# TOPICS IN MACROECONOMICS AND HOUSEHOLD FINANCE

## CONTACT INFORMATION

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PhD Advanced Course, half-credit, Block III, 2019-2020

## COURSE DESCRIPTION

The objective of this course is to introduce Ph.D. students to tools that are necessary to study questions in quantitative macroeconomics, with a focus on household finance. We will first review these tools (dynamic programming and numerical tools) in class. We will then move on to applying these tools to questions of household finance, including inter-temporal saving decisions and portfolio allocations (e.g. housing choices). Also, we will discuss computational problems that typically arise in these types of models (e.g. continuous and discrete choices, multi-dimensional problems).

## ASSESSMENT

Students will be evaluated through a take-home exam, and depending on the size of the class, possibly a small in-class presentation (20% of final grade). The take home will be used to evaluate the students' skills to apply the methods developed in class.

## LITERATURE

<u>Household Finance (incomplete)</u>

- Badarinza, C., J.Y.Campbell, and T. Ramadorai (2016). "International Comparative Household Finance", Annual Review of Economics, 8, 111-44.
- Christelis, D., D. Georgarakos, and M. Haliassos (2013). "Differences in Portfolios Across Countries: Economic Environment versus Household Characteristics", Review of Economics and Statistics, 95(1), 220–36.
- ECB Household Finances and Consumption Network, "HFCS Report on the Results of the Second
  Wave, Statistics Paper No. 18, December 2013 (available from: HFCN website).
- The US Survey of Consumer Finances (SCF). check FED Board website
- Cocco, J. (2005). "Portfolio Choice in the Presence of Housing", Review of Financial Studies, 535–567.
- Yang, F. (2009). "Consumption over the Life-Cycle: How Different is Housing", Review of Economic Dynamics 12, 423–443.
- Piazzesi, M. and M. Schneider (2016). "Housing and Macroeconomics", Vol 2. Handbook of Macroeconomics.

- Kaas, L. and. G. Kocharkov, E. Preugschat, and N. Siassi (2017). „Low Homeownership in Germany – A Quantitative Exploration", Journal of the European Economic Association (forthcoming).
- Imrohoroglu, A., K. Matoba, and S. Tuzel (2018). "Proposition 13: An equilibrium Analysis". American Economic Journal: Macroeconomics, American Economic Association, vol. 10(2), pages 24-51
- De Nardi, M. and G. Fella (2017). "Saving and Wealth Inequality", Review of Economic Dynamics, 26, 280-300.

Computational

General

- Judd, K. (1998). "Numerical Methods in Economics" MIT Press
- Miranda, M. & Fackler, P. (2002). "Applied Computational Economics and Finance", MIT Press
- Herr, B. and A. Maussner (2005). "Dynamic General Equilibrium Modelling", Springer Press

Household Finance

- Ludwig, A. and M. Schoen (2018). "Endogenous grids in higher dimensions: Delaunay Interpolation and Hybrid Methods". Computational Economics 51, 463–492.
- Druehdahl, J. and T. Jorgensen (2017), "A General Endogenous Grid Method for Multi-Dimensional Models with Non-Convexities and Constraints", Journal of Economic Dynamics & Control, issue 74, 87-107.

Judd (1998) is an advanced book on numerical methods and I do not expect you to understand every detail. In class we will then go over some material and apply it to economic problems. I encourage you to re-read the relevant chapters after class. Also, it is a great reference in general. Miranda & Fackler (2002) is a much more accessible alternative book on numerical methods that you may want to consult if you feel that Judd (1998) is not the right book for you. Herr & Maussner (2005) will not be used that much in class. However, I think it is a great reference book as it discusses many computational problems specific to dynamic general equilibrium models.

## SOFTWARE

There is no point in re-inventing the wheel, and I encourage you to use canned code whenever possible. The web is a valuable resource of ready-made code which is often written by professionals has been debugged and optimized over many years (c.f. some sources/toolboxes). However, part of this course's intention is to acquaint you with different numerical methods (and its pitfalls) and the best way to study it is to do it yourself.

Computer language for this course will be Matlab and I expect that you are at least somewhat familiar with Matlab or some other language such as Fortran, Python or Julia. Alternatively, you are expected to teach yourselves over the course.

A tutorial to get you started with Matlab (and many others on youtube) and programming tips are available at

*www.mathworks.com/access/helpdesk/help/pdf_doc/matlab/getstart.pdf*
*www.mathworks.com/access/helpdesk/help/pdf_doc/matlab/programming_tips.pdf*

Toolboxes for Matlab:

- A documentation of Matlab and its toolboxes can be downloaded for free at *www.mathworks.com*.
- Miranda and Fackler provide a Matlab toolbox called *CompEcon*. The toolbox can be freely downloaded at *ww4.ncsu.edu/~pfackler/compecon/toolbox.html*.

Toolboxes for Fortran:

- Hans Fehr and Fabian Kindermann provide incredibly nices toolboxes for Fortran user in Computational Economics. Consult this website https://www.ce-fortran.com/author/myadmin/

Toolboxes for Python and Julia:

- A very good and comprehensive website initiated by Sargent and Stachurski. I can be checked out here: *https://quantecon.org/lectures/*

This list is not complete but I think it is a good starting point. The toolboxes include much more than we will cover in class but are good references for you when encountering problems in future: equation solvers and optimization routines, a set of routines for function approximation, a set of numerical integration routines, routines for solving ordinary differential equations (both initial and boundary value problems), and routines for solving discrete- and continuous-time dynamic programming problems.