Anne MacKay

Département de mathémathiques
Université du Québec à Montréal
C.P. 8888, Succursale Centre-ville
PK-5151
Montréal, QC H3C 3P8
+1-514-987-3000 x6417
mackay.anne@uqam.ca

RESEARCH INTERESTS

Actuarial and financial mathematics
Pricing and hedging long-term financial and insurance guarantees
Numerical methods in financial mathematics

ACADEMIC EXPERIENCE

Assistant professor 2016 – present
Department of Mathematics, UQAM, Montreal, Canada

Postdoctoral researcher 2014 – 2016
RiskLab, ETH Zurich, Zurich, Switzerland

EDUCATION

Doctor of Philosophy, Actuarial Science 2011 – 2014
University of Waterloo, Waterloo, Canada
Under the supervision of Dr. Carole Bernard and Dr. Mary Hardy
Thesis: Fee Structure and Surrender Incentives in Variable Annuities

Master of Science, Mathematics 2009 – 2011
Concordia University, Montréal, Canada
Under the supervision of Dr. Patrice Gaillardetz
Thesis: Pricing and Hedging Equity-Linked Products under Stochastic Volatility Models

Bachelor of Science, Actuarial Science 2004 – 2007
Université Laval, Québec, Canada

Certificate in Economics 2003 – 2005
Université Laval, Québec, Canada

PROFESSIONAL DESIGNATIONS

Fellow of the Society of Actuaries (FSA) 2012
Associate of the Canadian Institute of Actuaries (ACIA) 2019

GRANTS AND AWARDS

Research Grants

Établissement de nouveaux chercheurs universitaires, FRQNT (40 000$ over 2 years)	2018 – 2020
Research Grant, IFSID ($35,000 shared with A. Melnikov)	2016 – 2017
Discovery Grant, NSERC ($90,000 over 5 years)	2016 – 2021
Individual Research Grant, Society of Actuaries ($24,000 shared with Z. Cui, R. Feng)	2015 – 2016

PUBLICATIONS

Publications in peer-reviewed journals

1. Kouritzin, M. et A. MacKay (2019): "Branching Particle Pricers with Heston Examples", *International Journal of Theoretical and Applied Finance*, accepted.
2. MacKay, A., A. Melnikov et Y. Mishura (2018): "Optimization of small deviation for mixed fractional Brownian motion with trend", *Stochastics*, 90(7): 1-24.
3. Kourtizin, M. et A. MacKay (2018): "VIX-linked fees for GMWBs via Explicit Solution Simulation Methods", *Insurance: Mathematics and Economics*, 81: 1-17.
4. MacKay, A. (2017): "Quantile hedging pension payoffs: an analysis of investment incentives", *European Actuarial Journal*, 7(2): 481-514.
5. Cui, Z., R. Feng and A. MacKay (2017): "Variable Annuities with VIX-linked Fee Structure under a Heston-type Stochastic Volatility Model", *North American Actuarial Journal*, 21(3): 458-483.
6. MacKay, A., M. Augustyniak, C. Bernard and M. Hary (2015): "Risk Management of Policyholder Behavior in Equity-Linked Insurance", *Journal of Risk and Insurance*, 84(2): 661-690.
7. MacKay, A., M. V. Wüthrich (2015): "Best-Estimates in Bond Markets with Reinvestment Risk", *Risks*, 3(3): 250-276.
8. Bernard, C., A. MacKay and M. Muehlbeyer (2014): "Optimal Surrender Policy for Variable Annuity Guarantees", *Insurance: Mathematics and Economics*, 55, 116-128.
9. Bernard, C., M. Hardy and A. MacKay (2014): "State-Dependent Fees for Variable Annuity Guarantees", *ASTIN Bulletin*, 44, 559-585.
10. Gaillardetz, Patrice, Huan Yi Li, and Anne MacKay (2012): "Equity-linked products: evaluation of the dynamic hedging errors under stochastic mortality", *European Actuarial Journal*, 2(2): 243-258.

Peer-reviewed book chapters

1. MacKay, A. and A. Melnikov (2018): "Price bounds in jump-diffusion markets revisited via market completions", in *Recent Advances in Mathematical and Statistical Methods for Scientific and Engineering Applications* edited by D. Marc Kilgour, Herb Kunze, Roman Makarov, Roderick Melnik and Sunny Wang, Springer, 553 - 563.
2. Bernard, C., A. MacKay (2014): "Reducing Surrender Incentives through Fee Structure in Variable Annuities", Chapter in *Innovations in Quantitative Risk Management* edited by K. Glau, M. Scherer and R.Zagst, Springer, 209 - 223.

Working papers, for submission in peer-reviewed journals

1. MacKay, A. and A. Ocejo (2019): "Portfolio optimization with a guaranteed minimum maturity benefit and risk-adjusted fees", submitted.
2. Kouritzin, M. and A. MacKay (2019): "On stochastic approximation and option pricing".

SEMINARS AND TALKS

1. "Optimisation de portefeuille applique aux fonds distincts", Statistics seminar, Université de Sherbrooke, January 2020.
2. "Fee structure and optimal investment mix in variable annuities", Mathematical Finance and Applied Probability Seminar, University of Connecticut, January 2020.
3. "Constrained portfolio optimization in variable annuities", Winter Meeting of the Canadian Mathematical Society, Toronto, Canada, December 2019 (invited talk).
4. "Branching pricers with Heston examples", XV Latin American Congress of Probability and Mathematical Statistics, Mérida, Mexico, December 2019 (invited talk).
5. "Fee structure and optimal investment mix in variable annuities", 23$^{\text{rd}}$ International Congress on Insurance: Mathematics and Economics, Munich, Germany, July 2019.
6. "Simulating Heston via explicit weak solutions", Third International Congress on Actuarial Science and Quantitative Finance, Manizales, Colombia, June 2019.
7. "Simuler le modèle de Heston à l'aide de solutions explicites faibles", Statistics Seminar , Université de Sherbrooke, June 2019.
8. "Simulating Heston via explicit weak solutions", Annual meeting of the Statistical Society of Canada, Calgary, Canada, May 2019.
9. "Simulating Heston via explicit weak solutions", Fields Institute Quantitative Finance Seminar, Toronto, Canada, February 2019.
10. "Stochastic approximation algorithms: applications to variable annuities", 53$^{\text{rd}}$ Actuarial Research Conference, London, Canada, August 2018.
11. "VIX-linked Fees for GMWBs via Explicit Solution Simulation Methods", 21$^{\text{st}}$ International Congress on Insurance: Mathematics and Economics, Vienna, Austria, July 2017.
12. "Risk management via product design in variable annuities", Georgia State University, Atlanta, USA, December 2016.
13. "Variable Annuities with VIX-linked Fee Structure under a Heston-type Stochastic Volatility Model", 51$^{\text{st}}$ Actuarial Research Conference, Minneapolis, USA, July 2016.

14. "Quantile Hedging Interest Rate Linked Payoffs Using Equity", 20$^{\text{th}}$ International Congress on Insurance: Mathematics and Economics, Atlanta, USA, July 2016.
15. "VIX-linked Fee Structure for Variable Annuities", Sixth International IMS-FIPS Workshop, Edmonton, Canada, July 2016 (invited talk).
16. "Can quantile hedging explain funding practices for pension plans?", ETH Zurich, Zurich, Switzerland, April 2016.
17. "Risk Management of Policyholder Behavior in Equity-Linked Life Insurance", Université Catholique de Louvain, Louvain-la-Neuve, Belgium, November 2015.
18. "Risk Management of Policyholder Behavior in Equity-Linked Life Insurance", Université de Lausanne, Lausanne, Switzerland, November 2015.
19. "Risk Management of Policyholder Behavior in Equity-Linked Life Insurance", Cass Business School, London, United Kingdom, October 2015.
20. "Best-Estimates in Bond Markets with Reinvestment Risk", University of Copenhagen, Copenhagen, Denmark, October 2015.
21. "Best-Estimates in Bond Markets with Reinvestment Risk", Heriot Watt University, Edinburgh, United Kingdom, July 2015.
22. "Best-Estimate Yield Curves in Incomplete Bond Markets", 19$^{\text{th}}$ International Congress on Insurance: Mathematics and Economics, Liverpool, United Kingdom, June 2015.
23. "Best-Estimates in Bond Markets with Reinvestment Risk", 2015 Annual Meeting of the Statistical Society of Canada, Halifax, Canada, June 2015 (invited talk).
24. "Risk Management of Policyholder Behavior in Equity-Linked Insurance", Actuarial and Financial Mathematics Conference, Brussels, Belgium, January 2015.
25. "Group Self-Annuitization Schemes: How Optimal Are 'Optimal' Strategies?", ETH Zurich, Zurich, Switzerland, November 2014.
26. "Risk Management of Policyholder Behavior in Equity-Linked Life Insurance", Université de Montréal, Montréal, Canada, September 2014.
27. "Fixed and Variable Payout Annuities: How Optimal Are 'Optimal' Strategies?", 49$^{\text{th}}$ Actuarial Research Conference, Santa Barbara, USA, July 2014.
28. "Reducing Surrender Incentives through Fee Structure in Variable Annuities", 2014 Annual Meeting of the Statistical Society of Canada, Toronto, Canada, May 2014 (invited talk).
29. "Optimal Surrender Policy for Variable Annuity Guarantees", 3$^{\text{rd}}$ Workshop on Insurance Mathematics, Quebec City, Canada, January 2014 (invited talk).
30. "State-Dependent Fees and the Surrender Option in Variable Annuities", IFA Ulm, Ulm, Germany, July 2013.
31. "State-Dependent Fees and the Surrender Option in Variable Annuities", 17$^{\text{th}}$ International Congress on Insurance: Mathematics and Economics, Copenhagen, Denmark, July 2013.
32. "State-Dependent Fees and the Surrender Option in Variable Annuities", Annual Meeting of the Canadian Applied and Industrial Mathematics Society, Quebec City, Canada, June 2013.
33. "Market Dependent Fees for GMMB and GMDB Riders", 47$^{\text{th}}$ Actuarial Research Conference, Winnipeg, Canada, August 2012 (Honorable mention for high quality of presentation).
34. "Stochastic Volatility Models: Calibrating, Pricing and Hedging", Annual Meeting of the Canadian Institute of Actuaries, Toronto, Canada, June 2012 (invited talk).

35. "Hedging Equity-Indexed Annuities under Stochastic Volatility Models", Mathematical Finance Days, Montréal, Canada, April 2012 (Finalist for best master's thesis).
36. "Hedging Equity-Linked Products under Stochastic Volatility Models", 46$^{\text{th}}$ Actuarial Research Conference, Storrs, USA, August 2011 (Honorable mention for high quality of presentation)

TEACHING

Supervision

Dates in *italic* are expected dates of thesis submission.

PhD students
UQAM, Montreal, Canada:
- Marie-Claude Vachon (co-supervised with J.F. Renaud, 2018-*2022*)

Master students
UQAM, Montreal, Canada:
- Jackson Book (co-supervised with M. Boudreault, 2016-2019)
- Matthieu Bousquet-Racine (2016-2020)
- Nicolas Vellone-Scott (2017-*2020*)
- Julie Bélanger (2017-*2020*)
- Iro René Kouarfaté (2018-*2020*)

ETH Zurich, Zurich, Switzerland:
- Valentin Stalder (co-supervised with P. Embrechts, 2015-2016)
- Michelle Kühne (semester paper, 2016)
- Pawel Kalinowski (semester paper, 2015)

Undergraduate students
UQAM, Montreal, Canada:
- David Borel (Summer 2018)
- Nicolas Vellone-Scott (Summer 2016 and Summer 2017)
- Vincent Tousignant (Summer 2016)

Member of master's thesis evaluation committee
UQAM, Montreal, Canada:
- Adel Benlagra
- Andra Crainic
- Jean-François Forest-Desaulniers
- Zahra Ghasemivanani
- Dominic Viola
- Juan Sebastian Yanez
- Leila Zerrouk

Courses

UQAM, Montreal, Canada

- MAT998G: Sujets spéciaux en finance actuarielle: Fonds distincts — Winter 2019
- ACT2100: Compléments de probabilités — Winter 2018 to Winter 2020
- MAT7070: Mesure et probabilités (with J.F. Renaud) — Winter 2018
- ACT5001: Régimes de retraite: évaluation — Fall 2016 to Winter 2018
- ACT650C: Sujets spéciaux en actuariat: Initiation à la recherche — Winter 2017

University of Waterloo, Waterloo, Canada

- ACTSC231: Mathematics of Finance — Winter 2013

Concordia University, Montréal, Canada

- MATH206: Algebra & Functions — Winter 2011

OTHER EXPERIENCE

Service

UQAM

- Actuary in charge of the University Accreditation Program of the CIA — 2019
- Seminar committee of the Quantact research lab — 2018 – 2019

Conference organisation

- Co-chair of the scientific committee, 24$^{\text{th}}$ International Congress on Insurance: Mathematics and Economics — 2019-2020
- Ninth Graduate Student Workshop in Insurance and Financial Mathematics — 2020
- Quantact workshop in financial mathematics — 2019
- Eighth Graduate Student Workshop in Insurance and Financial Mathematics — 2019
- Seventh Graduate Student Workshop in Insurance and Financial Mathematics — 2018
- Quantact workshop on risk management of variable annuities — 2018
- Sixth Graduate Student Workshop in Insurance and Financial Mathematics — 2017

Scientific Referee — 2013 – 2019

- Quantitative Finance
- European Actuarial Journal
- Journal of Risk
- Insurance: Mathematics and Economics
- ASTIN Bulletin
- North American Actuarial Journal
- Risks

Question Writer and Grader, Society of Actuaries, Schaumburg, USA — 2013 – 2017

Professional

Actuarial Associate 2007 – 2009
Towers Perrin, Toronto, Canada