



SOCIETY OF ACTUARIES

Article from:

# Actuarial Futures

January 1998 – Issue 18

spend our time relating this information to its effects on The Principal.

**The Future of Futurism at The Principal**

I have been pleasantly surprised at the openness of people toward futures thinking. Of course, it doesn't hurt that the millennium is just around the corner. You can hardly pick up a magazine or watch a news show without some story on the future being addressed and this will only increase over the next couple of years.

Ultimately, for futurism to become an integral part of strategic planning and thinking within The Principal, it must be proven that the company can develop better strategies and be better prepared for future threats and opportunities. But because of the long-term aspects of futurism, success can be very difficult to measure. So far, business units and their people seem willing to incorporate futures activities in their daily operation. At least we are off to a good start.

**Transition from Actuary to Futurist**

From a personal standpoint, the transition from actuary to futurist has been an interesting and exciting one. In many ways, futurism expands on the work of the actuary by taking a holistic view of the world. Social, political, economic, environmental, and technology trends are used along with the usual actuarial assumptions such as demographics and interest rate trends when looking at the various ways that the future may develop. Both qualitative and quantitative methods are used. I look forward to the opportunity to add to the tools that The Principal can use in understanding the future.

*Robert G. Utter, FSA, is Second Vice President and Futurist at The Principal Financial Group in Des Moines, Iowa and an immediate past member of the Futurism Section Council.*



**Actuarial Assumptions and the Future**

by W. Harold Phillips

**ABSTRACT**

**T**he contributions of the actuarial profession to our employers, the industries we serve, and the public are hampered by a misunderstanding of what an actuary does. In many cases actuaries have fostered the myth that actuaries can and do predict the future.

Consensus is required within the profession so that we can reach out and better explain to others what we do.



**Thesis**

The future is unknown and unknowable. To try to predict it or estimate it is a very hazardous endeavor indeed. But what does this have to do with actuarial science?

The actuary cannot and should not attempt to estimate or predict the future. This would reduce actuarial work to guessing.

What then are actuarial assumptions? Actuarial assumptions are a representation of past or current experience in the parameters that affect a financial security system or the model it represents. Actuarial assumptions cannot and should not be used to estimate the future.

An actuarial model gives us a peek into how the future might be based on the actuarial assumptions that go into the calculations. This model does not predict or estimate the future. It merely shows the results of calculations based on the assumptions that go into the calculations.

An actuarial model depicts the future based on the actuarial assumptions used.

What then is the relationship of an actuarial model to the future? An answer is "none." What is the likelihood (probability) of the future turning out as depicted? Close to zero. So then can't a model predict the future? No! The future depicted is what it would look like if all the assumptions were fulfilled.

So what is the value of an actuarial model? It shows what the future might be

like if all the assumptions were fulfilled. As many futures can be "predicted" as sets of assumptions are used in the models.

Doesn't a model estimate the future? Can't the actuary estimate the assumptions for the future? Can't the actuary give it his or her best estimate? What special powers of prescience does the actuary have? None, really. Does the actuary do probability distributions on each assumption? Unlikely. How do you measure the highest likelihood? Think of the difficulties in the one item of interest alone.

Charles L Trowbridge has an interesting section: "The Uncertain Future," page 67 of the *Fundamental Concepts of Actuarial Science*, 1989, and we quote:

"Actuarial assumptions often, though not invariably, relate to a long span of time, not infrequently 50 or more years. The ability of humans to predict even shortrange future events is severely limited, and forecasting ability diminishes rapidly as the time span lengthens. Predictions are often based on 'extrapolation' or 'the continuance of present trends,' but neither can be expected to hold up for very long. The actuary is particularly aware that he has no crystal ball, and than any prediction that he might venture will invariable prove to be wrong, in one direction or the other. He can be expected to resist the idea that the assumptions he uses are predictions, though the public often understands them as such.

"If an actuarial assumption is not a prediction, then it may be better described as an estimate. Is it then the actuary's 'best estimate' (presumably based on his interpretation of all the pertinent data he can find)? A best estimate implies that the estimator picks

*(continued on page 8, column 1)*

## Actuarial Assumptions

*continued from page 7*

the mean, median, or mode of his personal probability distribution. This view of an actuarial assumption may suit some actuaries, but others will find it deficient.”

The author would fit into the camp that finds the estimate concept most deficient.

To the prohibition of estimates and predictions, I would add forecasts and projections. Dictionary definitions might be helpful here:

- Forecast 1: To estimate, predict or seek to predict
- Forecast 2: To serve as a prediction or prophesy of
- Forecast 3: To calculate in advance.

**Comment:** This third definition may come close to what actuaries do.

- Projection 1: A prediction or advance estimate based on known data or observations
- Projection 2: Extrapolation
  - Extrapolate 1: To estimate or infer (a value, quantity beyond the known range) on the basis of certain variables within the known range.
  - Extrapolate 2: To arrive at (conclusions or results) by hypothesizing from known facts or observations.
  - Extrapolate 3: To speculate about consequences on the basis of (known facts or observations).

The actuary does not and should not do any of these, with the possible exception of the third forecast, “to calculate in advance.”

If the actuary does none of these, what then is done? Is it possible that we have a semantics problem because we have been using words that do not quite describe what we do? After writing down many options, I found that the best was “application of actuarial assumptions into the future.”

Thus an actuary does not and should not estimate, predict or project into the future. The actuary calculates using assumptions.

What is the danger of actuaries giving the impression that we do estimating or predicting of the future and others picking up on this and assuming that we do? If this is what we do, shouldn't we be judged by how well we do it? How many of us would like to be judged in our actuarial competency by how close the future comes to what our actuarial model have shown? Not many, I'm sure. That would be most unfair. Yet if we let others believe that's what we do, can we expect anything less? What then should we be judged on? Definitely not on how close the future matches the assumptions.

Who then makes the assumptions? In many cases, the actuary is in the best position to set the assumptions. In other cases, for example, interest rates, it may fall to others such as economists or investment specialists. In some cases state law or regulations prescribe the assumptions. At other times, the IRS prescribes the assumptions to protect the revenue base. In all cases the actuary should be willing to show and discuss the assumptions used in the model. If they are challenged, the actuary usually should be prepared to run the model with other assumptions.

This discussion makes a case for the separation of the construction and the operation of the model and the assumptions that are used in the running of the model. Does all this then diminish the value of actuarial models and actuarial work? Not at all! What then is the value and purpose? Even though we cannot predict or foresee the future, we can do a great deal to prepare for it. Actuarial models that depict the future can help us in dealing with, coping with and preparing for the future. They can familiarize us with what the future may have in store.

They can be helpful to us in making currently required decisions in a way to maximize return or minimize loss.

### Examples Where the Above Principles Have Been Violated with Resulting Difficulties

1. **Illustrations.** Despite the fine print that states that illustrations are neither estimates, predictions or most likely numbers, the public does not seem to grasp this concept. Paying less than illustrated and/or premiums not vanishing as illustrated, has

gotten the industry into quite a bit of trouble. Agents have not helped. “Our company has always paid more than illustrated” may have been true from 1942 through 1980 but not since then. “But the agent promised that's what I would get” does not help the disappointment when people have been relying on the illustration for retirement planning.

I submit that the illustration problem is related to the points made above. The perception exists that somehow the actuary, the consummate professional, is estimating or predicting what will happen by use of the illustration. If that's not what such an expert is doing, what is being done? That's the heart of the problem. The actuary has not explained what is being done. Companies using the illustrations prepared by the actuary have just passed them onto their prospects.

What is being done, of course, is that current assumptions are being used for the future for all the durations shown. No estimation, prediction, projection, or extrapolation. Are the numbers accurate? Yes, to the last decimal place. They are based on current assumptions, showing what the future would be like if these current assumptions held into the future. This is a mighty big “if.” The future is unknown and unknowable, and what will actually happen is virtually certain not to be what is in the illustration.

A clearer understanding by all of what an actuary does and what actuarial assumptions mean can help us out of the illustration pitfalls. The new model illustrations regulation solves some of the problems, but the basic issue of disappointment when less is paid than illustrated remains.

### 2. **Actuarial Standards of Practice** (ASOP No. 17 Expert Testimony)

- 2.1 defines actuarial assumption as the value of a parameter or other actuarial choice, having an impact on an estimate of future cost or other actuarial item under consideration.
- 2.3 defines actuarial method as a procedure by which data are analyzed and utilized for the purpose of estimating a future cost or other actuarial item.

**Comment:** I would change the word “estimate” to “calculation.” The use of the word “estimate” is contrary to the

thesis of this paper and can only get us into trouble.

- 6.5 states: "Inherent Uncertainty of Results. Actuarial forecasts or projections have a degree of uncertainty because they are based on the probability of occurrence of future contingent events. One of the most important duties of an actuarial expert witness is to convey the inherent uncertainty of actuarial estimates or forecasts."

**Comment:** The reason for the inherent uncertainty of results is that the future is unknown and unknowable. The future cannot be predicted. The actuarial model depicts the future based on the assumptions used. The future as it unfolds will be different from the assumptions. The difference in the numbers of the model and the future as it unfolds will depend on how the actual experience differs from the assumptions. We need to get out of the mode of predicting or even trying to predict the future. It will only get us into trouble. See below also.

- 6.6 states: "When confronted with an attempt to characterize an actuarial opinion as nothing more than a guess, the actuary should counter such a characterization, and not allow the concept of uncertainty to be used to discredit the validity of actuarial work and testimony."

**Comment:** Depiction of the results of an actuarial model as an estimate is tantamount to admitting that it is but a guess. A better approach would be to explain what an actuary does by using actuarial assumptions as described above under "thesis."

ASOP No. 10 deals with Methods and Assumptions for GAAP Financial Statements.

- 5.4 states: "Best estimate assumptions reflect the most likely outcome."

**Comment:** Assumptions and estimates are two terms that are in conflict. An actuary does not and should not use estimates in actuarial models. Actuarial assumptions are used, but they are not estimates. A most likely outcome? That is virtually impossible. Does an actuary do a probability distribution for each assumption? No. How many options are considered and chosen from to pick the most likely? For an actuary to set down the most likely course of interest rates is beyond his or her capability. Accounting rules seem to be requiring the actuary to do what he or she is incapable of doing, is not trained to do, and should not be doing because of the folly of even attempting it. This is based on the myth that actuaries do or attempt to predict the future. Based on the thesis of this paper, nothing could be further from the truth.

- 5.5.2 states: "Assumptions that included provisions for the risk of

adverse deviations should bear a reasonable relationship to best estimate assumptions."

**Comment:** All comments above apply.

**Conclusion**

It is important to understand what an actuary does and how he or she uses actuarial assumptions. The actuary is not in the business of predicting or estimating. The more we can get the public away from this perception, the better off we'll be.

The purpose of this paper is to stimulate discussion within the profession and hopefully move toward consensus. If we can reach such a consensus, we can then reach out to others and better explain what we do and how we go about doing it. A great opportunity exists here. We should remove any myths that exist so that our contribution can be better understood and be made more effective.

I am indebted to the writings of Frank M. Reddington (especially "Nescience and Prescience"). Thoughts I had on this subject were greatly stimulated when I came upon his writings. A collection of his writings is in the SOA library, "A Ramble Through the Actuarial Countryside," 1986, Staple Inn, Institute of Actuaries Student's Society.

*W. Harold Phillips, FSA, is Senior Life Actuary at the California Department of Insurance in Los Angeles, California.*

*Council member (left to right) Bob Utter, Al Easton, Tom Hughes, and Larry Miller take a break from planning the future of the Futurism Section at the Annual Meeting in Washington, D.C. in October.*

