

# Simon Scheidegger

## Curriculum Vitae

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### Research Interests

Computational economics and finance, high-dimensional dynamic stochastic programming, machine learning applied to economics and finance, high-performance computing

### Work experience

07/2017 - today Senior Research Associate, Department of Banking and Finance, University of Zurich  
09/2015 - 09/2017 Visiting fellow at Hoover Institution, Stanford University  
09/2012 - 07/2017 Post Doc, Department of Banking and Finance, University of Zurich  
10/2010 - 08/2012 Credit Risk Modeler, Credit Suisse  
05/2007 - 10/2010 Assistant, Department of Physics, University of Basel

### Education and Qualifications

10/2010 PhD Theoretical Physics (summa cum laude, PhD thesis was awarded with the Faculty Prize of the Department of Science), University of Basel  
05/2007 Master Physics (with distinction), University of Basel  
09/2005 Bachelor Physics (with distinction), University of Basel

### Selected Publications

- Rethinking large-scale economic modeling for efficiency: optimizations for GPU and Xeon Phi clusters (with F. Kübler, D. Mikushin, O. Schenk (2018), Forthcoming IPDPS 18)
- Using Adaptive Sparse Grids to Solve High-Dimensional Dynamic Models (with J. Brumm, *Econometrica*, Vol. 85, No. 5 (September, 2017), 1575-1612)
- Computing equilibria in dynamic stochastic macro-models with heterogeneous agents (with J. Brumm, F. Kübler (2017), *Advances in Economics and Econometrics*, Eleventh World Congress)
- Parallelized Dimensional Decomposition for Dynamic Stochastic Economic Models (with A. Eftekhari, O. Schenk (2017), *Platform for advanced scientific computing ACM*)
- Scalable high-dimensional dynamic stochastic economic modeling (with J. Brumm, D. Mikushin, O. Schenk), *Journal of Computational Science*, Volume 11, November 2015, 12-25.

### Submitted Papers

- Machine learning for high-dimensional dynamic stochastic economies (with I. Billionis)
- Pricing American derivatives under stochastic volatility with recursive adaptive sparse expectations (with A. Treccani, *R&R Journal of Financial Econometrics*)
- Large-scale sparse inverse covariance matrix estimation (with M. Bollhoefer, A. Eftekhari, and O. Schenk (2017))

### Work in Progress

- Machine learning for dynamic incentive problems (with Philipp Renner; Job Market Paper)
- Optimal Monetary Policy under Uncertainty in the Presence of a Lower Bound (with J. Brumm, T. Mertens, J. Williams)
- Tackling large dynamic stochastic equilibrium models with occasionally binding constraints by high-dimensional model reduction techniques (with A. Eftekhari)
- Monetary policy in an oil-exporting economy (with J. Bejarano, J. Brumm, F. Hamann)
- Optimal Dynamic Taxation with Endogenous Debt Limits (with K. L. Judd, P. Renner, S. Yeltekin)

## Publications in Physics

- FISH: A 3D parallel MHD code for astrophysical applications (with R. Käppeli, S.C. Whitehouse, U.-L. Pen, M. Liebendörfer), *The Astrophysical Journal Supplement*, 2011, 195, 20K
- Neutrino Radiation-Hydrodynamics: General Relativistic versus Multidimensional Supernova Simulations (with M. Liebendörfer, T. Fischer, M. Hempel, R. Käppeli, G. Pagliara, A. Perego, I. Sagert, J. Schaffner-Bielich, F.-K. Thielemann, S.C. Whitehouse), *Progress of Theoretical Physics Supplement*, 2010, 186, 87-92
- Gravitational waves from supernova matter (with S.C. Whitehouse, R. Käppeli, M. Liebendörfer), *Class. Quantum Grav.* 27 (2010) 114101
- The influence of model parameters on the prediction of gravitational wave signal from stellar core collapse (with R. Käppeli, S.C. Whitehouse, T. Fischer, M. Liebendörfer), *Astronomy & Astrophysics* 514 (2010), A51+
- Supernovae as Nuclear and Particle Physics Laboratories (with M. Liebendörfer, T. Fischer, M. Hempel, A. Mezzacappa, G. Pagliara, I. Sagert, J. Schaffner-Bielich, F.-K. Thielemann, S. C. Whitehouse), *Nuclear Physics A*, Volume 827, Issue 1-4, pp. 573-578c
- Nuclear physics in core-collapse supernovae (with M. Liebendörfer, T. Fischer, C. Fröhlich, R. W. Hix, K. Langanke, G. Martinez-Pinedo, A. Mezzacappa, F.-K. Thielemann and S.C. Whitehouse), *New Astronomy Reviews* 52 Issue 7-10, pp. 373-376
- Gravitational waves from 3D MHD core collapse simulations (with T. Fischer, S.C. Whitehouse, M. Liebendörfer), *Astronomy & Astrophysics* 490, Issue 1, pp. 231-241

## Honors, Awards, Grants

- PI on the project *Taylor Rules and Sudden Stops in Small Open Economies* that was awarded for the period January 1st 2017 - December 31st, 2018 (net worth of grant: 13,000 CHF).
- PI on the project *Solving large-scale public finance models on emerging HPC systems* that was awarded with 129k node hours on the Cray XC50-Hybrid at CSCS for the period October 1st 2017- September 30th, 2018.
- Co-PI on the project *Computing equilibria in heterogeneous agent macro models on contemporary HPC platforms*. that was awarded for the period July 1st 2017 - June 30th, 2020 (jointly with Prof. F. Kübler and Prof. O. Schenk – net worth of grant: 461,500 CHF).
- PI on the project *Solving Large-scale Public Finance Models on Emerging HPC Systems* at JLSE, Argonne for the period March 2017 - March 2018.
- PI on the project *Solving large-scale overlapping generations models and medium-scale monetary policy models* that was awarded with 350k node hours ( $\approx 10$  mio core hours) on the Cray XC30 at CSCS for the period October 1st 2016- September 30th, 2017.
- Visiting Fellow (2015-2017), Hoover Institution, Stanford University.
- PI on the project *Computational Methods for solving dynamic stochastic economic models* that was awarded with 50,000 MPP on the NERSC (DOE) for the period January 1st 2016- January 1th, 2017.
- PI on the project *Solving High-Dimensional Dynamic Stochastic Economic Models with Adaptive Sparse Grids* that was awarded with 350k node hours ( $\approx 10$  mio core hours) on the Cray XC30 at CSCS for the period October 1st 2015- September 30th, 2016.
- Co-PI on the project *project Tackling large dynamic stochastic equilibrium models with occasionally binding constraints* that was awarded for the period April 1st 2015 - June 30th, 2017 (jointly with Prof. F. Kübler and Prof. O. Schenk – net worth of grant: 250,000 CHF).
- PI on the project *High-Dimensional Dynamic Stochastic Economic Modeling using Adaptive Sparse Grids* that was awarded with 9 mio core hours) on the Cray XC30 at CSCS for the period October 1st 2014- September 30th, 2015.
- Awarded with the Faculty Prize 2011 (Faculty of Science, University of Basel).
- Winner of a 3 year postdoctoral fellowship at the Max Planck Institute for Astrophysics, Garching (starting October 1, 2010) – declined.
- Voted best teaching assistant by the students of the Department of Physics, Basel University, in the Spring term of 2009.

## Teaching

02/2018	Introduction to Programming in Python for PhD students, University of Zurich
10/2017	Introduction to Programming in Python for Msc students, University of Zurich
10/2017	Global Solution Methods VII, Central Bank of Colombia (lecturer)
07/2017	Lecture suite on advanced scientific computing and parallel programming. Open Source Macroeconomics Laboratory, BFI, University of Chicago
03/2017	Global Solution Methods VI, Central Bank of Colombia (lecturer)
02/2017	Introduction to Parallel Programming & high-performance computing, Zurich Institute for Computational Economics, University of Zurich (lecturer)
02/2017	Introduction to Adaptive Sparse Grids, Zurich Institute for Computational Economics, University of Zurich (lecturer)
Autumn term 2016	Lecture suite on advanced scientific computing and parallel programming for graduate students in finance and economics, SFI, University of Geneva (lecturer)
07/2016	Lecture suite on high-dimensional function approximation & integration, parallel computation, machine learning, IMF, Washington D.C. (lecturer)
05/2016	Global Solution Methods V, Central Bank of Colombia (lecturer)
02/2016	Introduction to Parallel Programming & high-performance computing, Zurich Institute for Computational Economics, University of Zurich (lecturer)
02/2016	Introduction to Adaptive Sparse Grids, Zurich Institute for Computational Economics, University of Zurich (lecturer)
09/2015	Global Solution Methods IV, Central Bank of Colombia (lecturer)
Spring term 2015	Introduction to Financial Economics, University of Zurich (coordination of tutorials and exams)
02/2015	Introduction to Adaptive Sparse Grids, Zurich Institute for Computational Economics, University of Zurich (lecturer)
Spring term 2014	Introduction to Financial Economics, University of Zurich (tutorials)
Spring term 2013	Introduction to Financial Economics, University of Zurich (tutorials)
Spring term 2010	Radiative Transfer in Stars and its numerical treatment, University of Basel (teaching assistant and substitute lecturer)
Autumn term 2009	Stars and black holes, University of Basel (teaching assistant and substitute lecturer)
Spring term 2009	Hydrodynamics and introduction to parallel programming in FORTRAN (teaching assistant, numerical applications)
Autumn term 2008	Plasma physics, University of Basel (teaching assistant and substitute lecturer)
Spring term 2008	Nuclear astrophysics II, University of Basel (teaching assistant)
Autumn term 2007	Nuclear astrophysics I, University of Basel (teaching assistant)

## Seminars (since 2012)

Yale, USA (01/18) HEC Lausanne; Switzerland (01/18); University of Central Florida, USA (01/18), University of Zurich, Switzerland (06/2017); Bank of France, France (05/2017); Central Bank of Colombia BANREP, Colombia (03/2017); University of Lausanne, Switzerland (02/2017); EPFL, Switzerland (01/2017); Tepper school of business, Carnegie Mellon University USA (12/2016); CFRA, Stanford University, USA (10/2016); IMF, Washington D.C., USA (07/2016) Hoover Institution, Stanford University, USA (07/2016); CCE, University of Copenhagen, Denmark (03/2016); GFRI, University of Geneva, Switzerland (02/2016); IMF, Washington D.C., USA (12/2015); Consumer Financial Protection Bureau, Washington D.C., USA (12/2015); Department of Economics, Stanford University, USA (10/2015); BYU Computational Public Economics Conference, Park City, USA (12/2014); Civil and Environmental Engineering, Cornell University, USA (10/2014); Hoover Institution, Stanford University, USA (07/2014); USI Lugano, Switzerland (05/2014); Argonne National Laboratory, Lemont, USA (11/2013); Becker Friedman Institute, University of Chicago, USA (11/2013); Computational Centre Computational Sciences University of Basel, Switzerland (09/2013); Hoover Institution, Stanford University, USA (07/2013); University of Zurich, Zurich, Switzerland

## Conferences (since 2012)

Midwest Macro Meetings, Pittsburgh (11/2017); New Thinking about Economic Challenges in the Design and Implementation of Programs to Stabilize the Climate, SIPER, Stanford, USA (08/2017); The Structural Foundations Of Monetary Policy, Hoover Institution, USA (05/2017); Platform for Advanced Scientific Computing (PASC), Lausanne, Switzerland (06/2016); 11th World Congress of the Econometric Society, Montreal, Canada (08/2015); 15th SAET Conference, University of Cambridge, UK (07/2015); Platform for Advanced Scien-

tific Computing (PASC), Zürich, Switzerland (07/2015); 3rd Workshop on Sparse Grids and Applications, Stuttgart, Germany (09/2014); 68th European Meeting of the Econometric Society (EEA-ESEM), Toulouse, France (08/2014); Platform for Advanced Scientific Computing (PASC) Zurich, Switzerland (06/2014); IS-CEF 2014 - International Symposium in Computational Economics and Finance, Paris, France (04/2014); CEF 2013 - Computing in Economics and Finance, Vancouver, Canada (07/2013); ICE - Initiative for Computational Economics, Chicago, USA (07/2012)

### Professional activities

- Domain Co-Chair (“Emerging domains”) of PASC18 (Basel, Switzerland, on July 2-4, 2018)
- Program committee: CSE2016 (19th IEEE international conference on Computational Science and Engineering, Paris, August 24th -26rd, 2016)
- Program committee: CSE2015 (18th IEEE international conference on Computational Science and Engineering, Oct. 21st -23rd, 2015)
- Organizer of a minisymposium at PASC16 (pasc16.org) on ‘Emerging Applications of Computation in Economics’ (jointly with Dr. J. Brumm), EPFL Lausanne, June 8th - 10th 2016.
- Organizer of a minisymposium at PASC15 (pasc15.org) on ‘Emerging Applications of Computation in Economics’ (jointly with Dr. K. L. Judd), ETH Zürich, June 1st - 3rd 2015.
- Co-organizer of the Workshop ‘Fitting Flexible State-Space and Hierarchical Models Using the Laplace Approximation and Automatic Differentiation’, University of Zürich, September 1st - 3rd 2014.

### Refereeing

- Journal of Political Economy
- Operations Research
- Quantitative Economics
- Handbook of Computational Economics
- Mathematical Methods of Operations Research

### Professional Memberships

- The Econometric Society
- American Economic Association
- Deutsche Physikalische Gesellschaft (German Physical Society)
- Royal Astronomical Society

### Personal information

- Citizenship: Swiss
- Languages: German (native), English (fluent), French (good)