

Optimal Asset Allocation of Pension Funds under Long-term VaR and ES Constraints

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We consider the optimal assets allocation strategy for a defined-contribution pension fund in the accumulation phase and decumulation phase. We model the optimal problem from the view of pension fund manager who is aiming at maximizing his expected utility of terminal fund wealth. The optimal problem is discussed in a general background where interest rate and salary are stochastic and the pension assets can be invested into three assets: riskless asset, stock and bond. Long-term Value-at-Risk is used as the constraints to control the contribution risk and solvency risk of pension fund. We find an analytic solution for the optimal problem without risk constraints and the necessary conditions for optimal problem with risk constraints. As complementarily, we process a numerical simulation to find the optimal path for investment strategies without and with risk constraints and compare the differences between the optimal investment strategies of the two cases.

Keywords: Value-at-Risk, Stochastic optimal control, Defined-contribution pension, Optimal asset allocation