On improving pension product design

The paper provides some guidelines to individuals with defined contribution (DC) pension plans on how to manage pension savings both before and after retirement. We argue that decisions regarding investment, annuity payments, and the size of death sum should not only depend on the individual’s age (or time left to retirement), nor should they solely depend on the risk preferences, but should also capture: 1) economical characteristics - such as current value on the pension savings account, expected pension contributions (mandatory and voluntary), and expected income after retirement (e.g. retirement state pension), and 2) personal characteristics - such as risk aversion, lifetime expectancy, preferable payout profile, bequest motive, and preferences on portfolio composition. Specifically, the decisions are optimal under the expected CRRA utility function and are subject to the constraints characterizing the individual. The problem is solved via a model that combines two optimization approaches: stochastic optimal control and multi-stage stochastic programming. The first method is common in financial and actuarial literature, but produces theoretical results. However, the latter, which is characteristic for operations research, has highly practical applications. We present the operations research methods which have potential to stimulate new thinking and add to actuarial practice.