

Session 1B: Mortality Compression Q&A

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**Presented at the Living to 100 Symposium
Orlando, Fla.**

January 5-7, 2011

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Paul Sweeting: I had a couple of questions about the C50 measure that was used and how it was calculated given that you not only have the number of deaths in each discrete year. Sometimes I saw there are integer values given, but when they weren't, I wonder what approach was used to calculate that measure—whether there's an assumption that deaths occurred evenly through each year of age or whether a survival model was fitted or something else. I was interested to see how that was done. Also, on things like the C50 measure, I was interested in the impact of any cohort effects. Later these were mentioned, but those were mainly in relation to very short-term deviations. I think if you had an improvement in the rates of mortality for a particular cohort that was fastened to the ones on either side, as that cohort moved through you might see compression, but then expansion as it came out the other side, I think. I'm not sure, but I was wondering what effect that might have on the results.

Allen Klein: I'm not sure how the calculation was done between years on the C50. I did not look into the details of the calculations I presented. I got this assignment not too long ago and my focus was on trying to summarize the results of the paper rather than delve into the calculations in the limited time I had. So I apologize for not being able to answer your question. It's a good question, and as I worked very closely with the authors in my preparation for this presentation, I know they would be more than happy to answer this or any other questions you have. So please feel free to contact them.

Jack Yue: I did a projection for C50. I think I agree with you—it's highly discrete and the result I got from different years, the shortest distance is different. For example, for some years maybe between 75 and 85 and for another year it's 72 to 87, so it switches a lot. But here I only considered the lengths of the interval so I didn't consider the center of the interval. So it is possible to have different intervals, but I just computed the distance.

Jean-Marie Robine: I will not directly answer your question on the C50. But I think it's a good opportunity, with the growing interest for the distribution of the individual life duration, to discuss this kind of indicators. We found something like between 15 and 20 indicators to measure the dispersion of the individual life duration. We have no doubt about the usefulness of the life expectancy at birth or the modal age at death measuring the most frequent number of deaths but there are a lot of indicators to measure the deviation. It is interesting, but at the same time it's bad because it's making it really difficult to compare the various studies and just increasing the quantity of data. We have to summarize the world of information. I don't know which one is the best. Wilmoth and Horiuchi suggested using the interquartile range as the best measure. Then Väinö Kanisto came with the C50, but later he proposed to use the standard deviation above the mode. I am not supporting any of these measures, but I think it could be very interesting that we have a discussion on them. I do not know how to organize such a discussion to agree on which dispersion measures should be used if we want not only to compare our studies but also to get some common information from all of them.

Will Mitchell: I was trying to understand Jack's presentation where it was showing two standard deviations above the mode might be about age 100 and to assume that stays constant over the future projection period. I'm wondering, over past periods, has that been observed as the percentage of the population above age 100 remains stable? And then also I'm just curious: when we look at the results for different countries, it seems like for Japan the graph is showing a lot of people living beyond age 100. What is the actual percentage? At birth, what percentage of people do you expect, both females and males, to live beyond age 100?

Jack Yue: At least for Japan I think for the females on this graph we can see the data. If I remember this correctly, this is for about 20 years. For N+2 standard deviations, it is about 100 years old for Japanese females. And I think for the United States it is about the same. But for Sweden it's a little bit different. I think the reason Sweden is different is because I think Sweden only has about five million population so there's a lot of fluctuation. The probability here for Sweden is not very stable, as we can see. The one going up here and the one going up here, for

Sweden. And a similar result here in Taiwan. Taiwan has about 23 million people and the result is also not very stable. The result I have for the country I have for the United States, for Japan and probably for France or the United Kingdom, I think $N+2$ standard deviations is a possible indicator for the future. I need to double check, but I know that it is correct for the Japanese female. And for the male, I think the $N+2$ standard deviations is about 98 or 96, so it's a little bit smaller; 100 is for the female. Does this answer your question?

Will Mitchell: I'm still getting familiar with these slides, but when you show a 10 percent probability

Jack Yue: There's one standard deviation here, one standard deviation. Here are two standard deviations, so this on the top here is $N+1$ standard deviation for the survival probability and on the bottom these three lines are $N+2$ standard deviations so it's different. For one standard deviation I think it's about 12 percent to 13 percent. Also very stable.

Brian Ivanovic: There have been some recent articles published about individuals at high age or apparent high age not actually being alive. As an example, there are reports from Japan about relatives of supposed supercentarians not reporting deaths than had occurred years before. This raises a question in my mind for those interested in studying the tail of the survival curve of how one might adjust for this bias. If you see this is an issue, how are you adjusting for that in your analysis, or how are you validating that these individuals, in fact, are alive?

Jean-Marie Robine: Thank you for your question. I think it's a very important one. I did a lot of work on the Japanese demographic data, and I really think they are among the best in the world. I'm not saying it's perfect, but the data are really good. The information we are talking about was provided for the first time by Japan. I think all of us we would like to know for our own countries how many people are remaining immortal in our computer or on our registers when we start with a registration of people at birth. In Japan there are two main data sources, i.e. the birth registration system and the resident registration system. If you want to

have an idea about the number of centenarians in Japan you can use the list of centenarians provided by the Ministry of Health. This list is made from the resident registries. In Japan you should be registered in the city where you are living. You are registered where you are living with your address. This list is extremely accurate. Today there are 43,000 people in Japan on this list. After the survey made by the Japanese government this summer in the municipalities, it appeared that about 2-300 persons on this list were missing, 2-300 out of 43,000. The list was released the first time in 1963, and at that time there were 151 persons on this list, so the number was increasing from 151 to 43,000. Maybe there are some missing cases and we have to decrease a little bit these numbers, a little bit from 151 in 1963 to maybe 42,700 today. It's not changing for this absolutely huge increase in the number of centenarians. They made a mistake when they started the survey. They confused the registers and they started from the birth registration system where people are registered at birth like in France. In fact, the register started in Japan in 1872 and from the people registered at birth from 1872 to 1910, which are the people who can be centenarians today, they found 200 or 300,000 people who have been registered at birth but they never got information on their deaths. But if you consider everything which occurred in Japan during the last century—the wars, migration—this is a very interesting information. In France we are trying to get this information, asking the French Statistical Institute to give us this information? How many people do you have on your register for which you never get information on their death? In Japan they confuse these two pieces of information, birth registration and residence registration.

Allen Klein: I'd like to add a couple of things to this. I'm aware of the problem in Japan as well. I guess what I can say about the problem in general is that when you see something that's out of bounds or very different from all the other data in surrounding regions, you really need to question whether there might be something wrong with the data. If you think it is fine, there has to be a reason for the longer longevity. You should be able to come up with a reason if the data is really right.

The other thing I wanted to say is, in the future, with the technology we have today and better record-keeping, hopefully we will have better data going forward. But we do need to clean up the problems and make sure the data is accurate.

Neil Fackler: My question is it seems like a lot of those studies that have been done have focused on fairly homogeneous populations, and I'm just wondering with the increasing diversity in a lot of places and heterogeneity of the populations if there would be an expectation for things to change and, if so, how?

Jean-Marie Robine: Yes, thank you for your question. In fact, today among the low-mortality countries (I'm not talking about the developing countries or the poor countries), there is a huge divergence between countries like Japan where the mortality is really collapsing among the oldest old and where we are witnessing today the shifting mortality scenario, and countries like Denmark, The Netherlands or even the United States, where the mortality levels among the oldest old are not really improving. At age 65 the life expectancy was almost the same between our countries in the '70s, i.e. between the United States, Canada, France, United Kingdom or Japan. The gap between the countries was less than two years and today there is a six-year gap between Japan and Denmark or a five-year gap between Japan and the United States. It's just amazing how diverging we are today when the engine of the increase in life expectancy is the fall of mortality among the oldest old.

Allen Klein: I think you may see some differences in safety and environmental issues that may grow in magnitude. This will create some divergence in mortality.

Jay Olshansky: I have a question for Jean-Marie. There were a couple of pictures that you had in your presentation indicating that half the babies born today are going to live to 100, and I'm wondering if you can comment on the methodology that yields those types of estimates and whether you personally believe that to be true.

Jean-Marie Robine: Thank you, Jay. No, I cannot, of course, but I will do my best. French journalists called France Meslè at INED to know if it is true that half the babies born in France in this year will become centenarians. So she did her best to compute how many of the babies currently born in France could become centenarians. According to her hypotheses she found about 15 per cent. But you can see that the figures I was showing for the United Kingdom are much more optimistic than in France when forecasting the future mortality. I don't know if you are happy or not with my answer. Definitely I don't think, nobody is thinking in France, that half the babies born in France or in Europe will become centenarians, but definitely we are forecasting that a significant part of them, because 15 percent is not nothing, will become centenarians. I have no idea what is the truth between 15 and 50 persons. Even I am not sure that 15 percent is possible. You know my work. I'm never doing forecasting because I don't know how we can know today who will live to become centenarians. We are really at the frontier. Dealing with human longevity is just bringing surprise day after day. In the forecasts during the 20th century we were always forecasting 75 or 85 years would be the maximum. We have been always surprised by the fall of mortality among the old and the oldest old and by the lengthening of life, and we really don't know where we are going. So when I'm talking not with you, but when I'm talking with journalists, I'm just saying, take what James Vaupel is saying, since years and years the life expectancy is increasing by three months per year. OK, we can keep on going with this for one more century and this will give you a series of forecasted values. Now, if you want to say that life expectancy will increase less or more, that it will go faster or it will go slower. You need to come with very good arguments. I'm pleased to listen to every kind of possible future, but what is your argument to tell me that tomorrow the mortality decrease will go faster than today, or will be stopped or will be reduced? I will be happy to listen to any kind of argument. The value of a forecast is just this one—it's just forecast what will be the future if nothing is changing, but, of course, we know the future will not be the same as today. It's not possible; things will change. From this forecasted linear series of values, which is for me the zero or the no-chance scenario, you can decide to go one side but you need to have very strong arguments. Today I am talking for myself—I have no arguments to say tomorrow the speed at which we will make progress will be slower or faster than during the last 10 or 20 years, and I'm carefully listening to people supporting one side or another side. Really I'm looking for original strong arguments.