Longer Lives at Older Ages

Extended Abstract

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Abstract

Our paper analyzes recent developments in oldest-old mortality. Monitoring these trends is not only of academic interest but also highly important for public-policy makers as well as businesses such as reinsurance companies. The analysis is based on data from the Human Mortality Database and the Kannisto-Thatcher-Database on Old-Age Mortality. Our preliminary results indicate that in recent years survival improvements above age 80 contributed more than 40 percent to the increase in record life expectancy at birth. We show that not only life expectancy at birth rises linearly in the record-holding country and some other countries: also at age 65 life expectancy increases linearly for at least 25 years. The slope is not as steep as for life expectancy at birth. Nevertheless, 65-year-old Japanese women gain more than five hours of life expectancy every day.

Introduction: Aim of Paper and Research Motivation Our paper analyzes recent developments in mortality among older people with a particular emphasis on the oldest-old (80+). Falling levels of mortality among the oldest-old have been first documented in the pioneering studies of Vaïnö Kannisto (e.g. Kannisto, 1994, 1996; Kannisto et al., 1994) in the 1990s. The empirical results of improved survival chances were in contrast to the convictions of many biologists and gerontologists who believed that mortality at

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advanced ages cannot be reduced substantially or that the length of life is fixed.

Monitoring trends about the actual plasticity of old age mortality is not only of academic interest, though. Recently, the news agency *Reuters* covered a report by the reinsurance company Swiss Re: "Globally, more than $17 trillion worth of pension assets are exposed to longevity risk – mainly in the Americas and Europe and particularly the UK, Swiss Re said in the report" (Reuters, 2010).

Data   All analyses in this extended abstract are based on data from the Human Mortality Database and the Kannisto-Thatcher-Database on Old Age Mortality.

Results

Importance of Mortality Developments at Older Ages   Survival improvements at older ages are the major contributing factor to the increase in life expectancy at birth as shown in Table 1 (page 4) and in Figure 1 (page 5). Table 1 depicts the absolute and relative age-specific contributions to the increase in *record* life expectancy at birth. They have been estimated using Arriaga's method (1984) as outlined in Preston et al. (2001).

Over time, younger ages gradually lost their relevance for the observed increase in life expectancy. Mortality improvements at ages 65 and higher have only played an important part since the 1960s. During the last observation period, the two highest age-groups have contributed 3.66 years or more than 80% to the increase in record life expectancy of 4.50 years. The oldest-old alone contributed 2 years or 45 percent. Of course, this development is largely driven by Japan, the record-holding country in life expectancy. The same pattern can be observed for other countries, too. We chose France as an example in Figure 1 (page 5): Single ages between ages 75 and 90 contributed alone more than three percent to the increase in life expectancy in France.

Trends in Life Expectancy at Age 65 and Age 80   For this extended abstract we decided to illustrate mortality developments among people aged 65+ and 80+ by using (remaining) life expectancy at age 65 and at age 80. Although this measurement has been criticized in recent years, it remains the most widely used index of mortality to aggregate age-specific mortality in a single number. Figure 2 (page 6) shows remaining life expectancy at age

65 and age 80 in selected countries for women. One can easily see that not only life expectancy at birth is rising linearly (Oeppen and Vaupel, 2002). Record life expectancy at age 65 is increasing in a similar fashion (left panel) at least since the 1980s. Indeed, estimating a linear regression model for the time period 1985–2007 yielded an $r^2 = 0.987$ and a slope of 0.2129. That means that — for more than two decades — 65 year-old women in Japan, the record holding country, gain more than 5 hours every day! As the left panel shows, such remarkable increases have not only been observed in the record holding country but also in other countries such as France, Germany (West) or Italy.

The daily gain for women aged 80 years is 3.5 hours per day ($\beta = 0.1457$) since 1990. This is not as high as for 65-year-olds but one can detect that it is rising linearly as well — again not only for the record holding women from Japan but also in several other countries.

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Table and Figures

Table 1: Absolute (in Years) and Relative (in %) Age-specific Contributions to the Increase in Record Life Expectancy Among Women, 1840–2008

Age	1840–1900		1900–1960		1960–1990		1990–2008	
	Abs.	Rel.	Abs.	Rel.	Abs.	Rel.	Abs.	Rel.
0	4.66	31.64%	4.06	26.93%	0.92	14.53%	0.14	3.22%
1-14	4.57	31.03%	2.35	15.57%	0.35	5.60%	0.10	2.23%
15–49	3.13	21.25%	5.15	34.17%	0.47	7.52%	0.18	4.08%
50–64	1.21	8.20%	2.03	13.47%	0.93	14.71%	0.42	9.25%
65–79	0.95	6.42%	1.44	9.58%	2.57	40.68%	1.63	36.18%
80+	0.22	1.46%	0.04	0.28%	1.07	16.96%	2.03	45.03%
$\sum$	14.74	100.00%	15.07	100.00%	6.31	100.00%	4.50	99.99%

Figure 1: (Relative) Age-Specific Contributions to the Increase in Life Expectancy in France, Women, 1900–2008
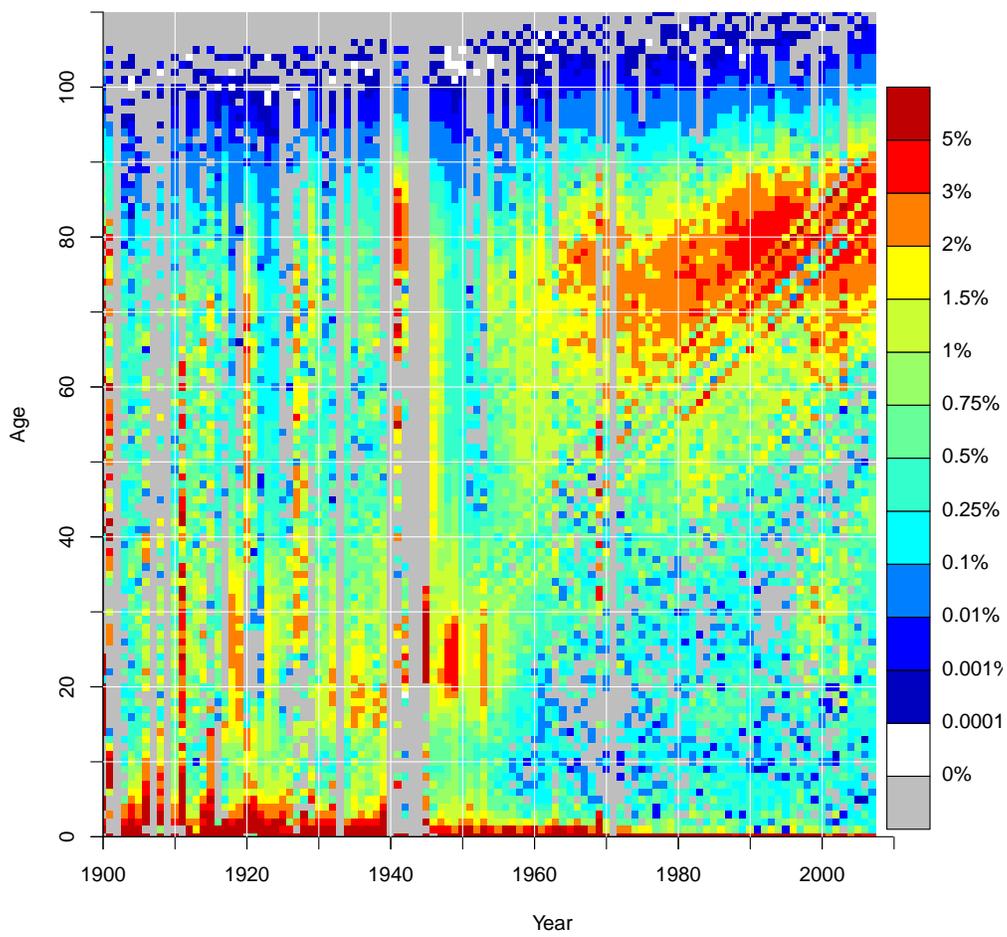
Figure 2: Life Expectancy At Ages 65 and 80 for Women in Selected Countries, 1950–2008