



Scandinavian Actuarial Journal >

Volume 2008, 2008 - [Issue 2-3](#)

2,176 195

Views | CrossRef citations to date | 3 | Altmetric

ORIGINAL ARTICLES

# Modelling and management of mortality risk: a review

Andrew J. G. Cairns , David Blake & Kevin Dowd

Pages 79-113 | Published online: 12 Dec 2008

 Cite this article  <https://doi.org/10.1080/03461230802173608>

Sample our  
Economics, Finance,  
Business & Industry Journals  
>> **Sign in here** to start your access  
to the latest two volumes for 14 days



 Full Article

 Figures & data

 References

 Citations

 Metrics

 Reprints & Permissions

Read this article

 Share

## Abstract

In the first part of the paper, we consider the wide range of extrapolative stochastic mortality models that have been proposed over the last 15–20 years. A number of models that we consider are framed in discrete time and place emphasis on the statistical aspects of modelling and forecasting. We discuss how these models can be evaluated, compared and contrasted. We also discuss a discrete-time market model that facilitates valuation of mortality-linked contracts with embedded options. We then review several approaches to modelling mortality in continuous time. These models tend to be simpler in nature, but make it possible to examine the potential for dynamic hedging of mortality risk. Finally, we review a range of financial instruments (traded and over-the-counter) that could be used to hedge mortality risk. Some of these, such as mortality swaps, already exist, while others anticipate future developments in the market.

Keywords:

- Stochastic mortality models
- Short-rate models
- Market models
- Cohort effect
- SCOR market model
- Mortality-linked securities
- Mortality swaps
- q-forwards

# Notes

- <sup>1</sup>In our notation the subscript  $c$  in  $m_c(t, x)$  distinguishes the crude or actual death rate from the underlying or expected death rate.
- <sup>2</sup>To date, we are unaware of any studies that have explicitly attempted to model the exposures as unobserved variables.
- <sup>3</sup>The discrete-time models described in Section 4 can all be described as short-rate models, with the exception of the market model in Section 4.7.

## Related Research Data

[Interest Rate Models Theory and Practice](#)  
Source: Unknown Repository

[The Cohort Effect: Insights and Explanations](#)  
Source: British Actuarial Journal

[The fair value of guaranteed annuity options](#)  
Source: Scandinavian Actuarial Journal

[Evaluating the performance of the lee-carter method for forecasting mortality](#)  
Source: Demography

[Using Age, Period and Cohort Models to Estimate Future Mortality Rates](#)  
Source: International Journal of Epidemiology

[Affine Processes for Dynamic Mortality and Actuarial Valuations](#)  
Source: SSRN Electronic Journal

[Smoothing and forecasting mortality rates](#)  
Source: Statistical Modelling

[Mortality modelling with Lévy processes](#)

## Information for

[Authors](#)

[R&D professionals](#)

[Editors](#)

[Librarians](#)

[Societies](#)

## Opportunities

[Reprints and e-prints](#)

[Advertising solutions](#)

[Accelerated publication](#)

[Corporate access solutions](#)

## Open access

[Overview](#)

[Open journals](#)

[Open Select](#)

[Dove Medical Press](#)

[F1000Research](#)

## Help and information

[Help and contact](#)

[Newsroom](#)

[All journals](#)

[Books](#)

## Keep up to date

Register to receive personalised research and resources by email



[Sign me up](#)



Copyright © 2025 Informa UK Limited [Privacy policy](#) [Cookies](#) [Terms & conditions](#)

[Accessibility](#)

 Taylor and Francis Group

Registered in England & Wales No. 01072954  
5 Howick Place | London | SW1P 1WG