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The Quasi-Monte Carlo Method in the cash flow testing simulations

Abstract

[Main Purpose]

The cash flow testing is a large-scale simulation pitting a company's current policy obligation against future earnings. The cash flow testing is mainly on the interest rate. The formula of the profit margin of the insurance company is:
Profit=
Premium+InvestmentIncome-DeathBen-SurrendBen-AquisitionCost-MaintenanceCost-ReserveIncrease-Tax

From the formula we can see results of cash-flow testing will be sensitive to certain assumptions:
• The rate at which policyholders will surrender their contracts, particularly in times of noncompetitive interest rates.
• The rate at which policyholders will continue to make premium payments on flexible premium products.
• Also important are assumptions regarding policy loan activity and penalty-free withdrawal utilization for policyholders.

The cash flow testing is now widely used to test the sensitivity of the interest rate. **The main purpose of the paper is to use Quasi-Monte Carlo method to simulate the change of the surrender rate**, which is also an important part of the profit margin. We also used the low discrepancy sequences instead of pseudo-random number in the simulation to overcome the large data volume problem.

[Main Process]

- Introduce the principles and the mathematic tools of cash flow testing and the Quasi-Monte Carlo method
- Examine the surrender rate model and discuss the one we used
- Introduce the low discrepancy sequences and examines how we accelerated convergence of the simulation by using the sequences of the originally posed constructions.
- Present the results of several simulations using actual corporate models

Reference:

Michael G. Hilgers Quasi-Monte Carlo methods in cash flow testing simulations, Proceedings of the 2000 Winter Simulation Conference.