Informal Discussion Transcript

Session 2A — From Population to Insured Lives, Finding Longevity Drivers

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LES LOHMANN: I want to join in on the criticism about the 50,000. We do have a proxy for determining what appropriate bands were and for inflation, namely the census data, which I think in 1950, I think the maximum pay that they looked at was probably something like $4,000 or $5,000. And in 1960, I think it was 10,000. I don't remember the details, but I think that that really skews the data, because you're looking at very wealthy people. Insurance was not ubiquitous in those days. You know, pretty much everybody has some insurance these days. That wasn't true in 1950. And so you are not only looking at wealthy people, but you're looking at wealthy people who bought insurance, and so I think that really needs to be looked at more. And those people, as we talked about this morning, would tend to live a little longer. And then a question for Dr. Zhu. You know smokers were not distinguished until I guess, the beginning or late '70s, if I recall correctly. How did you distinguish smoker mortality on 1950 to 1973 issues? '78, whatever it was?

ZHIWEI ZHU: Those are all very good questions, actually. I was expecting questions like these. As I mentioned earlier, the presentation, the main purpose of my presentation, is to put a methodology on the table, rather than emphasizing

the findings themselves. And I also mentioned for different purposes, we may configure the data, the approach, a little bit different. So I guess my point is we may not be able to get one unique answer for all the purposes. I mentioned for pricing purposes we did the filtering for more recently issued policies. And there is another purpose, since our company is a reinsurance company, and our reinsured policies could be more towards the larger policy side. So your point is well taken. This dataset, the filtering, it may not be a good presentation of the general insured population from that point of view, but it is closer to a reinsured segment.

LES LOHMANN: And you reminded me, actually, of another proxy and I'm sure it's available for inflation there, would be the retention limits as they've grown over the years. I'll bet the retention limit wasn't greater than $1,000 in 1950?

ZHIWEI ZHU: Yeah, that's another good point. Because we care about more recent policies, if we look at it, most of our policies have at least $100,000 face amount. And again, the filtering, the conditions we set, is for certain specific purposes with a focus on face amount, not retention. The study frame was not the general insured population. That's not what I meant to study.

DOUG ANDREWS: My question is for the Gavrilovs in terms of

the methodology that was used. I thought it was very original to define a control group by the same years of birth, but that had died much earlier than the group you were looking at. I don't know why that isn't a control group, but it's a very different kind of a construction. If we were doing some kind of a drug test, we would have made sure that we had half of the people that died at 65 and half of the people that lived to 100 be in the same group and the other group would not get the drug, so that they would be the same samples. Which then makes me wonder, you know, is there any bias in choosing your control groups that way? What if you had chosen all the people born in the same year, but died at 75 or 85 or 95, and then it makes me wonder, well, why did we choose 65? I don't think that that was the life expectancy in 1890 or 1891. If we were going to choose something, why didn't we choose life expectancy at 1890 or 1891 as the age we would expect people to live to, and then looked at the centenarians? So I'm interested by your approach in the control group, but I'd like to know more about it.

LEONID GAVRILOV: Thank you for the question. We thought about this. In our study we compare centenarians to their peers who lived 65 years. Age 65 is chosen because it is close to median life span in the studied birth cohorts. Approximately half of the population died before 65 years,

while the other half died later, which justifies the choice of this control group with intermediate life span. Comparison of characteristics for these two age groups allows us to identify factors that favor survival between ages 65 and 100. This is important for understanding factors that affect survival for the longer-lived half of the studied population.

We also studied death certificates for people who died at age 65 and confirmed that most of them died from age-related chronic diseases rather than external causes of death. This is important because we are interested in factors that could delay deaths from age-related diseases to 100 years and later.

The reason why we do not use a control group with all people included, independent on their age at death, is that if you take all people including those who died in childhood, then your results will be confounded by factors of infant mortality and external causes of death.

Also we plan in the future to use an additional control group of the oldest-old people who lived 85 years. This will allow us to identify factors that favor survival between ages 85 and 100 years.

TOM PERLS: I have a question for you as well, Leonid. A technical question and then I think one quite close to the previous one. You validated the ages of the people who died

at 65, their age at death.

NATALIA GAVRILOVA: Death date verification using Social Security Death Index is not feasible for validating death dates of control individuals who died in the 1950s. However, we found that more than 65 percent of deaths in the control group could be confirmed through U.S. state death indexes, cemetery records and obituaries, which cover longer periods of time. And we found practically no disagreement between family history data and official records. Given that the exact ages of death for controls are not critically important for the study design, we believe it is possible to rely on death date information recorded in family histories for controls not found in external sources.

TOM PERLS: The reason I asked is because we know that Social Security Death Index is available only from 1960 on, so these people died in 1955.

NATALIA GAVRILOVA: Yes, data completeness of Social Security Death Index is not very high for deaths occurring before the 1970s.

TOM PERLS: So you couldn't use … you couldn't use SSDI for that.

NATALIA GAVRILOVA: We could not use Social Security Death Index, because these people were not there. But we found about 65 percent of cases in other external data sources

and agreement between death dates in family histories and external sources was very good.

TOM PERLS: So you went through all the trouble of finding some death certificates on these people?

NATALIA GAVRILOVA: We relied basically on state death indexes, which are based on death certificates and for some states there were indeed images of death certificates.

TOM PERLS: And then, my next question isn't about that, but more from a clinical point of view as a physician. Even back in 1955, I would say that people dying at age 65 had to be very, very sick. And I'm guessing the primary causes of death around that time related to smoking and hypertension. Forty percent of people were smoking in the 1940s, so my question is very related to the previous one, is, this seems to me to be a study more of what it takes to live beyond the age of 65 than it is to live to 100. It's just simply getting beyond 65. So I don't think it's a study of factors to get you to 100.

NATALIA GAVRILOVA: Yeah, but we actually studied what factors are predictive for survival from 65 to 100 and indeed these people mostly died from chronic age-related diseases like heart disease, cancer or stroke according to death certificates which we had on hand. I would not describe those people who lived 65 years as being very, very sick because half of the studied birth cohorts died

before this age. Hence they are somewhere in between according to their health status, outliving half of their peers.

TOM PERLS: Smoking. So maybe the issue here is that, some of the factors that you found are not related to living to 100 but are related to not smoking.

LEONID GAVRILOV: Unfortunately, we do not have information about smoking in our data. But you're quite right that it makes sense to make another study and to take another control group, for example, those who survived to 85, for example, taking into account that after age 85 smoking is no longer a strong risk factor. And then to do the same analysis to make sure that this is a predictor of exceptional longevity after age 85 years.

FROM THE FLOOR: I was fascinated with this farmer and the better mortality with the fall births and I was sort of imagining that I was a farmer back in the, at the turn of the century, the other turn of the century. And you know, in the wintertime, I didn't have a lot to do, not a lot of light and it was pretty damn cold in the house. And I can see a lot of pregnancies occurring from January through March. And that's a lot of births after a harvest. Which, by the way, as a farmer, that's probably really good thinking. To have a birth any time during the growing season probably is not managing your resources in any sort

of competent way. And so I'm wondering if you did a real analysis of the numbers of births? I would be willing to bet that among farmers, you have an extraordinary number of births in the fall and not so many in the spring and summer. And thus, you would have just naturally, more people survive to whatever age, from the fall simply because we start out with more people. I was wondering if there was any way to look at that. Did you look at that? What does it mean? You know, I'll go sit down.

LEONID GAVRILOV: In our analysis we controlled for effects of farming occupation and months of birth simultaneously by methods of multivariate statistics. Both studied variables had statistically significant independent net effects on longevity risk.

JOSEPH LU: I have a question to Zhiwei on the methodology. I'm just wondering how easy it is to incorporate two-dimensional analysis into your Logit's model. For example, if the differences in mortality rates between rich and poor can narrow with increasing ages, can your model robustly allow for features like that?

ZHIWEI ZHU: Yes. Logistic regression, one of the strengths, is quite flexible for multiple dimensional analysis as you mentioned. You can create a number of predictive variables, or independent variables. There are many ways that we can have multiple variables in the model. For instance, with

age, gender and smoker, studying what you mentioned is one issue in modeling called interaction, how things vary jointly by other variables. And there are different ways to do interaction. One is like the professor Gavrilovs did, split the data so that we have total independence between the two data groups when variable relationships between the two data groups. Another is to include the interaction terms into your model, say age times gender. There are different ways to incorporate and quantify interactions.

DOUG DOLL: I have a question for Dr. Zhu. Let's say for example, I wanted to model the differences between smoker and nonsmoker mortality. And I want to do it by duration and I have thousands of deaths in each of those. I have the first 10 durations, but by the time I got out to duration 25, I only have like 10 deaths. So that calculated qx, at duration 25, is very uncredible. If I just stick that in the model, does it give the same weight to that as it does for the qx I calculated in the first several durations?

ZHIWEI ZHU: Again, there are different ways to deal with the issue. That's another strength. As you can tell, I like the modeling approach. You could incorporate different weights. For instance, for our study, we weighted the data by policy exposures rather than claim count. Each policy gets up to one vote each duration year. That may not totally answer your question because for the later

durations without data you cannot put weight on those durations. Basically you're more relying on the model, the function itself, to determine how the mortality will be. So the modeling approach is driven by the data availability and the data quality more in early durations. If you have a lot of data in the early durations, some data in the later duration with older ages, even it's not credible, still I think this modeling approach can provide you reasonably estimated results by combining your knowledge and the modeling approach.

MOSHE MILEVSKY: Two quick comments. First of all, to professor Gavrilov, in fact, to both of them, I wanted to thank you for resurrecting the Gompertz Law of Mortality at Advanced Ages. (APPLAUSE) Great article in the *Wall Street Journal*, I think it was a year ago, when they covered that as well. I also have a comment about the issue of fraud and old people lying. There's actually evidence that doesn't just effect older people. It actually happens at younger ages as well.

Some of you attended my session earlier on tontines and annuities. A couple of hundred years ago, when tontines were issued, people would pick nominees that were very, very young because they were expected to live the longest. So you'd find an infant or 1-year-old, 2-year-old and nominate them and then as long as they're alive, they would

get payments. The investor would get payments, but every once in a while, smallpox would hit and that child would die and you're left with a nominee who's named Joe Smith, that isn't alive, so they would name their next child Joe Smith as well. And then if that one happened to die, they name the third one Joe Smith. Evidence? Well, what you see is very, very low infant mortality rates among tontine nominees. Abnormally low numbers, and it's because people would lie about what the name of the child was. So it really happens at both high and low ages and it really does affect mortality table data to the point that John Finlaison, the chief actuary in the UK, 200 years ago, didn't accept any mortality under the age of 3 for his mortality tables. He used the annuity and tontine tables. He just didn't trust them because he knew of the problem with people substituting names. But, anyway, thank you very much and again, thank you professor Gavrilov for your excellent research. Appreciate it.

LEONID GAVRILOV: Thank you for your comment. Tomorrow, Natalia Gavrilova will present more examples on this topic on resurrection of the Gompertz law. So we invite you and all the audience to hear the presentation tomorrow.

FROM THE FLOOR: I'll comment on the matter of the lying based on name. I do know of a case within my own company where the father was an annuitant. He died, his son was not

named junior and for over 10 years, he thought the company just wanted to give him the money and he deposited it in his account. Eventually got caught.