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Executive Summary

This report describes a study conducted for The Society of Actuaries (SOA) and the Canadian Institute of Actuaries (CIA) designed to acquaint actuaries and other financial professionals with the application of methods of futures research that could supplement traditional actuarial forecasting practices and to obtain insights into the rationales and thought processes experts use in making assumptions about the long-range values of economic variables.

This work followed a similar study that the SOA performed in 2005 but used more advanced futures research methods. As was the case in the 2005 study, the purpose of the current study was to demonstrate these techniques through a realistic application, rather than prediction, especially given the small (intended) number of participants

Substantively, the study that ran from late August 2018 until March 2020 focused on two-, five- and 10-year forecasts for four U.S. economic variables

1. Annual increase in the Consumer Price Index (CPI)
2. 10-year Treasury spot yields
3. S&P 500 total rate of return
4. Corporate Baa spot yields

Small expert groups comprised of about 30 actuaries and futurists provided judgments about these variables in two surveys, the first of which ran during July 2019 and asked for direct estimates of the future values of the variables. The second, which ran from November 2019 to January 2020, explored the consequences of possible future developments on the course of the variables. Because this study was designed to demonstrate several futures techniques, the time period taken to perform these surveys was longer than most other users of the techniques have experienced.

The respondents provided judgments about the future values of the variables and ranges of expectations, as well as values that might be considered catastrophic and timing of regression to the mean. In addition, they were quite generous in sharing their rationales; more than 300 reasons were given. They nominated over 90 future developments (later consolidated down to 28) that they felt were important to the future course of the variables and estimated the probabilities and possible impacts of these developments.

Although the study was completed a few weeks before the COVID-19 pandemic became a major global issue, the panel identified several developments that were soon to capture the world's attention; these were hypothetical at the time of the study: "Pandemic kills 1% of world population (Spanish flu of 1918 is estimated to have killed between 50 million and 100 million people worldwide)" and "Price of oil drops below \$30 for more than a year."

The panel judged that the probabilities of each of these developments was quite low (less than 15%), nevertheless their inclusion was remarkable.

Principal conclusions included:

- This work illustrated several systematic techniques for forecasting the future value of time series variables by collecting estimates of individuals in a group; by combining extrapolative forecasts obtained through use of historical data and statistical curve fit methods; and through combining group judgments about future developments that could deflect the extrapolations.
- The curve fitting methods that were used are well known and are based on regression to minimize errors when curves of known shapes are fit to the data. The method for eliciting expert judgments about future developments and their consequences was Real Time Delphi. The method for combining the expert judgments about probability and impacts of future developments with extrapolations was Trend Impact Analysis. A Monte Carlo model was used in which random numbers determined the assumed occurrence or nonoccurrence of future developments based on their estimated probabilities; this model was used to create a large number of mini-quantitative scenarios that led to definition of expected median and interquartile ranges of the variables under study. The computer algorithms developed for this study are available for SOA/CIA member use.
- The study also demonstrated how the methods could be used in policy analysis by simulating policy decisions through changing probabilities or impacts and observing the effects on the variables of interest.

Many of the reasons participants provided were eloquent statements of hope and uncertainty about the future. The range of expectations was quite wide, perhaps wider than at any time in the recent past. From an economic point of view, the forecasts generally reflected an inflationary future, largely determined by uncertain politics, man-made and natural disasters, and chance.

This report is available in English only at this time. The French version will be available over the coming months. A French version of the executive summary is available.