A Note *from the Editor*

A question that I have heard many times goes something like this: "Do papers published in *Variance* have to present new and original research?" The answer is easy: "No! *Variance* is much more than a research journal." We highly value new research and must have a steady supply of research papers to publish, but the journal casts its net much wider.

The majority of *Variance* readers are practicing actuaries. Useful applications of research are appreciated. It's not easy to take theory and put it into practice. Just reading and understanding the theory, typically served with a large helping of Greek letters and mathematical symbols, takes more time and effort than many readers can spare. Papers that show realistic applications of theory promote the mission of *Variance* "to disseminate work of interest to casualty actuaries worldwide."

Descriptions of actuarial models or extensions to models can produce good *Variance* papers. Actuarial models are typically the synthesis of a number of tools. For example, in the first issue, Greg Taylor and Peter Mulquiney's paper on mortgage insurance uses Markov chains, GLMs, and simulation. Fitting all of the pieces together to create a realistic model is part science and part art.

Please share your perspectives of the insurance business and risk management with our readers. In this issue, Sholom Feldblum challenges state regulators and the actuarial community to reconsider the traditional insurance capital structure based on equity. He points out that equity is an expensive way to finance a business under U.S. tax code. Wouldn't many parties benefit from insurance companies raising a portion of their capital through some types of debt issuance?

Primers or summaries of less-well-known areas of actuarial practice are welcome. Roger Hayne contributed an excellent overview of extended service contracts to our first issue. We have all heard about these contracts—you can't buy anything that uses electricity without listening to a pitch for an extended service contract—but relatively few actuaries have practical experience pricing or reserving for them.

Variance is here to expose the best ideas to the actuarial community. If you have a good idea or model, *Variance* may be the place to share it!

Curtis Gary Dean

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Letters
to the Editor

Modeling Mortgage Insurance—Corrections and an Amplification

I would like to correct several errors in Appendix A of the paper by Taylor and Mulquiney ("Modeling Mortgage Insurance as a Multistate Process," *Variance*, Spring 2007, Vol. 1, Issue 1). In (A.3), the sign in front of the second occurrence of $(\lambda_{ha}+\lambda_{ah}+\lambda_{ap}-2\lambda_{ps})$ should be a plus instead of a minus. In (A.6), $(r_2-r_1)+$ should be $(r_2-r_1)\times$ in the term containing exp $-r_2$ and $(r_1-r_2)\times$ in the term containing exp $-r_1$. Also in (A.6), $-2\lambda_{ha}\lambda_{ps}^2$ should be $-2\lambda_{ha}^2\lambda_{ps}$, $-2\lambda_{ah}\lambda_{ps}^2$ should be $-2\lambda_{ah}^2\lambda_{ps}$, and $-2\lambda_{ap}\lambda_{ps}^2$ should be $-2\lambda_{ap}^2\lambda_{ps}$.

I would also like to note that the partial-quarter transition matrix $W(\alpha)$ can be written elegantly as

$$
\begin{bmatrix}
\frac{-r_2+\lambda_{ha}}{r_1-r_2} & \frac{-\lambda_{ha}}{r_1-r_2} & \frac{r_1 r_2}{(r_1-r_2)(r_1-\lambda_{ps})} & \frac{-r_2\lambda_{ps}}{(r_1-r_2)(r_1-\lambda_{ps})} \\
\frac{-\lambda_{ah}}{r_1-r_2} & \frac{r_1-\lambda_{ha}}{r_1-r_2} & \frac{r_1(r_2-\lambda_{ap})}{(r_1-r_2)(r_1-\lambda_{ps})} & \frac{-(r_2-\lambda_{ap})\lambda_{ps}}{(r_1-r_2)(r_1-\lambda_{ps})} \\
0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0
\end{bmatrix} e^{-r_1\alpha}
$$

$$
+\begin{bmatrix}
\frac{r_1-\lambda_{ha}}{r_1-r_2} & \frac{\lambda_{ha}}{r_1-r_2} & \frac{-r_1 r_2}{(r_1-r_2)(r_2-\lambda_{ps})} & \frac{r_1\lambda_{ps}}{(r_1-r_2)(r_2-\lambda_{ps})} \\
\frac{\lambda_{ah}}{r_1-r_2} & \frac{-r_2+\lambda_{ha}}{r_1-r_2} & \frac{-(r_1-\lambda_{ap})r_2}{(r_1-r_2)(r_2-\lambda_{ps})} & \frac{(r_1-\lambda_{ap})\lambda_{ps}}{(r_1-r_2)(r_2-\lambda_{ps})} \\
0 & 0 & 0 & 0 \\
0 & 0 & 0 & 0
\end{bmatrix} e^{-r_2\alpha}
$$

$$
+\begin{bmatrix}
0 & 0 & \frac{r_1 r_2}{(r_1-\lambda_{ps})(r_2-\lambda_{ps})} & \frac{-r_1 r_2}{(r_1-\lambda_{ps})(r_2-\lambda_{ps})} \\
0 & 0 & \frac{r_1 r_2-\lambda_{ap}\lambda_{ps}}{(r_1-\lambda_{ps})(r_2-\lambda_{ps})} & \frac{-r_1 r_2+\lambda_{ap}\lambda_{ps}}{(r_1-\lambda_{ps})(r_2-\lambda_{ps})} \\
0 & 0 & 1 & -1 \\
0 & 0 & 0 & 0
\end{bmatrix} e^{-\lambda_{ps}\alpha}
$$

$$
+\begin{bmatrix}
0 & 0 & 0 & 1 \\
0 & 0 & 0 & 1 \\
0 & 0 & 0 & 1 \\
0 & 0 & 0 & 1
\end{bmatrix},
$$

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where $r_1 = \frac{1}{2}\{\lambda_{ha} + \lambda_{ah} + \lambda_{ap} + [(\lambda_{ha} + \lambda_{ah} + \lambda_{ap})^2 - 4\lambda_{ha}\lambda_{ap}]^{\frac{1}{2}}\}$ and $r_2 = \frac{1}{2}\{\lambda_{ha} + \lambda_{ah} + \lambda_{ap} - [(\lambda_{ha} + \lambda_{ah} + \lambda_{ap})^2 - 4\lambda_{ha}\lambda_{ap}]^{\frac{1}{2}}\}$. To get the whole-quarter transition matrix, one simply substitutes 1 for α.

Each of the four terms is associated with one of the eigenvalues of the continuous-time transition matrix Q, which are $-r_1, -r_2, -\lambda_{ps}$, and 0, respectively. Each of the four matrices has rank one, with each column being a multiple of the eigenvector of Q associated with the term's eigenvalue and each row being a multiple of the eigenvector of Q^T associated with the term's eigenvalue.

—Clive L. Keatinge, FCAS

Defining Expected Value

I would like to take issue with Mark Shapland's use of the term "expected value" in his recent paper ("Loss Reserve Estimates: A Statistical Approach for Determining 'Reasonableness,'" *Variance*, Spring 2007, Vol. 1, Issue 1). He believes it is acceptable to call the sum of the expected value (in the traditional statistical sense) of a random variable (e.g., aggregate losses) and a quantity based on the variance of that random variable (e.g., a risk margin) an expected value. At one point he says, "In order to avoid confusion...the types of risk included in the calculation of expected value should be disclosed."

I suggest that, in order to avoid confusion, risk should never be included in the calculation of expected value. That is not to say that there is no room for a risk margin in reserves. However, let us call an expected value an expected value and a risk margin a risk margin. If we start mixing up our definitions, we will confuse not only ourselves, but everyone who relies on our services as well.

—Clive L. Keatinge, FCAS