Steffen Schuldenzucker

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Research Fields

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

Education

2014–est. 08/2019 **PhD Student**, *University of Zurich*, Switzerland.
- Computation and Economics Research Group, Advisor: Prof. Sven Seuken, PhD
- PhD Thesis title: *A Formal Analysis of Complexity and Systemic Risk in Financial Networks with Derivatives*

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

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

2005–2006 **Early Study Program** for gifted high school students, *University of Bonn*.

1999–2008 **High School**, *Collegium Josephinum*, Bonn.

Research Grants

2019–2020 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: 01.09.2019; duration: 18 months; amount: **CHF 72,400**

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. **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)
2. **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)

3. **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

4. **Monotonic and Non-Monotonic Solution Concepts for Generalized Circuits.** Steffen Schuldenzucker and Sven Seuken. Working Paper, July 2019. (PDF) (arXiv)
5. **Portfolio Compression: Positive and Negative Effects on Systemic Risk.** Steffen Schuldenzucker, Sven Seuken, and Stefano Battiston. Research Note, March 2018. (PDF) (SSRN)
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

02/01/2020 Invited Talk "Understanding Complexity in Finance: Networks, Derivatives, and Systemic Risk" (tentative title). *Young Researcher Workshop on Economics and Computation*, Tel-Aviv University, Israel

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*, *ACM Transactions on Economics and Computation*
- Conference Reviewer for: 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)

References (available upon request)

- Prof. Dr. Sven Seuken (PhD Advisor)
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  ✉ *seuken@ifi.uzh.ch*
- Prof. Frank H. Page, Jr., PhD (PhD Proposal Reviewer)
  Department of Economics
  Indiana University
  100 S Woodlawn
  Bloomington, IN 47405, USA
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- PD Dr. Stefan Geschke (MSc Thesis Advisor)
  Department of Mathematics
  University of Hamburg
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  Formerly Professor, Hausdoff Center for Mathematics, Bonn