



Objectives of the research on NNEG

- To give a more academically rigorous view than previously, given the increasing importance of the market.
- To consider appropriate stochastic models, including the range of demographic and economic factors taken into account, how they are modelled, and the correlations assumed. Any modelling should consider the range of ERM product features and options.
- To give a view on whether it is necessary to model all factors stochastically or could some factors (e.g. mortality) be valued deterministically without any great impact on the results.
- To consider practical approaches to approximating any models proposed.
- To consider whether it is reasonable to use closed form solutions based on Black Scholes (as adjusted) or whether there are alternative closed form solutions which might be better. It is recognised, for example, that the geometric Brownian Motion (GBM) underlying Black Scholes does not truly represent the ERM risks. However, the research proposal is interested in practical solutions, so closed form solutions such as Black Scholes should be supported (or at least not ruled out) if with suitable parameters and adjustments they gave similar results to stochastic modelling.
- To consider the relative merits of 'real world' and arbitrage free (risk neutral) methods and how the assumptions should be set on both bases. In the context of the insurance industry, particular attention is drawn to the different uses to which cashflows and value might be put and the importance of appropriately determining expected cashflows and future outcomes through the economic cycle, distinct from the current price or fair value, and the relationship between the two under different economic conditions, e.g. under a low risk free rate environment.
- To consider whether there are any "halfway house" solutions between real world and risk-neutral approaches given, in relation to the latter, the absence of a deep and liquid market. It should be noted that the 2007 paper suggested that there was a significant difference in the value of the NNEG on the two approaches.
- To consider the theoretical reasonableness of applying a deferred possession cap (positive deferment rate) on the projected ERM cashflows and on the value of the ERM assets and how this cap should be assessed under different economic conditions. For example, the implications when real yields are negative and resulting impact on the difference between real world and risk neutral cashflows.
- To provide results based on detailed modelling. The 2007 paper had a very simple model and it was felt that a more realistic approach was desired. However, it was recognised that there would be significant commercial constraints on providers giving information directly. It is considered that academic research based on real ERM data and past experience would add to the credibility of this research, compared to past professional and academic papers.
- To provide commentary in terms of theoretical coherence, consistency with current and historical market data, ease of implementation and explanation, and objectivity.