Session 3B: Mortality Modeling II-Other Methods Q&A

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Jack Yue: I have two questions for Wai-Sum. I was just curious about the wide prediction confidence interval. Could you try, for example, the backcast method or try the training and testing data (i.e., cross-validation) and see if the wider prediction interval can cover the true mortality values? I think that it might be more convincing if you do the simulation like that. And because in concept the Chebyshev band is more conservative, I think the confidence interval is larger than the other one. Probably you could try to use simulation to double check which one has the desired significance. That's the first question.

The second question is about the Bonferroni confidence interval. I don't know if you tried that, but maybe you can check if the result using the Bonferroni confidence interval is close to your result or not. Maybe there are things that are easier. I think your computation looks complicated to many users, so maybe you could try that. Thank you.

Wai-Sum Chan: Yes, we did try to count the coverage probabilities using backcasting or forecasting methods. We did only look at 95 percent level, which is commonly used in practice. We did not look at 99% or 90% levels since we believe that the results will be similar. Second, Bonferroni is a parametric method and it is slightly different from our current nonparametric approach. Also, Bonferroni method is difficult for high dimension multivariate model as we need to perform high dimension integrations. Furthermore, the Bonferroni method has been proved to be a little bit conservative type. We can discuss the details with you later after the talk.

Thomas Edwalds: I was curious on the principal component analysis piece where you're developing your model. You talk about having a first and second component, but I didn't actually understand how you decided where to break it. What was the method for coming up with that? Could you expand on that a little bit?

HSIN CHUNG WANG: I'll try to explain this. I used two methods. The first method was to minimize the average MAPE (Mean Absolute Percentage Error) and we chose the piecewise regression model which has the smallest MAPE. Based on the empirical result, we found that using the last 10 or 15 years of data to fit a regression line gives the best prediction result.

For the second method I used, we can see the first component and second component have a trend, and we can use F test, fetal regression model and by the step-wise regression method to decide. Then we can use R square and MAPE to make a decision.

THOMAS EDWALDS: For the graph that had those two lines in it, what was on the x-axis? What was on the y-axis? Where were those points being generated from?

HSIN CHUNG WANG: We apply the PCA on the original mortality rates and decide the number of time periods. The loadings of the first Principal Components are on the x-axis and the loadings of the Second Principal Components are on the Y-axis.