

# ADAM MICHAEL BAUER, Ph. D.

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## PROFESSIONAL SUMMARY

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Quantitative researcher specialized in applied optimization modeling, stochastic dynamical systems, and data-driven model development. 5+ years of experience building, validating, and optimizing large-scale computational models, designing data pipelines, and stress-testing decision systems under deep uncertainty. Expert in Python-based stochastic modeling and simulation, time-series modeling, and probabilistic risk assessment, with a track record of translating complex research into scalable tools that support real-world decision making. Strong interest in financial markets, asset pricing, algorithm optimization, and data-based investment research.

## EDUCATION

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### University of Illinois Urbana-Champaign

Ph. D. in Physics | GPA: 4.000/4.000

Urbana, Illinois

Aug 2020 — May 2025

*Doctoral Thesis: The Physics, Economics, and Political Economy of Climate Risk*

*Focus Areas:* Climate and economic risk management, stochastic optimization modeling, statistics, computational science

*Honors:* National Science Foundation Graduate Research Fellowship (Nationally competitive graduate research fellowship)

### University of Arizona

B.S. in Physics (with honors) & B.S. in Applied Mathematics | GPA: 3.972/4.000

Tucson, Arizona

Aug 2016 — May 2020

*Honors:* Excellence in Undergraduate Research Award (Given for most outstanding undergraduate research in the College of Science)

## RELEVANT WORK EXPERIENCE

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### University of Chicago, Institute for Climate and Sustainable Growth

Postdoctoral Research Scholar

Chicago, Illinois

Jul 2025 — Present

- Developing and stress-testing deep learning models (many-layer neural nets) using Python (tensorflow, hydra) to efficiently solve high-dimensional economic models under uncertainty.
- Building and validating predictive, non-stationary statistical models using Python (scipy.stats, xarray, dask, openMPI) and extreme value theory to forecast high-importance tail risks in large, noisy datasets.
- Implementing a data assimilation model using Python (scipy.optimize, pandas, xarray) and ensemble simulations to estimate and forecast the evolution of climate intervention inequality risk.
- Engineering high-performance computing frameworks using openMPI and SLURM task arrays to improve model runtime efficiency by 25x, accelerating the model iteration cycle from days to hours.
- Developing reusable Python modeling frameworks using Github version control to enable rapid evaluation of alternative model specifications, future scenarios, and Monte Carlo simulations.
- Mentoring research team members (1 peer level, 1 junior level), helping them achieve personal and professional goals.

### World Bank Group, Global Change Division

Research Consultant (Lead climate-economic risk modeler)

Washington, D.C.

May 2023 — Jun 2025

- Led an interdisciplinary research team that built two optimization-based dynamic economic models using Python (CVXPY, Pyomo, xarray) to quantify climate risk and perform risk-cost analysis to inform World Bank decision-makers.
- Directed the project roadmap and prioritized features based on institutional stakeholder requirements and feedback, adapting scope to meet evolving priorities.
- Developed stress-testing frameworks and sensitivity analysis of stochastic models using Monte Carlo simulations to quantify financial trade-offs, inform institutional decision-making, and make recommendations on future project development.
- Worked as a conduit between departmental and disciplinary silos to facilitate collaboration between economists, climate scientists, and engineers to define model requirements and inform policy strategy.
- Built and deployed two model software packages for internal World Bank use utilizing version control.
- Presented research findings to internal World Bank team members and senior leadership at the World Bank Learning Series.

### Columbia Business School & Tamer Center for Social Enterprise

Research Consultant; Staff Associate II in the Faculty of Business

New York, NY

Apr 2022 — Jun 2022; Sep 2022 — Dec 2022

- Built a stochastic model for carbon pricing using asset pricing theory, Python (scipy.optimize), and genetic algorithms to estimate risk premia and carbon price dynamics under uncertainty.
- Engineered a quality-controlled, feature engineered alternative dataset on climate damage and mitigation costs, drawing from multiple sources; utilized dataset for streamlined calibration of asset pricing model of carbon pricing.
- Conducted scenario analysis using publicly-available scenario sets to identify structural drivers of carbon price levels and volatility under different future carbon dioxide emissions and climate policy scenarios.

## University of Illinois Urbana-Champaign, Department of Physics

Graduate Research Fellow & Undergraduate Research Mentor

Champaign, Illinois

Aug 2020 — Jun 2025

- Developed a stochastic empirical and theoretical model using dynamical systems theory, Python (pandas, xarray), and large datasets (100s of GBs) to explain nonlinear relationships between weather/climate state variables and extreme events.
- Formulated a statistical model evaluation method that used historical model performance to predict future model success; reduced forecasting RMSE by 25% and mitigated model bias for tail-risk assessment.
- Mentored an undergraduate student from no coding experience to winning an NSF Graduate Research Fellowship, providing training in Python, statistics, and uncertainty quantification, and supporting their first publication.
- Wrote multiple first-author, peer-reviewed publications on research projects and gave presentations at domestic and international conferences to communicate research results to the broader community.

## SELECTED REPOSITORIES, PUBLICATIONS, AND PRESENTATIONS

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Github Repositories (3 of 8):

- Data assimilation pipeline to quantify and forecast inequality risk from climate engineering strategies.
- Highly-parallelized codebase for analyzing heat wave risk in observational and climate datasets using extreme value theory.
- Reproducibility package for academic publication on stochastic modeling of decarbonization investment strategies.

Peer-reviewed Research Articles (3 of 8):

- **Bauer, A. M.**, L. R. Vargas Zeppetello, C. Proistosescu. *An Analytical Model for the Influence of Soil Moisture on Temperature Extremes in the Midlatitudes*. Journal of Climate, 38(24), 2026.
- **Bauer, A. M.**, F. McIsaac, S. Hallegatte. *Decarbonization Investment Strategies in an Uncertain Climate*. Earth's Future, 13(5), 2025.
- **Bauer, A. M.**, C. Proistosescu, G. Wagner. *Carbon Dioxide as a Risky Asset*. Climatic Change, 177(72), 2024.

+ an additional 5 academic research articles, 2 preprints, 2 policy briefs, and 2 public-facing articles (see [www.ambauer.com/pubs](http://www.ambauer.com/pubs))

Conference Presentations (2 of 15):

- **Bauer, A. M.**, C. Proistosescu, K. Droegemeier. *Learning Climate Sensitivity from Future Observations, Fast and Slow*. Presented at the Fall Meeting of the American Geophysical Union in Washington DC, 2025.
- **Bauer, A. M.**, C. Proistosescu, G. Wagner. *Financial Modeling of Climate Risk Supports Stringent Mitigation Action*. Presented at the Annual Meeting of Environmental and Resource Economists in Portland, ME, 2022.

## TECHNICAL PROFICIENCIES AND SOFT SKILLS

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Programming and Technical Tools:

- *Python (expert) and SQL (basic)*:
  - For computation: NumPy, Pandas, xarray, scikit-learn, tensorflow, SciPy, dask, numba, statsmodels, BigQuery
  - For optimization: scipy.optimize, pyomo, CVXPY, Gurobi
  - For data visualization: matplotlib, seaborn, plotly, cartopy
- *Computational Efficiency*: Algorithm complexity analysis, vectorization (NumPy/dask), parallelization (openMPI, dask)
- *Distributed and High-Performance Computing*: openMPI, SLURM (task arrays, scripting, logging)
- *Certifications*: NVIDIA Academy Getting Started with Deep Learning Course

Communication and Other Soft Skills:

- Extensive written and oral communication skills to a variety of audiences, including policymakers, subject matter experts, non-technical audiences, cross-disciplinary teams, and end-users of modeling tools.
- Able to oversee the entire project lifecycle from identifying research (market) needs and opportunities, synthesizing methodologies, building proof-of-concept models, and delivering timely results to stakeholders and management.
- Experience performing on a range of project timelines, from near-term, rapid production to long-term deliverables.
- Comfortable mentoring group members at a variety of career stages, including early to peer-level.
- *Languages*: English (native), Italian (basic proficiency, B1 level)

## LEADERSHIP AND ACTIVITIES

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University of Illinois Urbana-Champaign

Graduate & Undergraduate Peer Mentor; Journal Club Co-founder

Urbana, Illinois

Aug 2020 — Jun 2025

- Assisted 7 first-year graduate students in finding research mentors, career-building services, and professional development opportunities.
- Founded a weekly student-only journal club to facilitate a welcoming and supportive environment for junior scientists to ask questions, get feedback, and form connections to support their career growth.