

# Letter of Intent

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## Title

The Value of High-Excess Commercial Insurance (working title)

## Description

Firms use property-casualty insurance as a source of “contingent capital.” That is, instead of setting aside capital to fund rare but extreme events, firms will purchase insurance.

High layer excess insurance, in particular, serves this purpose. Firms rarely access these layers, and the expected value of claims in those layers is minimal. As such, the insurance policy’s primary value is that it allows the firm to deploy the capital that it would otherwise need to set aside to weather an extreme loss event. Our research will focus on the measurement of this value.

Our research will have a “real-world” context, which recognizes that most large firms use (consulting) actuaries to value reserves. As such, our research will also consider the effect of the process that actuaries use to establish self-insured claim reserves. Specifically, our model will consider that the property-casualty reserving process recognizes claim costs (both retained and insured) gradually.

We believe that actuaries supporting the evaluation and negotiation commercial insurance contracts - for both the insurer and the insured - will be able to use the results of our research.

## Literature Review

Most of “capital” research in this area focuses on the insurer’s return on capital rather than the protection of the insured’s capital.

The research related to the insured’s preference focuses on utility theory (as a function of wealth) and that research is generally presented in the context of personal insurance coverages (such as homeowners). Capital protection and wealth maximization are related concepts and utility functions (generically) quantify insurance value. However, the research we reviewed differs from our approach which seeks to quantify of one specific aspect of the value of insurance.

We identified and reviewed the following papers in our literature review:

Macalaster, Spencer. Insurance as a Form of Capital. January 12, 2015. Described the issue conceptually but without measurement and does not mention the role of the actuary in establishing reserves.

Arrow, K.J. Essays in the Theory of Risk Bearing; Markham: Chicago, IL, USA, 1971. Arrow’s theorem is the cornerstone of the application of expected-utility theory in insurance

Raviv, A. The design of optimal insurance policy. Am. Econ. Rev. 1979, 69, 84–96. Used expected utility theory to measure value for an insured.

Gollier, C. Optimum insurance of approximate losses. J. Risk Insur. 1996, 63, 369–380. Also used expected utility theory to measure optimize the insured retentions.

Yaari, M. The dual theory of choice under risk. *Econometrica* 1987, 55, 95–115. The modification of expected utility theory

Kai A. Konrad; Stegrios Skaperds. Self-Insurance and Self-Protection: A Nonexpected Utility Analysis. *The Geneva Papers on Risk and Insurance Theory*, 1993-12, Vol.18 (2), p.131-146. Used rank-dependent expected utility preferences to measure value for an insured

Christophe Courbage. Self-Insurance, Self-Protection and Market Insurance within the Dual Theory of Choice. *The Geneva papers on risk and insurance theory*, 2001-06-01, Vol.26 (1), p.43-56. Used dual theory to measure value for an insured

Michael Merz; Mario V. Wüthrich, Demand of Insurance under the Cost-of-Capital Premium Calculation Principle. *Risks*, 2014, Vol.2(2), 226-248. Used risk premium approach to measure value for an insured

Bernard, C.; He, X.D.; Yan, J.-A.; Zhou, X.Y. Optimal insurance design under rank-dependent expected utility. In *Mathematical Finance*; SSRN Preprint: Waterloo, Canada, 2014. Used rank-dependent expected utility theory to measure value for an insured too

Laury, S.; M. Mcinnes, and J.Swarthout(2009). Insurance Decisions for Low-Probability Losses. *Journal of Risk and Uncertainty*, 39, 17–44. Used experimental evidence to show individual’s under-insure decision for low-probability high-loss events

Kunreuther, H.; Pauly, M. (2004). Neglecting disaster: Why don’t people insure against large losses? *Journal of Risk and Uncertainty*, 28, 5–21. Used utility theory to show the reason why individuals don’t insure low-probability and high-loss events

## **Funding**

- The rough estimate of our funding requirement would be \$15,000.

## **Other**

- Will provide a practical worked example with our research. We will construct the “data” and actuarial assumptions included in that example.
- We intend to submit our paper to either North American Actuarial Journal or Variance.

## **Author Information**

- Rajesh Sahasrabuddhe is a Fellow of the Casualty Actuarial Society, an Associate of the Canadian Institute of Actuaries and a Member of the American Academy of Actuaries. He has been providing actuarial consulting services since 1995 and is an active CAS volunteer. In addition to several papers that appear in the CAS Forum, he has co-authored a paper that appears in Variance. (That paper was selected for the Variance prize.)
- Zhenkai Zhu is a master’s degree student studying at the University of Connecticut. He is also pursuing the Associate of Society of Actuary credential.