

Health Impacts of Climate Change

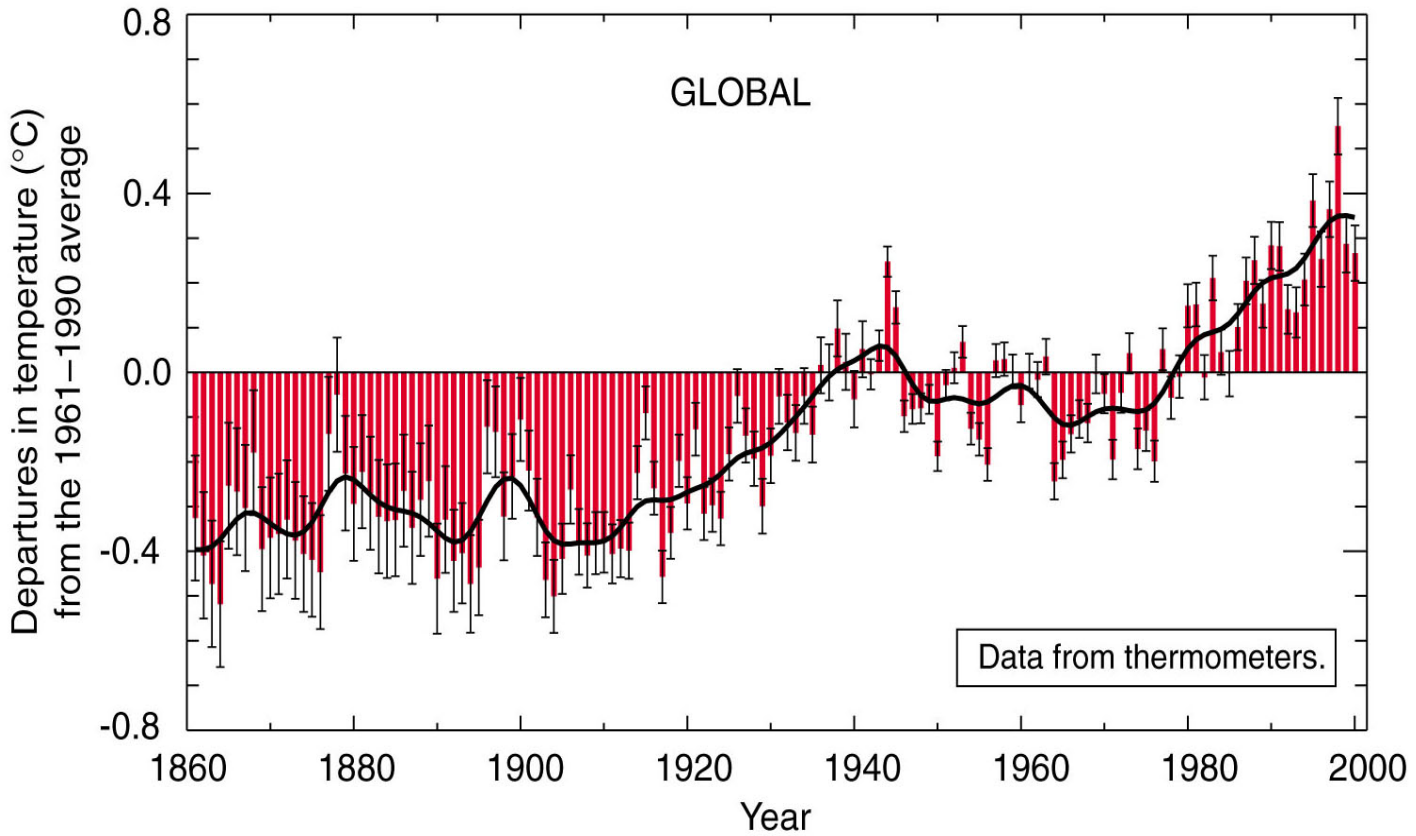
Michael Greenstone

3M Professor of Environmental Economics

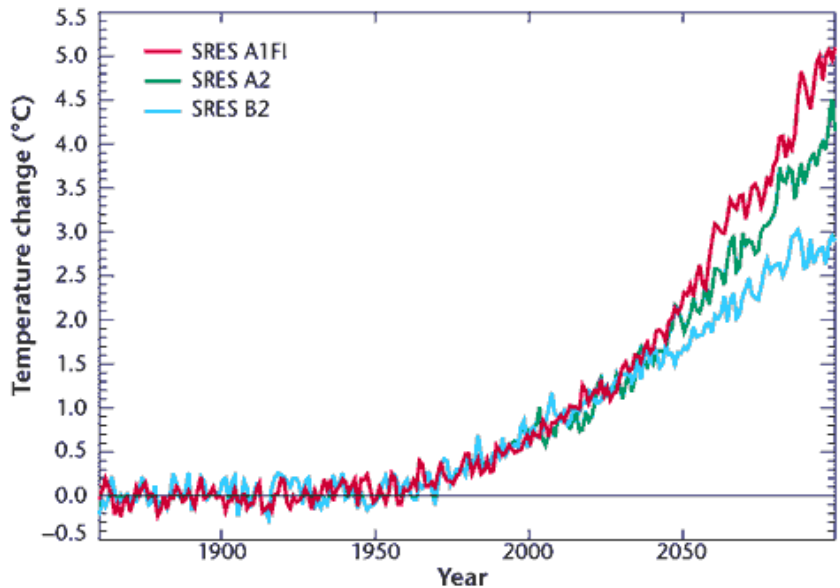
MIT

February 2008

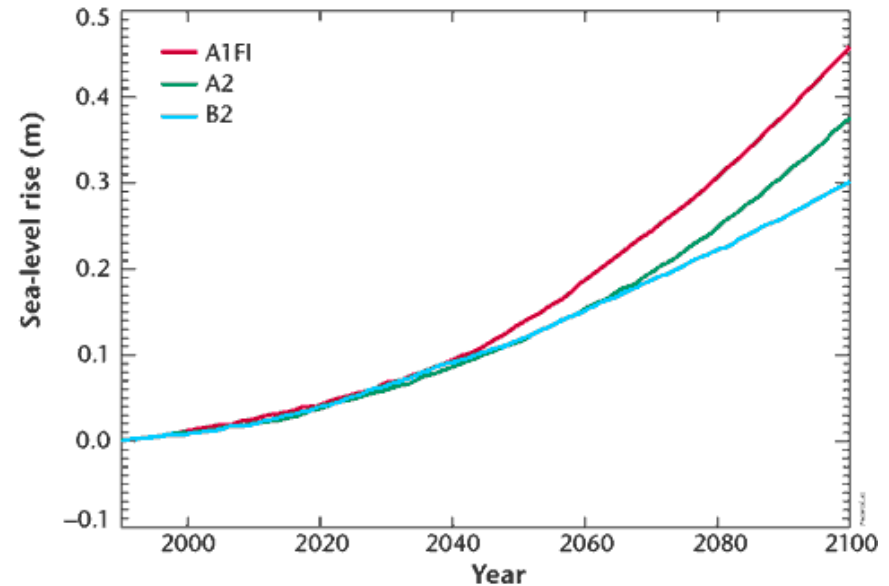
Variations in global surface temperature for the past 140 years



Expected impact on global climate



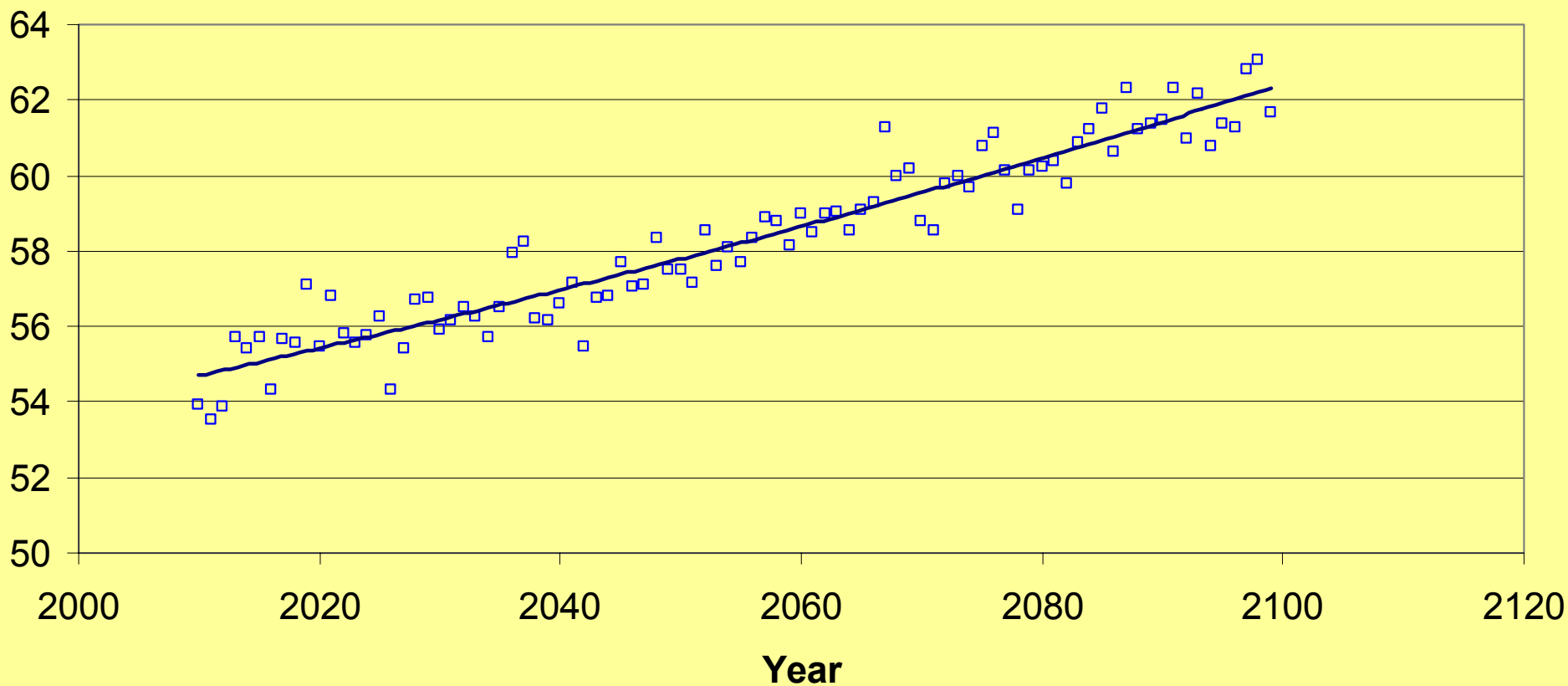
- **Change in global surface temperature**



- **Change in global mean sea level**

Source: Hadley Centre (UK) Model 3 – A1F1

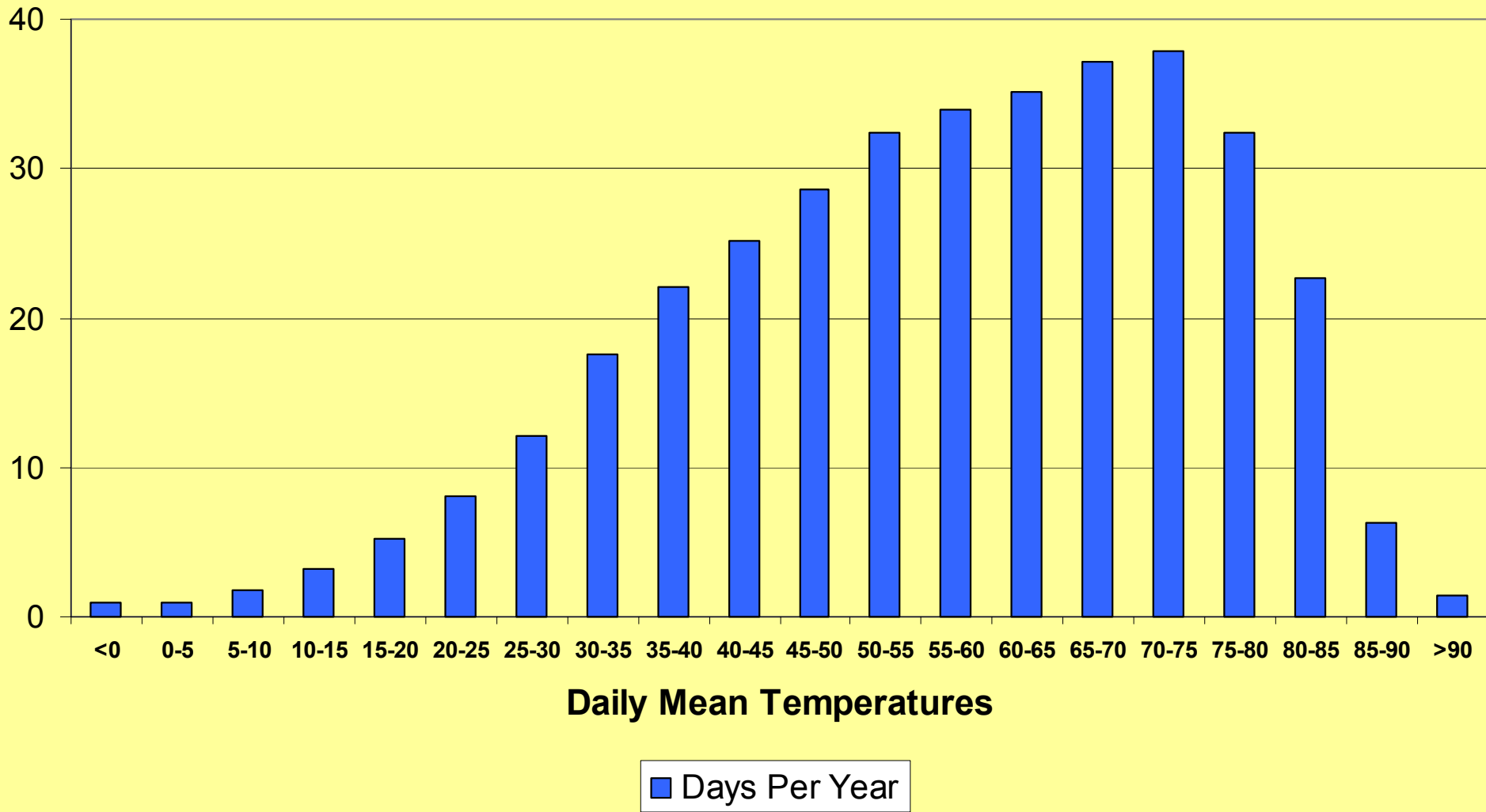
Expected impact on U.S. climate



□ Average Daily Mean Temperature (Annual)
— Poly. (Average Daily Mean Temperature (Annual))

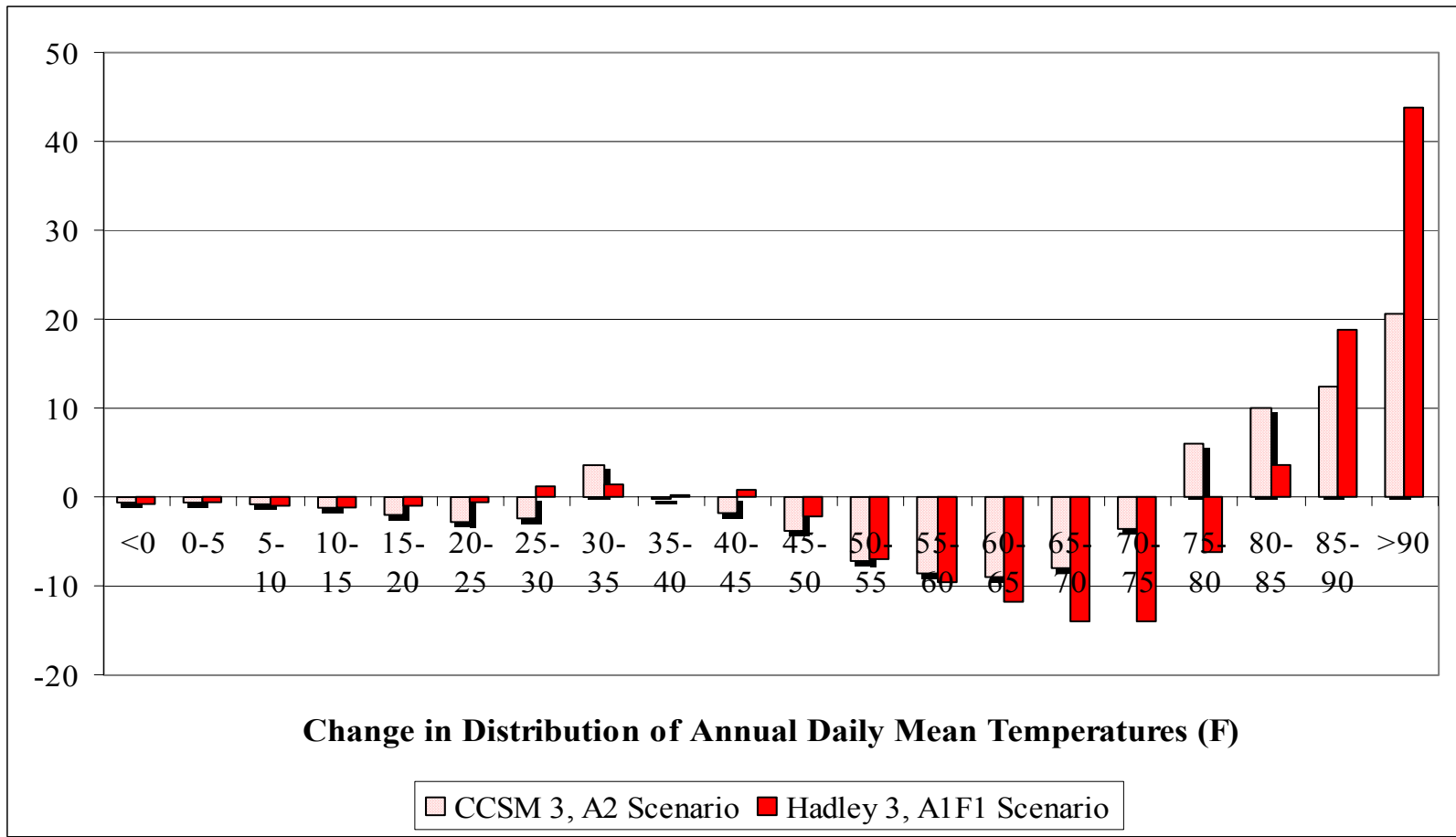
Source: Author's Calculations From National Center for Atmospheric Research, Community Climate System Model (CCSM) 3 A2

Distribution of Annual Daily Mean Temperatures (F), 1968-2002

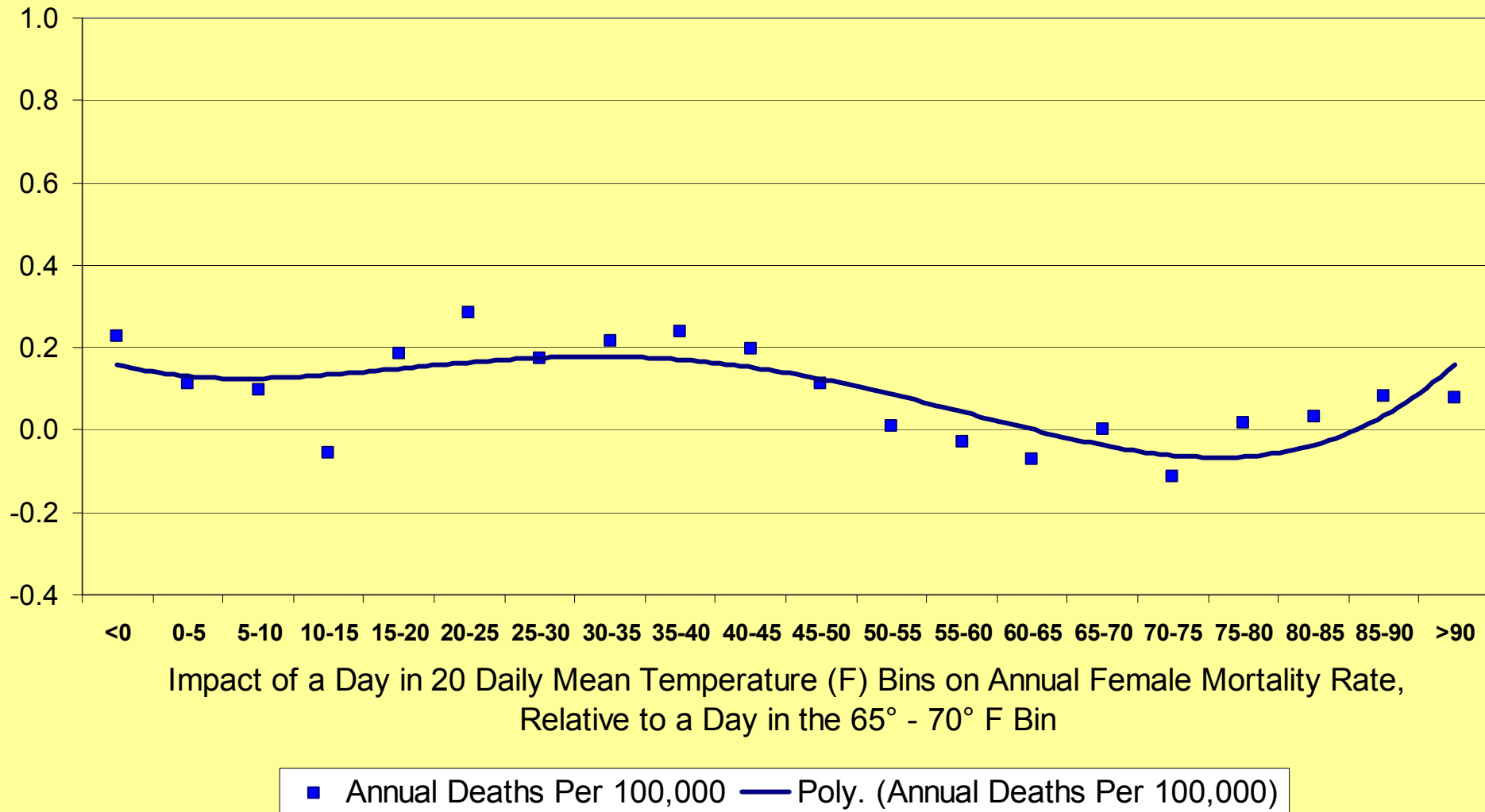


Note: Population-weighted average over all counties

Changes in Distribution of Daily Temperatures Under Hadley 3 A1FI and CCSM 3, A2

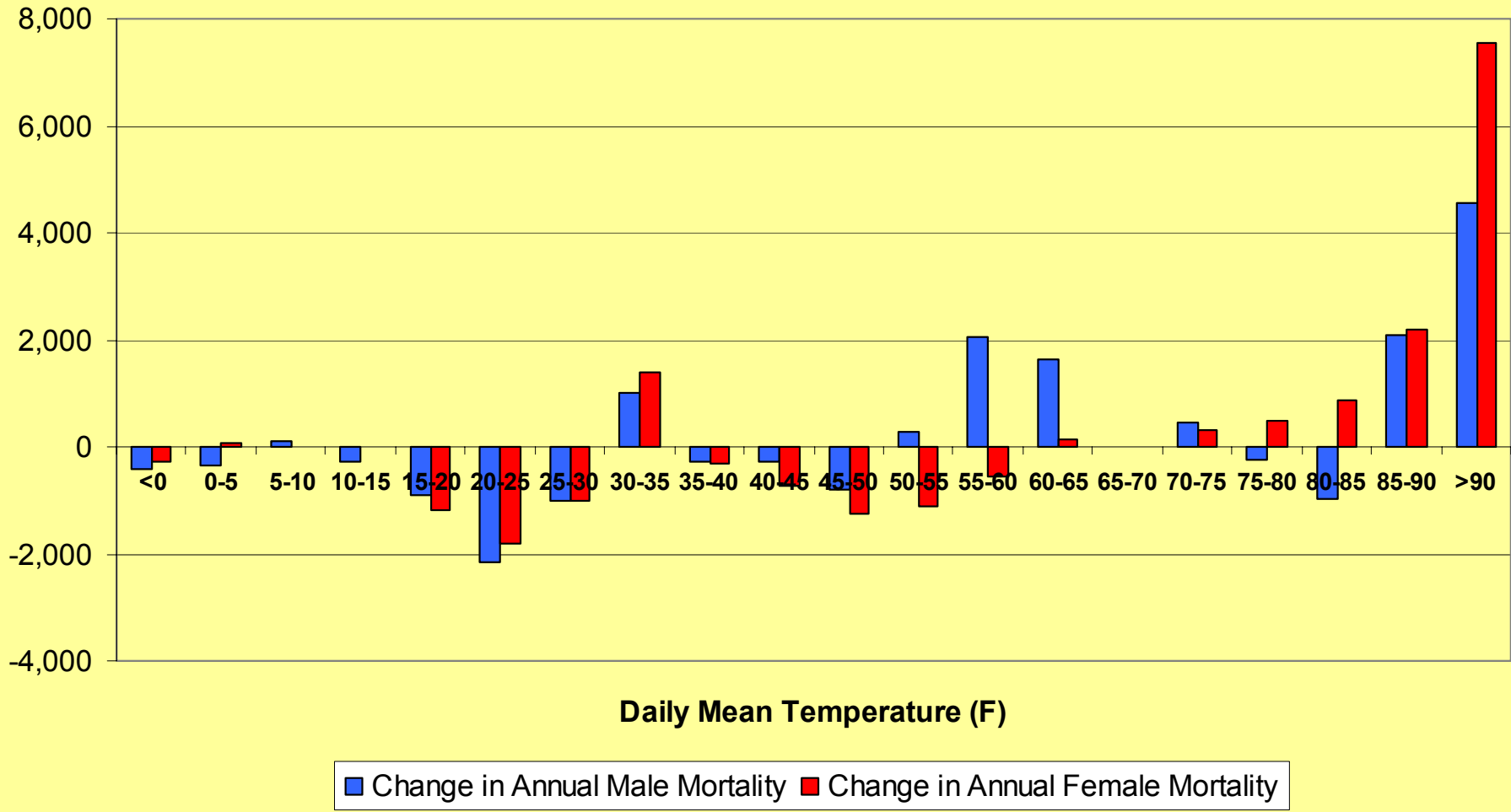


Estimated Response Function Between Daily Temperature and Mortality: Females

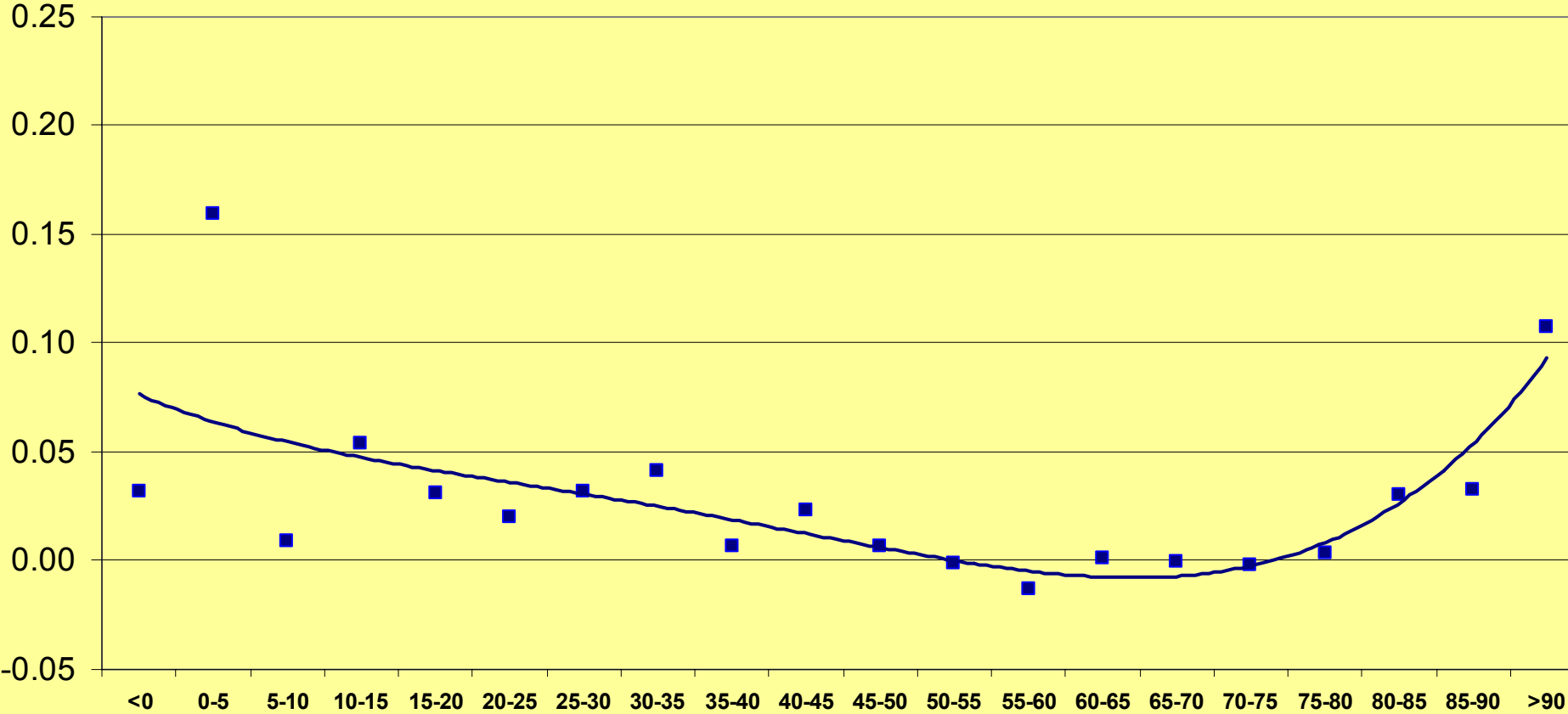


Note: Population-weighted sum of age-specific response functions

Predicted change in annual female and male mortality



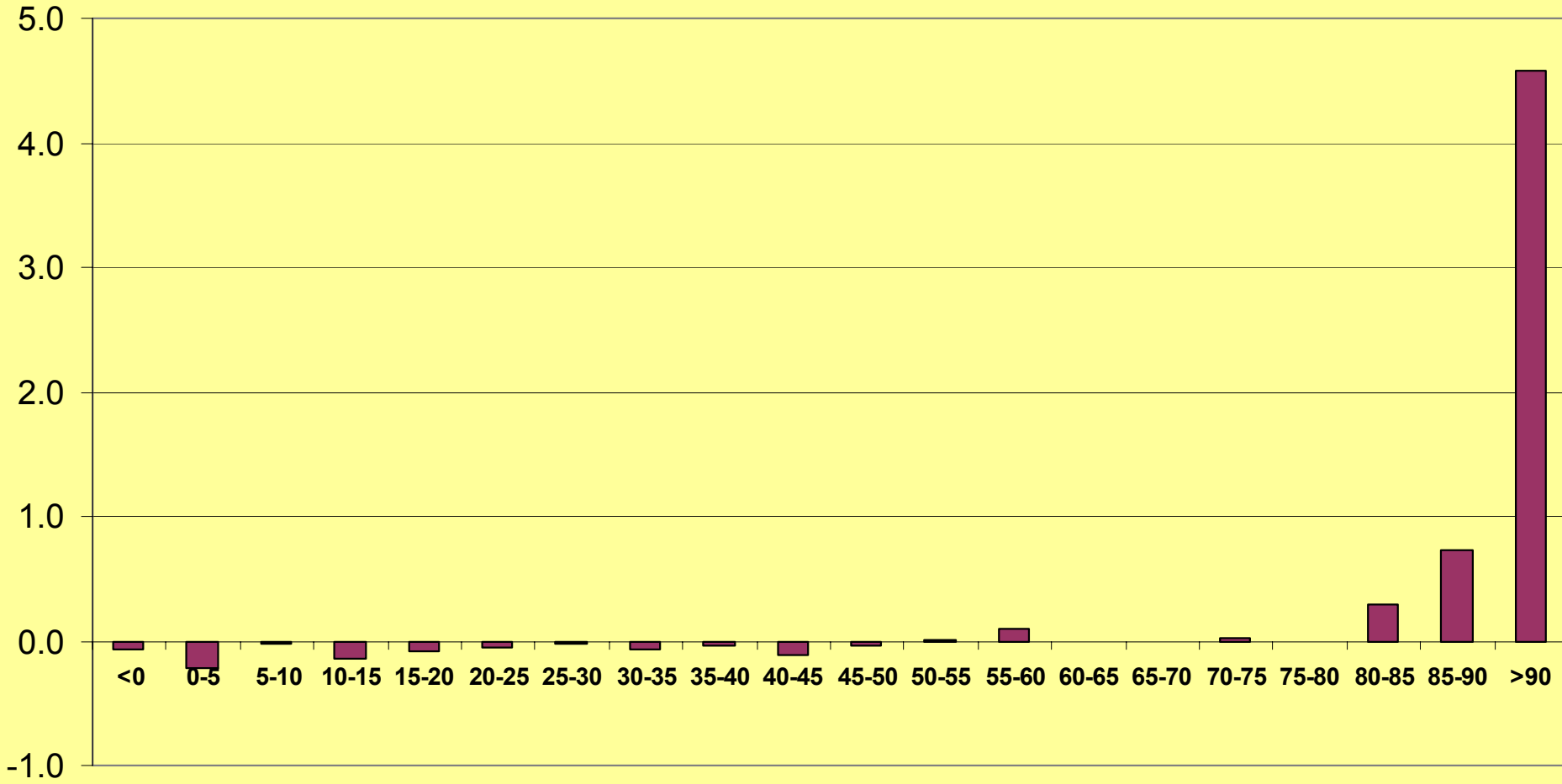
Estimated Response Function Between Daily Temperature and Residential Energy Consumption



Impact of a Day in 20 Daily Mean Temperature (F) Bins on Annual Residential Energy Consumption, Relative to a Day in the 65° - 70° F Bin

■ Quadrillions of BTUs — Poly. (Quadrillions of BTUs)

Predicted change in annual residential energy consumption



Daily Mean Temperature (F)

Quad BTU

Conclusions

1. Under “Business as Usual”, the World Will Become Much Hotter
2. Health Impacts in US Likely to be Small Due to Adaptation/Self-Protection (Energy Consumption)
3. Mortality Impacts Substantial in India (and Probably Other Developing Countries)