Postdoctoral Research Fellowship in

Modelling, Measurement and Management of Longevity and Morbidity Risk

The Department of Actuarial Mathematics and Statistics at Heriot-Watt University seeks to appoint a full-time research fellows for a period of three years each (or part-time equivalent) to join an established team of researchers working on the theme of longevity, mortality and morbidity risks. The position has been funded by the Actuarial Research Centre of the Institute and Faculty of Actuaries, and offers the successful candidate the opportunity to engage in a range of outward looking projects motivated by real-world problems arising in the insurance and pensions industry.

Research programme leader: Professor Andrew Cairns

Salary: £31,076 per annum plus pension benefits

Closing date for applications: 7 April 2017

Start date: ideally not later than 30 June 2017

About our team

The School of Mathematical and Computer Sciences of Heriot Watt University is internationally renowned in actuarial science and financial risk through the world-leading research activities of its Department of Actuarial Mathematics and Statistics. The School is a partner of the Scottish Financial Risk Academy, founded in 2010 by a consortium led by Heriot-Watt University and the University of Edinburgh and comprising several member companies. The School is also a constituent part of the Maxwell Institute, an international centre of excellence, based in Edinburgh, covering the whole range of the mathematical science.

The Longevity, Mortality and Morbidity research team, led by Professor Andrew Cairns and Professor Angus Macdonald has an established worldwide reputation in the development of statistical methods and models for the analysis and management of longevity, mortality and morbidity risks.

Additional team members are based at Cass Business School, the University of Southampton, the University of California Santa Barbara, the University of Aarhus, and Longevitas.

Detailed Description

Applications are invited for two Postdoctoral Research Fellows to join the 4 year research programme on "Modelling, Measurement and Management of Longevity and Morbidity Risk" funded by the Actuarial Research Centre of the Institute and Faculty of Actuaries. The successful candidate will work with world renowned researchers Professor Andrew Cairns (Director of the Actuarial Research Centre), Professor Angus Macdonald, Dr George Streftaris and Dr Torsten Kleinow in the Department of Actuarial Mathematics and Statistics. They will work on development of new statistical models that will advance the ability of insurers and pension plans to measure the mortality and morbidity risks that they carry, and to develop innovative new strategies for the management of these risks. One of the research fellows will also work on the development of risk management strategies for longevity risk.

Recent decades have seen significant changes in mortality and morbidity rates with a corresponding impact on the financial calculations carried out by pension plans and insurers. Alongside these developments we have seen greater focus in actuarial work on how to price and reserve for the corresponding liabilities, and rapid development of mathematical and statistical models to underpin this work.

The research programme aims to take this modelling work to a higher level still that will be world-leading in the modelling, measurement and management of longevity and morbidity risk.

The research programme will tackle problems that are of primary interest to industry (facilitated by a workshop early on) and other external stakeholders to maximise the potential impact of the outputs.

The research programme will cover the following four projects:

- Development of the next generation of single and multi-population mortality models that are robust, straightforward to apply and that are designed explicitly to push back the barriers to financial innovation. The work will produce ground-breaking insights into the risks associated with deferred pensions and the nature of how different populations interact.
- Development of a robust, scientific approach that helps key stakeholders to understand better the wider range of options for managing longevity risk. Questions that we will address include: how to quantify the benefits of those options; how to reach decisions on the best choice; and how does the balance shift when counterparties disagree on the pricing basis. We aim to develop a toolkit that will help practitioners innovate and expand significantly the market's potential for longevity risk transfer.
- Developing open access modelling of the key drivers of mortality such as smoking, obesity and other lifestyle factors and understanding how these interact with all-cause mortality and cause-of-death mortality data. These will help inform actuaries about the potential future scenarios.
- Development of new methods for pricing and reserving for Critical Illness Insurance, including: Bayesian rate forecasting that takes into account emerging trends in morbidity; consideration of flexible distributions to describe the uncertainty in the delay between claim

diagnosis and settlement; and the use of recently developed statistical tools for model assessment that combine Bayesian and classical approaches.

The research fellow will work on two out of these four projects.

Key duties and responsibilities

The successful applicant will:

- carry out work in discussion with and under the direction of the principal investigator and co-investigators;
- work independently and as part of the research team to develop innovative new models for longevity, mortality and morbidity risks;
- work on the construction of new datasets (acquisition, validation and data cleaning), such as sub-population mortality data, including liaison with a variety of data providers;
- contribute to the development of new solutions to individual problems, and new lines of investigation;
- carry out numerical and programming work to assist in the development of solutions to risk analysis and risk management problems;
- play a significant role in the writing of research papers;
- present the results of their research to a variety of audiences, including practitioners in the UK and internationally.

Education, Qualifications and Experience

- Minimum qualification: Doctorate. To be considered for the role, you will have a PhD in a relevant subject such as actuarial science, statistics and econometrics. Candidates with a relevant PhD in the medical or biological sciences with a strong statistical element might also be considered.

Additionally:

- you will have begun to develop a track record of publication in international journals;
- will have specific skills and knowledge in the some of the fields of mortality and morbidity risk, computational statistical methods, computational Bayesian methods, simulation methods, graphical presentation of complex data, econometrics, fast computation of complex statistical problems;
- you will have the skill to present the results of your research to a variety of audiences from academics through to interested practitioners;
- you will be highly skilled in programming in R, Matlab, C++ or another relevant language or package, and be able to use this skill to solve a range of statistical and stochastic modelling problems;
- you will be highly skilled in numerical statistical and mathematical methods, and be able to use this skill to solve a range of statistical and stochastic modelling problems;

- you will have the ability to learn and use other relevant computing languages where these are appropriate for the underpinning research and knowledge exchange activities;
- you will have the ability to work independently and develop your own ideas on how to tackle specific research questions.

Further details

If you wish to discuss the role further, please contact the Research Programme Director, Professor Andrew Cairns (A.J.G.Cairns@hw.ac.uk).

Applications

Formal applications must be submitted online at

https://www.hw.ac.uk/about/careers/job-opportunities.htm

At the application stage it will be helpful if you could include:

- Your CV
- A personal statement that addresses the following points (not in any particular order):
    - What is your motivation for applying for a postdoctoral position in the Department of Actuarial Mathematics at Heriot-Watt University?
    - What are your medium term career goals?
    - How will your experiences as a postdoc help you achieve these goals?
    - What general lines of research in actuarial science or quantitative risk management linked to the two programmes above would you prefer to work in if you were to be appointed to an ARC postdoctoral position?
    - Are you currently a member of a professional actuarial association or other professional body, or do you intend to join one in the future?
- Transcripts for your BSc and MSc degrees or equivalent
- The names and contact details of two academic referees

Please also email these items directly to Professor Andrew Cairns (A.J.G.Cairns@hw.ac.uk).