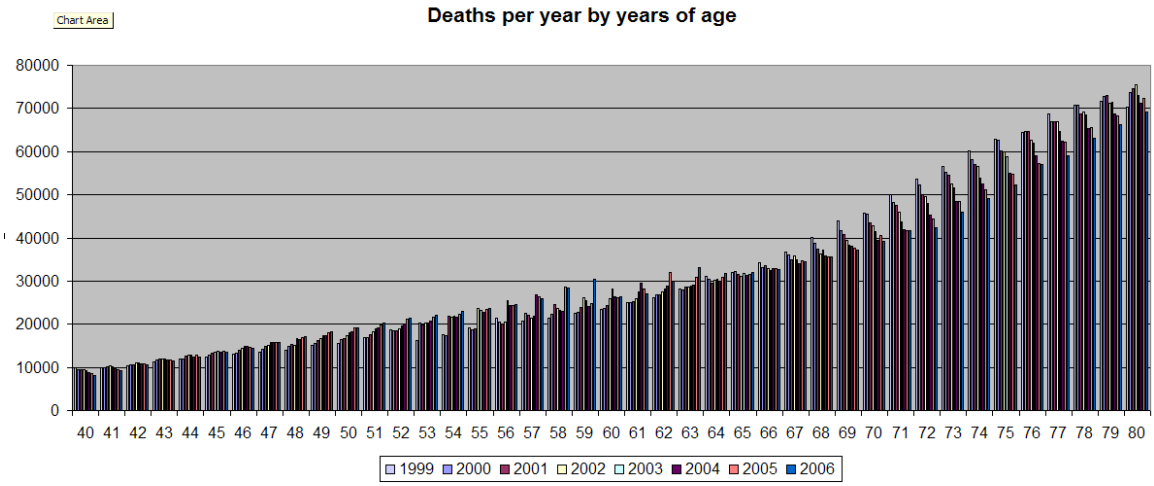
A Discontinuity?

Hans Spiller

The current (Mar 2010) Atlantic Monthly contains a column by Megan McArdle in which she raises skepticism of the often-cited statistic that 45,000 people a year die from lack of health care insurance[1]. She mentions several studies, most of which date from the 80s and 90s, which she admits are not particularly relevant to the current situation. But she goes on to claim[2]

> "To my mind probably the single most solid piece of evidence is this: turning 65--i.e., going on Medicare--doesn't reduce your risk of dying. If lack of insurance leads to death, then that should show up as a discontinuity in the mortality rate around the age of 65. It doesn't. There are some caveats--if the effects are sufficiently long term, then it's hard to measure, because of course as elderly people age, their mortality rate starts rising dramatically. But still, there should be some kink in the curve, and in the best data we have, it just isn't there."

So I tracked down the CDC's mortality statistics[3], and was startled to discover that not only does the kink show up, but it's getting significantly more pronounced as time goes on. Here it is:



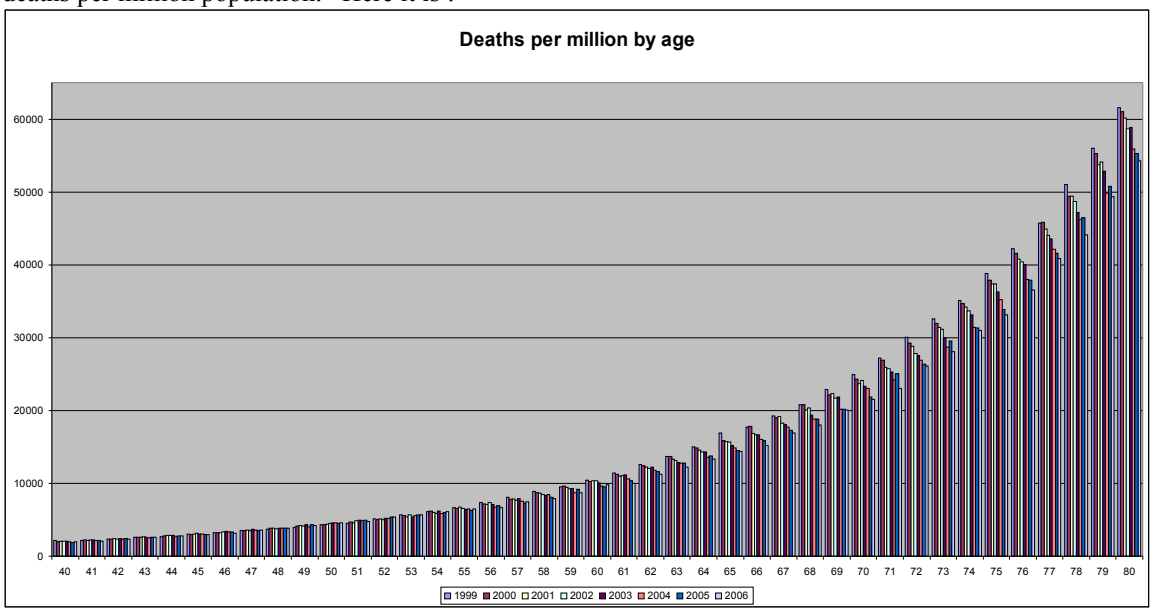
Looking carefully at this chart, I notice a number of things. If you look at the 2006 statistics, you see the kink most clearly. Imagine a straightedge along the top of the 2006 columns, and you'll see it, although there are spikes at age 59 and 63. It was there in earlier years too, although it gets smaller and smaller and is practically invisible in 1999.

Secondly, I notice a significant decline in the death rates starting at age 66 and increasing to a peak at 74. This looks like a significant improvement in survival from diseases of aging.

At the same time, there's a significant increase in the death rates for the 44-64 age groups. You'd think if health care were getting better for oldsters, it'd have some impact on middle-agers, but the opposite seems to be true.

Finally, you can see the impact of the baby boom as a wave flowing through these numbers. A 1946 baby was 53 in 1999 and 60 in 2006. The numbers are big enough they may impact the statistics in ways that are difficult to predict.

So I tracked down the census data for the year 2000[4] and factored it in. Here's the same data, presented as deaths per million population. Here it is[5].



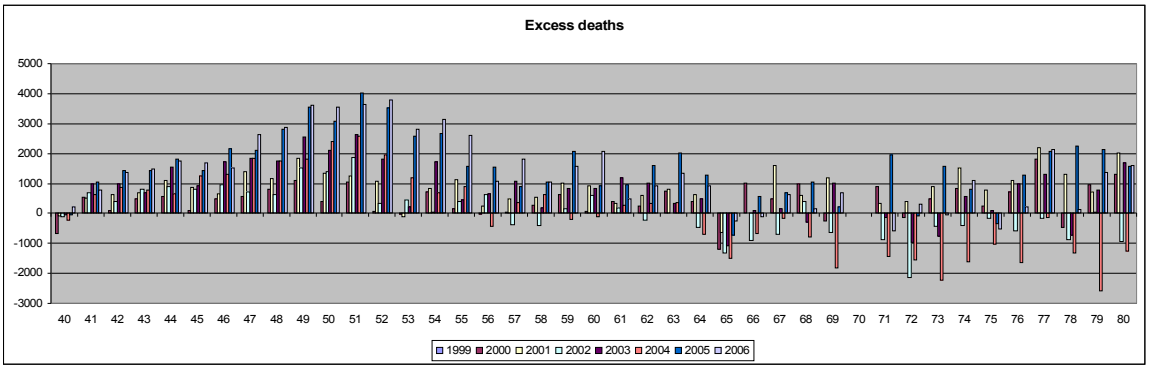
That's pretty interesting. Things have smoothed out dramatically. To see the 2006 kink you have to zoom in quite far. I suspect this is what McArdle is referring to when she's talking about the best data available. But looking at it this way, the declining death rates for oldsters is much more pronounced and has now progressed down to 59 and is still barely visible at 55. That's definitely on the other side of McArdle's kink and would clearly affect its visibility. Significantly, the rise in death rates is still visible in ages 47-53, despite the overpowering effect of improving healthcare.

So to see if there's really a kink caused by a large part of the population going from having no insurance to everybody having insurance, I need to factor out the effect of improving healthcare quality for those that do have it. The way I've come up with is a simple multiplier. I normalized this for age 70. I tried several other ages (including below 65), but 70 seems to work best, although it's still a bit spiky. I think what's going on is that under 70, the effects of diseases contracted but undiagnosed until medicare kicked in are still having an effect, and over 70, the numbers become small enough that statistical variations become significant. I also tried normalizing for different ages for different years, but I felt that that was cheating a little.

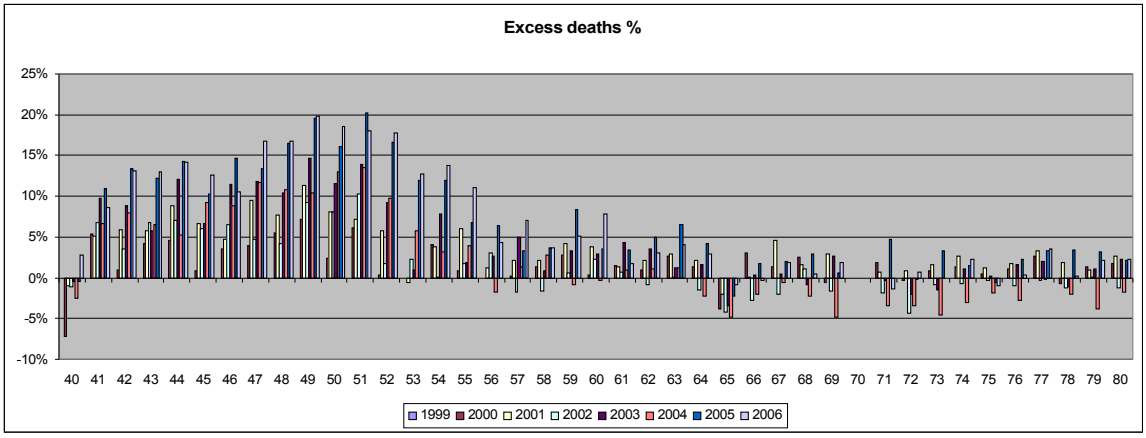
Here are my factors:

1999	2000	2001	2002	2003	2004	2005	2006
1	1.027097	1.053127	1.035619	1.0708	1.082956	1.139361	1.160303

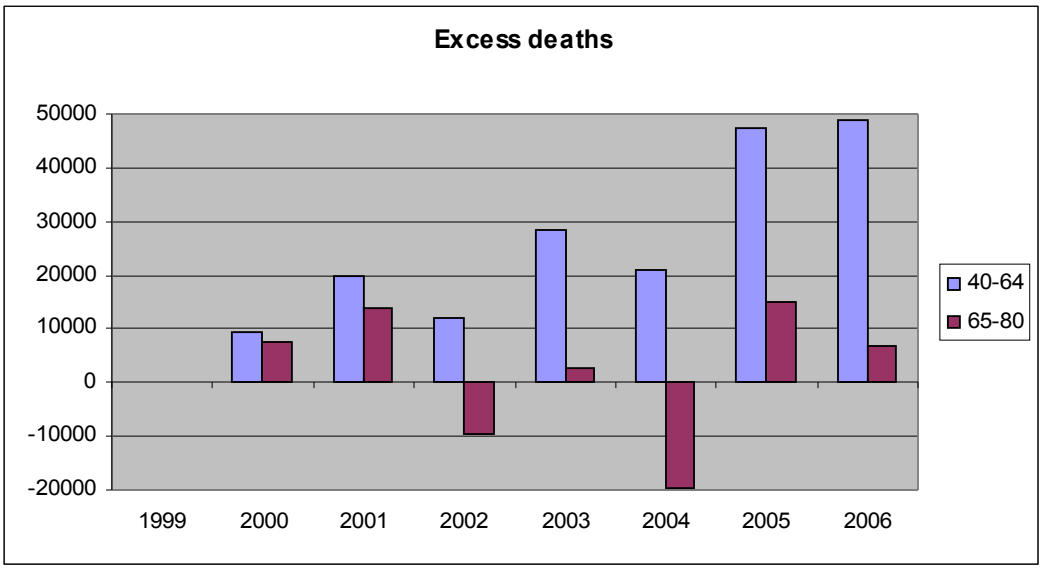
By multiplying the statistics for 1999 by this factor and the population corrector, I get a predictor for how many people would have died had health care quality stayed the same, irrespective of how many people had it. Subtracting this number from how many people actually did die, I get this:



That's pretty dramatic. Prior to age 65, we have a significant and consistent rise in deaths year by year which correlates well with the denial of health insurance to an increasing part of our population, and after 65, when nobody is denied insurance, the numbers are all over the place and somewhat smaller. That suggests that what we're doing is on the right track. Since a lot more people die per capita over 65 than under, the magnitude of any statistical errors are exaggerated there. So I made another table, which displays excess deaths as a percentage of all deaths for each age. Over 65, excess deaths are mostly under 3%, and show no rise or fall, but under 65, they're mostly over 5% by 2005 and consistently increasing year by year. This then, is the kink McArdle can't find.



My final chart is year by year excess deaths collectively. The numbers here are suspiciously close to the 45,000 from the Harvard study. Using the 65-80 numbers as a control, we probably shouldn't trust these numbers more than about +/- 25% or so. But this ignores the under 40 population, which the Harvard study does not. That leaves plenty of room.



[1] http://www.ncpa.org/pdfs/2009_harvard_health_study.pdf
[2] http://meganmcardle.theatlantic.com/archives/2010/02/how_many_people_die_from_lack.php
[3] http://www.cdc.gov/nchs/nvss/mortality/gmwk310.htm
[4] http://ceic.mt.gov/C2000/SF12000/Pyramid/pptab00.htm
[5] I found that I needed to add or subtract deaths from the year 2000 census data to produce a fairly accurate age by year population get such smooth curves. Building this year by year population was by far the most laborious part of this process. It doesn't factor in immigration/emigration, but I think it's pretty close.