Tommi Sottinen's publications

March 18, 2024

G Thesis

1. Sottinen, T. (2003) *Fractional Brownian motion in finance and queueing.* Ph.D. Thesis, University of Helsinki.

A Peer-reviewed scientific articles

2. Sottinen, T. (2001) *Fractional Brownian motion, random walks, and binary market models.* Finance & Stochastics, **5**, 343–355.
3. Kozachenko, Yu., Sottinen, T., and Vasylyk, O. (2002) *Weakly Self-similar processes with stationary increments in the spaces* $\mathrm{SSub}_\phi(\Omega)$. Theory Probab. Math. Statist. **65**, 77–88.
4. Kozachenko, Yu., Sottinen, T., and Vasylyk, O. (2002) *Path space large deviations of a large buffer with Gaussian input traffic.* Queueing Systems **42**, no. 2, 113–129.
5. Sottinen, T., and Valkeila, E. (2003) *On arbitrage and replication in the Fractional Black–Scholes pricing model.* Statistics & Decisions **21**, 93–107.
6. Gilsing, H. and Sottinen, T. (2003) *Power series expansions for fractional Brownian motions.* Theory of Stochastic Processes **9**(25), no. 3-4, (Proceedings of Seventh International School on Mathematical and Statistical Methods in Economics, Finance and Insurance), 38–49.
7. Sottinen, T. (2004) *On Gaussian processes equivalent in law to fractional Brownian motion.* Journal of Theoretical Probability **17**, no. 2, 309–325.
8. Sottinen, T., and Tudor, C.A. (2005) *On the equivalence of multiparameter Gaussian processes.* Journal of Theoretical Probability, to appear.
9. Kozachenko, Yu., Sottinen, T. and Vasylyk, O. (2005) *Simulation of weakly self-similar stationary increment* $\mathrm{Sub}_\phi(\Omega)$*-processes: a series expansion approach.* Methodology and Computing in Applied Probability **7**, 379–400.
10. Sottinen, T., and Tudor, C.A. (2007) *Parameter estimation for stochastic equations with additive fractional Brownian sheet.* Statistical Inference for Stochastic Processes **11**, 221–236.
11. Bender, C., Sottinen, T. and Valkeila, E. (2007) *Arbitrage with fractional Brownian motion?* Theory of Stochastic Processes **13**(29), no. 1-2, (Proceedings of the International Conference "Modern Stochastics: Theory and Applications"), 23–34.
12. Gasbarra, D., Sottinen, T. and Valkeila, E. (2007) *Gaussian bridges.* Stochastic Analysis and Applications: The Abel Symposium 2005. (Eds. F. Benth, G. Di Nunno, T. Lindstrøm, B. Øksendal and T. Zhang) Abel Symposia, Springer.
13. Särkkä, S., and Sottinen, T. (2008) *Application of Girsanov Theorem to Particle Filtering of Discretely Observed Continuous-Time Non-Linear Systems.* Bayesian Analysis **3**, no. 3., 555–584.

14. Bender, C., Sottinen, T., and Valkeila, E. (2008) *Pricing by hedging and no-arbitrage beyond semimartingales.* Finance & Stochastics **12**, 441–468.

15. Morlanes, J. I., Rasila, A., and Sottinen, T. (2009) *Empirical evidence on arbitrage by changing the stock exchange.* Advances and Applications in Statistics, no. **2**, Vol. 12, 223–233.

16. Kozachenko, Yu., Sottinen, T., and Vasylyk, O. (2011) *Lipschitz conditions for $Sub_\phi(\Omega)$-processes with application to weakly self-similar stationary increment processes.* Theory Probab. Math. Stat. **82**, 57–73.

17. Gapeev, P., Sottinen, T. and Valkeila, E. (2011) *Robust replication in H-self-similar Gaussian market models under uncertainty.* Statistics & Decisions **28**, 37–50.

18. Gasbarra, D., Sottinen, T., and van Zanten, H. (2011) *Conditional full support of Gaussian processes with stationary increments.* Journal of Applied Probability **48**, No. 2.

19. Bender, C., Sottinen, T. and Valkeila, E. (2011) *Fractional processess as models in stochastic finance.* Advanced Mathematical Methods for Finance. (Eds. G. Di Nunno and B. Øksendal) Series in Mathematical Finance, Springer.

20. Sottinen, T. and Yazigi, A. (2014) *Generalized Gaussian Bridges.* Stochastic Processes and their Applications **124**, Issue 9, 3084–3105.

21. Azmoodeh, E., Sottinen, T., Viitasaari, L. and Yazigi, A. (2014) *Necessary and Sufficient Conditions for Hölder Continuity of Gaussian Processes.* Statistics & Probability Letters **94**, 230–235.

22. Azmoodeh, E., Sottinen, T. and Viitasaari, L. (2015) *Asymptotic normality of randomized periodogram for estimating quadratic variation in mixed Brownian-fractional Brownian model.* Modern Stochastics: Theory and Applications **2**, No. 1, 29.–49.

23. Sottinen, T. and Viitasaari, L. (2015) *Fredholm representation of multi-parameter Gaussian processes with applications to equivalence in law and series expansions.* Modern Stochastics: Theory and Applications **2**, No 3 (Proceedings of PRESTO-2015 conference), 287–295.

24. Sottinen, T. and Viitasaari, L. (2016) *Pathwise integrals and Itô–Tanaka Formula for Gaussian processes.* Journal of Theoretical Probability **29**, Issue 2, 590–616.

25. Sottinen, T. and Viitasaari, L. (2016) *Stochastic Analysis of Gaussian Processes via Fredholm Representation.* International Journal of Stochastic Analysis, doi:10.1155/2016/8694365

26. Pakkanen, M.S., Sottinen, T. and Yazigi, A. (2017) *On the conditional small ball property of multivariate Levy-driven moving average processes.* Stochastic Processes and their Applications, doi:10.1007/s11203-017-9156-6.

27. Yang, X., Rasila, A. and Sottinen, T. (2017) *Walk on Spheres Algorithm for Helmholtz and Yukawa Equations via Duffin Correspondence.* Methodology and Computing in Applied Probability **19**, 589–602.

28. Sottinen, T. and Viitasaari, L. (2017) *Prediction Law of Fractional Brownian*

Motion. Statistics & Probability Letters **129**, 155–166.

29. Shokrollahi, F. and Sottinen, T. (2017) *Hedging in fractional Black-Scholes model with transaction costs.* Statistics & Probability Letters **130**, 85–91.
30. Sottinen, T. and Viitasaari, L. (2018) *Conditional-Mean Hedging Under Transaction Costs in Gaussian Models.* International Journal of Theoretical and Applied Finance **21**, no. 2. (Special Issue on Barcelona Workshop on Mathematical Finance)
31. Rasila, A. and Sottinen, T. (2018) *Yukawa Potential, Panharmonic Measure and Brownian Motion.* Axioms **2018**, 7(2), 28.
32. Sottinen, T. and Viitasaari, L. (2018) *Parameter Estimation for the Langevin Equation with Stationary-Increment Gaussian Noise.* Statistical Inference for Stochastic Processes, **21**, 569–601 doi:10.1007/s11203-017-9156-6
33. Sottinen, T. and Viitasaari, L. (2018) *Transfer Principle for nth Order Fractional Brownian Motion with Applications to Prediction and Equivalence in Law.* Theory of Probability and Mathematical Statistics **98**, 188–204.
34. Yang, X., Rasila, A. and Sottinen, T. (2019) *Efficient simulation of Schrödinger equation with piecewise constant positive potential.* Mathematics and Computers in Simulation **166**, 315–323.
35. Lehto, S., Ernvall-Hytönen, A.-M. and Sottinen, T. (2019) *Divisible Skylines: Exploring Least Common Multiples and Divisibility through Visual Art.* Proceedings of Bridges 2019: Mathematics, Art, Music, Architecture, Culture
36. Sottinen, T. and Viitasaari, L. (2020) *Prediction Law of Mixed Gaussian Volterra Processes.* Statistics & Probability Letters **156**, January 2020, 108594, https://doi.org/10.1016/j.spl.2019.108594
37. Azmoodeh, E., Sottinen, T., Tudor, C.A. and Viitasaari, L. (2021) *Integration-by-Parts Characterizations of Gaussian Processes.* Collectanea Mathematica **72** (1), 25–41
38. Merino, R., Pospisil, J., Sobotka, T., Sottinen, T. and Vives, J. (2021) *Decomposition formula for rough Volterra stochastic volatility models.* International Journal of Theoretical and Applied Finance **24**, No. 02, 2150008 https://doi.org/10.1142/S0219024921500084
39. Sottinen, T., Alòs, E., Azmoodeh, E. and Di Nunno, G. (2021) *Long-Memory Models in Mathematical Finance.* Frontiers in Applied Mathematics and Statistics **7**, 28.
40. Sottinen, T. (2021) *The Characterization of Brownian Motion as an Isotopic i.i.d.-component Lévy Process.* In Contributions to Mathematics and Statistics: Essays in Honor of Seppo Hassi (eds. De Snoo, H.S.V. and Wietsma, H.L.), Acta Wasaensia **462**, 179–186.
41. Dufitinema, J., Pynnönen, S. and Sottinen, T. (2022) *Maximum likelihood estimators from discrete data modeled by mixed fractional Brownian motion with application to the Nordic stock markets.* Communications in Statistics - Simulation and Computation. https://doi.org/10.1080/03610918.2020.1764581
42. Sottinen, T. (2022) *Brownian Bridges on Polygons.* Proceedings of Bridges

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43. Azmoodeh, E., Ilmonen, P, Shafik, N., Sottinen, T. and Viitasaari, L. (2023) *On Sharp Rate of Convergence for Discretization of Integrals Driven by Fractional Brownian Motions and Related Processes with Discontinuous Integrands.* Journal of Theoretical Probability. https://doi.org/10.1007/s10959-023-01272-7

44. Maleki Almani, H., and Sottinen, T. (2023) *Multi-mixed fractional Brownian motions and Ornstein–Uhlenbeck processes* Modern Stochastics: Theory and Applications. https://doi.org/10.15559/23-VMSTA229

45. Dufitinema, J., Shokrollahi, F., Sottinen, T. and Viitasaari, L. (2024) *Long-range dependent completely correlated mixed fractional Brownian motion.* Stochastic Processes and Their Applications, Volume 170, April 2024, 104289. https://doi.org/10.1016/j.spa.2023.104289

46. Maleki Almani, H., Shokrollahi, F., and Sottinen, T. (2024) *Prediction of Gaussian Volterra Processes with Compound Poisson Jumps.* Statistics and Probability Letters, Volume 208. https://doi.org/10.1016/j.spl.2024.110054

B Preprints

47. Sottinen, T. and Valkeila, E. (2001) *Fractional Brownian motion as a model in finance.* Preprint **302**, University of Helsinki, Department of Mathematics.

48. Van Bever, G., Ilmonen, P., Viitasaari, L., Shafik, N. and Sottinen, T. (2021) *On optimal prediction of missing functional data with memory.* Namur Institute for Complex Systems Working paper.

49. Sottinen, T., Sönmez, E. and Viitasaari, L. (2022) *On the existence and regularity of local times.* arXiv preprint arXiv:2211.01464

50. Sottinen, T. and Viitasaari, L. (2023) *Transfer principle for fractional Ornstein-Uhlenbeck processes.* arXiv preprint arXiv:2311.00823

51. Han, Q., Rasila, A. and Sottinen, T. (2023) *Efficient simulation of mixed boundary value problems and conformal mappings.* arXiv preprint arXiv:2312.15382

52. Maleki Almani, H. and Sottinen, T. (2024) *Parameter estimation for multi-mixed fractional Ornstein-Uhlenbeck processes by generalized method of moments.* arXiv preprint arXiv:2401.05114

E Popular articles

53. Sottinen, T. (2004) *Nobelin muistopalkinto taloustieteestä 2003: R. Englen ARCH-malli.* (Nobel memorial prize on economics 2004: R. Engle's ARCH model) Arkhimedes 2004:2, 10–12.

54. Sottinen, T. (2004) *Sattuman matematiikkaa III: Kolmogorovin aksioomat ja frekvenssitulkinta.* (Mathematics of chance III: Kolmogorov's axioms and the frequentistic interpretation) Solmu 2004:2, 17–21.

55. Lehto, S., and Sottinen, T. (2005) *Sisarusongelma - paradoksi ehdollisesta todennäköisyydestä.* (The Sibling problem - A paradox of conditional probability) Solmu 2005:1, 14–15.

56. Rasila, A. and Sottinen, T. (2005) *Algebra, PlayStation ja älykkyys.* (Algebra, PlayStation, and intelligence) Solmu Erikoisnumero 1/2005–2006.

57. Norros, I. and Sottinen, T. (2013) *Esko Valkeila 1951–2012.* Arkhimedes 2013:1, 30–33.

58. Sottinen, T. (2015) *BS-kaava ja lama.* (BS-formula and depression) Arkhimedes 2015:1, 26–30.

59. Sottinen, T. (2016) *Moni sekoaa muotiin.* Professoriblogi 2.5.2016.

60. Sottinen, T. (2016) *Häränpaskahommia.* Professoriblogi 12.9.2016.

61. Sottinen, T. (2016) *Muotia maailmalla.* Professoriblogi 28.11.2016.

62. Sottinen, T. (2017) *Yliopistojen autonomia ja universumin maksimaalisen ironian periaate.* Professoriblogi 27.2.2017.

63. Sottinen, T. (2017) *Avoin tiede.* Professoriblogi 29.5.2017.

D Lecture notes

64. Sottinen, T. (2006) *Malliavin-laskenta.* (Malliavin Calculus) Lecture notes, 91 pages.

65. Sottinen, T. (2006) *Rahoitusteoria.* (Mathematical Finance) Lecture notes, 153 pages.

66. Sottinen, T. (2006) *Todennäköisyysteoria.* (Probability Theory) Lecture notes, 131 pages.

67. Sottinen, T. (2008) *Operations Research with GNU Linear Programming Kit.* Lecture notes, 207 pages.

68. Sottinen, T. (2009) *Päätöksenteko epävarmuuden vallitessa.* (Decisions under Uncertainty) Lecture notes, 100 pages.

69. Sottinen, T. (2010) *Operations Research with GNU Octave.* Lecture notes, 187 pages.

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71. Sottinen, T. (2018) *Probability and Stochastic Processes with a Twist of GNU Octave towards Queueing*, Lecture notes, 180 pages.

72. Sottinen, T. (2019) *Lineaarialgebraa lähinnä tasossa.* (Linear Algebra Mainly on Plane), Lecture notes 82 pages.

73. Sottinen, T. (2020) *Päätöksentekoa koronan aikaan.* (Decision Analysis in the Time of Corona) Lecture notes, 84 pages.

74. Sottinen, T. (2021) *Octave with Spice: Or a Gentle Introduction to GNU Octave Towards Linear Programming*, Lecture notes, 38 pages.

75. Sottinen, T. (2022) *Linear Programming with Spice: Or a Gentle Introduction to Linear Models*, Lecture notes, 72 pages.

76. Sottinen, T. (2023) *A Gentle Introduction to Stochastic Differential Equations with Brownian Noise*, Lecture Notes, 28 pages.