Christian Furrer *Curriculum Vitae*

Vognmandsmarken 29, 2. th., DK-2100 Copenhagen Ø.
Born May 12, 1994 in Svendborg, Denmark. Single, no children.
E-mail: furrer@math.ku.dk; Phone: +45 30 24 18 15; Homepage: https://furrer.dk/christian.

Education

Dept. of Mathematical Sciences, University of Copenhagen — Copenhagen, Denmark

PhD in Actuarial Mathematics (Industrial PhD) — *2017 – 2020*

BSc's and MSc's in Actuarial Mathematics, cand. act. — *2012 – 2017*

Experience

Dept. of Mathematical Sciences, University of Copenhagen — Copenhagen, Denmark

Associate professor — *Feb '24 – present*

Tenure track assistant professor — *Oct '20 – Jan '24*

Teaching assistant — *Sep '14 – Jan '17*

Innovation & Models, PFA Pension — Copenhagen, Denmark

Industrial PhD student — *Sep '17 – Aug '20*

Publications

1. *Expert Kaplan–Meier estimation*, with Bladt, Scandinavian Actuarial Journal 2024, pp. 1–27, 2024
2. *Aggregate Markov models in life insurance: properties and valuation*, with Ahmad and Bladt, Insurance: Mathematics and Economics 113, pp. 50–69, 2023 [Corrigendum],

   Life/IAALS Prize at ICA2023
3. *Transaction time models in multi-state life insurance*, with Buchardt and Sandqvist, Scandinavian Actuarial Journal 2023(10), pp. 974–999, 2023
4. *Extension of as-if-Markov modeling to scaled payments*, with Christiansen, Insurance: Mathematics and Economics 107, pp. 288–306, 2022 [Corrigendum]
5. *Scaled insurance cash flows: representation and computation via change of measure techniques*, Finance and Stochastics 26(2), pp. 359–382, 2022
6. *Computation of bonus in multi-state life insurance*, with Ahmad and Buchardt, ASTIN Bulletin 52, pp. 291–331, 2022 [Corrigendum and amended manuscript]
7. *Dynamics of state-wise prospective reserves in the presence of non-monotone information*, with Christiansen, Insurance: Mathematics and Economics 97, pp. 81–98, 2021
8. *Tax- and expense-modified risk-minimization for insurance payment processes*, with Buchardt and Møller, Scandinavian Actuarial Journal 2020(10), pp. 934–961, 2020
9. *Forward transition rates*, with Buchardt and Steffensen, Finance and Stochastics 23(4), pp. 975–999, 2019
10. *Experience rating in the classic Markov chain life insurance setting: An empirical Bayes and multivariate frailty approach*, European Actuarial Journal 9, pp. 31–58, 2019,

    2019 Gauss Prize / EAJ Best Paper Award.

Manuscripts

- *Conditional Aalen–Johansen estimation*, with Bladt, 2023 [R package on CRAN: AalenJohansen]
- *Estimation for multistate models subject to reporting delays and incomplete event adjudication*, with Buchardt and Sandqvist, 2023
- *Bivariate phase-type distributions for experience rating in disability insurance*, with Sørensen and Yslas, 2024.

Other works

- *Matematikken bag bedre forsikringer til en mere fair pris*, with Bladt, Hiabu, and Steffensen, Aktuel Naturvidenskab 2023, pp. 27–29, 2023
- *Introduction to actuarial mathematics*, second edition, lecture notes for *Insurance and Law*, 2023
- *Multi-state modeling in the mathematics of life insurance: meditations and applications*, PhD thesis, 2020.

Professional

- Member of the Steering Committee for the project frame InterAct (Jan '22 – present)
- Organizer of the Seminar in Insurance and Economics (Jun '22 – present)
- Conferences and workshops:
  - Co-organizer of a workshop on *fairness* with a view towards insurance (Aug '23)
  - Chairperson of the organizing committee of the 2024 Scandinavian Actuarial Conference
  - Member of the European Actuarial Day 2023 Program Committee and the European Congress of Actuaries 2024 Program Committee
- 2017 – present: Member of the Danish Society of Actuaries
  - Qualifying Actuary (Apr '19 – present)
  - Chairperson of the Education Committee (Dec '21 – Jan '24)
  - Member of the Education Committee (Jan '24 – present)
  - Chairperson of 'Udvalg om implementing af Core Syllabus bestemmelse' (Feb '21 – Jan '22). Member of 'Kontaktudvalget' (Dec '18 – Sep '20), 'Efteruddannelsesudvalget' (Oct '20 – Jan '22), 'Udvalg om den fremtidige strategi for Aktuarforeningen' (Feb '21 – Dec '21), and 'Kommunikationsudvalget' (Mar '22 – Jan '24)
- Member of the Education Committee of the Actuarial Association of Europe and the Education Committee of the International Actuarial Association (Jan '21 – present)
- 2020 – present: Member of the German Society for Insurance and Financial Mathematics
- Management and leadership training:
  - Leading Research (Feb '23 – Jun '23)
- Pedagogical training:
  - Introduction to University Pedagogy (Nov '17)
  - 'Universitetspædagogikum' (Aug '21 – Aug '22)
  - 'Kursus for førsteårsundervisere' (23 Nov '21)
- Referee for ASTIN Bulletin, Applied Probability, Finance and Stochastics, Scandinavian Actuarial Journal, Statistics, and Stochastic Models
- Media appearences: 12 May '21 in B.T. and 21 Sep '22 on videnskab.dk.

Funding

- 2017 – 2020: Industrial PhD project titled *Biometriske risici i livsforsikring* in collaboration with the University of Copenhagen and PFA Pension and co-funded by the Innovation Fund Denmark; the Industrial PhD candidate was myself
- 2022 – 2033: Member of the project frame InterAct managed by Mogens Steffensen and co-funded by partners from the Danish insurance and pensions industry
- 2022 – 2025: Industrial PhD project titled *Tab af erhvervsevne: forsikring og forebyggelse* in collaboration with Mogens Steffensen and PFA Pension and co-funded by the Innovation Fund Denmark; the Industrial PhD candidate is Oliver Lunding Sandqvist
- 2022 – 2023: Co-investigator of *FAIR: Forsikringsmatematisk modellering Adapteret til Individets Retsstilling* supported by Fynske Købstæders Fond
- 2022: Travel grant by Dr.phil. Ragna Rask-Nielsens Grundforskningsfond
- 2022: Travel grant by Verein zur Förderung der Versicherungs- und Finanzmathematik – Universität Oldenburg e.V.
- 2023 – 2024: Co-investigator of *WorkFair: Workshop og konference om fairness* supported by Fynske Købstæders Fond
- 2023 – 2024: Principal investigator of *MISS: Modeling and learning Insurance risks Subject to Systematic changes in information* supported by the Hanse-Wissenschaftskolleg
- 2024: Grant by the Carlsberg Foundation for the Scandinavian Actuarial Conference 2024.

Read more about the Innovation Fund Denmark's Industrial PhD programme via this link.

Longer visits

- Visitor at *Institut für Mathematik, Carl von Ossietzky Universität Oldenburg*, Germany, 2018
- Visitor at *Département de sciences actuarielles, Université de Lausanne*, Switzerland, 2022
- Junior Fellow at *Hanse-Wissenschaftskolleg*, Delmenhorst, Germany, 2023.

Presentations

- ○ *Credibility for Markov chains.* The 21st International Congress on Insurance: Mathematics and Economics, Vienna, Austria, Jul '17
- ○ *Empirical Bayes Credibility for the Classic Markov Chain Life Insurance Setting.* The 31st International Congress of Actuaries, Berlin, Germany, Jun '18
- ○ *An empirical Bayes approach to group heterogeneity in the classic Markov chain life insurance setting.* The 4th European Actuarial Journal Conference, Leuven, Belgium, Sep '18
- ◇ *Forward transition rates.* Oberseminar Stochastik/Statistik, University of Oldenburg, Germany, Oct '18
- ○ *Forward transition rates.* Actuarial and Financial Mathematics Conference, Brussels, Belgium, Feb '19
- ○ *Simple shrinkage estimation in multi-state models.* Perspectives on Actuarial Risks in Talks of Young Researchers, Sibiu, Romania, Apr '19
- ○ *Tax- and expense-modified risk-minimization for life insurance payment processes.* The 23rd International Congress on Insurance: Mathematics and Economics, Munich, Germany, Jul '19

- ◇ *Change-of-measure techniques for efficient computation of expected cash flows.* Oberseminar Stochastik/Statistik, University of Oldenburg, Germany, Jul '19
- ◇ *Predictive modeling of disability insurance: background, pitfalls, and open questions.* Workshop on Time to Event Data and Machine Learning with focus on pension insurance problems, Copenhagen, Denmark, Nov '19
- ◇ *On forward transition rates and representation of some non-classic payment processes via change-of-measure techniques.* Talks in Financial and Insurance Mathematics, ETH Zurich, Switzerland, Dec '19
- ○ *Tax- and expense-modified risk-minimization for insurance payment processes.* Actuarial and Financial Mathematics Conference, Brussels, Belgium, Feb '20
- ⋆ *Experience rating in the classic Markov chain life insurance setting.* e-Jahrestagung von DAV & DGVFM, online, Apr '20
- ◇ *Multi-state modeling in the mathematics of life insurance: meditations and applications.* PhD Defense, University of Copenhagen, Denmark, Nov '20
- ◇ *Multi-state modeling in the mathematics of life insurance: meditations and applications.* Danish Society of Actuaries, online, Dec '20
- ⋆ *Change of measure techniques for scaled insurance cash flows.* European Actuarial Days, online, Jun '21
- ○ *Beyond Markov chain modeling.* United as One: 24th International Congress on Insurance: Mathematics and Economics, online, Jul '21
- ◇ *Change of measure techniques for scaled insurance cash flows.* Joint Risk & Stochastics and Financial Mathematics Seminar, London School of Economics and Political Science, United Kingdom, online, Dec '21
- ◇ *Multi-state modeling in the mathematics of life insurance.* Actuarial Science Seminar, HEC Lausanne, Switzerland, Feb '22
- ◇ *Change of measure techniques for scaled insurance cash flows.* One World Actuarial Research Seminar, online, Apr '22
- ○ *Extension of as-if-Markov modeling to scaled payments.* The 5th European Actuarial Journal Conference, Tartu, Estonia, Aug '22
- ◇ *Experience rating in the classic Markov chain life insurance setting.* 1st Convention A, online, Sep '22
- ◇ *Bewertung von Lebensversicherungsverbindlichkeiten – Entwicklungen in Dänemark.* Verein zur Förderung der Versicherungs- und Finanzmathematik – Universität Oldenburg e.V., Oldenburg, Germany, Sep '22
- ◇ *Change of measure techniques for scaled insurance cash flows.* Seminars in Mathematical Statistics, KTH Royal Institute of Technology, Stockholm, Sweden, Dec '22
- ◇ *Expert Kaplan–Meier estimation.* Seminars in Mathematical Statistics, Stockholm University, Sweden, Dec '22
- ○ *Conditional Aalen–Johansen estimation.* Perspectives on Actuarial Risks in Talks of Young Researchers, Valencia, Spain, Jan '23
- ◇ *Conditional Aalen–Johansen estimation.* Riskcenter, University of Barcelona, Spain, Feb '23

◇ *Change of measure techniques for scaled insurance cash flows.* Stochastic Models VII, Bedlewo, Poland, Jun '23

○ *Extension of as-if-Markov modeling to scaled payments.* The 26th International Congress on Insurance: Mathematics and Economics, Edinburgh, United Kingdom, Jul '23

◇ *Conditional Aalen–Johansen estimation.* Groupe de Travail: Actuariat et Risques Contemporains, Sorbonne University, Paris, France, Sep '23

⋆ *Multi-state modeling in life insurance.* DGVFM-Workshop für junge Mathematiker*innen, Loccum, Germany, Oct '23

◇ *Conditional Aalen–Johansen estimation.* ZeSOB Kolloquium, University of Oldenburg, Germany, Oct '23

◇ *Multi-state modeling in the mathematics of life insurance.* Fellow Lecture at the HWK, Delmenhorst, Germany, Nov '23.

Contributed talks: ○ Invited talks: ⋆ Seminars & miscellaneous: ◇

Teaching and supervision

Doctoral students

Oliver Lunding Sandqvist (primary supervisor) *Feb '22 – present*
Industrial PhD project titled *Tab af erhvervsevne: forsikring og forebyggelse.*
Supervised jointly with Mogens Steffensen as well as Lars Frederik Brandt Henriksen and Niklas Lindholm (previously Kristian Buchardt) from PFA Pension.

Philipp Carsten Hornung (co-supervisor) *Aug '23 – present*
Within the project frame InterAct and titled *Payout phase and biometric risk in pensions.*
Supervised jointly with Mogens Steffensen.

Tessa Steensgaard (co-supervisor) *Aug '23 – present*
Within the project frame InterAct and titled *Methods in Interpretable Machine Learning.*
Supervised jointly with Mogens Steffensen and Munir Hiabu.

BSc's and MSc's Programmes in Actuarial Mathematics at the Dept. of Mathematical Sciences, University of Copenhagen

Inference, Market Consistent Valuation and Pricing in Life Insurance *Spring '18*
With Buchardt and Møller. Co-lecturer.
Evaluated as an 'A-course' by the Teaching Committee.

Beyond the Classic Markov Chain Life Insurance Setting *Winter '18/19*
Course coordinator and sole lecturer.
Evaluated as an 'A-course' by the Teaching Committee.

Advanced Topics in Modern Life Insurance *Spring '20*
With Buchardt and Falden. Course coordinator and main lecturer.
Evaluated as an 'A-course' by the Teaching Committee.

Projects in the Mathematics of Life Insurance *Spring '23, '24*
With Sandqvist and Ahmad, respectively. Course coordinator and main lecturer.
Evaluated as an 'A-course' by the Teaching Committee in '23.

Insurance and Law *Spring '21, '22, '23, '24*
With Andreasen. Course coordinator and main lecturer.
Evaluated as an 'A-course' by the Teaching Committee in '22, '23.

Coordinator of the actuarial BSc's projects *Sep '22 – present*

Course coordinator of Accounting and Law *Sep '23 – present*

Supervision of MSc's theses

- Martin Ø. Rebild (with Lundgren), *Developing an Economic Scenario Generator for Insurance Applications*, Jan '24
- Sebastian B.G. Olsen, *As-if-Markov Models with Random Left Truncation*, Jan '24
- Olivia Juul-Branth, *Stochastic Retirement – a Non-Purely Incidental Approach*, Jan '24
- Mie J. Christensen, *Aggregate Markov models with stochastic retirement*, Jan '24
- Helene J.Z. Abildstrøm (with Sandqvist), *Loss of Income Insurance: Transaction Time Modelling with Duration Effects*, Jan '24
- Clara K. Opstrup, *Stochastic retirement and partial pension*, Jan '24
- Helene Ullum, *Aggregate Markov models in life insurance: The non-smooth case*, Jan '24
- Christopher H. Nielsen & Morten B. Larsen (with Sandqvist), *Disability Reserving in Transaction Time Models*, Jan '24
- Lars C. Geisler, *Two Principles of Market Consistent Valuation for Investment-Dependent Payment Processes in Life Insurance*, Jun '23
- Thea H. Larsen, *Partial pension*, Jun '23
- Frederik Skjødt (with Buchardt and Ott), *Design and computation of bonus in the presence of risk charge*, Jan '23
- Louise B. Dinesen, *Real Estate as a Pension Device: The Case of Reverse Mortgage Insurance*, Jan '23
- Christian S. Simonsen (with Lollike), *State Space Reduction Methods for Life Insurance*, Jun '22
- Sophie E. Gasser (with Ahmad), *Stochastic behavioral rates*, Jun '22
- Christiane A. Duus-Holm, *Comparative study on small population mortality modeling*, Jan '22
- Philipp C. Hornung, *Dynamics of the prospective reserve*, Sep '21
- Hamid Y. Mohammad (with Hessler), *Doubly stochastic Markov chains with application to life insurance*, Jun '21
- Oliver L. Sandqvist (with Buchardt), *Transaction time models in life insurance*, Jun '21
- Liu Li, *Risk-minimization of unit-linked life insurance contracts in the presence of taxes and expenses*, Jun '21
- Oliver P. Mikkelsen, *Stochastic retirement*, Jun '21
- Jacob J. Sørensen (with Steffensen), *Experience Rating in the Setup of Multivariate Correlated Frailties Using a Class of Conjugate Hierarchical Priors*, Dec '19
- Jamaal Ahmad (with Steffensen and Buchardt), *Elimination of Path Dependencies for Projection of Cash Flows in Multi-State Life Insurance*, Sep '19
- Mikkel A. Lilja (with Pedersen), *Valuation of Payment Processes in the Presence of Realistically Asymmetric Taxes on Investment Returns*, Jun '19
- Morten B. Jacobsen (with Pedersen), *A Case Study on Modelling Taxation on Investment Returns and Methods of Performance Assessment*, Jun '19.

Further activities at the Dept. of Mathematical Sciences, University of Copenhagen

Supervision of BSc's theses in Mathematics and Mathematics-Economics

- Savannah Willert, *Beregning af bonus*, Jun '22.

Miscellaneous

Courses for the Danish Society of Actuaries:

- 4 Apr '22: *Fremregning for gennemsnitsrente: tilstandsvist og tilstandsfrit* (with Ahmad and Buchardt), 20 participants
- 20 Mar '23: *Fremregning for gennemsnitsrente: tilstandsvist og tilstandsfrit* (with Ahmad and Buchardt), 10 participants.

Miscellaneous

Languages: Danish *(mother tongue)*, German *(fluent)*, and English *(fluent)*.

Chess: Former Danish scholastic chess champion (2013); currently on hiatus.

Other interests include: Art (modern and contemporary, especially *Jugendstil*), European politics, literature (Tolkien, Murakami, Houellebecq), music (Cohen, Marie Key, Fleetwood Mac), philosophy (Lakatos, Nietzsche).