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The Value of Information in Insurance Pricing: Reply

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A Point Well Taken

The reviewer is right that there is an error in Proposition 2. His discovery of this error is useful. Also, I believe that some of the work in Powers's Appendix could be extended to analyze the effect of accuracy on variance in various scenarios.

In the definition of a in formula (6) in Proposition 2 of my article, the exponent furthest to the left should be deleted. This extraneous exponent appeared in the second paragraph of the proof of Proposition 2 due to an error in substituting in the formula for μ. The error can be corrected in the original version without reference to Powers's reformulation of Proposition 2.

A Misinterpretation

The first general statement referred to as not true by Powers is: "Although not proven here, an increase in accuracy decreases both the mean and the variance of the expected losses of the risks chosen." Powers interprets the statement in a way which is not unreasonable but is not the way the statement was intended. An explanation of the intended meaning of the statement is as follows. Since the estimator is used in an attempt to select the best risks, increased accuracy will tend to limit the set of risks selected to the portion of the original distribution with lower expected losses, thereby reducing the variance.

It is possible to construct mathematical counterexamples, but my statement was made in the context of an example of an application, not in a technical discussion of Proposition 1 or Proposition 2. It was meant to apply in actual practice; that is, to actual insurance situations and estimators that might be used. Powers's counterexample involves an actuary "deliberately using methods that tended to overestimate."

The second statement Powers describes as incorrect was also made in the context of an example, and it also is meant to apply to insurers rather than to

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all possible mathematical estimators. I assume that $\mu_1 < \mu_2$ would be true in an actual application. It is not a realistic scenario if, when insurer B estimates higher expected losses, it is an indication that the expected losses are really lower.

If, as in Powers's example, $\sigma_1 = 0.5$, $\sigma_2 = 1.5$, and $\rho = 0.5$, then insurer B is an estimator such that the expected value of B's estimate decreases as the true expected value increases. This follows from the fact, based on the conditions stated in Proposition 1, that, if log(expected losses/m) = x, then the expected value of log(expected losses/estimate) equals $0.5(\sigma_2/\sigma_1)x = 1.5x$.