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Josie Oetjen, Langenfelder Damm 75, 22525 Hamburg

National Bureau of Economic Research
1050 Massachusetts Avenue
Cambridge, MA 02138

March 20, 2023

Application for the Graduate Student Workshop on Heterogeneous-Agent Macroeconomics

Dear Sir or Madame,

I am writing to apply for the Graduate Student Workshop on Heterogeneous-Agent Macroeconomics in Cambridge. I am an economics Ph.D. student at the University of Hamburg with a particular interest in heterogeneous agent models. I refer to the following pages for my motivation, skills, and previous experience.

For a recommendation, please contact:

Prof. Dr. Olaf Posch
olaf.posch@uni-hamburg.de

or

Rene Glawion
rene.glawion@uni-hamburg.de

Sincerely,



Josie Oetjen

CV JOSIE OETJEN

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EDUCATION

University of Hamburg — **Hamburg, HH, Germany**
PhD Candidate in Economics — *Apr 2023 - today*

Stanford University — **Stanford, CA, United States**
Taking four Computer Science graduate courses; GPA: 4.3/4.0 — *Mar 2022 - Dec 2022*

University of Hamburg — **Hamburg, HH, Germany**
Candidate for Master of Science in Economics; Current GPA: 4.0/4.0 — *Oct 2021 - Dec 2022*

University of Hamburg — **Hamburg, HH, Germany**
Candidate for Bachelor of Science in Economics; GPA: 4.0/4.0 — *Oct 2019 - Oct 2021*

University of Hamburg — **Hamburg, HH, Germany**
Candidate for Bachelor of Science in Psychology; GPA: 3.4/4.0 — *Oct 2016 - Sep 2019*

St. Viti Gymnasium Zeven — **Zeven, NI, Germany**
Baccalaureate; GPA: 3.7/4.0 — *Aug 2007 - Jun 2015*

GRADUATE COURSEWORK MACROECONOMICS

- Advanced Macroeconomics (10 ECTS Credits)
  Elements of Dynamic Macroeconomic Theory based on Advanced Macroeconomics by David Romer
- Panel Data Econometrics (6 ECTS Credits)
  Analyzing Macroeconomic Time Series Data

WORK EXPERIENCE

University of Hamburg — **Hamburg, Germany**

Research Associate (Chair: Methods of Economics) — *Apr 2023 - today*
- Working on applications and solution methods for heterogeneous agent models
- Tutor for statistics for economics

Research Assistant (Chair: Methods of Economics) — *Jan 2021 - Mar 2023*
- Implementating numerical solutions of DSGE models
- Working with the computational economics toolbox in Matlab, Python, and Julia

Student Researcher (Chair: Methods of Economics) — *Oct 2020 - Dec 2021*
- Data procurement and cleaning in R and Python
- Translating lecture slides for the course Computational Economics from Matlab to Python and Julia

Tradal GbR — **Hamburg, Germany**

Co-founder and CEO — *Jan 2021 - today*
- Tradal offers a web application that enables individuals and companies to easily use machine learning methods that help choose the optimal investment strategy in the financial market
- Tasks: Funding procurement, corporate structure and objectives, implementation of forecasting algorithms
- The project received 116,000 Euro funding from the German government (EXIST Gründerstipendium)

Diehl Aviation GmbH — **Hamburg, Germany**

Working Student Human Resources — *Oct 2019 - Sep 2020*
- Setting up and structuring databases for employees
- Monitoring and organizing recruitment processes

Abercrombie & Fitch Co. — **Hamburg, Germany**

Working Student Sales — *Jun 2015 - Sep 2019*

- Administrative assistance of the Store and Regional Management
- Mentoring and training new sales associates about products and customer service

European ISH **Hamburg, Germany**
Internship Psychological Research *Sep 2018 - Dec 2018*
- Planing and conducting lab experiments
- Empirical research and literature review

THESES & PROJECT PAPERS

- Carbon Taxes in a Heterogeneous Agent New Keynesian Model (2022)
  Master's Thesis University of Hamburg
- Using Deep Learning to Solve Parabolic Partial Differential Equations Arising in Heterogeneous Agent Models (2022)
  Project Paper Stanford University, with René Glawion
- Financial Time Series Forecasting with Generative Adversarial Networks (2022)
  Project Paper Stanford University, with Xuhui Zhang
- Trajectory Planning and Control in Robot Autonomy (2022)
  Project Paper Stanford University, with Alberto Guiggiani, Avrum Noor, and Karthik Pythireddi
- Applications of Non-linear Machine Learning Tree Methods for Predicting Sovereign Defaults (2021)
  Bachelor's Thesis Economics University of Hamburg
- Negative Relationship between Moderate Alcohol Consumption and Working Memory Performance? - A Multi-level Quasi-experiment (2019)
  Bachelor's Thesis Psychology University of Hamburg

EXTRACURRICULAR

- Tutor at the refugee shelter Fördern & Wohnen Hamburg (2020-2022)
- Tutor for first semester students at the University of Hamburg (2017-2018)
- Board and employee at the non-profit student association Viticcino (2012-2015)

SKILLS

Programming & Applications:	Python, Matlab, R, Julia, Fortran, HTML5, CSS, JS, LaTeX, Git
Languages:	German (native), Low German (native), English (fluent), French (basics)

AWARDS & SCHOLARSHIPS

- EXIST project funding scholarship for the project "AI for Investment Decisions": €116,000 (2022-2023)
- PROMOS scholarship of the German Academic Exchange Service (declined) (2022)
- Award of the Dr. Walter Kapaun Foundation for the thesis "Applications of Non-linear Machine Learning Tree Methods for Predicting Sovereign Defaults" (2022)
- Master Plus scholarship of the Claussen-Simon-Stiftung for outstanding master's students (2021-2022)
- 5th place at the national dressage championships for young riders Niedersachsen, Germany (2016)
- Award of the German Mathematical Association for outstanding achievements in mathematics (2015)
- E-fellows scholarship for the best high school graduates (2015)

Motivation for the Workshop on Heterogeneous-Agent Macroeconomics

J. Oetjen

March 20, 2023

I am writing to express my interest in attending your workshop on heterogeneous-agent macroeconomics. My motivation for attending the workshop stems from both my previous experience in this field and my future research goals within the scope of my Ph.D. studies.

Although I am currently at the beginning of my doctoral studies at the University of Hamburg in Germany, I have completed a Master's degree in economics, which is equivalent to the first two years of a Ph.D. program at universities abroad. During my Master's program, I took a comprehensive course in Advanced Macroeconomics taught by Prof. Dr. Michael Bauer, based on the corresponding book by David Romer. The course allowed me to further develop the macroeconomic knowledge and skills I gained during my bachelor's studies. In particular, we have dealt in detail with dynamic programming and the standard New Keynesian model, studying both the theory and practical applications.

I finished my Master's degree with the thesis "Carbon Taxes in a Heterogeneous Agent New Keynesian Model", where I extended the HANK model of Kaplan et al. (2018) by carbon emissions, taxes on carbon emissions, and different tax revenue recycling schemes. I implemented this extended model using Fortran and examined the aggregate and distributional economic effects of these policy measures. Furthermore, I evaluated whether these schemes impact the impulse responses and the consumption effect decomposition following a one-time unexpected interest rate shock. Through this research, I gained valuable insights into the mechanisms of heterogeneous agent models and finite difference algorithms, both for the steady state and the transition dynamics.

In 2022, I furthermore took selected graduate courses in computer science at Stanford University, where I improved my skills in numerical algorithms and machine learning methods, mainly working with Python. Along with a colleague, I wrote the project paper "Using Deep Learning to Solve Parabolic Partial Differential Equations Arising in Heterogeneous Agent Models", in which we successfully employed a feed-forward neural network to approximate the solution of the Hamilton–Jacobi–Bellman equation in the continuous time Aiyagari model presented in Achdou et al. (2022).

In addition to my academic experiences, I have gained practical research experience in the field of macroeconomics by working as a student researcher, research assistant, and now a research associate at the chair Methods of Economics. Here, I have worked on numerically solving DSGE models using Python, Julia, and Matlab, procuring macroeconomic data, and conducting literature research.

Overall, I am highly interested in heterogeneous agent models due to their ability to highlight the distributional consequences of policy actions, which I think are just as significant as aggregate consequences. Given the rising inequality worldwide, I believe using these more realistic models will become indispensable in the near future. I would happily attend your workshop to deepen my knowledge because I plan to continue working with heterogeneous agent models in my Ph.D. research, focusing on solution methods and applications in continuous time. Here, I will put particular emphasis on transition dynamics and methods to compute those dynamics more efficiently because of their relevance for comprehensive policy analyses.

Thank you for considering my application to attend your workshop.

Sincerely,



Josie Oetjen

References

Achdou, Y., Han, J., Lasry, J.-M., Lions, P.-L., and Moll, B. (2022). Income and wealth distribution in macroeconomics: A continuous-time approach. *The review of economic studies*, 89(1):45–86.

Kaplan, G., Moll, B., and Violante, G. L. (2018). Monetary policy according to hank. *American Economic Review*, 108(3):697–743.