

Pricing and hedging of mortality linked securities

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Much of trading in practice consists of exchanging sequences of cash flows where payments occur at several points in time. This is the case also with mortality swaps and forward contracts. The payment schedule matters since, in practice, wealth cannot be transferred quite freely in time. This is in contrast with most pricing models of mathematical finance where arbitrary amounts of wealth (positive as well as negative) can be transferred in time through a numeraire asset.

In reality, traders base their price quotes on their existing positions, their market expectations as well as their appetites for risk. The effect of an existing position is a significant factor both for the insurer and the insured. This paper describes a general pricing framework for mortality linked securities that captures all the three factors above. The framework builds on the uncertain future cash flows associated both with the illiquid securities to be priced as well as the securities traded in existing markets. Our framework applies to general premiums that may have several payout dates. This allows, in particular, for finding the critical swap rate for an agent with given existing position, market expectations and risk preferences.

Our approach allows for computational implementations via simulation and optimization. The technique is illustrated with pricing of mortality linked securities written on Finnish male population.