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CAN HETEROGENEITY OF POPULATIONS EXPLAIN DIFFERENCES IN MORTALITY?

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Life expectancy is rising at a steady pace in industrialized countries. Since the 1950's, increases in human life expectancy are largely attributed to improvements in old-age survival. Generally, this is also true for the United States where life expectancy at birth for women is among the highest in the world. Since the 1980's, however, a deceleration of life expectancy improvements could be observed in the US, especially for women. The pace of survival improvements in the best performing countries like Japan, France or Sweden was more pronounced. The reasons for this slowdown in mortality decline in the United States are not yet understood. In this study we investigate whether the heterogeneity in the U.S. population plays a major role in explaining the current differences in survival improvements. Understanding past mortality changes, their causes and patterns, is also essential for predicting future developments in life expectancy which has impacts on pension and health care systems and the political management of other social needs.

Three possible explanations are considered to explain why the survival improvements level off in some populations but not in others. First, the data available for a specific population may not meet the requirements for analysis. Second, there can be real changes in the pace of mortality decline affecting the population, e.g. due to emerging new diseases or due to major economic or social crises. Third, changes in the composition of the population could explain the deceleration in mortality decline. Various population subgroups that can be defined by sex, ethnicity, education, marital status or income are characterized by significant mortality differences that can persist to very high ages. If population subgroups characterized by slower rises in life expectancy gained weight in a population over time, a levelling off in survival improvements would be observable for the population as a whole. The latter explanation sees population heterogeneity and compositional changes responsible for decelerations in survival improvements. Following this line of reasoning, we asked: How did mortality develop in the best-performing population subgroups in the United States compared with Japan, the world record holder in life expectancy? Our hypothesis is that the rates of survival improvements differ between subpopulations and that the subgroups with the highest life expectancy and the best living conditions in the United States should not show stagnating mortality declines.

Since official mortality estimates in the United States are of poor quality, we estimated mortality rates via the "Extinct-Cohort-Method" using Medicare enrollment data from the Social Security Administration due to their higher quality. To ensure highest quality and plausibility we scrutinized the data thoroughly and restricted the analysis to data for 1976 to 1994 for an age range starting at 65 years. We reduced heterogeneity in our selected subpopulations and selected the female and Caucasian populations of the five U.S. states performing best in terms of life expectancy, Gross State Product per head and median household income, respectively.

If our hypothesis was true and if the deceleration in mortality decline at higher ages was caused by compositional changes of the U.S. population, these best performing subpopulations should show a rate of decrease similar to the well performing population of Japan. In contrast, other subpopulations performing worse should show a much slower decrease in mortality. This could be a possible explanation for the general slower rise of life expectancy in the United States. However, our results show that the subpopulations performing best in terms of life expectancy showed a much slower pace in survival improvements than our country of reference, Japan. The U.S. subpopulations performing best in Gross State Product per head or median income – the two other indicators chosen – do not show survival improvements to the extent Japan does, either.

The best-performing subpopulations in terms of life expectancy, Gross State Product per head or median household income show stagnating improvements in survival that also characterize other U.S. subpopulations performing less well. Our conclusion is therefore that the deceleration of life expectancy improvements since the 1980's is most likely a general characteristic of the American population and not a characteristic confined to a number of subpopulations gaining importance. We do not find evidence that compositional change and major differences in survival improvements between various subpopulations cause the comparatively slow rise in life expectancy.

Instead, the results indicate that survival improvements at higher ages are occurring more slowly in the United States than in many other developed countries – even if the best performing subpopulations are considered. Although old-age survival has increased in the United States for more than 50 years, there is apparently still a larger potential for further increases than in other industrialized countries. Our results do not support the hypothesis that the heterogeneity of the United States population is a major cause for the widening gap between the United States life expectancy trajectory and the linear climb in life expectancy of best practice countries.

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