

## **George Tzougas – Curriculum Vitae**

**Office Address::** Heriot Watt University, School of Mathematical and Computer Sciences, Department of Actuarial Mathematics and Statistics Edinburgh, EH14 4AS, United Kingdom **e-mail:** [George.Tzougas@hw.ac.uk](mailto:George.Tzougas@hw.ac.uk)

### **Academic Qualifications**

- Doctor of Philosophy Degree in Statistics and Actuarial Science (2008-2013) - Department of Statistics, Athens University of Economics and Business.
- Master of Science Degree in Statistics and Actuarial Science (2006-2008) - Department of Statistics, Athens University of Economics and Business.
- Bachelor of Science in Mathematics (2001-2006) - Department of Mathematics, Athens University.

### **Present and Previous Employment**

- 2021-present: Associate Professor – Heriot Watt University
- 2018-2021: Assistant Professor - London School of Economics and Political Science.
- 2016-2018: Fellow in Statistics - London School of Economics and Political Science.
- 2015-2016: Lecturer in Statistics - School of Mathematical Sciences, Department of Statistics, University College Cork.
- 2014-2015: Post-doctoral Research Fellow - Department of Statistics, Athens University of Economics and Business.
- 2013-2014: External Actuarial Consultant for SANY Consulting Ltd.
- 2004-2005: Participation in several stages of the project: “A Risk Analysis Information System”, Ministry of National Economy and Finance, Athens, Greece.

### **Professional Activities and Administrative Duties**

- 2021-present: Academic Director of the Scottish Financial Risk Academy, HW.

[Home | Sfra \(sfrascottishfinancialriskacademy.com\)](http://sfrascottishfinancialriskacademy.com)

Note: As the Academic Director of the SFRA, my plan is to organize conferences that facilitate interaction between industry professionals and academia. I will also strive to provide projects to MSc students and utilize my industry contacts to secure funding for myself and my colleagues. It is my aspiration to establish our Department as a world-leading institution in the fields of the impact of climate change on insurance, the application of statistical learning methods for actuaries, pensions, cyber insurance, and the modeling and management of mortality risk.

- 2018-2021: Programme Director for the BSc in Actuarial Science degree, LSE.
- 2018-2021 Liaison Officer with the Institute and Faculty of Actuaries, LSE.
- 2018-2021 Responsible for BSc Admissions in Actuarial Science, LSE.
- 2018-2021 Mentor to undergraduate students, Department of Statistics, LSE Professional Activities
- Chair of the Statistical Learning in Actuarial Applications Working Party in the IFoA Data Science Research Section: Statistical Learning in Actuarial Applications WP - IFoA Data Science Research Section  
[Statistical Learning in Actuarial Applications WP - IFoA Data Science Research Section](#)
- Member of the American Risk and Insurance Association
- Fellow of the Royal Statistical Society
- Member of the reviewer board of MDPI's Risks journal:  
[https://www.mdpi.com/journal/risks/submission\\_reviewers](https://www.mdpi.com/journal/risks/submission_reviewers)
- Member of the Scientific Advisory Board for OWARS

### **Awards**

1. Scor Actuarial Award, Spain and Portugal, 2023. For the paper "Social Risk Management during the First stage of a Pandemic: Application to COVID-19" which I co-authored with Carmen Boado-Penas, Julia Eisenberg and Sule Sahin.
2. Highly commended award, IFoA Best Paper Prizes, 2021. For the paper 'Insurance ratemaking using the Exponential-Lognormal regression model' which I co-authored with my former undergraduate students Mr Woo Hee Yik and Mr Muhammad Waqar Mustaqeem.
3. Excellence in Education Award, London School of Economics and Political Science , 2019- 2020.
4. Excellence in Education Award, London School of Economics and Political Science , 2018- 2019.
5. LSESU Teaching Excellence Award for Excellent Feedback and Communication, 2018-2019
6. Excellence in Education Award, London School of Economics and Political Science , 2017- 2018.
7. Best Class Teacher Award, London School of Economics and Political Science, 2016-2017

### **Research Grants**

1. **2022-2024: Primary Investigator for the Research Project "Carbon Dioxide Price Forecasting and Investigation of Spillover Effects Between Different Carbon Markets"**
  - The project is funded by the Philanthropic Funding in European and Financial Studies
  - Funding amount: 32,817 pounds

- **Project Description**

We employ time series models and hybrid time series-neural network models to forecast carbon prices and their volatility whilst incorporating the time-varying impact of asymmetric information and extreme factors onto the forecasting model in order to help investors formulate investment strategies. Furthermore, we utilize copula-based models to examine the spill over effect between the EU and UK carbon markets by investigating how EU carbon prices can impact the UK ones. For this purpose, we use continuous futures contracts from both EU and UK data sets. We also examine the price variance in conjunction to pollution exposure gap as well as the impact of carbon price differentials on low-income populations and communities.

- **Project Team**

PI, Dr George Tzougas  
 CI, Professor Andreas Tsanakas, Bayes Business School  
 CI, Dr Rui Zhou, Bayes Business School  
 CI, Dr Despoina Makariou, University of St Gallen  
 CI, Dr Joe Meagher, Hymans Robertson  
 Research Associates, Zezhun Chen and Konstantinos Bisiotis

## 2. 2021-present: Co-Investigator for Research Risk in Decarbonisation Finance

- The project is funded by UKRI

- **Project Description**

We look at financial instruments that have been used to finance decarbonisation and seek to deliver a comprehensive review of risks. This includes an assessment of whether current premiums correctly reflect these risks and whether evaluations comply with regulatory guidelines and ESG indexes. We work to identify resilient structures among the finance networks of decarbonisation and identify other risk frameworks, such as ecological or policy risk. Beyond academic output we intend to develop a practical decision framework for funding decarbonisation.

[George Tzougas - YouTube](#)

- **Project Team**

[MIP 3.3 Risk in decarbonisation finance | IDRIC](#)

### Research Interests

- Mixture models
- Distribution theory
- Computational statistics
- Data science
- Actuarial modelling
- Copulas

- Hybrid neural networks -regression models
- INAR models
- Impact of climate change to finance and insurance

### **Publications**

1. Jeong, H., Tzougas, G., & Fung, T. C. "Multivariate claim count regression model with varying dispersion and dependence parameters." *\*Journal of the Royal Statistical Society Series A: Statistics in Society\**, 186(3), 2023.
2. Chen, Z., Dassios, A., & Tzougas, G. "EM estimation for bivariate mixed Poisson INAR (1) claim count regression models with correlated random effects." *\*European Actuarial Journal\**, 1-31, 2023.
3. Fung, T. C., Tzougas, G., & Wüthrich, M. V. "Mixture composite regression models with multi-type feature selection." *\*North American Actuarial Journal\**, 27(2), 396-428, 2023.
4. Fung, T. C., Jeong, H., & Tzougas, G. "Soft splicing model: bridging the gap between composite model and finite mixture model." *\*Scandinavian Actuarial Journal\**, 1-30, 2023.
5. Chen, Z., Dassios, A., & Tzougas, G. "Multivariate mixed Poisson Generalized Inverse Gaussian INAR (1) regression." *\*Computational Statistics\**, 38(2), 955-977, 2023.
6. Chen, Z., Dassios, A., & Tzougas, G. "INAR approximation of bivariate linear birth and death process." *\*Statistical Inference for Stochastic Processes\**, 1-39, 2023.
7. Aradhye, G., Tzougas, G., & Bhati, D. "EM estimation for the mixed Pareto regression model for claim severities." *\*Communications in Statistics-Theory and Methods\**, 1-17, 2023.
8. Tzougas, G., & Kutzkov, K. "Enhancing Logistic Regression Using Neural Networks for Classification in Actuarial Learning." *\*Algorithms\**, 16(2), 99, 2023.
9. Tzougas, G., Dang, V., John, A., Kroustalis, S., Dey, D., & Kutzkov, K. "Classification of climate-related insurance claims using gradient boosting." *\*Anales del Instituto de Actuarios Españoles\**, 149-168, 2022.
10. Tzougas, G., & Makariou, D. "The multivariate Poisson-Generalized Inverse Gaussian claim count regression model with varying dispersion and shape parameters." *\*Risk Management and Insurance Review\**, 25(4), 401-417, 2022.
11. Jose, A., Macdonald, A. S., Tzougas, G., & Streftaris, G. "A combined neural network approach for the prediction of admission rates related to respiratory diseases." *\*Risks\**, 10(11), 217, 2022.
12. Chen, Z., Dassios, A., & Tzougas, G. "EM estimation for the bivariate mixed exponential regression model." *\*Risks\**, 10(5), 105, 2022.
13. Tzougas, G., Hong, N., & Ho, R. "Mixed Poisson regression models with varying dispersion arising from non-conjugate mixing distributions." *\*Algorithms\**, 1, 2022.

14. Makariou, D., Barrieu, P., & Tzougas, G. "A finite mixture modelling perspective for combining experts' opinions with an application to quantile-based risk measures." *\*Risks\**, 9(6), 115, 2021.
15. Tzougas, G., & Jeong, H. "An expectation-maximization algorithm for the exponential-generalized inverse gaussian regression model with varying dispersion and shape for modelling the aggregate claim amount." *\*Risks\**, 9(1), 19, 2021.
16. Chen, Z., Dassios, A., & Tzougas, G. "A First Order Binomial Mixed Poisson Integer-valued Autoregressive Model with Serially Dependent innovations." *\*Journal of Applied Statistics\**, 1, 2021.
17. Tzougas, G., & di Cerchiara, A. P. "The Multivariate Mixed Negative Binomial Regression Model with an Application to a Posteriori Ratemaking." *\*Insurance: Mathematics and Economics\**, 11, 2021.
18. Tzougas, G., & di Cerchiara, A. P. "Bivariate Mixed Poisson Regression Models with Varying Dispersion." *\*North American Actuarial Journal\**, 4, 2021.
19. Tzougas, G. "EM estimation for the Poisson-inverse gamma regression model with varying dispersion: an application to insurance ratemaking." *\*Risks\**, 8(3), 97, 2020.
20. Tzougas, G., & Karlis, D. "An EM algorithm for fitting a new class of mixed exponential regression models with varying dispersion." *\*ASTIN Bulletin: The Journal of the IAA\**, 50(2), 555-583, 2020.
21. Tzougas, G., Yik, W. H., & Mustaqeem, M. W. "Insurance ratemaking using the Exponential-Lognormal regression model." *\*Annals of Actuarial Science\**, 14(1), 42-71, 2020.
22. Tzougas, G., Hoon, W. L., & Lim, J. M. "The negative binomial-inverse Gaussian regression model with an application to insurance ratemaking." *\*European Actuarial Journal\**, 9, 323-344, 2019.
23. Karlis, D., Tzougas, G., & Frangos, N. "Confidence intervals of the premiums of optimal bonus malus systems." *\*Scandinavian Actuarial Journal\**, 2018(2), 129-144
24. Tzougas, G., Vrontos, S., & Frangos, N. "Bonus-malus systems with two-component mixture models arising from different parametric families." *\*North American Actuarial Journal\**, 22(1), 55-91, 2018.
25. Tzougas, G., Vrontos, S., & Frangos, N. "Risk classification for claim counts and losses using regression models for location, scale and shape." *\*Variance\**, 9(1), 140-157, 2015.
26. Tzougas, G., Vrontos, S., & Frangos, N. "Optimal bonus-malus systems using finite mixture models." *\*ASTIN Bulletin: The Journal of the IAA\**, 44(2), 417-444, 2014.
27. Tzougas, G., & Frangos, N. "The design of an optimal bonus-malus system based on the Sichel distribution." *\*Modern problems in insurance mathematics\**, 239-260.

## **Invited Talks**

1. Eugenides Foundation , Impact of Climate Change to Finance and Insurance, 2023, Athens, Greece.
2. Local Mixed Poisson Net for Claim Frequencies. University of Sheffield , 2022, UK.
3. Neural Network Embedding of the Negative Binomial Regression Model for Claim Frequencies. One World Actuarial Research Seminar., 5th May 2021.
4. An EM Type Algorithm for fitting general family of mixed exponential models applied to heavy-tailed losses. Talks in Financial and Insurance Mathematics. Research Seminar organized by ETH Zurich, 26th March, 2020, Zurich.
5. An EM type algorithm for maximum likelihood estimation of the negative binomial-gamma regression model: Invited to to talk at the Economic Risk Seminar organized by the at the School of Business and Economics of the Humboldt-Universität zu Berlin at Spandauer Straße 1, 16 July 2018.
6. Risk Classification for Claim Counts and Losses Using Regression Models for Location, Scale and Shape. Invited to talk at the Spring Meeting of the Casualty Actuarial Society, 15-18 May 2016, Seattle.

## **Research Students**

- **Postdoctoral Research Associates:**
  1. Zezhun Chen, ,Heriot Watt University, School of Mathematical and Computer Sciences, Department of Actuarial Mathematics and Statistics.
  2. Konstantinos Bisiotis, , Heriot Watt University, School of Mathematical and Computer Sciences, Department of Actuarial Mathematics and Statistics.
- **PhD Students:**
  1. 2022-present: Yubo Rasmussen Heriot Watt University, School of Mathematical and Computer Sciences, Department of Actuarial Mathematics and Statistics
  2. 2021-present: Yusuf Ismaila, Heriot Watt University, School of Mathematical and Computer Sciences, Department of Actuarial Mathematics and Statistics
  3. 2022-present: Gudmundarson Ragnar, Heriot Watt University, School of Mathematical and Computer Sciences, Department of Actuarial Mathematics and Statistics
  4. 2021-present: Alex, Jose, Heriot Watt University, School of Mathematical and Computer Sciences, Department of Actuarial Mathematics and Statistics
  5. 2021-present: Zezhun Chen, Department of Statistics, LSE Current (co-advising with Prof. Angelos Dassios and Dr Erik Baurdoux)
  6. 2018-2021: Alice Pignatelli di Cerchiara, Department of Statistics, LSE Current (co-advising with Dr Erik Baurdoux and Prof. Angelos Dassios)
- **Undergraduate Research Students:**

1. 2019-2020: Ryan Ho and Natalia Hong
2. 2018-2019: Woo Hee Yik and Waqar Mustaqeem
3. 2016-2017: Lim J.M. and Hoon, W.L.

### **Teaching Experience**

#### **• Department of Actuarial Mathematics and Statistics, Heriot-Watt University (2021-)**

- Lecturer for the postgraduate course F71RA Machine Learning for Risk and Insurance 1.

#### **• Department of Statistics, London School of Economics and Political Science (2016-2021)**

- Lecturer for the undergraduate course ST306 Actuarial Mathematics (General).

- Lecturer for the undergraduate course ST227 Survival Models

- Lecturer for the undergraduate course ST301 Actuarial Mathematics (Life).

- Lecturer for the postgraduate course ST440 Recent Developments In Finance and Insurance.

- Lecturer for the undergraduate course Sample Surveys and Experiments ST205

- Lecturer for the postgraduate course ST433 Computational Methods in Finance and Insurance

- Lecturer for the undergraduate course SO102 Statistics in Society (Part II)

- Class Teacher for the undergraduate course ST304 Time Series and Forecasting

- Class Teacher for the undergraduate course ST308 Bayesian Inference

#### **• School of Mathematical Sciences, Department of Statistics, University College Cork (2015- 2016)**

- Lecturer for the fourth year undergraduate/postgraduate course Statistical Methods in Insurance ST4055

- Lecturer for the third year undergraduate course Data Analysis I ST3300 - Design and delivery of one of the four topics of the fourth year undergraduate module Computational Statistical Methods for Actuarial Science ST4072

- Lecturer for the second year undergraduate course Introduction to Biostatistics ST2001 - Lecturer for the first year undergraduate course Introduction to Statistics MS1004

- Lecturer for the third year undergraduate module Biostatistics I ST3001

#### **• Department of Statistics, Athens University of Economics and Business (2009-2015)**

- Tutor for several courses at an undergraduate level including: Calculus (70 pages of notes), Linear Algebra and Applications, Linear and Generalized Linear Models (80 pages of notes). Lectures and example classes with programming language R were prepared for postgraduate students on the subjects of General Insurance and Actuarial Modelling.