Johan Sandberg, Ph.D.

CONTACT
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PERSONAL
Date and Place of Birth: 23 December 1980, Kalmar, Sweden.
Citizenship: Swedish (EU).

SUMMARY OF QUALIFICATIONS
Head of Counterparty Credit Risk Models in Nordea with long experience from quantitative analysis in finance. Expert on regulatory framework and advanced modelling of counterparty credit risk. Ph.D. in Mathematical Statistics and M.Sc. in Engineering Physics. Author of several papers in highly ranked scientific journals. I am used to analyze large data sets (ranging from portfolio data for a large bank to brain wave activity and audio data). *My key skill is to invent meaningful and sound methods to measure and predict any quantity of interest – given the quality of available data.* Although my theoretical background in stochastic processes is solid I never lose sight of finding a working solution to the problem at hand. *Another key skill is my ability to communicate in an effective way and at the right level for the targeted audience: activating and triggering the appropriate thoughts and actions.* As a person I am outgoing and straight forward, always seeking win-win solutions.

RESEARCH INTERESTS
Financial Applications: Pricing and credit exposure modeling in general. IR and FX models, model validation. Margin models, IMM exposure models. *Data Analysis*: Stochastic Signal Processing in general, Stochastic Processes, Spectrum and Cepstrum Analysis, Mel-frequency Cepstrum, Machine Learning and Artificial Intelligence, Audio Related Applications, Time-Frequency Analysis, Non-stationary Random Processes, Time Series Modeling.

WORK EXPERIENCE
Nordea Bank, Copenhagen, Denmark:

Head of Counterparty Credit Risk Models   Sep 2021 – present

Nordea Bank AB, commonly referred to as Nordea, is a Nordic financial services group operating in Northern Europe. It is the largest bank in Scandinavia and it is present in 19 countries around the world, operating through full service branches, subsidiaries and representative offices. Nordea currently serves 9.3 million private and 530,000 active corporate customers, including 2,650 large corporates and institutions. Number of employees is close to 30,000 and assets under management is €325 billion. (Source: Wikipedia 2021-08-20)

Danske Bank, Copenhagen, Denmark:

Chief Analyst   April 2018 – Aug 2021

Developer of SnowFox which is the bank's production software used for generating the risk factor scenarios for the bank's calculation of exposure estimates used for regulatory capital requirement calculation and for internal risk management of the bank's counterparty credit risk.

Senior Analyst   Feb 2016 – May 2018

Danske Bank A/S , founded already 1971, is the largest bank in Denmark. With over 5 million customers it has a significant presence in many of the European countries and it is considered to be one of the major retail banks in northern Europe. But what has made Danske Bank well known within the financial research community is its award winning internally developed software, called SuperFly, used for pricing and risk calculations.

Nordea Bank, Copenhagen, Denmark:

Senior Risk Manager Jul 2014 – Jan 2016

Worked within the bank's models and measures team for counterparty credit risk. A large part of the work was related to the IMM model: backtesting, various model adjustments, calibration, CVA risk charge, moving more asset classes into simulation, impact test, collateral modelling, etc. But I was also working with the non-modeled part of the portfolio by deciding and approving the credit risk handling of new products, as well as working with SA-CCR and SIMM on the regulatory side. Large focus on external and internal communication, for instance in ISDA working groups and towards regulatory bodies.

Risk Manager Sep 2010 – Jun 2014

Risk manager in Group Market and Counterparty Credit Risk. As the only quant under my manager I was employed for improving the bank's counterparty credit risk framework in order to obtain an IMM approval on the default risk charge. This was successfully achieved by end of 2012.

Lund University, Centre for Mathematical Sciences, Sweden:

Researcher 2010

Stochastic signal processing applied to speaker verification, and a few other audio-related applications.

Ph.D. student 2005–2010

80% research, 20% teaching. I worked in the area between Mathematical Statistics and Digital Signal Processing. Note: Swedish Ph.D. is 4 yrs. + 20% teaching = 5 yrs.

Lund University (Swedish: Lunds universitet) is one of northern Europe's oldest and most prestigious universities, consistently ranking among the world's top 100 universities. Further, it ranks among the best universities in Northern Europe and in international rankings. The university, located in the city of Lund in the province of Scania, Sweden, traces its roots back to 1425, when a Franciscan studium generale was founded in Lund next to the Lund Cathedral, arguably making it the oldest institution of higher education in Scandinavia. The university currently enrolls around 42,000 students. (Source: Wikipedia 2016-01-24)

Lund University Hospital, Division of Clinical Physiology, Sweden:

Software Engineer 2003

Developing WebSvar — A web-based information retrieval system.

Software Engineer 2002

Building a Dicom network.

EDUCATION   Certificate in Quantitative Finance (CQF), Fitch Learning, London, UK.
Overall course score: 99%. 2013

Lund University, Sweden:

Ph.D. in Mathematical Statistics, 240 ECTS 2010

Licentiate in Engineering, 120 ECTS 2008

Master of Science in Engineering Physics, 270 ECTS 2005

Other Courses:

- Sociology of Culture: 15 ECTS 2004
- Philosophy: 30 ECTS 2002
- Psychology: 30 ECTS 2000
- Introduction to Law: 9 ECTS 2019

ACADEMIC EXPERIENCES	Reviewer for IEEE Signal Processing Letters.	2015
	Reviewer for EUSIPCO.	2012
	Reviewer for IEEE Transactions on Signal Processing.	2010
	Reviewer for EUSIPCO.	2010
	Reviewer for ICASSP.	2009
	Lecturing Stationary Stochastic Processes $\sim$ 80 students.	2010
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	Teaching assistant in several courses in Mathematical Statistics.	2003–2008
	Co-supervisor of master thesis.	2006
	Member of the advisory board at Mathematical Statistics.	2006
	Teaching assistant in Object-oriented Programming using Java	2001–2004

| RESEARCH VISITS | École Normale Supérieure (ENS) de Lyon, France (2 months). This was a collaboration I initiated with Prof. Patrick Flandrin and Prof. Pierre Borgnat. 2008 |

COMPUTER SKILLS
Expert: Python, Matlab, LaTeX. *Advanced user:* SQL, FIS Adaptiv Analytics, Linux, Sun Solaris, Free BSD, Java, Photoshop. *Basic knowledge:* C/C++, Perl, Maple, R, S.

INTERESTS
Computer Science, Artificial Intelligence, Leadership and Communication, Modern Art.

JOURNAL PUBLICATIONS
M. Hansson-Sandsten and **J. Sandberg**, "Mean Square Error Optimal Multiple Windows for Cepstrum Estimation," in revision.

T. Kinnunen, R. Saeidi, F. Sedlák, K-A Lee, **J. Sandberg**, M. Hansson-Sandsten, and H. Li, "Low-Variance Multitaper MFCC Features: a Case Study in Robust Speaker Verification," *IEEE Transactions on Audio, Speech and Language Processing*, vol. 20, no. 7, pp. 1990 – 2001, 10.1109/TASL.2012.2191960, 2012.

J. Sandberg and M. Hansson-Sandsten, "Optimal Cepstrum Smoothing," *Signal Processing*, vol. 92, no. 5, pp. 1290 – 1301, doi: 10.1016/j.sigpro.2011.11.026, 2012.

J. Sandberg and M. Hansson-Sandsten, "Optimal Non-Parametric Covariance Function Estimation for any Family of Random Processes," *EURASIP Journal on Advances in Signal Processing*, vol. 2011, Article ID 140797, doi:10.1155/2011/140797, 2011.

J. Sandberg, M. Hansson-Sandsten, T. Kinnunen, R. Saeidi, P. Flandrin, and P. Borgnat, "Multitaper Estimation of Frequency-Warped Cepstra with Application to Speaker Verification," *IEEE Signal Processing Letters*, vol. 17, no. 4, pp. 343 – 346, doi:10.1109/LSP.2010.2040228, 2010.

J. Sandberg and M. Hansson-Sandsten, "Optimal Stochastic Discrete Time-Frequency Analysis in Ambiguity and Time-Lag Domain," *Signal Processing*, vol. 90, no. 7, pp. 2203 – 2211, doi:10.1016/j.sigpro.2010.01.028, 2010.

M. Hansson-Sandsten and **J. Sandberg**, "Optimization of Weighting Factors for Multiple Window Spectrogram of Event Related Potentials," *EURASIP Journal on Advances in Signal Processing*, vol. 2010, doi: 10.1155/2010/391798, 2010.

J. Sandberg and M. Hansson-Sandsten, "A Comparison Between Different Discrete Ambiguity Domain Definitions in Stochastic Time-Frequency Analysis," *IEEE Transactions on Signal Processing*, vol. 57, no. 3, pp. 868 – 877, doi: 10.1109/TSP.2008.2009892, 2009.

CONFERENCE PROCEEDINGS
C. Hanilci, T. Kinnunen, R. Saeidi, J. Pohjalainen, P. Alku, F. Ertas, **J. Sandberg**, and M. Hansson-Sandsten, "Comparing Spectrum Estimators in Speaker Verification Under Additive Noise Degradation," *Proceedings of the ICASSP, IEEE International Conference on Acoustics, Speech, and Signal Processing*, Kyoto, Japan. March 2012, pp. 4769 – 4772, doi: 10.1109/ICASSP.2012.6288985.

T. Kinnunen, R. Saeidi, **J. Sandberg**, and M. Hansson-Sandsten, "What Else is New Than the Hamming Window? Robust MFCCs for Speaker Recognition via Multitapering," *Interspeech*, Makuhari, Japan. September 2010, pp. 2734 – 2737.

J. Sandberg, M. Hansson-Sandsten, "Approximate Optimal Periodogram Smoothing for Cepstrum Estimation using a Penalty Term," *Proceedings of the EUSIPCO, European Signal Processing Conference*, Aalborg, Denmark. August 2010, pp. 363 – 367.

J. Sandberg, M. Hansson-Sandsten, "Optimal Wigner Cross-Spectrum Estimation," in *Proceedings of the EUSIPCO, European Signal Processing Conference*, Glasgow, UK. August 2009, pp. 2298 – 2302.

M. Hansson-Sandsten, **J. Sandberg**, "Optimization of Weighting Factors for Multiple Window Time-Frequency Analysis," in *Proceedings of the EUSIPCO, European Signal Processing Conference*, Glasgow, UK. August 2009, pp. 2283 – 2287.

M. Hansson-Sandsten, **J. Sandberg**, "Optimal Cepstrum Estimation Using Multiple Windows," in *Proceedings of the ICASSP, IEEE International Conference on Acoustics, Speech, and Signal Processing*, Taipei, Taiwan. April 2009, pp. 3077 – 3080, doi: 10.1109/ICASSP.2009.4960274.

J. Sandberg and M. Hansson, "Coherence Estimation between EEG Signals using Multiple Window Time-Frequency Analysis compared to Gaussian Kernels," in *Proceedings of EUSIPCO, European Signal Processing Conference*, Florence, Italy. Sept. 2006.

J. Sandberg, M. Hansson, and M. Lindgren, "Detecting MMN in Infants EEG with Singular Value Decomposition," in *Proceedings of EMBC, 27th Annual Int. Conf of the IEEE Engineering in Medicine and Biology Society*, Shanghai, China. Sept. 2005, pp. 4227 – 4230 doi: 10.1109/IEMBS.2005.1615397.

M. Hansson and **J. Sandberg**, "Multiple Windows for Estimation of Locally Stationary Transients in the Electroencephalogram," in *Proceedings of EMBC, 27th Annual Int. Conf of the IEEE Engineering in Medicine and Biology Society*, Shanghai, China. Sept. 2005, pp. 7293 – 7296 doi: 10.1109/IEMBS.2005.1616195.

THESES

J. Sandberg, "Discrete Stochastic Time-Frequency Analysis and Cepstrum Estimation," *Doctoral Thesis in Mathematical Statistics*, 2010. ISBN: 978-91-628-8080-4. Advisor: Professor Maria Hansson-Sandsten, Faculty opponent: Professor Magnus Jansson, Royal Institute of Technology, Stockholm.

J. Sandberg, "Ambiguity Domain Definitions and Covariance Function Estimation for Non-Stationary Random Processes in Discrete Time," *Licentiate Thesis in Mathematical Statistics*, 2008. Advisor: Professor Maria Hansson-Sandsten, Faculty opponent: Professor Martin Stridh.

J. Sandberg, "Detecting MMN in Infants EEG with Bootstrap and SVD," *Master Thesis in Mathematical Statistics*, 2005.