Ronnie Sircar
Eugene Higgins Professor of Operations Research & Financial Engineering
ORFE Department, Princeton University, Sherrerd Hall 208, Princeton, NJ 08544.

Academic Positions and Education

2000-present	**Princeton University** Assistant (2000-04), Associate (2004-08), and Full (2008-) Professor, Operations Research & Financial Engineering Department.
2015-present	Affiliate Faculty member, Andlinger Center for Energy & the Environment.
2004-present	Affiliate Faculty member, Program in Applied & Computational Mathematics.
2000-present	Affiliate Faculty member, Bendheim Center for Finance.
Fall 2016	**Stanford University** Visiting Professor, Institute for Computational Mathematics & Engineering.
Fall 2010	**Oxford-Man Institute of Quantitative Finance, Oxford University**
1997-2000	**University of Michigan** Assistant Professor, Department of Mathematics.
1993-1997	**Stanford University** Ph.D. in Scientific Computing and Computational Mathematics; minor in Mathematics. Completed June 1997.
1992-1993	**Oxford University** M.Sc. with Distinction in Mathematical Modelling and Numerical Analysis.
1989-1992	**Oxford University** B.A. First Class Honours in Mathematics.

Awards

March 2020	Fellow of Society for Industrial & Applied Mathematics (SIAM).
Dec. 2006	Engineering Council Teaching Award, Princeton University.
Dec. 2005	Engineering Council Teaching Award, Princeton University.
June 2003	Howard B. Wentz, Jr. Junior Faculty Award, Princeton University.
Nov. 2002	Engineering Council Teaching Award, Princeton University.
1996-1997	Lieberman Fellowship, Stanford University.

Recent Grants

2021-2026	First Republic Bank Lifelong Learning & Research Initiative, PI, $7.5 million.
2020-2023	ARPA-E PERFORM grant, co-PI, $4.25 million.
2020-2022	PIIRS Development Finance grant, co-PI.
2017-2021	NSF Algorithms for Modern Power Systems grant, co-PI, $280K.
2015-2019	Princeton-Humboldt Strategic Partnership award, $70,000.
2012-2016	National Science Foundation Research Grant DMS-1211906, PI, $236K.

Administrative Roles (Princeton University)

2018-24	Chair, ORFE Department.
2015-18	Director of Graduate Studies, Bendheim Center for Finance.
2013-15	Director of Graduate Studies, ORFE Department.
2009-10	Acting Chair, ORFE Department.
2002-05	Director of Undergraduate Studies, ORFE Department.

Editorial

Associate Editor, Communications in Mathematical Sciences, 2015-.
Editorial Board, Risk and Decision Analysis, 2014-.
Founding co-Editor-in-Chief, SIAM Journal on Financial Mathematics, 2008-14; Associate Editor 2015-.
Associate Editor, Management Science, 2010-12.
Co-Managing Editor, International Journal on Theoretical & Applied Finance, 2008-10.
Associate Editor, Mathematical Finance, 2006-19.
Editorial Board, Applied Mathematical Finance, 2003-present.
Associate Editor, Operations Research Letters, 2002-08.
Associate Editor, Operations Research, 2005-08.
Book Review Editor, Quantitative Finance, 2005-6.

Professional Societies

Society for Industrial and Applied Mathematics (SIAM); selected as Fellow in 2020.
SIAM Activity Group on Financial Mathematics: elected Chair for 2013-15; elected Vice Chair for 2011-13; Secretary (2007-09, elected term; re-elected 2009-11).
Institute for Operations Research and the Management Sciences (INFORMS). American Mathematical Society (AMS).
Bachelier Finance Society (member of Council, 2012-16).

Recent Invited Talks

Meetings

Nov 2021 *Applications of Mean Field Games Workshop*, IMSI, Chicago (online).
July 2020 *SIAM Annual Meeting*, plenary (online).
Sept 2019 *Banff Workshop on Energy Finance*, Banff, Canada.
April 2019 Stochastic Control, Ambiguity and Games Conference, Leeds, UK.
Mar 2019 BPS Conference on Quantitative Finance, Singapore.
Sept 2018 *Control for Power Systems Conference*, Paris, France.
July 2018 *SIAM Annual Meeting minisymposium*, Portland, Oregon.
June 2018 *Howison 60th birthday workshop*, Oxford.
May 2018 *Byrne Workshop on Stochastic Analysis in Finance and Insurance*, University of Michigan.
Feb 2018 *Mean Field Games Workshop*, Alan Turing Inst., London.
Dec 2017 *StatFin 2017*, Chennai, India, (*plenary speaker*).
Nov 2017 *2nd Eastern Conference on Mathematical Finance*, NYU.
Aug 2017 *Mean Field Games Workshop*, IPAM, UCLA.
May 2017 *10th Oxford-Princeton Workshop*, Oxford.
Apr 2017 *Berlin-Singapore Finance Workshop*, Berlin, Germany.
Apr 2017 *Mini-conference on stochastic processes and mathematical finance*, Fargo ND, (*principal speaker*).
Nov 2016 *SIAM Financial Math meeting minisymposium*, Austin.
May 2016 *Berlin Young Researchers Workshop*, Berlin, (*invited keynote*).
Apr 2016 *Paris-Princeton Commodity Workshop*, Princeton.

Colloquia & Seminars

Mar 2022 *SIAM Financial Mathematics & Engineering Activity Group seminar* (online).
Apr 2021 *Risk Management & Insurance Seminar*, Robinson College of Business, Georgia State University (online).
Feb 2021 *Mathematics Colloquium*, Humboldt University, Berlin (online).
Fall 2020 *Mathematics Colloquium*, University of Connecticut (online).
Nov 2018 *Mathematics Colloquium*, Baylor University.
Feb 2018 *IAQF/Thalesians seminar*, New York.
Nov 2017 *Financial Mathematics Seminar*, University of Michigan.
Nov 2017 *Financial Risk & Engineering Department Seminar*, NYU Poly.
Apr 2017 *Industrial & Enterprise Systems Engineering Department Seminar*, UIUC.
Apr 2017 *Industrial and Systems Engineering Department Seminar*, University of Minnesota.
Mar 2017 *Mathematical Finance Seminar*, University of California at Santa Barbara.
Mar 2017 *Finance Seminar*, University of Sussex.
Oct 2016 *Financial Mathematics Seminar*, Stanford University.
Apr 2016 *Financial Mathematics Seminar*, Statistics Department, Columbia University.
Mar 2016 *Applied Mathematics Colloquium*, University of Washington at Seattle.
Jan 2015 *Mathematics Department Colloquium*, Illinois Institute of Technology.

Publications

Books

J.-P. Fouque, G. Papanicolaou, R. Sircar, K. Solna, *Multiscale Stochastic Volatility for Equity, Interest-Rate and Credit Derivatives*, Cambridge University Press, September 2011.

J.-P. Fouque, G. Papanicolaou, R. Sircar, *Derivatives in Financial Markets with Stochastic Volatility*, Cambridge University Press, September 2000.

Surveys

M. Ludkovski, R. Sircar, *Game Theoretic Models for Energy Production*, in Fields Communications Volume: Commodities, Energy and Environmental Finance, Springer (2015).

R. Carmona, R. Sircar, *Financial Mathematics*, in Princeton Companion to Applied Mathematics, (eds. N. Higham, F. Santosa), Princeton University Press (2015).

M. Lorig, R. Sircar, *Stochastic Volatility: Modeling and Asymptotic Approaches to Option Pricing & Portfolio Selection*, in Fundamentals of Financial Signal Processing, (eds. A. Akansu, S. Kulkarni, D. Malioutov, I. Pollak), Wiley (2015).

Non-technical articles

R. Aïd, M. Ludkovski, R. Sircar, *Renewables Reliability in an Era of Force Majeure*, SIAM News, May 2021.

A.M. Reppen, R. Sircar, *Cryptocurrencies, Mining, and Mean Field Games*, SIAM News, Jan. 2021.

R. Sircar, *FME 2010: Global Meltdown Broadens Agenda for Research in Financial Math*, SIAM News, Jan. 2011.

R. Sircar, *Financial Mathematics '08: Modeling the Market for a Diminishing Resource*, SIAM News, Jan. 2009.

R. Carmona, R. Sircar, *Financial Mathematics '08: Mathematics and the Financial Crisis*, SIAM News, Jan. 2009.

M. Giles, R. Sircar, *Financial Mathematics at ICIAM*, SIAM News, Oct. 2007.

R. Sircar, *Recent Books on the Mathematics of Finance*, Featured Book Review, SIAM Review, **47**(2), 2005, pages 369 – 372.

Submitted

P.J. Graber, R. Sircar, *Master Equation for Cournot Mean Field Games of Control with Absorption*, November 2021.

Y. Ait-Sahalia, F. Matthys, E. Osambela, R. Sircar, *When Uncertainty and Volatility Are Disconnected: Implications for Asset Pricing and Portfolio Performance*, May 2021.

P. Graewe, U. Horst, R. Sircar, *A Maximum Principle approach to deterministic Mean Field Games of Control with Absorption*, April 2021.

L. Avanesyan, R. Sircar, *Power Mixture Forward Performance Processes*, December 2020.

Z. Li, A. Reppen, R. Sircar, *A Mean Field Games Model for Cryptocurrency Mining*, December 2019.

I. Brown, J. Funk, R. Sircar, *Oil Prices & Dynamic Games under Stochastic Demand*, October 2017.

P. Chan, R. Sircar, *Optimal Trading with Predictable Return and Stochastic Volatility*, June 2015, under revision for Applied Mathematical Finance.

E. Choi, R. Sircar, *Analysis of Systematic Risks in Multi-Name Credit and Equity Markets*, August 2013, under revision for Applied Mathematical Finance.

Published

J.-P. Fouque, R. Hu, R. Sircar, *Sub- and Super-solution Approach to Accuracy Analysis of Portfolio Optimization Asymptotics in Multiscale Stochastic Factor Markets*, to appear in SIAM J. Financial Math.

Sinong Geng, Houssam Nassif, Carlos A. Manzanares, A. Max Reppen, R. Sircar, *Deep PQR: Solving Inverse Reinforcement Learning using Anchor Actions*, June 2020, in Proceedings of the 37th International Conference on Machine Learning (ICML), Vienna, Austria, PMLR 119.

L. Avanesyan, M. Shkolnikov, R. Sircar, *Construction of Forward Performance Processes in Stochastic Factor Models and an Extension of Widder's Theorem*, Finance & Stochastics, **24**(4), 2020, pages 981-1011.

M. Bichuch, R. Sircar, *Optimal Investment with Transaction Costs and Stochastic Volatility, Part II*, SIAM J. Control & Optimization, **57**, 2019, pages 437-467.

A. Agarwal, R. Sircar, *Portfolio Benchmarking under Drawdown Constraint and Stochastic Sharpe Ratio*, SIAM J. Financial Mathematics, **9**, 2018, pages 435-464.

P. Chan, R. Sircar, *Fracking, Renewables & Mean Field Games*, SIAM Review, **59**(3), 2017, pages 588-615.

J.-P. Fouque, A. Papanicolaou, R. Sircar, *Perturbation Analysis for Investment Portfolios Under Partial Information with Expert Opinions*, SIAM J. Control & Optimization, **55**(3), 2017, pages 1534-1566.

M. Bichuch, R. Sircar, *Optimal Investment with Transaction Costs and Stochastic Volatility, Part I: Infinite Horizon*, SIAM J. Control & Optimization, **55**(6), 2017, pages 3799-3832.

J.-P. Fouque, R. Sircar, T. Zariphopoulou, *Portfolio Optimization & Stochastic Volatility Asymptotics*, Mathematical Finance, **27**(3), 2017, pages 704-745. Published online 2015.

M. Ludkovski, R. Sircar, *Technology Ladders and R&D in Dynamic Cournot Markets*, Journal of Economic Dynamics and Control, **69**, August 2016, pages 127-151.

M. Lorig, R.Sircar, *Portfolio Optimization under Local-Stochastic Volatility: Coefficient Taylor Series Approximations & Implied Sharpe Ratio*, SIAM J. Financial Mathematics, **7**, 2016, pages 418-447.

M. Shkolnikov, R. Sircar, T. Zariphopoulou, *Asymptotic Analysis of Forward performance processes in incomplete markets and their ill-posed HJB equations*, SIAM J. Financial Mathematics, **7**, 2016, pages 588-618.

J.-P. Fouque, M. Lorig, R. Sircar, *Second Order Multiscale Stochastic Volatility Asymptotics: Stochastic Terminal Layer Analysis & Calibration*, Finance & Stochastics **20**(3), 2016, pages 543-588.

A. Agarwal, S. Juneja, R. Sircar, *American Options under Stochastic Volatility: Control Variates, Maturity Randomization & Multiscale Asymptotics*, Quantitative Finance **16**(1), 2016, pages 17-30.

P. Chan, M. Stein, R. Sircar, *A Feedback Model for the Financialization of Commodity Markets*, SIAM J. Financial Mathematics **6**, 2015, pages 870-899.

P. Chan, R. Sircar, *Bertrand & Cournot Mean Field Games*, Applied Mathematics & Optimization **71**, 2015, pages 533-569.

Y. Dong, R. Sircar, *Time-Inconsistent Portfolio Investment Problems*, April 2014, in Stochastic Analysis and Applications 2014, (eds. D. Crisan, B. Hambly and T. Zariphopoulou), Springer.

A. Dasarathy, R. Sircar, *Variable Costs in Dynamic Cournot Energy Markets*, in Fields Communications Volume: Commodities, Energy and Environmental Finance, Springer (2015).

T. Leung, R. Sircar, *Implied Volatility of Leveraged ETF Options*, Applied Mathematical Finance **22**(2), 2015, pages 162-188.

J.-P. Fouque, A. Papanicolaou, R. Sircar, *Filtering and Portfolio Optimization with Stochastic Unobserved Drift in Asset Returns*, Communications in Mathematical Sciences **13**(4), 2015, pages 935-953.

A. Papanicolaou, R. Sircar, *A Regime-Switching Heston Model for VIX and S&P 500 Implied Volatilities*, Quantitative Finance, **14**(10), 2014, pages 1811-1827.

M. Coulon, W. Powell, R. Sircar *A Model for Hedging Load and Price Risk in the Texas Electricity Market*, Energy Economics **40**, 2013, pages 976-988.

R. Sircar, S. Sturm, *From Smile Asymptotics to Market Risk Measures*, Mathematical Finance **25**(2), 2015, pages 400-425 (published online since Nov. 2012).

A. Ledvina, R. Sircar, *Oligopoly Games under Asymmetric Costs and an Application to Energy Production*, Mathematics and Financial Economics, **6**(4), 2012, pages 261-293.

M. Ludkovski, R. Sircar, *Exploration and Exhaustibility in Dynamic Cournot Games*, European Journal on Applied Mathematics **23**(3), 2012, pages 343-372.

A. Ledvina, R. Sircar, *Dynamic Bertrand and Cournot Competition: Asymptotic and Computational Analysis of Product Differentiation*, Risk and Decision Analysis, **3**(3), 2012, pages 149-165.

T. Leung, R. Sircar, T. Zariphopoulou, *Forward Indifference Valuation of American Options*, Stochastics, **84**$(5-6)$, 2012, pages 741-770.

A. Ledvina, R. Sircar, *Dynamic Bertrand Oligopoly*, Applied Mathematics and Optimization **63**(1), 2011, pages 11-44.

C. Harris, S. Howison, R. Sircar, *Games with Exhaustible Resources*, SIAM J. Applied Mathematics **70**(7), 2010, pages 2556-2581.

A. Toussaint, R. Sircar, *A Framework for Dynamic Hedging under Convex Risk Measures*, Proceedings of 2008 Ascona Seminar on Stochastic Analysis, Random Fields and Applications, (eds. R. Dalang, M. Dozzi, F. Russo), Birkhauser.

J.-P. Fouque, R. Sircar, K. Solna, *Multiname and Multiscale Default Modeling*, SIAM J. Multiscale Modeling and Simulation, **7**(4), 2009, pages 1956-1978.

J. Perello, J. Masoliver, R. Sircar, *Option pricing under stochastic volatility: the exponential Ornstein-Uhlenbeck model*, Journal of Statistical Mechanics, 2008, P06010.

A. Ilhan, M. Jonsson, R. Sircar, *Optimal Static-Dynamic Hedges for Exotic Options under Convex Risk Measures*, Stochastic Processes & Applications, **119**(10), 2009, pages 3608-3632.

T. Leung, R. Sircar, *Exponential Hedging with Optimal Stopping and Application to ESO Valuation*, SIAM Journal on Control & Optimization, **48**(3), 2009, pages 1422-1451.

T. Leung, R. Sircar, T. Zariphopoulou, *Credit Derivatives and Risk Aversion*, in Advances in Econometrics (eds. T. Fomby, J.-P. Fouque and K. Solna), 2008, Elsevier Science.

R. Sircar, T. Zariphopoulou, *Utility Valuation of Credit Derivatives: Single and Two-Name Cases*, in Advances in Mathematical Finance (eds. M. Fu, R. Jarrow, J.-Y. Yen, R. Elliott), ANHA Series, Birkhauser, 2007, pages 279-301.

E. Papageorgiou, R. Sircar, *Multiscale Intensity Models and Name Grouping for Valuation of Multi-name Credit Derivatives*, Applied Mathematical Finance, **16**(4), 2009, pages 353-383.

T. Leung, R. Sircar, *Accounting for Risk Aversion, Vesting, Job Termination Risk and Multiple Exercises in Valuation of Employee Stock Options*, Mathematical Finance, **19**(1), 2009, pages 99-128.

R. Sircar, T. Zariphopoulou, *Utility Valuation of Credit Derivatives and Application to CDOs*, Quantitative Finance, **10**(2), 2010, pages 195-208.

E. Papageorgiou, R. Sircar, *Multiscale Intensity Models for Single Name Credit Derivatives*, Applied Mathematical Finance, **15**(1), 2008, pages 73-105.

E. Bayraktar, U. Horst, R. Sircar, *Queueing Theoretic Approaches to Financial Price Fluctuations*, in Handbook of Financial Engineering (ed. J. Birge and V. Linetsky), Elsevier, Volume 15 of Handbooks in Operations Research and Management Science, North Holland, 2007, pages 637-677.

R. Sircar, W. Xiong, *A General Framework for Evaluating Executive Stock Options*, Journal of Economic Dynamics and Control, **31**(7), 2007, pages 2317-2349.

A. Ilhan, M. Jonsson, R. Sircar, *Portfolio Optimization with Derivatives and Indifference Pricing*, in *Indifference Pricing*, (ed. R. Carmona), Princeton University Press, 2008.

J.-P. Fouque, R. Sircar, K. Solna, *Stochastic Volatility Effects on Defaultable Bonds*, Applied Mathematical Finance **13**(3), 2006, pages 215 – 244.

A. Ilhan, M. Jonsson, R. Sircar, *Optimal Investment with Derivative Securities*, Finance & Stochastics **9**(4), 2005, pages 585 – 595.

E. Bayraktar, U. Horst, R. Sircar, *A Limit Theorem for Financial Markets with Inert Investors*, Mathematics of Operations Research **31**(4), 2006, pages 789 – 810.

A. Ilhan, R. Sircar, *Optimal Static-Dynamic Hedges for Barrier Options*, Mathematical Finance **16**(2), 2006, pages 359 – 385.

R. Sircar, T. Zariphopoulou, *Bounds & Asymptotic Approximations for Utility Prices when Volatility is Random*, SIAM Journal on Control & Optimization **43**(4), 2005, pages 1328 – 1353.

P. Cotton, J.-P. Fouque, G. Papanicolaou, R. Sircar, *Stochastic Volatility Corrections for Interest Rate Derivatives*, Mathematical Finance **14**(2), 2004, pages 173-200.

A. Ilhan, M. Jonsson, R. Sircar, *Singular Perturbations for Boundary Value Problems Arising from Exotic Options*, SIAM Journal on Applied Mathematics **64**(4), 2004, pages 1268 – 1293.

J.-P. Fouque, G. Papanicolaou, R. Sircar, K. Solna, *Maturity Cycles in Implied Volatility*, Finance & Stochastics **8**(4), 2004, pages 451 – 477.

E. Bayraktar, H.V. Poor, R. Sircar, *Estimating the Fractal Dimension of the S&P 500 Index using Wavelet Analysis*, International Journal of Theoretical & Applied Finance, **7**(5), 2004, pages 615 – 643.

J.-P. Fouque, G. Papanicolaou, R. Sircar, K. Solna, *Multiscale Stochastic Volatility Asymptotics*, SIAM Journal on Multiscale Modeling and Simulation, **2**(1), 2003, pages 22 – 42.

J.-P. Fouque, G. Papanicolaou, R. Sircar, K. Solna, *Singular Perturbations in Option Pricing*, SIAM Journal on Applied Mathematics **63**(5), 2003, pages 1648 – 65.

M. Jonsson, R. Sircar, *Partial Hedging in a Stochastic Volatility Environment*, Mathematical Finance **12**(4), October 2002, pages 375 – 409.

M. Jonsson, R. Sircar, *Optimal Investment Problems and Volatility Homogenization Approximations*, in Modern Methods of Scientific Computing, A. Bourlioux, M. Gander & G. Sabidussi *eds.*, NATO Science Series II, vol. 75, Kluwer, August 2002, pages 255 – 281.

D. Darius, A. Ilhan, J. Mulvey, K. Simsek, R. Sircar, *Trend-Following Hedge Funds and Multi-Period Asset Allocation*, Quantitative Finance **2**(5), October 2002, pages 354 – 61.

J.-P. Fouque, G. Papanicolaou, R. Sircar, *Stochastic Volatility and the Epsilon Martingale Decomposition*, in Trends in Mathematics, M. Kohlmann, S. Tang editors, pages 152 – 9, Birkhauser Verlag, October 2000.

J.-P. Fouque, G. Papanicolaou, R. Sircar, K. Solna, *Short Time-Scale in S&P 500 Volatility*, Journal of Computational Finance **6**(4), Summer 2003, pages 1 – 23.

J.-P. Fouque, G. Papanicolaou, R. Sircar, *From the Implied Volatility Skew to a Robust Correction to Black-Scholes American Option Prices*, International Journal of Theoretical & Applied Finance, **4**(4), 2001.

J.-P. Fouque, G. Papanicolaou, R. Sircar, *Stochastic Volatility Correction to Black-Scholes*, RISK **13**(2), February 2000, pages 89 – 92.

R. Sircar, *Hedging under Stochastic Volatility*, in Quantitative Analysis in Financial Markets, Volume 2, M. Avellaneda, editor, World Scientific Publishing, February 2000.

J.-P. Fouque, G. Papanicolaou, R. Sircar, *Financial Modeling in a Fast Mean-Reverting Stochastic Volatility Environment*, Asia-Pacific Financial Markets **6**(1), 1999, pages $37-48$.

J.-P. Fouque, G. Papanicolaou, R. Sircar, *Mean-Reverting Stochastic Volatility*, International Journal of Theoretical & Applied Finance **3**(1), pages $101-142$, 2000.

J.-P. Fouque, G. Papanicolaou, R. Sircar, *Asymptotics of a Two-Scale Stochastic Volatility Model*, in the Volume "Equations aux derivées partielles et applications" in honour of Jacques-Louis Lions, pages $517-525$, May 1998.

R. Sircar, G. Papanicolaou, *Stochastic Volatility, Smile and Asymptotics*, Applied Mathematical Finance **6**(2), pages $107-145$, June 1999.

R. Sircar, G. Papanicolaou, *General Black-Scholes Models accounting for increased market volatility from hedging strategies*, Applied Mathematical Finance **5**(1), 1998, pages $45-82$.