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Optimal dividends in with-profit insurance using stochastic control

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Abstract

We study optimal dividend payments and investments of the surplus of with-profit life insurance policies using continuous-time stochastic control. Under some simplifying assumptions, the control problem studied can be treated as a generalisation of the investment-consumption problem first set up and studied by Merton.

We use the dynamic programming method, by which the control problem boils down to solving a second order partial differential equation (PDE) called a *Hamilton-Jacobi- Bellman equation*. We consider cases where the policy holders display constant relative risk aversion, which implies first that the PDE has a semi-explicit solution and second that the optimal investment process is constant. The optimal dividend process is linear in the surplus.

We illustrate the results with simulations for a simple life annuity, where the PDE has an explicit solution.

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