BORROWING

Actuaries are among the few people in this confusing world who actually relish confusion. They want to make sense of trends, reversals, discontinuities, and the like. But will the mother of all discontinuities, looming in a recess just over the horizon, cause past trends to be irrelevant, the reversals to be minor blips, and the discontinuities to become the new norm?

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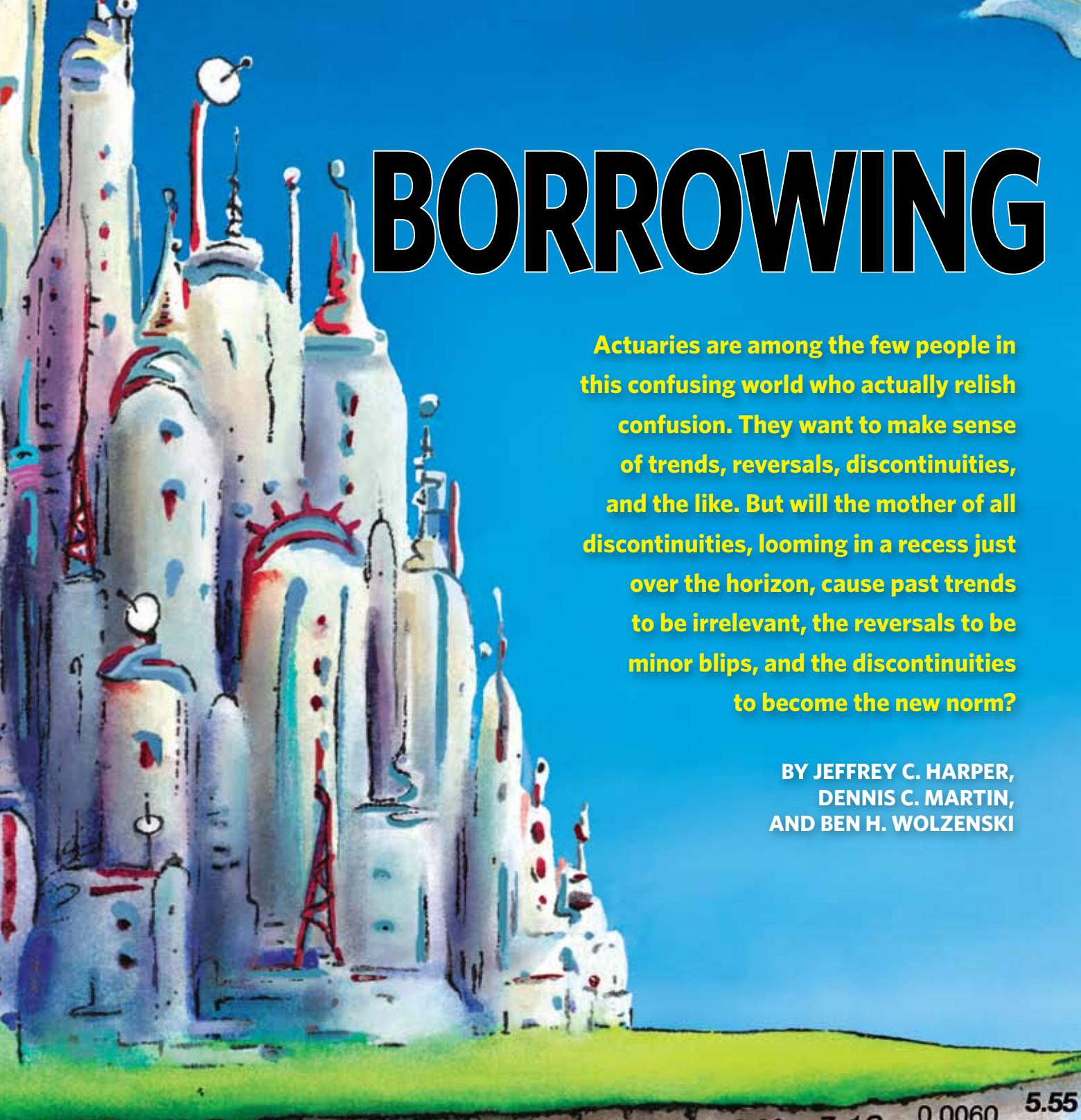


TROUBLE

Are Those Who Don't Study the Future Condemned to Falter in It?

THE WEBSITE OF THE SOCIETY OFACTUARIES (SOA) says it, so it must be true: "An actuary is a business professional who analyzes the financial consequences of risk. Actuaries use mathematics, statistics, and financial theory to study uncertain future events, especially those of concern to insurance and pension programs. They evaluate the likelihood of those events, design creative ways to reduce the likelihood, and decrease the impact of adverse events that actually do occur."

Key words in this definition include "analyzes," "consequences," "uncertain future events," and "likelihood." Each of these words is usually applied in a sense of everyday living. To the shortsighted actuary, analysis means performing a mortality study. To the uninitiated practitioner, consequences are heightened cash surrenders causing a C-3 incident. In a limited horizon, uncertain future events are disabilities arising from a predictable accident or a known sickness. To the non-futurist, likelihood means predicting future decrement or expense rates based on historical empirical data. Certainly, extreme events are of interest to actuaries, and are studied and even anticipated by the actuarial profession. But the extreme events that ultimately matter may loom in recesses into which the actuary doesn't peer in his everyday world.

PHILIPPE LECHIEN

Futurism

Futurism isn't about predicting the future or discovering all of these looming issues. Rather, futurism is about studying what might be a part of the future and preparing appropriate responses. Futurists admit that the future of human systems—all complex systems, in fact—is inherently uncertain. Rather than assume that such uncertainty doesn't exist, they deal with it head-on. Futurists forecast in the form of scenarios rather than predictions, and they use the uncertainty inherent in human systems to motivate people to action. This sounds like what actuaries should be doing—both the part about forecasting and the part about motivating people to action.

Whether it's the future of Social Security, health care in the United States, or the insurance industry around the world, when leaders act on actuaries' projections and recommendations about the future, it makes a real difference in the everyday lives of millions of people for generations to come. In this critical role, futurism tools and techniques augment the already powerful skill set that actuaries bring to the table.

A number of tools are at our disposal. Let's consider just two of them and see what can be learned from their application.

› **THE DELPHI METHOD**—Named after the Grecian site of prophecy and scholarly enquiry, the method (also known as the Delphi process) is a means of reaching consensus through structured consultation, such as through surveys, questionnaires, or e-mails and other communications, among a group of people who may have very different perspectives and fields of expertise. It's particularly useful where there's little or no published information on the subject under consideration. This technique, if used effectively, can be highly efficient and generate new knowledge. Paradoxically, a frequent side benefit of the method is the lack of complete consensus—even after consultation. Obviously, not all possible scenarios will play out, and knowing in advance the one that will play out simply isn't practical. But much can be learned from those that don't.

› **THE PREDICTIVE MARKET METHOD**—Predictive markets, or prediction markets, are speculative markets created for the sole purpose of making predictions. Assets are created whose final cash value is tied to a particular event (e.g., will the next president of the United States be a Republican) or parameter (e.g., will total sales next quarter exceed a million dollars).The current market prices can then be interpreted as predictions of the probability of the event or the expected value of the parameter. Other names for prediction markets include information markets, decision markets, idea futures, event derivatives, and virtual markets. All of these names have just a hint of the exotic about them. But all of them are descriptive of the method (and any peek into the future or into markets is always a bit exotic).

How effective are futurism techniques in helping to understand looming problems and issues? Consider a recent study sponsored by the SOA where participants deemed the following events to be the 10 most significant developments over the next two decades that could potentially affect selected economic variables in the study:

› Oil prices rising over $60 per barrel for at least five years;
› The dollar collapsing against the euro;
› Growing budget deficits, rising demand for services (e.g., health care), a stable or declining labor force, and growth in the number of retirees buffeting the consumer price index (CPI);
› New technologies dropping the costs of production for most products by 10 percent or more;
› Corporate defaults growing to triple the current rate;
› General confidence in the United States sagging and direct foreign investment dropping by 50 percent;
› Growing global political instability, including more Iraq-like wars and terrorist activities;
› New technologies improving productivity in services by more than 10 percent;
› The U.S. investment climate proving attractive;
› Globalization lowering labor costs by an average of 10 percent.

This study is less than two years old, and already there are a number of direct hits: oil, currency, CPI, technologies, confidence in the United States. And with minor substitutions, such as the subprime mortgage defaults for corporate defaults and terrorist states for terrorist activities, the hit rate is even more impressive.

Futurism at Work

› "Delphi Study of Economic Variables Report: A Study of the Future Course of Economic Variables Using Futures Research Techniques," www.soa.org/research/finance/research-delphi-study-of-economic-variables-report.aspx
› "Persistence of Individual Mortality Risk Differentials Utilizing a Modified Online Predictive Model," www.soa.org/research/life/research-ind-mort-risk.aspx
› "Study of the Effect of a Flu Pandemic on Economic Values Using the Delphi Method and Study of the Effect of a Flu Pandemic on Insured Mortality Using the Delphi Method", www.soa.org/research/life/research-impact-pan-influ-life-ins.aspx
› *Applied Futurism*: *An Introduction for Actuaries*, a study guide published by the Education and Examination Committee of the Society of Actuaries, www.soa.org/files/pdf/applied_futurism.pdf
› An extensive list of books, periodicals, and articles on futurism compiled by the SOA Futurism Section, is available online at www.soa.org/files/pdf/books_journals.pdf

Application of Futurism Techniques

Actuaries routinely develop model projections of assets, liabilities, risks, etc., and all of these projections require a complete set of assumptions to drive them. A number of sources are available for the derivation of these assumptions, ranging from company experience, the experience of a group of companies or of a similar company, and industry experience, to pure imagination. However, any of these has some limitation. At one end of the spectrum, the actuary may realize that historical company experience, even if credible for the next few iterations, may be entirely inappropriate for the long term. At the other end of the spectrum, utilization of one's pure imagination may be fun, and even informative, but can lack credibility in the eyes of senior management (or investors or regulators). Futurism techniques such as the Delphi method or the predictive market method may help to address those limitations.

A Delphi Method Study

Let's look at one recent SOA study that used the Delphi method for insight into the thought processes that experts utilized in judging the long-range (20-year) values of four U.S. economic variables: (i) annual increase in the CPI; (ii) 10-year Treasury

bond spot yields; (iii) S&P 500 Index total rate of return; and (iv) corporate Baa bond spot yields. The study asked what value these variables might achieve by 2024, what future events might determine the course of these variables, and the probability and impact of these events. (The complete study report, *Delphi Study of Economic Variables Report: A Study of the Future Course of Economic Variables Using Futures Research Techniques*, is available on the SOA website.)

A goal of the study was to produce a plausible range of opinions—not necessarily a consensus. Because the number of participants is usually small, Delphi studies don't (and aren't intended to) produce statistically significant results. They are expected to deliver a synthesis of the opinion of the particular group involved, no more and no less. In fact, the Delphi method is designed to encourage a true debate, independent of personalities. Anonymity is required, and no comments are attributed to specific participants. In this study, participants were asked for their estimates and reasons in the first round and were fed back these reasons, as well as emerging group medians, in the second round. At that time, they were also asked to reconsider their earlier responses. Two rounds of questions were used, with 28 participants in the first round and 24 participants in the second round. Of the 24 second-round participants, 12 identified themselves as actuaries with 10 or more years of experience; other participants were economists, investment managers, futurists, modelers, and scientists.

Participants were asked to rate the likelihood of future developments that were identified by the group, as well as the peak impact of each development, on the four economic variables. Participants also answered qualitative and quantitative questions about the usefulness of the study in enhancing actuarial processes that they used.

The quantitative results were intriguing. The range of forecasted economic variables was compared with a trend impact analysis model (TIA), performed using information gathered from participants and from statistical packages. The range between lowest and highest plausible values in the quantitative section was very wide. There was almost no shifting from the first to the second round, but, despite little change in the averages from the two rounds, narrative comments by participants showed that getting feedback from the first round caused some to reconsider their earlier answers. The TIA produced narrower ranges than the direct estimates of participants. The TIA median interest rates and CPI increase were significantly higher than the participants' expected values and the TIA's S&P 500 return significantly lower. (This relationship might sound familiar to those who have developed interest-sensitive products under deterministic and stochastic approaches.)

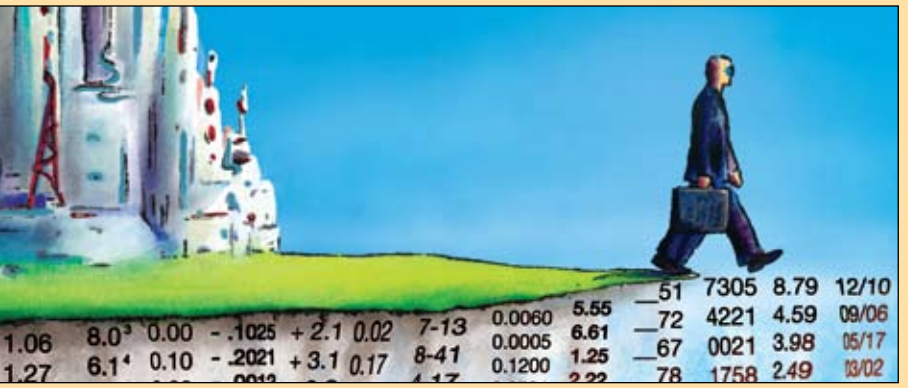
It was possible to use the Delphi method to collect judgments from participants about long-term forecasts of volatile economic variables and the reasons behind the quantitative answers. The opinions of those surveyed were widely separated and generally appeared to be based on individual mental models on the nature of the economy, the role of external events, and the effectiveness of regulatory institutions.

Most of the judgmental techniques and forecasts of the type used in the study were found by the participants to be extremely useful or essential. The two applications valued most highly were identification of potential developments that could affect forecasts and the validity of outliers that stochastic models may forecast.

Probably every actuary has a few concerns looming in the back of his or her mind that would benefit from the application of the Delphi method. Whether it's as broad as the future of the environment or the prospects for world peace, or as narrow as older age mortality rates among insured lives or the impact of a government program on health care costs and efficacy, the Delphi method allows experts to rethink their positions in light of differing opinions and rationales in a non-confrontational way. This feedback process broadens the scope of plausible future outcomes considered, as well as appropriate responses. In the end, it improves the likelihood of the best possible result.

A Predictive Market Method Study

Another recent study conducted by the SOA and Social Technologies, an independent research firm, used the predictive market method to look into the long-term effect of underwriting. According to a recently published report, *Persistence of the Preferred Risk Discount* (also available on the SOA website), the study used a modified version of an online predictive-market process to investigate the degree and extent to which preferred risks and risk premiums could be expected to persist over a 15-year and a 30-year time horizon. Participating in the study were 60 life industry experts, most of them



Why Study the Future?

The world changes so quickly it's hard to keep up. New inventions and innovations alter the way we live. People's values, attitudes, and beliefs are changing. And the pace of change keeps accelerating, making it difficult to prepare for tomorrow. By studying the future, people can better anticipate what lies ahead. More importantly, they can actively decide how they will live in the future, by making choices today and realizing the consequences of their decisions.

—The World Future Society (www.wfs.org)

from actuarial, underwriting, and medical insurance fields.

Typically, prediction markets create an artificial market for speculative bets that can be used to make more accurate collective predictions about the future. They allow participants with expert or relevant knowledge to aggregate and compare their information in a neutral environment, offering them frequent opportunities to revise or reassess their judgments. By trading artificial contracts, participants reveal a consensus opinion on outcomes.

While most conventional predictive markets have a short-term outcome that is clearly true or false, this study sought assessments of the future persistence of risk discounts and risk premiums—questions for which there will be no definitive answers for many years. As all actuaries know, such is the nature of pensions, life insurance, and annuities and, to some extent, health and long-term care insurance. To address this challenge, the study posed open-ended questions about the future expected duration of risk discounts and premiums but preserved the market metaphor and anonymous participation.

Some of the study findings were surprising. By their actions in the market, participants judged over two-thirds of the risk discount to persist for 30 years for issue at age 60. That is to say, by attained age 90, two-thirds of the benefits of preferred risk underwriting were judged to still be in effect. For issue at age 35, almost three-quarters of the risk discount was judged to persist. For risk premium, an even higher proportion was judged to persist for 30 years: over 95 percent for issue at age 35 and over 85 percent for issue at age 60. In other words, participants assumed that less of the risk discount persisted compared to the risk premium. This is contrary to the behavior of mortality risk discounts and risk premiums under the principle of conservation of deaths.

Again, after learning a little about prediction markets, stop and think of a few concerns looming in the back of your mind where this method might provide additional information and insight. When will the next major natural disaster occur, and what will the economic effect be? What are the odds of a major pandemic? And when will it occur? What will be the impact of genetic research on longevity in the next 10, 20, and 30 years?

Make Futurism Your Own

Whatever your area of actuarial practice, it's likely that you routinely consider distant future and uncertain events. You probably could benefit from another perspective. By using futurism techniques to anticipate, if not predict, some of those looming problems, you increase the quality of your advice and recommendations. Think of it as a gift to future generations. ●

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