SAMUEL N. COHEN

Mathematical Institute, University of Oxford, Radcliffe Infirmary Quarter, Oxford, OX2 6GG, UK
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MEMBERSHIPS

- London Mathematical Society
- Institute of Mathematical Statistics
- Society for Industrial and Applied Mathematics
- Bachelier Finance Society
- Oxford-Man Institute of Quantitative Finance (Associate member)
- Oxford-Nie Financial Big Data Lab

EDUCATION

The University of Adelaide

- *Doctor of Philosophy (Ph.D.),* 2008-2010
  Principal Supervisor: RBC Professor Robert J. Elliott
  Secondary Supervisor: Elder Professor Charles E. M. Pearce

  Research project considering issues surrounding dynamic risk measures, and the associated theory of Backward Stochastic Differential Equations, particularly with reference to situations driven by processes other than Brownian motion.

- *Bachelor of Mathematical Sciences (Hons.),* 2007,
  with First Class Honours in Statistics.
  Supervisor: Elder Professor Charles E. M. Pearce

  Research project considering problems in the analysis of occupational health and safety data, particularly identifiability of estimates of underlying offence rates from regulatory enforcement data.

- *Bachelor of Mathematical and Computer Sciences,* 2006,
  with majors in Pure Mathematics and Statistics.
- *Bachelor of Finance,* 2006

The Hamilton & Alexandra College, Class of 2002, School Dux.

ACADEMIC POSITIONS

- Alan Turing Institute, Theme Lead for Machine Learning in Finance   2018–Present
- Mathematical Institute, University of Oxford: Associate Professor   2012–Present
- New College, University of Oxford: Non-stipendary Lecturer   2014–Present
- Exeter College, University of Oxford: Lump Sum Lecturer   2011–2014
- St John's College, University of Oxford: Junior Research Fellow in Mathematics
     2010–2012
- Mathematical Institute, University of Oxford: Module Lecturer   2010–2012
- University of Adelaide: Casual Tutor and Lecturer   2006–2010
- University of South Australia: Casual Lecturer and Course Coordinator   2009
- Bradford College, University of Adelaide: Tutor   2006–2008
- University of Adelaide: Administrative Assistant – Centre for International Economic Studies   2005–2007

INVITED POSITIONS

- Università degli Studi di Milano-Bicocca (Milan)
  and Università degli Studi dell'Insubria (Varese) October 2019
- University of Technology, Sydney: Nicola Bruti-Liberati Fellow December 2014
- Université du Maine: Professeur Invité April 2014
- Université de Rennes I: Professeur Invité July 2011
- Shandong University: Visiting researcher May 2010

PUBLICATIONS

Papers Accepted/Published

- Cohen, S.N., Snow, D. and Szpruch, L., Black-box model risk in finance, to appear in *Machine Learning in Financial Markets: A Guide to Contemporary Practice*, Capponi, C. and Lehalle, C.-A. (Eds), Cambridge University Press, 2021

- Cohen, S.N., Reisinger, C., Wang, S. Detecting and repairing arbitrage in traded option prices, *Applied Mathematical Finance*, 27(5):345-373, 2021

- Cohen, S.N. Uncertainty and filtering of hidden Markov models in discrete time, *Probability, Uncertainty and Quantitative Risk*, 2020, Article 4

- Allan, A.L. and Cohen, S.N. Pathwise stochastic control with applications to robust filtering, *Annals of Applied Probability*, 30(5):2274-2310, 2020

- Cohen, S.N. and Tegner, M. European Option Pricing with Stochastic Volatility models under Parameter Uncertainty, pp123–167 in Cohen, S.N., Gyöngy, I., dos Reis, G., Siska, D., Szpruch, L. (Eds), *Frontiers in Stochastic Analysis–BSDEs, SPDEs and their Applications*, Springer, 2019

- Cohen, S.N. and Allan, A.L. Parameter Uncertainty in the Kalman-Bucy Filter, *SIAM Journal on Control and Optimization*, 57(3): 1646-1671, 2019

- Cohen, S.N., Henckel, T., Menzies, G.D., Muhle-Karbe, J. and Zizzo, D.J. Switching cost models as hypothesis tests, *Economics Letters*, 175:32-25, 2019

- Cohen, S.N. Data and Uncertainty in extreme risks – a nonlinear expectations approach, in *Innovations in Insurance, Risk and Asset Management*, Eds. K Glau, D Linders, A Min, M Scherer, L Schneider, R Zagst, World Scientific, 2018

- Cohen, S.N., Elliott, R.J. and Siu, T.K. Malliavin Calculus in a Binomial Framework, *Applied Stochastic Models in Business and Industry*, 2018; 1-8.

- Cohen, S.N. and Fedyashov, V. Nash equilibria for nonzero-sum ergodic stochastic differential games, *Journal of Applied Probability* 54(4):977–994, 2017

- Cohen, S.N. Data-driven nonlinear expectations for statistical uncertainty in decisions, *Electronic Journal of Statistics* 11(1):1858–1889, 2017

- Allan, A.L. and Cohen, S.N. Ergodic Backward Stochastic Difference Equations, *Stochastics* 88(8):1207–1239, 2016

- Elliott, R.J., Siu, T.K. and Cohen, S.N. Backward stochastic difference equations for dynamic convex risk measures on a binomial tree, *Journal of Applied Probability* 52(3): 771–785, 2015.

- Cohen, S.N., Ji, S. and Yang, S., A generalized Girsanov transformation of finite state stochastic processes in discrete time, *Statistics and Probability Letters* 84: 33–39, 2014.

- Cohen, S.N. and Hu, Y., Ergodic BSDEs Driven by Markov Chains. *SIAM Journal on Control and Optimization* 51(5):4138–4168, 2013.

- Cohen, S.N. Undiscounted Markov chain BSDEs to stopping times, *Journal of Applied Probability* 51(1), 2014.

- Cohen, S.N., Quasi-sure analysis, aggregation and dual representations of sublinear

expectations in general spaces, *Electronic Journal of Probability* **17** Article 62, 2012.

- Cohen, S.N. and Szpruch, L., A limit order book model for latency arbitrage, *Mathematics and Financial Economics* **6**(3):211–227, 2012.

- Cohen, S.N., Chaos representations for Marked Point Processes, *Communications on Stochastic Analysis* **6**(2), 263–279, 2012.

- Cohen, S.N. and Szpruch, L., On Markovian solutions to Markov chain BSDEs, *Numerical Algebra, Control and Optimization* **2**(2):257–269, 2012.

- Cohen, S.N. Representing filtration consistent nonlinear expectations as *g*-expectations in general probability spaces, *Stochastic Processes and their Applications* **122**(4), 1601–1626, 2012.

- Cohen, S.N. and Elliott, R.J. Existence, Uniqueness and Comparisons for BSDEs in General Spaces, *Annals of Probability*, **40**(5):2264-2297, 2012

- Cohen, S.N. and Elliott, R.J. Backward Stochastic Difference Equations and nearly-time-consistent nonlinear expectations, *SIAM Journal of Control and Optimization* **49**:125–139, 2011.

- Pearce, C.E.M., Cohen, S.N. and Tuke, S.J. New Zealand palaeodemography: Pitfalls and possibilities, in *BIOMAT 2009: International Symposium on Mathematical and Computational Biology (Brasilia 1–6 August 2009)* Ed. R.P. Mondaini, World Scientific 2010, 194–212

- Cohen, S.N., Elliott, R.J. and Pearce, C.E.M. A general comparison theorem for Backward Stochastic Differential Equations, *Advances in Applied Probability*, **42**(3):878–898, 2010.

- Cohen, S.N. Pricing and risk measurement with Backward Stochastic Differential Equations, invited contribution in *AustMS Gazette* **37**(3):168–169, 2010.

- Cohen, S.N. and Elliott, R.J. A General Theory of Finite State Backward Stochastic Difference Equations, *Stochastic Processes and their Applications*, **120**(4):442–466, 2010.

- Cohen, S.N. and Elliott, R.J. Comparisons for Backward Stochastic Differential Equations on Markov Chains and related no-arbitrage conditions, *The Annals of Applied Probability*, **20**(1):267–311, 2010.

- Cohen, S.N. and Elliott, R.J. Backward Stochastic Differential Equations on Markov Chains, *Communications on Stochastic Analysis*, **2**(2):251–262, 2010.

- Cohen, S.N. and Elliott, R.J. Comparison Theorems for Finite State Backward Stochastic Differential Equations, in *Contemporary Quantitative Finance, Essays in Honour of Eckhard Platen*, Eds. C. Chiarella, A. Novikov, Springer, 2010, 135–158.

- Cohen, S.N. and Elliott, R.J. Backward Stochastic Difference Equations with Finite States, in *Stochastic Analysis with Financial Applications, Hong Kong 2009*, Eds. A. Kohatsu-Higa, N. Privault and S.-J. Sheu, Birkhäuser, 2010, 33–43

- Cohen, S.N., Forbes, B. and Lee, P. First Steps Toward a New Optimised-Sampling Index Portfolio, presented at the 2nd Australian Business and Behavioural Sciences Association International Conference, Adelaide, (2006), . Included in electronic proceedings.

Papers Submitted/Unpublished

- Cohen, S.N., Reisinger, C. and Wang, S., Arbitrage-free neural-SDE market models

- Cohen, S.N. and Treetanthiploet, T., Correlated Bandits for Dynamic Pricing via the ARC algorithm

- Cohen, S.N. and Treetanthiploet, T., Asymptotic Randomised Control with applications to bandits

- Cohen, S.N., Tegnér, M.N.A. and Wiesel, J., Bounding quantiles of Wasserstein distance between true and empirical measure

- Cohen, S.N. and Treetanthiploet, T., Gittins' theorem under uncertainty

- Cohen, S.N. and Fedyashov, V. Ergodic BSDEs with jumps and time dependence
- Cohen, S.N. and Elliott, R.J. Filters and smoothers for self-exciting Markov modulated counting processes
- Cohen, S.N., A martingale representation theorem for a class of jump processes
- An, L., Cohen, S.N. and Ji, S. Reflected Backward Stochastic Difference Equations and Optimal Stopping Problems under g-expectation
- Cohen, S.N., Ji, S. and Peng, S. Sublinear Expectations and Martingales in Discrete Time
- Cohen, S.N. What risk measures are time consistent for all filtrations?
- Cohen, S.N. and Elliott, R.J. Time consistency and moving horizons for risk measures.
- Cohen, S.N., Elliott, R.J. and Pearce, C.E.M. A ring isomorphism and corresponding pseudoinverses.

Theses
- Problems in Backward Stochastic Differential Equations; with applications to nonlinear expectations and risk measures, PhD thesis, University of Adelaide, 2011
- Gains, claims and pains: Mathematical and Statistical Problems in Occupational Health and Safety, Honours thesis (Statistics), University of Adelaide, 2007.

Books
- Cohen, S.N., Gyöngy, I., dos Reis, G., Siska, D., Szpruch, L. (Eds), *Frontiers in Stochastic Analysis–BSDEs, SPDEs and their Applications*, Springer, 2019
- Cohen, S.N. and Elliott, R.J. *Stochastic Calculus and Applications (2nd Ed.)*, Birkhäuser, 2015
- Cohen, S.N., Madan, D.B., Siu, T.K and Yang, H. (Eds) *Stochastic processes, filtering and control: A festschrift in honour of Robert J. Elliott*, World Scientific, 2012.

Semi-mathematical work
- Cohen, S.N. The Lehman Collapse: What went wrong?, Areté, Issue 57 Winter 2018
- Cohen, S.N., The dynamic programming principle in *Math in Seventeen Syllables: A Folder of Mathematical Haiku*, Journal of Humanistic Mathematics, 8(1), 2018

EDITING & REFEREEING

Associate editor for the journals Stochastics, Journal of Stochastic Analysis and Applications, and Communications on Stochastic Analysis.

Acted as a referee for various journals, including Annals of Probability, Quantitative Finance, Finance and Stochastics, Electronic Journal of Probability, SIAM Control, SIAM Fiancial Mathematics, IEEE Automatic Control and Mathematical Finance.I have also acted as a reviewer for grant applications through various national funding agencies.

RESEARCH SUPERVISION

Doctoral students:
- Deqing Jiang (joint with Justin Sirignano)
- Eliana Fausti
- Saad Labyad (joint with Álvaro Cartea)
- Victor Sheng Wang (joint with Christoph Reisinger)
- Lingyi Yang (joint with Jaroslav Fowkes)
- Tanut Treetanthiploet
- Andrew Allan, Thesis: *Parameter uncertainty in stochastic filtering* (defended 2019)

- Victor Fedyashov, Thesis: *Topics in ergodic control and backward stochastic differential equations* (defended 2017)

University of Oxford, MSc in Mathematical and Computational Finance (over 20 students from 2011 onwards)

University of Oxford, Part C (MMath) Dissertation:
- Andrew Allan (2015)
- Hannah Bavcic (2017)

University of Oxford, Part B Structured Project:
- Undergraduate projects in mathematical finance (2012-2015).

PRIZES & AWARDS
- Nicola Bruti-Liberati Fellowship and Lecture (2014),
- Adelaide Doctoral Research Medal (2012),
- Adelaide Postgraduate Alumni University Medal (2011),
- B.H. Neumann Prize, Australian Mathematical Society (2009),
- T.M. Cherry Prize, ANZIAM (2009),
- Head of School's Award for Lecturing Excellence in
  - "Financial Modelling: Theory and Techniques" (2010),
  - "Financial Modelling III" (2008) and
  - "Statistical Practice I" (2008),
- Adelaide University Medal (2007),
- Adelaide Honours Priority Scholarship (2007),
- Applied Probability Trust Prize (2007),
- Sir Ronald Fisher Memorial Scholarship (Statistics) (2006),
- David Murray Memorial Scholarship in Mathematical Sciences (2006),
- J.R. Wilton Prize (2005),
- Dean's Certificate for Outstanding Achievement (Economics) (2005),
- E.A. Cornish Memorial Prize (2004),
- Australian Bureau of Statistics Scholarship (2003, 2004),
- Dean's Merit List for Economics (2003, 2004)
- Dean's Certificate of Merit (Mathematics) (2003),
- School Dux of 2002 (The Hamilton & Alexandra College, Hamilton, Victoria),
- Latrobe University Encouragement Award for Mathematics (2001),
- Jeremy King Memorial Prize for Service to the Community (2001),
- Sir Reginald Ansett Memorial Scholarship (1997).

ADMINISTRATION
- External Examiner (2021–), MSc in Mathematical Finance, University College London
- Chair of Examiners (2015–17), Examiner (2012–2014) and supervisory committee, MSc in Mathematical Finance, University of Oxford.
- Examiner (2018–), Chair of Admissions (2015–18), Admissions Panel (2012-2014) MSc in Mathematical and Computational Finance and MSc in Mathematical Finance, University of Oxford.
- Co-organizer of *Fridays@4* (career and wellbeing seminar for graduate students and early career researchers), Mathematical Institute, Oxford, (2017–)

- Public Engagement with Research Champion for the Mathematical Insitute, University of Oxford