A Discussion of Three Papers on Data Sources, Quality and Analyses

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Kestenbaum/Ferguson

Once again my friends from the Social Security Administration (SSA) have done a meticulous job. I have little to add except a brief anecdote. I went to my chiropractor for my monthly visit in December of last year and told her I was headed to this conference. She told me that she had five patients who were over 100 years old. All five only sought additional medical attention from an ophthalmologist, and none of them ever filed any insurance claims under Part B (medical insurance) of Medicare. They only saw her a few times a year, so their medical expenses were low. She also said that the keys to long life were avoiding stress and junk food, getting lots of exercise and eating a healthy diet. She added that the centenarians she had treated for a number of years had all retired early and then worked as consultants in other fields that they really enjoyed. The key was that they were not tied to a desk for eight hours a day.

Yue

I thank Professor Yue for writing an excellent paper. I thought it was interesting that the 2003 Elderly Census in Taiwan included everyone in Taiwan who was at least 89 years old. All such individuals listed in their household registration system were interviewed. Family members or care providers answered the questions for persons incapable of doing so themselves. This is in contrast to most of the surveys conducted in the United States, which exclude "institutionalized individuals," e.g., those residing in nursing homes, hospitals or prisons, as well as some members of the Armed Forces.

I would like to make one observation regarding the calculations described in Professor Yue's paper having to do with the calculation of bootstrap confidence intervals. Professor Yue drew 1,000 bootstrap samples from each of the binomial distributions $B(n_x, \hat{q}_x)$ for age $x \geq 80$, where n_x and $\hat{q}_x$ are, respectively, the observed values of the population size and the observed mortality rate at age x. He then computed an empirical distribution for each $\hat{q}_x$ by computing an estimate of $\hat{q}_x$ as the average of the 1,000 bootstrap sample values.

There is sometimes a problem with this type of calculation, as Schenker explains in his paper "Qualms About Bootstrap Confidence Intervals" (see pages 360-361 of the June 1985 issue of *JASA*). Schenker observed that the "coverage probabilities were well below the nominal level for small to moderate [size] samples." In particular, Schenker notes some problems when the sample size is below 100. Fortunately, in Professor Yue's study, most if not all of the sample sizes, n_x, should exceed 100, so that this problem should not be an issue here.

Robine, Cheung and Paccaud

This was another excellent paper with a number of interesting ideas. One question I had for the authors was whether they had thought about computing correlation coefficients for the data summarized in Figure 6. Recall that these concerned the modes and standard errors. However, it may be that the number of data points is too small for this to be fruitful.

Another question was whether they had looked at other partitions of their database. For example, did they observe any differences between death rates in rural versus urban locations

within Switzerland? This might test the conjecture that the elderly living in rural Swiss locations have a higher death rate during the cold winter months.

I also wondered what happens in places that have moderate winters but very warm summers, in contrast to Switzerland that has cold and blustery winters but moderate summers. I recall hearing a story about the great tennis player Don Budge[1] who won the Grand Slam of tennis in 1938. The story goes that when he won the Australian Championship (now known as the Australian Open) in January 1938, the weather was extremely warm. After the tournament, he contracted a severe fever. As a consequence, his hairline receded approximately two inches. Budge blamed this health problem on the heat in Australia during the long, strenuous tournament. A friend of mine, a distinguished jurist in Washington who lived in Arizona for a number of years, told me about the summer temperatures reaching 120 degrees Fahrenheit in Phoenix. I wonder whether the death rates in such climates would be higher during the hot summer months than in the moderate winter months? What are the death rates of (the presumably wealthy) retirees who winter in South Florida, summer in New England and spend the spring and fall in the mid-Atlantic region of the United States?

This leads one to ask if there are any implications of this work for pricing life insurance, annuities or other insurance products. This might be a little bit tricky in countries such as the United States where many people have residences in several different parts of the country. Perhaps the most interesting product to apply this to would be home equity conversion mortgages, alternatively known as reverse mortgages. The seniors availing themselves of such products are usually not particularly wealthy and have expressed a preference for staying where they are. My employer, the Federal Housing Administration, is the main insurer for such a product. This is a line of research that my office could attempt to pursue in the future.

Concluding Remark

In conclusion, I would like to thank all three groups of authors for presenting such carefully researched and thought-provoking papers.

References

Schenker, N., "Qualms About Bootstrap Confidence Intervals," *Journal of the American Statistical Association*, Vol. 80, June 1985, pages 360-361.

[1] Some of the material in this paragraph is based on personal communication with David Budge, the elder son of Don Budge.