

[Home](#) > [The Geneva Papers on Risk and Insurance Theory](#) > [Article](#)

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](#)

Download PDF 

 [Save article](#)

[View saved research](#) >



[The Geneva Papers on Risk and Insurance Theory](#)

[Aims and scope](#) →

[Submit manuscript](#) →

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

 879 Accesses  64 Citations  3 Altmetric [Explore all metrics](#) →

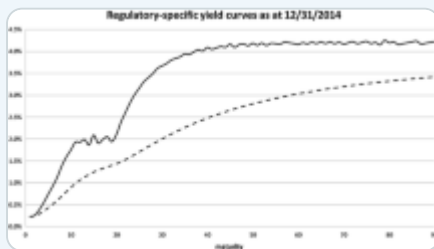
Abstract

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.

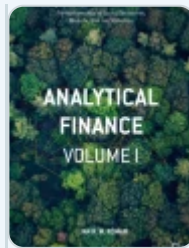
[Download](#) to read the full article text

Similar content being viewed by others



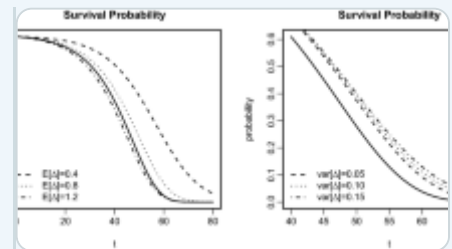
Market inconsistencies of market-consistent European life insurance economic valuations: pitfalls and...

Article | 07 February 2017



Pricing Using Deflators

Chapter | © 2017



The impact of longevity and investment risk on a portfolio of life insurance liabilities

Article | 12 June 2018

Explore related subjects

Discover the latest articles, books and news in related subjects, suggested using machine learning.

[Actuarial Mathematics](#)

[Applied Probability](#)

[Insurance](#)

[Mathematical Finance](#)

[Stochastic Integrals](#)

[Probabilistic Methods, Simulation and Stochastic Differential Equations](#)

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

[Reprints 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

07 July 2000

Issue date

01 June 2001

DOI

<https://doi.org/10.1023/A:1011264408187>

Revised

27 March 2001

Published

01 June 2001

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