General Session V: Factors Affecting Mortality
Discussant: Jean-Marc Fix

Presented at the Living to 100 Symposium
Orlando, Fla.

January 5-7, 2011

Geoff's presentation was at least the third paper I have seen so far in the Society of Actuaries' Living to 100 symposium dealing with measures of the socio-economic impact on mortality. What makes it interesting is that everyone, Jay and Hiram earlier and Geoff this time, has looked at the similar problem and approached it from a different angle.

A caveat, before I continue, is that maybe the impact of race for the Maori population in New Zealand might not be directly portable to other ethnic groups or other races in other countries. This is especially true for the determination of the socio-economic correlation between Maori race and socio-economic disfavor. It might be that different factors are at play for the different races in the United States, for instance, compared to New Zealand.

Key questions are always tough questions as Kenneth Howse mentioned yesterday at lunch. Here the question Geoff asked is really important for all of us who are in some kind of public service work: what is "fair"? Furthermore, what is fair and what is doable are often in conflict. For pension, we are all aware of the Social Security crisis where what needs to be done and how to do it fairly are quite different.

A good point that Geoff's paper raises is to look rigorously at how fair a scheme is in reality and to substitute once again facts for appearances. Do the math and see what comes out versus "oh, it's the same" and, therefore, "there's no problem." So, I think, a really important lesson we can learn from his paper: Assumptions are dangerous unless verified.

Looking at the four scenarios, we are not trying to see here which one is more likely. We are looking at possible solutions and possible approaches and I think that was a good way to look at that.

The convergence of mortality may be an issue in this paper. If I understand it right, the annuity values and all the values were for somebody taken at age 20. So, of

course, over 45 years or so of convergence, you get a lot of convergence. Even if the convergence starts now for somebody who is 50, I guess the inequality impact could be much more severe. This makes the case of a 20-year-old pretty much a best-case scenario even if convergence, which is quite difficult to achieve in practice, would be possible.

So I think the important lesson here is, do the math and do not just go with impressions. You might not have all the data but looking at scenarios will help you highlight the consequences of the different choices and, ultimately, I think that's the most valuable lesson I drew from Geoff's paper.

Anatoli was very generous with his paper because there is enough material for at least eight or nine papers hidden in that one paper. There is a tremendous amount of information, but the key approach here is that in our traditional way to look at things, we lose almost all information embedded in the modeling mortality. What we do is, look in the past, see what the mortality was and project it into the future. We addressed that earlier. That creates a lot of problems.

To solve those problems, we need a better understanding of what are the drivers of the mortality under consideration. Drivers change, but before we know what their values will be in the future, we need to identify them and we need to study them. Anatoli's contribution is a very rigorous approach to applying the same mechanics we apply to mortality but applied directly to the different factors and I think that's really important.

Anatoli identified seven key factors. In his papers, there are a lot more factors mentioned but not studied so there is a lot of research potential. It will be very interesting in the future. For each of those factors, there is quite a diversity of trajectories and they all behave differently. Some are useful; some are not as useful. Some vary between the young and old; some don't. So there's a lot of information there that suggests you should look at the curves for each factor even if the mathematics might be a little bit difficult. It was for me, at least.

Some of the additional pluses of Anatoli's paper are the elegant answers he found to look at mathematical variables for difficult processes, such as the resistance to stress. Prior to reading his paper, it was not really obvious to me how resistance to stress could be measured by looking at mortality curves. Anatoli suggests using the width of the U-curve as a measure of that resistance. The wider the curve, the more the body resists the deleterious impact of the factor measured (x-axis) before mortality is affected (y-axis). As we age, this resistance decreases and the U-curve gets narrower. Anatoli makes an important contribution to our quiver of possible approaches to measuring risk factors by factoring stochastic components on each of the individual risk factors instead of only looking stochastically at mortality as a whole.

I would have liked a little more discussion on the difference between the shape of the left side of the U-curve and of the right side of the U-curve because it's not a symmetrical parabola. That is interesting to study just by itself so that is even more material to look at.

The definition of healthy is limited. In the Framingham studies (www.framinghamheartstudy.org), there is a lot of data, but the definition of healthy is looking only at cancer and heart attacks. To that extent, the Framingham studies may not look at some of the other variables that may be important for aging.

As Eric Stallard mentioned earlier today, crossover points are interesting in a couple of the variables, most notably cholesterol and diastolic blood pressure. There are a lot of things that can be extracted from those curves Anatoli provided us and I encourage him to include more of those when he publishes the online version of his paper.

Lastly, I finally discovered proof through Anatoli's paper that men and women are a different species. There is hardly any one curve where the genders exhibit anywhere near the same mortality behavior.