

**CEPAR LONGEVITY RISK WORKSHOP PROGRAM**  
***Longevity Risk – Mortality modelling, Products and Risk Management***  
 27 November 2019, UNSW, Sydney

**Location:**

*Mathews Building (Map Ref F23)*  
*Room 214*

8.45AM	<b>Registration</b>
9.00AM	<p><b>Ermanno Pitacco, University of Trieste</b></p> <p><b>“From Gompertz to frailty models: mortality modeling for actuarial applications”.</b></p> <p>This presentation will provide a survey on “mortality laws”, with special focus on actuarial applications. The survey will start from the seminal contribution by B. Gompertz, the first mortality model based on biological assumptions. Various generalizations of the Gompertz law will then be addressed. Special attention will be placed on heterogeneity in mortality, caused by both observable and unobservable risk factors. In particular, frailty models will be presented, and relevant implementations in the field of life annuities and disability insurance will be discussed.</p>
10.00AM	<b>BREAK</b>
10.15AM	<p><b>Andrés Villegas, UNSW Sydney</b></p> <p><b>“Developments in the application of data analytics techniques to mortality modelling”</b></p> <p>This presentation will discuss application of data analytics techniques to the modelling of mortality. We will start by providing a survey of the recent literature applying modern statistical learning techniques to the projection and forecasting of mortality rates and life expectancy. We will then focus on a case study looking at the use of regularisation and cross-validation techniques in the automatic construction of mortality projection models. We will finish by outlining possible future directions on the use of statistical learning and machine learning for improving mortality forecasts.</p>
11.15AM	<b>BREAK</b>
11.30AM	<p><b>Michael Sherris, UNSW Sydney</b></p> <p><b>“Developments in multi-factor continuous time mortality modelling.”</b></p>

This presentation will introduce continuous-time multi-factor mortality models covering the dynamics of mortality rates, closed-form expressions for survival curves. Application of models to age-period and age-cohort data as well as multi-cohort models will be introduced. The Kalman filter and estimation of the models will be covered highlighting how Poisson variation can be incorporated into the model estimation. A comparison of fits and prediction using historical US mortality data will be used to assess model performance. Applications of the models are discussed including quantifying price of mortality risk using Blackrock CORI indices.

12.30PM

**LUNCH BREAK**

1.30PM

**Runhuan Feng, University of Illinois**

**“Fundamentals of variable annuity market, product designs and latest technical developments.”**

Variable annuities are hybrids of traditional life insurance and financial derivatives. The challenges from the modeling and risk management of these products stem from complex guaranteed benefits, dynamic policyholder behavior, and the interaction of mortality and financial risks. Today's computational power and technology make it possible for the life industry to develop highly sophisticated models. Nonetheless, the demand for computational power continues to grow. While the industry continues to rely heavily on hardware innovations, we are approaching a crossroads about how to proceed. In this talk, we review fundamental principles underlying industrial modeling practice and latest development in the academia for modeling of new product features and computational efficiency.

2.30PM

**BREAK**

3.00PM

**Jonathan Ziveyi, UNSW Sydney**

**“A value -based longevity index: a consistent framework for valuation of longevity-linked products and basis risk quantification”**

In this presentation we propose a universal value-based longevity index constructed from blending a multi-population affine term structure model for mortality evolution along with a dynamic Nelson-Siegel model for the dynamics of interest rates. We examine effectiveness of the index in hedging retirement income portfolios by presenting illustrative examples with the aid of US economic and population data where we note significant reduction in basis risk relative to indices based purely on mortality rates. We also note that interest rate and inflation risks can also materially influence the value of longevity-linked liabilities.

4.00PM

**WORKSHOP CONCLUDES**