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Letter to the Editor on Olshansky, Carnes and Desesquelles "Prospects for Human Longevity" in *Science* of Feb 21, 2001.

In a recent paper in *Science* (February 23, 2001) Olshanksy et al note that if the rate of mortality decline observed in France between 1985 and 1995 were to continue, life expectancy would reach 85 years by 2033 (average of male and female) and similarly in Japan by 2035. They argue that this represents an upper limit to the possibilities, unless scientists discover how to modify the aging process. Their corresponding calculation for the US indicates that 85 would not be reached until 2182, a century and a half later. However, in none of these cases should long run projections be based on such a short (ten year) observation period.[1] For example, had they used the same method, but analyzed data for the most recently available decade starting just three years later, 1988 to 1998 (instead of 1985 to 1995), the US would reach 85 years in 2052 rather than 2182, earlier by 130 years; extrapolation on twenty years, 1978-98 gives a date of 2060. Life expectancy increased by .7 to .9 (depending on data source) in just the three years between 1995 and 1998, compared to a gain of 1.1 years over the entire decade 1985 to 1995. A more systematic approach to forecasting based on longer run historical trends and more age detail suggests that 85 would be reached in 2065, with a 95% probability range between 2043 and 2114[2], indicating the high degree of uncertainty.

Analysts have repeatedly thought that death rates were approaching biological limits and could not fall much farther, only to be proved wrong by subsequent experience. The paper worries that continued decline at the long-run historical rates would reduce the death rates at ages below 30 to biologically implausible levels, and so constrains the infant mortality rate not to fall below 5 per 1000. However, 12 countries already report infant mortality below this threshold of 5 per 1000, with Iceland reporting 2.6. In any event, mortality below age 30 will have little effect on future life expectancy because it is already so low. However, infant mortality levels illustrate the perils in arguing that death rates at any age are near natural limits.

Olshansky et al note that the Technical Advisory Panel recommendation that the Social Security actuaries raise their life expectancy forecast for 2075 by 3.7 years would require that death rates at each age decline twice as fast as "the already favorable rate of mortality decline projected by the SSA". However, this "favorable rate" projected by the actuaries is only half the historical rate of decline.[3] In fact, mortality decline at the

historical rate would lead to life expectancy in 2075 that is higher by 3.7 years, as recommended by the Panel. None of this has anything to do with “ignoring the phenomenon of entropy in the life table”, as they suggest. However, they are right that even this apparently modest increase in the life expectancy projected for 2075 requires continuing dramatic biomedical advances, which are implicitly assumed.

At several points, the authors qualify their predictions with phrases like “unless biomedical researchers can discover how to modify the aging process”. However, over the past century science has made regular progress against disease and death, and given the dramatic biomedical advances for humans and other organisms in recent years, it would be risky to bet the long-term finances of the Social Security system on such an assumption. It is most prudent to assume that mortality will continue to decline on trend.

Citations

Ronald Lee and Lawrence Carter, "Modeling and Forecasting U.S. Mortality," *Journal of the American Statistical Association* v.87 n.419 (September, 1992), pp.659-671.

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[1] Experiments with 20th century US mortality data suggest that projections based on a ten or twenty year base period are erratic, while those based on a thirty year period give considerably more consistent projections.

[2] Based on an updated fitting of the model in Lee and Carter (1992).

[3] The Olshansky et al statement apparently refers to the assumptions in the 1999 Trustees report; the projected rate of decline was raised somewhat in the 2000 Trustees report.