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Hyperbolic Discounting: Implications for Actuarial Science and Financial Risk Management

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One of the foundational concepts in actuarial science and financial risk management is "present value" or "net present value": the idea that the theoretical value of any asset or liability is the present (or discounted) value of its future cash flows. Underlying even simple applications of this idea, however, are several essential assumptions, including (1) that we can appropriately identify both the timing and amount of the future cash flows; and (2) that we can determine the appropriate rate(s) at which to discount each cash flow. With respect to assumption (2), specific interest and discount rates potentially depend upon the totality of the environment in which the present value calculation is being made: current and expected financial and economic conditions, the degree of certainty regarding the cash flow being discounted, the behavioral characteristics (including the degree of risk aversion) of the individual or firm determining the PV, etc. Studies have shown that the traditional "exponential" discount factor framework does not necessarily describe empirical evidence about how people actually value things in the future. Instead, empirical studies have often observed a "hyperbolic" discounting pattern: relatively greater discounting in the short-term and relatively lower discounting in the long-term. And yet, the "exponential" approach to discounting is typically employed as the basis for the valuation of financial and risk management products and situations.

This presentation focuses on the mathematical underpinnings associated with the process of discounting future cash flows. We also investigate the economic and utility-theory framework underlying discounting, including from a behavioral perspective. We then examine the implications of potential alternatives such as hyperbolic discounting for actuarial science and financial risk management. Considering the current state of the economy and the impact of recent risk management and valuation issues, this project is both timely and relevant.