A Finite Difference Approach to the Valuation of Path Dependent Life Insurance Liabilities

| Original Paper | Published: 01 June 2001

| Volume 26, pages 57–84, (2001) Cite this article

The Geneva Papers on Risk and Insurance Theory

Aims and scope →

Submit manuscript →

Bjarke Jensen[1], Peter Løchte Jørgensen[2] & Anders Grosen[3]

Abstract

This paper sets up a model for the valuation of traditional participating life insurance policies. These claims are characterized by their explicit interest rate guarantees and by various embedded option elements, such as bonus and surrender options. Owing to the structure of these contracts, the theory of contingent claims pricing is a particularly well-suited framework for the analysis of their valuation.

The eventual benefits (or *pay-offs*) from the contracts considered crucially depend on the history of returns on the insurance company's assets during the contract period. This path-dependence prohibits the derivation of closed-form valuation formulas but we demonstrate that the dimensionality of the problem can be reduced to allow for the development and implementation of a finite difference algorithm for fast and accurate numerical evaluation of the contracts. We also demonstrate how the fundamental financial model can be extended to allow for mortality risk and we provide a wide range of numerical pricing results.

Author information

Authors and Affiliations

SEB Fixed Income Research, Landemærket 10, Copenhagen K, DK-1119, Denmark

Bjarke Jensen

Department of Management, University of Aarhus, Bldg. 350, Aarhus C, DK-8000, Denmark

Peter Løchte Jørgensen

Department of Finance, Aarhus School of Business, Aarhus V, DK-8210, Denmark

Anders Grosen

Rights and permissions

About this article

Cite this article

Jensen, B., Jørgensen, P. & Grosen, A. A Finite Difference Approach to the Valuation of Path Dependent Life Insurance Liabilities. *Geneva Risk Insur Rev* **26**, 57–84 (2001).
https://doi.org/10.1023/A:1011264408187

Received	Revised	Published
07 July 2000	27 March 2001	01 June 2001

Issue date
01 June 2001
DOI
https://doi.org/10.1023/A:1011264408187

Keywords

participating life insurance policies | embedded options | contingent claim valuation | numerical solution | finite difference approach

Search

Search by keyword or author

Navigation

Find a journal

Publish with us

Track your research