Stochastic Life Annuities

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Abstract: This paper gives analytic approximations for the distribution of a stochastic life annuity. It is assumed that returns follow a geometric Brownian motion. The distribution of the stochastic annuity may be used to answer questions such as ``What is the probability that an amount F is sufficient to fund a pension with annual amount y to a pensioner aged x?"" The main idea is to approximate the future lifetime distribution with a combination of exponentials, and then apply a known formula (due to Y or) related to the integral of geometric Brownian motion. The approximations are very accurate in the cases studied.