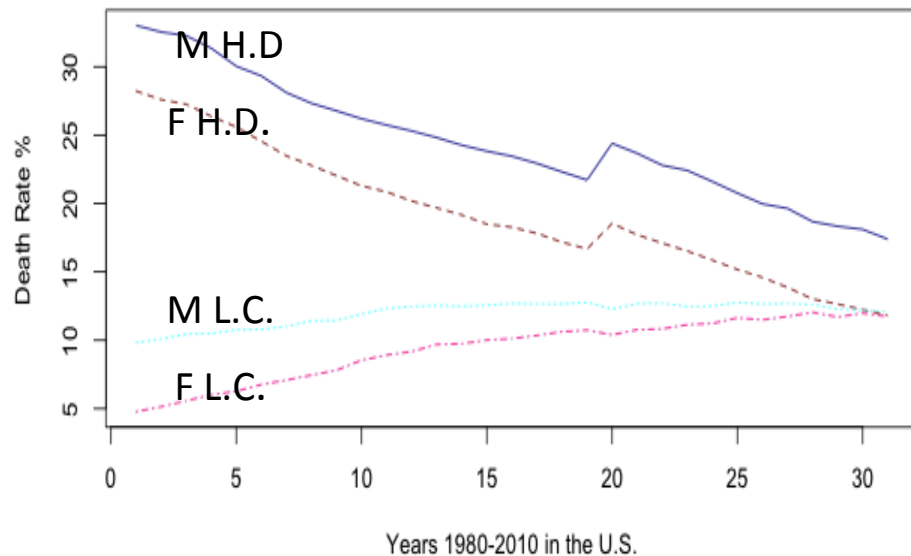
% Ischemic H.D. and L.C. Contributing to Overall Death Rate for Age 45-54



% Ischemic H.D. and L.C. Contributing to Overall Death Rate for Age 55-64



% Ischemic H.D. and L.C. Contributing to Overall Death Rate for Age 65-74



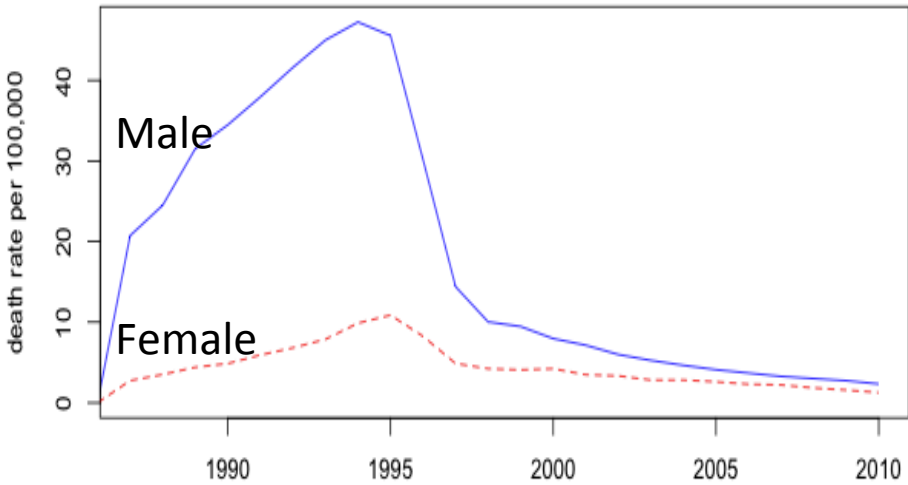
SO ISCHEMIC HEART DISEASE DEATHS
(VASTLY MORE DEATHS THAN LUNG CANCER)
ARE FALLING RAPIDLY IN MEN ..

THIS IS A
PERIOD EFFECT

AND ANOTHER EXAMPLE

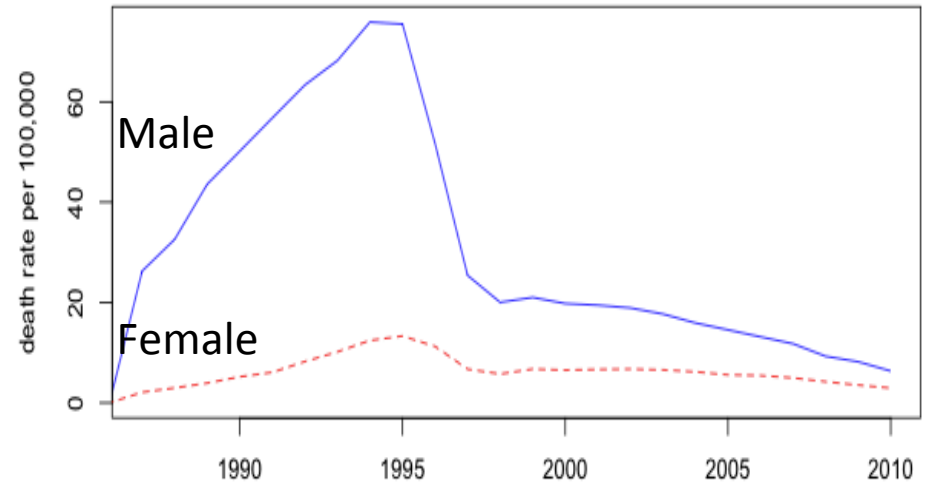
HIV ...

HIV death rates for 25-34 age group



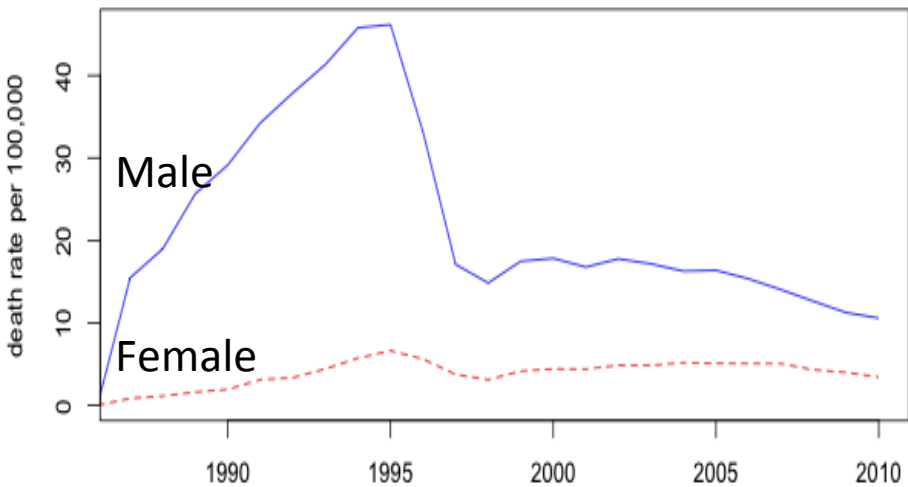
Years 1987-2010 in the U.S.

HIV death rates for 35-44 age group



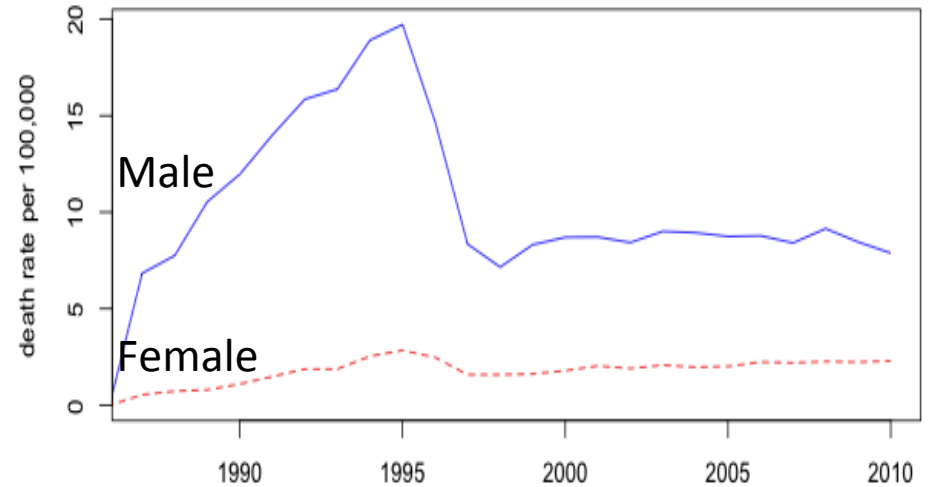
Years 1987-2010 in the U.S.

HIV death rates for 45-54 age group



Years 1987-2010 in the U.S.

HIV death rates for 55-64 age group



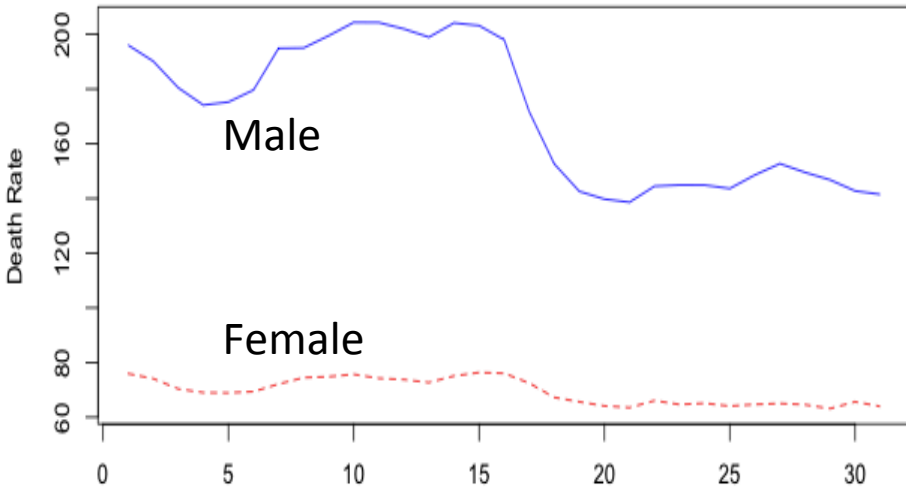
Years 1987-2010 in the U.S.

THE GOOD NEWS!

OVER TIME
MEN ARE BECOMING MORE LIKE WOMEN ...

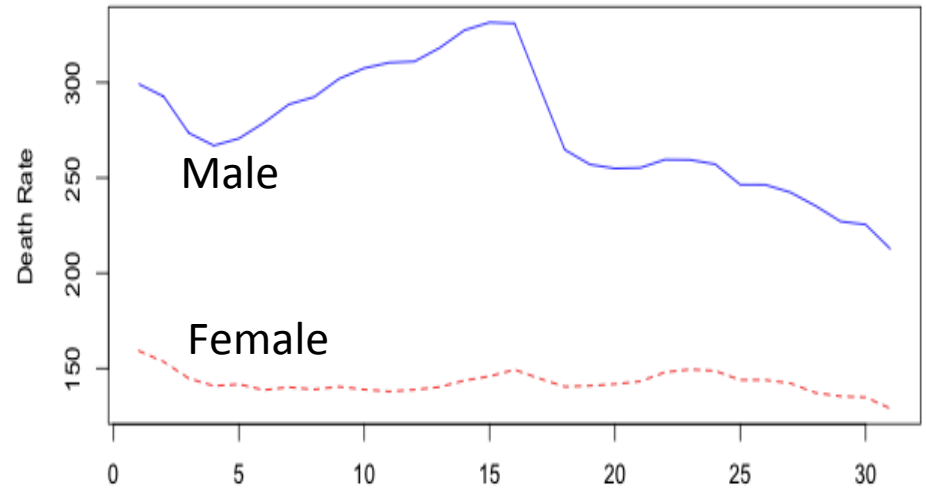
AT LEAST IN MORTALITY RATES

Male and Female Total Death Rate for Age 25-34



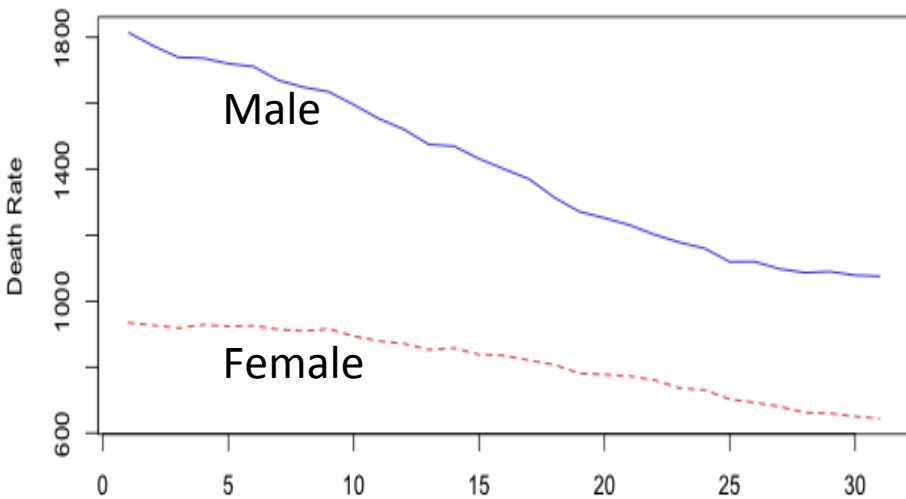
Years 1980-2010 in the U.S.

Male and Female Total Death Rate for Age 35-44



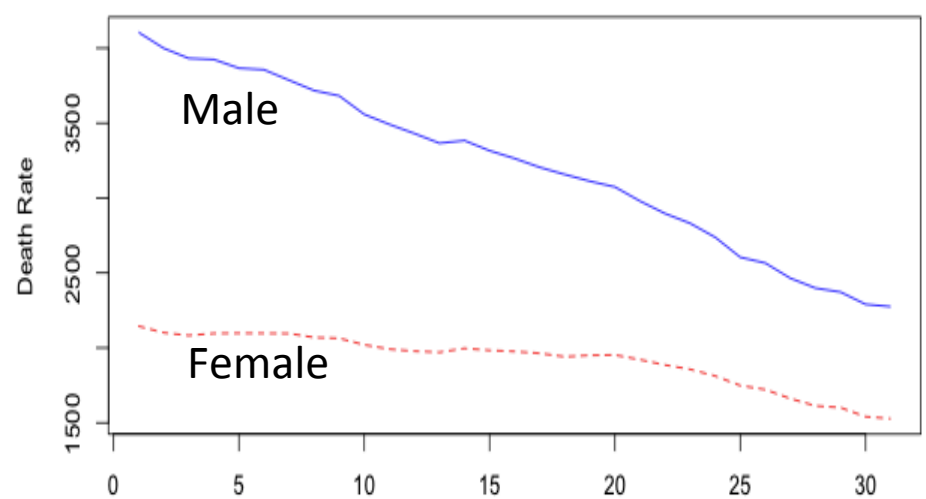
Years 1980-2010 in the U.S.

Male and Female Total Death Rate for Age 55-64



Years 1980-2010 in the U.S.

Male and Female Total Death Rate for Age 65-74



Years 1980-2010 in the U.S.

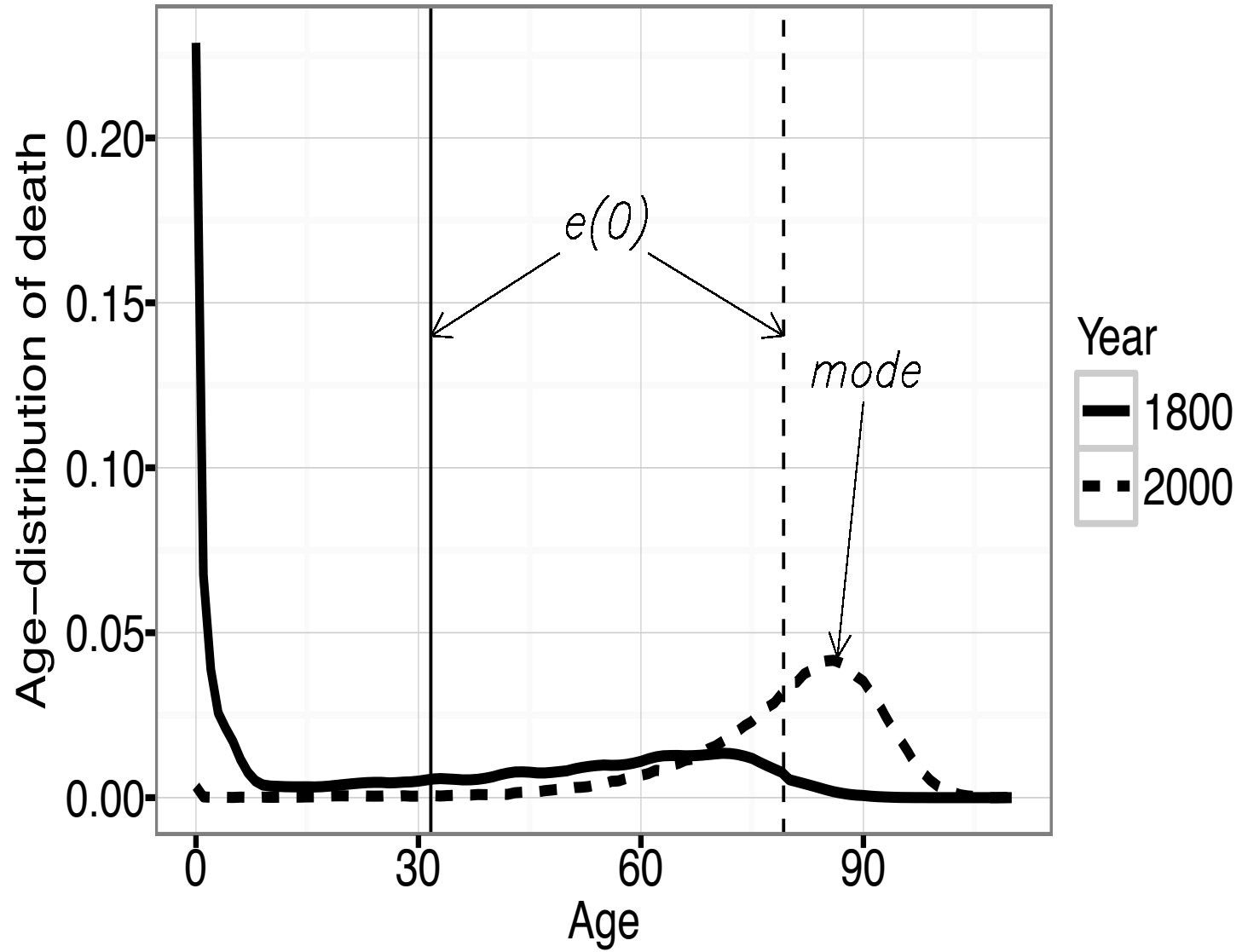
THANKS TO

NIA, USA FOR SUPPORT

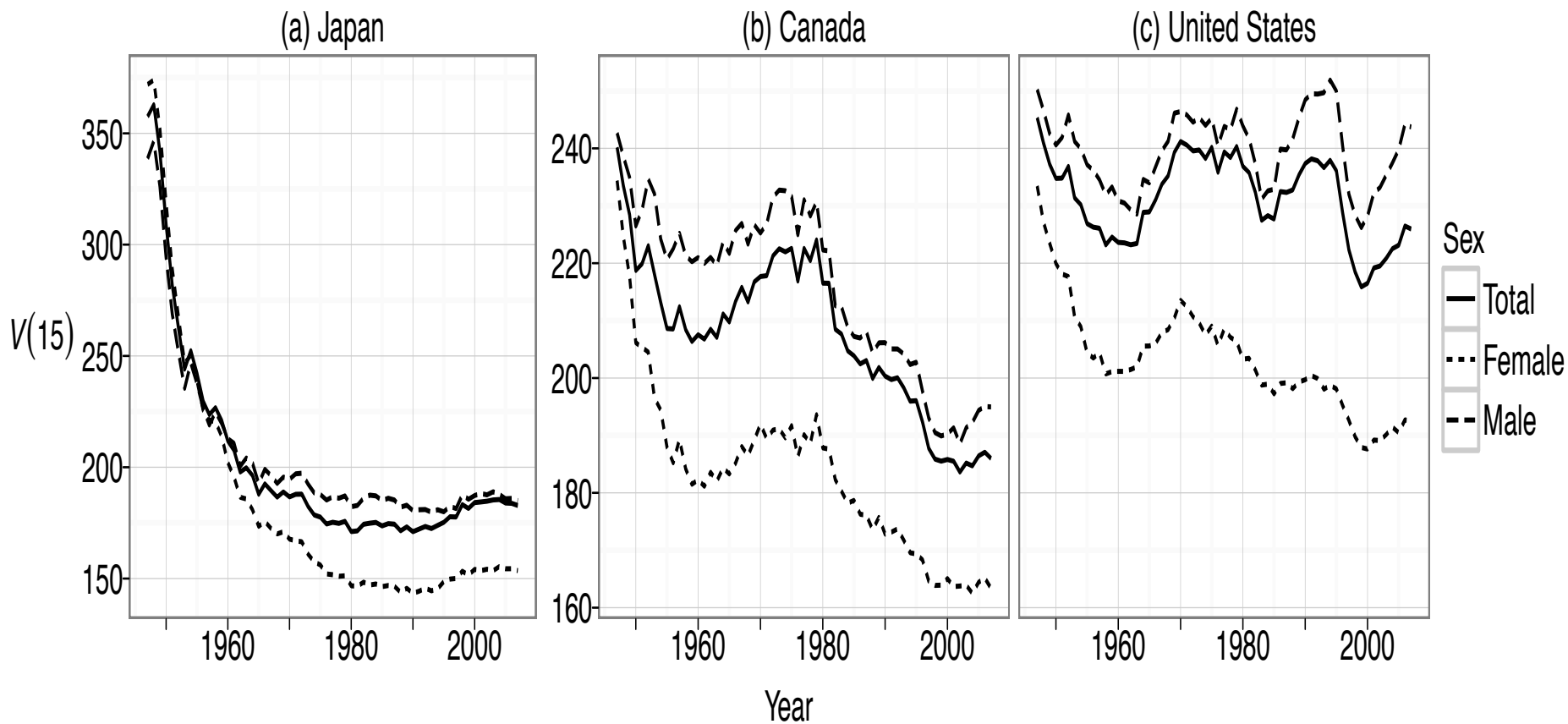
DUNCAN GILLESPIE, FOR COLLABORATIVE WORK ON
VARIANCES

GABI GREENBERG AND **BEN SELIGMAN**, FOR
COLLABORATIVE WORK MORTALITY DECLINE

THE SHAPE OF DEATH: SWEDEN



UNEQUAL LIVES:
VARIANCE IN AGE AT DEATH
(past age 15)



Fastest fall, now stagnant

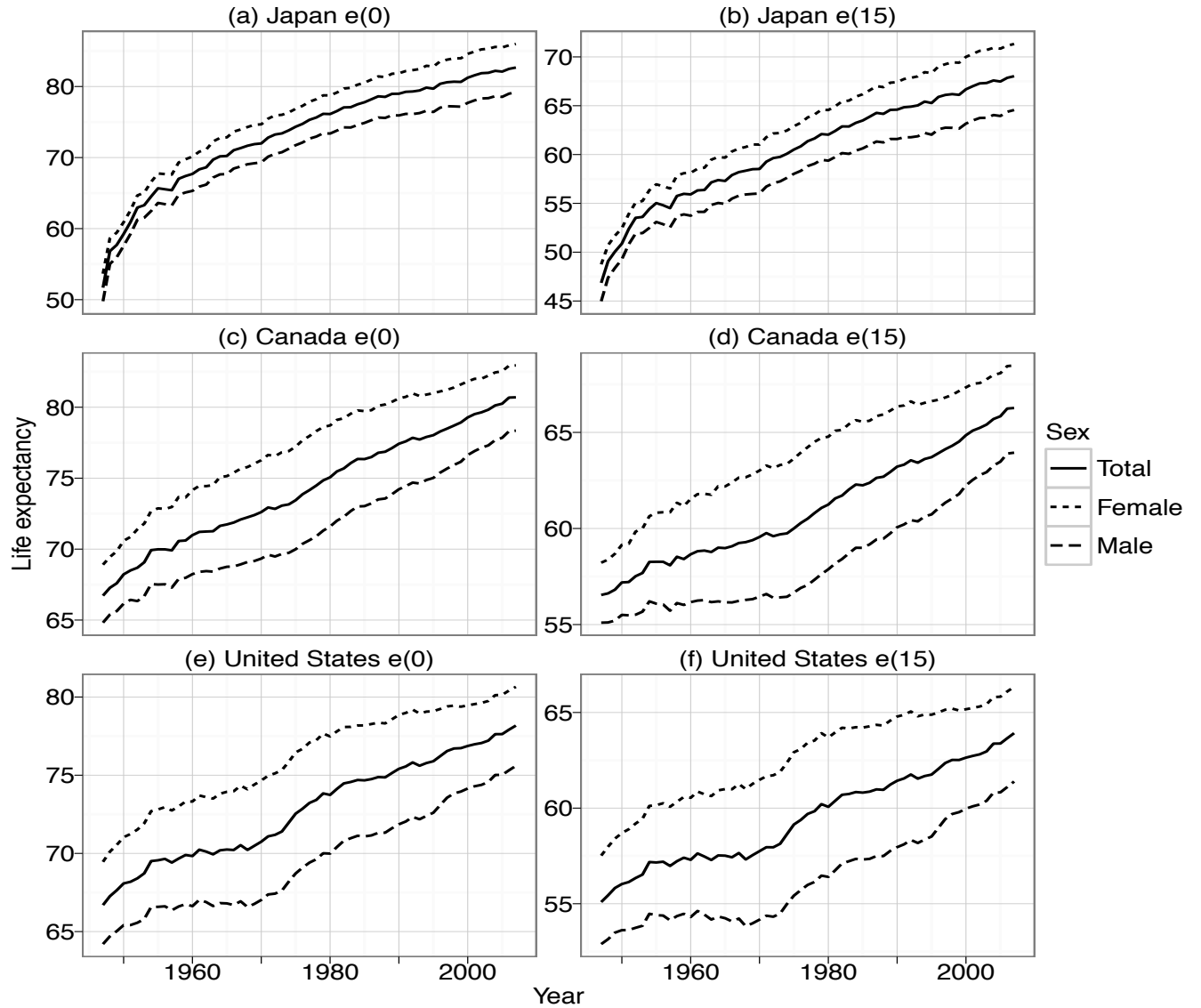
Flat till 1980, then falling

High and stagnant

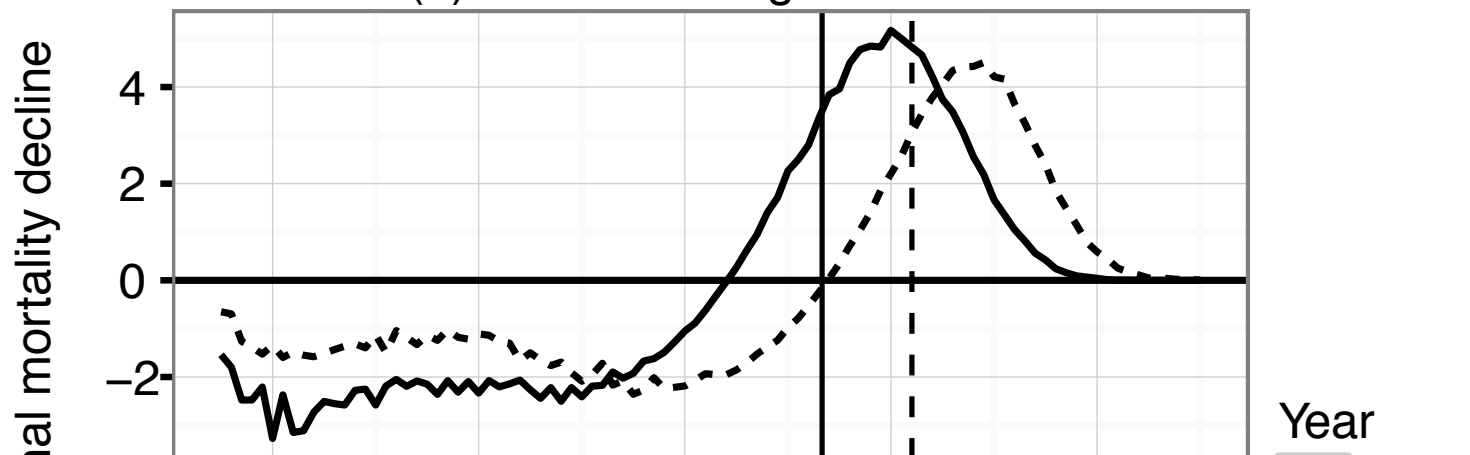
Life Expectancy at Birth

Life Expectancy at Age 15

LONGER LIVES:
A FAMILIAR
TALE



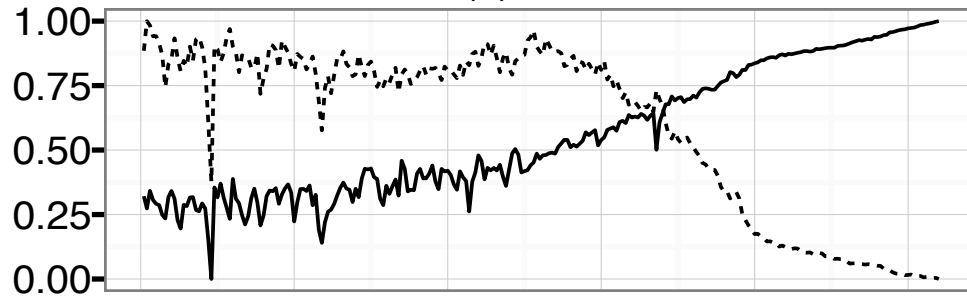
(a) Variance of age at death



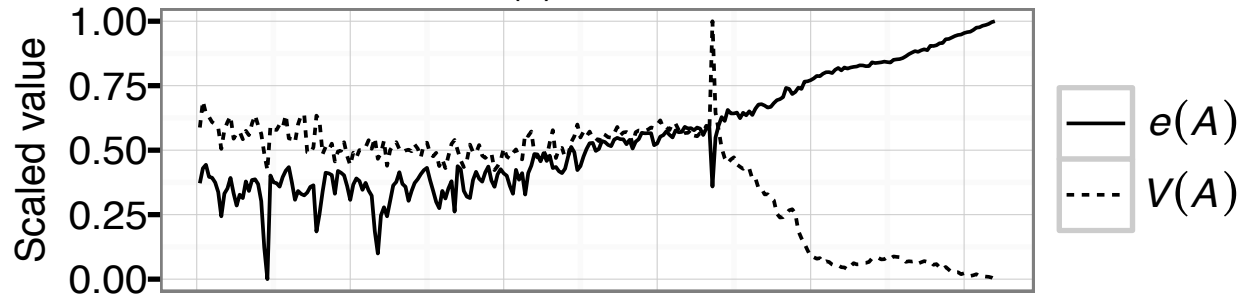
(b) Life expectancy



(a) $A = 0$



(b) $A = 15$



(c) $A = 65$

