



## ACADEMIC SEMINAR

# Bounded, Sigmoid Utility Functions in Insurance Economics

Applying a well-known argument of Karl Menger to an insurance version of the St. Petersburg Paradox, one can assert that von Neumann-Morgenstern utility functions are necessarily concave upward and bounded below as decision-maker wealth tends to negative infinity. However, this argument is subject to two criticisms: (1) infinite-mean losses do not exist in the real world; and (2) the St. Petersburg Paradox derives its force from empirical observation, and thus does not impart logical necessity. We show that, although infinite-mean insurance losses technically do not exist, they do provide a reasonable model for certain large property-liability indemnities. We then employ the Two-Envelope Paradox to demonstrate the logical necessity of concave-upward, lower-bounded utility for arbitrarily small (i.e., negative) values of wealth. Finally, we note that recognizing the bounded, sigmoid nature of utility functions challenges certain fundamental understandings in the economics of insurance demand.



## Professor Michael R. Powers

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Dr. Michael R. Powers is the Zurich Insurance Group Chair Professor of Risk Mathematics at Tsinghua University's School of Economics and Management. A 2011 recipient of China's *Qian Ren Ji Hua* award, he also serves as chief editor of the *Asia-Pacific Journal of Risk and Insurance*. Powers' research covers a variety of areas, including: government regulation and public policy; applications of game theory in risk and insurance; mathematical models in enterprise risk management; and cultural attitudes and risk finance. Dr. Powers joined Tsinghua from Temple University's Fox School of Business, where he was professor of risk management and insurance. Prior to that, he served as deputy insurance commissioner for the Commonwealth of Pennsylvania.

**Date:** 22 February 2018 (Thursday)

**Time:** 3:30 - 5:00 pm

**Venue:** SEK206, 2/F, Simon & Eleanor Kwok Building

**Language:** English

\*\*\* All are Welcome \*\*\*