**Sergi Barcons**
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March 2023

**Faculty to contact for recommendation**
Fabrice Collard
Professor of Economics at TSE
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Dear Committee,

I am excited to apply for the Graduate Student Workshop on Heterogeneous-Agent Macroeconomics hosted by the National Bureau of Economic Research on June 12-14, 2013, in Cambridge, MA.

I am a second-year PhD student at the Toulouse School of Economics (I will have finished the year in June), and I am highly interested in conducting research related to the macroeconomic consequences of heterogeneity. Specifically, I am interested in understanding why and when heterogeneity matters. As macroeconomic phenomena affect each agent differently, it can have profound implications for inequality. Additionally, incorporating transition dynamics, welfare assessments, aggregate uncertainty, or any type of frictions can make the questions even more compelling, yet technically challenging.

I have already invested time in developing the skills required to address such an agenda. However, there are still several topics that I need to learn more about. The curriculum of this graduate workshop aligns perfectly with my goals. It offers both theoretical and practical applications, including estimating HANK models, which I am excited to learn about.

Thank you for considering my application. I look forward to the opportunity to attend the workshop and further develop my knowledge and skills in this field.

Sincerely,
Sergi Barcons

# Sergi Barcons

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*Education*

**Ph.D. in Economics, TSE** 2021 - current
*Current: M. Res. in Economics (2nd year of the PhD, finishes in May 2023)*

**M.Sc. in Economic Theory and Econometrics, TSE** 2021 - 2022

**M.Sc. in Applied Mathematics, TSE** 2020 - 2021

**B.Sc. in Mathematics and Economics** 2017 - 2020

*Fields*

Macroeconomics, Heterogeneous Agents, Monetary Policy

*PhD Macro courses*

**Topics in Macro-Finance** Spring 2023
*with Christian Hellwig*
- Topics related to the 2008 financial crisis and great recession

**Topics in Macro-Labor** Winter/Spring 2023
*with Eugenia Gonzalez-Aguado*
- Topics related to the cyclicality in labor markets, wage dynamics and the sources of wage dispersion

**Behavioral Macroeconomics** Spring 2023
*with Tiziana Assenza*
- Overview of the main areas of study within behavioral macroeconomics

**Quantitative Techniques in Economics** Fall 2022
*with Andreas Schaab and Sumudu Kankanamge*
- Incomplete markets/heterogeneous agents in discrete and continuous time
- Sequence-space methods for heterogeneous-agent models

**Continuous-Time Dynamic Programming** Fall 2022
*with Andreas Schaab*

**Advances in Macroeconomics** Winter/Spring 2022
*with Christian Hellwig and Nicolas Werquin*
- Search and matching, assignment and assortative matching, span of control models, firm size distribution and dynamic contracts

**Macroeconomics 2** Winter/Spring 2022
*with Christian Hellwig and Eugenia Gonzalez-Aguado*
- Labor Search, asset pricing, risk-sharing, fiscal policy, monetary economics, firm dynamics and heterogenous-agent models

**Macroeconomics 1** Fall 2022
*with Fabrice Collard and Patrick Fève*
- DSGE economies, business cycle, SVAR models, estimation RBC

*Summer Schools*

**Advanced Numerical Methods in Macroeconomics** Summer 2022
*with Jesús Fernández-Villaverde and Galo Nuño* *CEMFI*

- Dynamic programming in continuous time, heterogeneous-agent models, aggregate shocks
- Deep learning, reinforcement learning and its application for solving high-dimensional dynamic programming problems

*Work in Progress*

Continuing the welfare assessment work of Dávila and Schaab (2022) using DS-weights
*with Eduardo Dávila and Andreas Schaab*

Banking Crisis and Household Heterogeneity: how household inequality affects the frequency and depth of financial recessions
*with Maria Frech*

Inequality in Times of Unconventional Monetary Policy
*2022, Master Thesis, advisor Fabrice Collard*

*Other Research Activities*

Collaborator of the `SpaseEcon` repository on GitHub (macro models in continuous time using adaptive sparse grids)
*with Andreas Schaab, Stacy Tan and Allen T. Zhang*

*Scholarships*

2022 Doctoral fellowship French ministry of education

*Teaching Assistant*

Winter/Spring 2022 Macroeconomics 2 (bachelor)

*References*

**Fabrice Collard** fabrice.collard@tse-fr.eu
*Professor of Economics at TSE*

# Motivation for attending the workshop

In broad terms, my research interests lie in the area of the aggregate implications of heterogeneity. Precisely, I am interested in exploring macroeconomic models that incorporate household heterogeneity, which is consistent with the micro data, and study how policies or other phenomena, say recessions, are influenced by such inequalites.

Thus far, I have explored topics related to monetary policy, welfare assessments with heterogenous agents and briefly financial frictions. For example, in my master's thesis, I developed a one-asset HANK model to study how wealth dispersion is affected when the central bank conducts unconventional monetary policy. Several questions motivated me: what are the consequences at the aggregate of conducting unconventional monetary policy in an environment with heterogenous agents, what are the general equilibiurm effects inducing changes in the inequality levels, and specially, should the central bank care about inequality?

In all of my research, I have employed continuous-time methods to solve heterogenous agent models. My decision to use continuous-time methods stems from the seminal paper by Kaplan, Moll, and Violante (2018) *"Monetary Policy According to HANK"* which in part inspired me to pursue a PhD degree. My first step in the world of quantitative economics was therefore to try to replicate (a simpler version) of this paper, and hence I had to learn such methods. Nonetheless, I am conscious that it is essential to learn different approaches and techniques to build my repertoire of quantitative tools.

Recently, some papers have used deep learning to get global solutions in large models with aggregate uncertainty. These papers also claim continuous time requires solving PDEs, something deep-learning algorithms struggle to do. In short, I do not want to be limited in the economic questions that I address because of technical limitations. Furthermore, in this graduate workshop there are several topics that I have not seen before but sounds exciting and useful for future research. For instance, estimating HANK models is one of those.

In summary, the type of questions than interest me are demanding on technical coding skills. Of those skills, I have only scratched the surface. And this is why attending this workshop will prove useful. In my opinion, understanding why there is inequality, and how to deal with it, requires policies to be confronted to macro models with heterogenous agents, otherwise, we will only know if we hurt or not the average individual. If I suffer from limitations, I want them to be due to my creativity, and not by a lack of knowledge on how to implement those thoughts on a computer.