Analyzing Heterogeneous Agent Models in Sequence Space

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Lectures

- **Lecture 1. Recap of consumption-saving and stationary equilibrium**
  Concepts: Buffet-stock saving, stationary equilibrium, numerical dynamic programming, deterministic histogram simulation, endogenous grid point method
  Material: *Slides*

- **Lecture 2. Transitional dynamics in sequence space**
  Concepts: Sequence-space, blocks, DAG, Jacobian, fake-news algorithm, driving forces
  Material: Auclert et al. (2021a)[1]; Druedahl (2023)

- **Lecture 3. Aggregate risk, linearized dynamics and analytical analysis**
  Concepts: First order solution, intertemporal Keynesian cross, simulation, estimation
  Material: Auclert et al. (2021a); Boppart et al. (2018); Auclert et al. (2023)

- **Lecture 4. Examples: Open-Economy HANK + HANK with search-and-matching (SAM)**
  Concepts: Policy analysis, endogenous idiosyncratic risk, discrete choices, bounded rationality
  Material, Open-Economy:
  Auclert et al. (2021b); Druedahl et al. (2022); Bellifemine et al. (2023)
  Material, HANK-SAM:
  Broer et al. (2023a,b); Bardóczy and Guerreiro (2023)
  Material: Auclert et al. (2020)

[1] See the SSJ toolkit.

Plan

Monday

- Lecture 1: 9:00 - 10:00
- Lecture 2: 10:00 - 12:00
- Introduction to code and exercises: 15:00 - 17:30

Tuesday

- Lecture 3: 15:00 - 17:30

Thursday

- Lecture 4: 14:00 - 17:00

Suggested preparation

You should refresh the following economic and computational concepts:

1. **Economics:** Stationary equilibrium, transition path, New Keynesian model
2. **Computational:** Numerical dynamic programming, endogenous grid point method

The code examples given will be in Python. To work actively with these:

1. Look through QuantEcon cheetsheet for MATLAB vs. Python.
2. Install Anaconda Individual Edition Python 3.11
3. Install VSCode
4. Download or clone repository GEModelTools
5. Open Anaconda Prompt:
   (a) Run *pip install QuantEcon, EconModel, ConSav*
   (b) Locate folder with GEModelTools
   (c) Run *pip install -e .*

Notes:

1. For more on using Python see the course
   Introduction to Programming and Numerical Analysis
2. These lectures builds on the course
   Advanced Macroecnomics: Heterogenous Agent Models

Code-packages

1. **GEModelTools:**
   github.com/NumEconCopenhagen/GEModelTools
   github.com/NumEconCopenhagen/GEModelToolsNotebooks
   My version of the SSJ toolbox

2. **EconModel:**
   github.com/NumEconCopenhagen/EconModel
   github.com/NumEconCopenhagen/EconModelNotebooks

3. **ConSav:**
   github.com/NumEconCopenhagen/ConsumptionSaving
   github.com/NumEconCopenhagen/ConsumptionSavingNotebooks

References

Auclert, A., Bardóczy, B., Rognlie, M., and Straub, L. (2021a). Using the Sequence-Space Jacobian to Solve and Estimate Heterogeneous-Agent Models. *Econometrica*, 89(5):2375–2408.

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Bardóczy, B. and Guerreiro, J. (2023). Unemployment Insurance in Macroeconomic Stabilization with Imperfect Expectations. Technical report.

Bellifemine, M., Couturier, A., and Jamilov, R. (2023). The Regional Keynesian Cross. Technical report.

Boppart, T., Krusell, P., and Mitman, K. (2018). Exploiting MIT shocks in heterogeneous-agent economies: the impulse response as a numerical derivative. *Journal of Economic Dynamics and Control*, 89:68–92.

Broer, T., Druedahl, J., Harmenberg, K., and Öberg, E. (2023a). Fiscal stimulus policies according to HANK-SAM. Working Paper.

Broer, T., Druedahl, J., Harmenberg, K., and Öberg, E. (2023b). The Unemployment-Risk Channel in Business-Cycle Fluctuations. CEPR Discussion Paper 16639.

Druedahl, J. (2023). Documentation for GEModelTools. Technical report.

Druedahl, J., Ravn, S. H., Sunder-Plassmann, L., Sundram, J. M., and Waldstrøm, N. (2022). The Transmission of Foreign Demand Shocks. Working Paper.