Steffen Schuldenzucker

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Research Fields

Algorithmic Finance, Computational Mechanism Design, Financial Networks, Financial Derivatives, Systemic Risk

Education

since 09/2019 **Guest Researcher, PostDoc**, *Goethe University Frankfurt*, Germany.
- Algorithms and Complexity Group. Host: Martin Hoefer
- Early Postdoc.Mobility fellowship; see below

2014–08/2019 **Ph.D. in Computer Science**, *University of Zurich*, Switzerland.
- Summa cum laude
- PhD Thesis: *A Formal Analysis of Complexity and Systemic Risk in Financial Networks with Derivatives*
- Dissertation Committee: Sven Seuken (PhD advisor), Michael P. Wellman, Constantinos Daskalakis

2012–2014 **M.Sc. in Mathematics**, *University of Bonn*, Germany.
- Mathematical Logic, Combinatorial Optimization
- Final grade: 1.1 (scale 1=best to 6=worst)

2008–2012 **B.Sc. in Mathematics**, *University of Bonn*, Germany.

Research Grants

2019–2021 Swiss National Science Foundation (SNSF) Early Postdoc.Mobility fellowship for the project *Bridging the gap between fast and slow stock trading through algorithmic market making*; starting date: 01.01.2020; duration: 18 months; amount: **CHF 72,400**

2019 Co-organizer for the 1.5-day *Workshop on the Systemic Impact of Digitalization on Finance*; date: 19./20.12.2019; grant awarded by the faculty of Business, Economics, and Informatics at the University of Zurich; amount: **CHF 18,640**

Internships

06–08/2018 **Research Intern**, *Department Financial Stability, Deutsche Bundesbank*, Frankfurt.
Analysis of regulatory microdata on financial derivatives transactions collected under EMIR.

Publications (peer-reviewed)

1. **Portfolio Compression in Financial Networks: Incentives and Systemic Risk.** Steffen Schuldenzucker and Sven Seuken. Extended abstract in *Proceedings of the 21st ACM Conference on Economics and Computation (**EC**)*, Online Event, Hungary, July 2020. Full version (August 2020): (SSRN)
2. **Default Ambiguity: Credit Default Swaps Create New Systemic Risks in Financial Networks.** Steffen Schuldenzucker, Sven Seuken, and Stefano Battiston. ***Management Science***. Published online: 26 June 2019. (PDF, open access)
3. **Finding Clearing Payments in Financial Networks with Credit Default Swaps is PPAD-complete.** Steffen Schuldenzucker, Sven Seuken, and Stefano Battiston. In *Proceedings of the 8th Innovations in Theoretical Computer Science (**ITCS**) Conference*, Berkeley, USA, January 2017. (PDF)
4. **Clearing Payments in Financial Networks with Credit Default Swaps.** Steffen Schuldenzucker, Sven Seuken, and Stefano Battiston. Extended abstract in *Proceedings of the 17th ACM Conference on Economics and Computation (**EC**)*, Maastricht, The Netherlands, July 2016. Long (working paper) version: (PDF)

Other Research Papers

5. **Monotonic and Non-Monotonic Solution Concepts for Generalized Circuits.** Steffen Schuldenzucker and Sven Seuken. Working Paper, July 2019. (PDF) (arXiv)
6. **The Computational Complexity of Clearing Financial Networks with Credit Default Swaps.** Steffen Schuldenzucker, Sven Seuken, and Stefano Battiston. Working Paper, May 2019. (PDF) (arXiv)
7. **An Axiomatic Framework for No-Arbitrage Relationships in Financial Derivatives Markets.** Steffen Schuldenzucker. Working Paper. Presented at *Logic and the Foundations of Game and Decision Theory (**LOFT**)*, Maastricht, The Netherlands, July 2016. (PDF)

Talks

12/03/2020 Invited Talk "Portfolio Compression in Financial Networks: Incentives and Systemic Risk." *FinTech Horizon 2020*, Online Event

07/03/2020 "Portfolio Compression in Financial Networks: Incentives and Systemic Risk." *ACM Conference on Economics and Computation (**EC'20**)*, Online Event, Hungary

01/02/2020 Invited Talk "Financial Networks with Derivatives: Complexity and Systemic Risk." *Young Researcher Workshop on Economics and Computation*, Tel-Aviv University, Israel

11/09/2019 Invited Talk "Portfolio Compression in Financial Networks: Incentives and Systemic Risk" *Lisbon Meetings in Game Theory, 11th Edition*, Lisbon, Portugal

01/19/2018 Invited Talk "Dangerous Derivatives: New Systemic Risks in Financial Networks with Credit Default Swaps." *Second FINEXUS Conference on Financial Networks and Sustainability*, Zurich, Switzerland

01/10/2017 "Finding Clearing Payments in Financial Networks with Credit Default Swaps is PPAD-complete." *Innovations in Theoretical Computer Science (**ITCS'17**) Conference*, Berkeley, USA

10/21/2016 Invited Talk "Clearing Payments in Financial Networks with Credit Default Swaps." *Research seminar at the Austrian National Bank*, Vienna, Austria

07/28/2016 "Clearing Payments in Financial Networks with Credit Default Swaps." *ACM Conference on Economics and Computation (**EC'16**)*, Maastricht, The Netherlands

07/22/2016 "An Axiomatic Framework for No-Arbitrage Relationships in Financial Derivatives Markets." *Logic and the Foundations of Game and Decision Theory (**LOFT'16**)*, Maastricht, The Netherlands

07/04/2016 "Clearing Payments in Financial Networks with Credit Default Swaps." Poster presentation at *The 27th Jerusalem Summer School in Economic Theory: The Theory of Networks*, Jerusalem, Israel, 2016

09/28/2015 "Consistency of Bank Defaults in Financial Networks with Derivatives." *Research Seminar BBLS Banking and Finance at the University of Zurich*, Switzerland

09/22/2015 "Consistency of Bank Defaults in Financial Networks with Derivatives." *Network Research Seminar at the University of Zurich*, Switzerland

Teaching (at UZH)

1. **Lecturer**, Lecture (BSc + MSc): *Economics and Computation* (2018, 2019)
2. **Guest Lecturer**, Lecture (MSc): *Introduction to Systemic Risk in Financial Networks.* (2015, 2016, 2018)
3. **Teaching Assistant**, Seminar (BSc + MSc): *Advanced Topics in Economics and Computation.* (2015–2018)
4. **Teaching Assistant**, Lecture (BSc + MSc): *Economics and Computation* (2014)

Advising / Mentoring (at UZH)

Master's Students

1. Wei Qiu (Semester Project, MSc Thesis), 12/2017–09/2019
2. Pouyan Rezakhani (Two Semester Projects, MSc Thesis), 03/2017–01/2019

Reviewing Activities

- Journal Reviewer for: *SIAM Journal of Computing*, *SIAM Journal on Financial Mathematics*, *ACM Transactions on Economics and Computation*
- Conference Reviewer for: STACS'21, EC'20, ICALP'20, WINE'20, ITCS'20, WINE'19, AAAI'18, EC'17, EC'16, AAAI'16, EC'15

Other Work (not listed above)

2012–2014 Student Employee, IT Advisory, *KPMG AG*, Berlin / Cologne, Germany.
Leading technical development in an audit project.

2012 Lecturer, *Lernen Bohlscheid*, Cologne, Germany.
Classes in mathematics for beginning students and professionals.

2006–2012 Software Developer, *Digital Gecko Ltd.*, Bonn, Germany.

2011 Intern, *Tsuru Capital LLC*, Tokyo, Japan.
Software development for algorithmic trading.

2010–2011 Student Employee, Mathematical Software Development, *much-net AG*, Bonn, Germany.
Development of a standard application for the financial sector.

2009–2010 Student Employee, High School Activities, *University of Bonn, Germany*.

06-08/2008 Intern IT, *BW Fuhrpark*, Bonn, Germany.

Personal Information

Citizenship German

Languages German (native), English (fluent)