

## **Delta-Gamma hedging of mortality and interest rate risk**

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May 31, 2011

### **Abstract**

One of the major concerns of life insurers and pension funds is the increasing longevity of their beneficiaries. This paper studies the hedging problem of annuity cash flows when mortality and interest rates are stochastic. We first propose a Delta-Gamma hedging technique for mortality risk. The risk factor against which to hedge is the difference between the actual mortality intensity in the future and its "forecast" today, the forward intensity. We specialize the hedging technique first to the case in which mortality intensities are affine, then to Ornstein-Uhlenbeck and Feller processes, providing actuarial justifications for this selection. We show that, without imposing no arbitrage, we can get equivalent probability measures under which the HJM condition for no arbitrage is satisfied. Last, we extend our results to the presence of both interest rate and mortality risk. We provide a UK calibrated example of Delta-Gamma Hedging of both mortality and interest rate risk.