Valuing Embedded Options in Insurance Products

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Abstract

In this talk, I shall provide an overview on equity-linked insurance products and present a valuation method. The problem is motivated by the Guaranteed Minimum Death Benefits in various deferred annuities. The payment of the products depends on the price of a stock at that time and possibly also on the history of the stock price. Because each time-until-death distribution can be approximated by a combination of exponential distributions, the analysis is made for the case where the time until death is exponentially distributed. The time-until-death random variable is assumed to be independent of the stock price process. The logarithm of the index process can be a Brownian motion, a jump-diffusion process or a random walk. We are able to obtain closed-form formulas for the contingent call and put options, for lookback options, and for barrier options. (This talk is based on joint papers with Hans U. Gerber and Elias S.W. Shiu).