

Deep learning techniques in the context of economic capital and cash flow projections

Abstract:

Analysis and optimization of asset allocations within Solvency II metrics are cumbersome. The central challenges are the analysis and optimization for life insurance business with future profit sharing, where complex options and guarantees are embedded which cannot be evaluated using closed form pricing formulas:

1. Derivation of own funds dependent on market environment and asset allocation needs Monte Carlo simulations
2. Derivation of risk capital needs real world simulations of changes of own funds, which implies nested stochastic simulations (due to 1.)
3. Each variation of asset allocation needs a new derivation of step 1. and 2.

As these steps typically have a duration of several weeks, in practice only a few combinations are tested to derive an asset allocation. Deep learning techniques are a potential way to overcome these problems as they can be used to approximate the dependency of life insurance cash flows on asset allocations.