Course Plan:

Adv. Macro: Heterogeneous Agent Models

Jeppe Druedahl (JD) & Patrick Moran (PM)

All articles are posted under »Files« on Absalon

I. Computational techniques

• Lecture 1. Introduction (JD)

Additional material: Heathcote et al. (2009); Kaplan and Violante (2018)

• Lecture 2. Stationary equilibrium (JD)

Additional material: Aiyagari (1994)

Additional material: Nothing

• Lecture 3. Transition path (JD)

Required reading: Documentation for GEModelTools (except on linearized solution and simulation)

Additional material: Auclert et al. (2021a), Kirkby (2017)

• Lecture 4. Assignment Workshop I (JR)

II. Applications without pricing frictions

• Lecture 5. Consumption-saving models (PM, online)

Required reading: Kaplan and Violante (2014)

Additional material: Harmenberg and Oberg (2021); Kaplan and Violante (2021)

• Lecture 6. Deviations from full rationality (PM, online)

Required reading: Carroll et al. (2020)

Additional material: Attanasio et al. (2020)

• Lecture 7. Wealth inequality (PM)

Required reading: Hubmer et al. (2021)

Additional material: De Nardi and Fella (2017)

• Lecture 8. Housing wealth (PM)

Required reading: Sommer and Sullivan (2018)

Additional material: Nothing

• Lecture 9. Demographics and global imbalances (PM)

Required reading: Auclert et al. (2021b)

Additional material: Mian et al. (2021)

• Lecture 10. Assignment Workshop II (JR)

III. Applications with pricing frictions

• Lecture 11. HANK I (JD)

Required reading: Auclert et al. (2020)

Additional material: McKay and Reis (2016); Kaplan et al. (2018); Hagedorn et al. (2019); Bayer et al. (2019); Alves et al. (2020); Auclert et al. (2020)

• Lecture 12. HANK II (JD)

Required reading: Werning (2015); Auclert et al. (2018); Broer et al. (2020)

Additional material: Nothing

• Lecture 13. I-HANK (JD)

Required reading: Druedahl et al. (2022) Additional material: Auclert et al. (2021c)

• Lecture 14a. HANK-SAM (JD)

Required reading: Broer et al. (2022)

Additional material: Den Haan et al. (2018); Ravn and Sterk (2021)

Conclusion

• Lecture 14b. Exam preparation (JD)

References

- Aiyagari, S. R. (1994). Uninsured Idiosyncratic Risk and Aggregate Saving. *The Quarterly Journal of Economics*, 109(3):659–684.
- Algan, Y., Allais, O., Den Haan, W. J., and Rendahl, P. (2014). Chapter 6 Solving and Simulating Models with Heterogeneous Agents and Aggregate Uncertainty. In Schmedders, K. and Judd, K. L., editors, *Handbook of Computational Economics*, volume 3 of *Handbook of Computational Economics Vol.* 3, pages 277–324. Elsevier.
- Alves, F., Kaplan, G., Moll, B., and Violante, G. L. (2020). A Further Look at the Propagation of Monetary Policy Shocks in HANK. *Journal of Money, Credit and Banking*, 52(S2):521–559.
- Attanasio, O., Kovacs, A., and Moran, P. (2020). Temptation and Commitment: Understanding Hand-to-Mouth Behavior. Working Paper.
- Auclert, A., Bardoczy, B., Rognlie, M., and Straub, L. (2021a). Using the Sequence-Space Jacobian to Solve and Estimate Heterogeneous-Agent Models. *Econometrica*, 89(5):2375–2408.
- Auclert, A., Malmberg, H., Martenet, F., and Rognlie, M. (2021b). Demographics, Wealth, and Global Imbalances in the Twenty-First Century. Working Paper.
- Auclert, A., Rognlie, M., Souchier, M., and Straub, L. (2021c). Exchange Rates and Monetary Policy with Heterogeneous Agents: Sizing up the Real Income Channel. NBER Working Paper 28872.
- Auclert, A., Rognlie, M., and Straub, L. (2018). The Intertemporal Keynesian Cross. NBER Working Paper 25020, National Bureau of Economic Research.
- Auclert, A., Rognlie, M., and Straub, L. (2020). Micro Jumps, Macro Humps: Monetary Policy and Business Cycles in an Estimated HANK Model. NBER Working Paper 26647.
- Azinovic, M., Gaegauf, L., and Scheidegger, S. (2022). Deep Equilibrium Nets. forthcoming in International Economic Review.
- Bayer, C., Luetticke, R., Pham-Dao, L., and Tjaden, V. (2019). Precautionary Savings, Illiquid Assets, and the Aggregate Consequences of Shocks to Household Income Risk. *Econometrica*, 87(1):255–290.
- 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 Oberg, E. (2022). The Unemployment-Risk Channel in Business-Cycle Fluctuations. Working Paper.
- Broer, T., Harbo Hansen, N.-J., Krusell, P., and Oberg, E. (2020). The New Keynesian Transmission Mechanism: A Heterogeneous-Agent Perspective. *The Review of Economic Studies*, 87(1):77–101.
- Carroll, C. D. (1992). The buffer-stock theory of saving: Some macroeconomic evidence. *Brookings Papers on Economic Activity*, 2:61–156.

- Carroll, C. D. (1997). Buffer-Stock Saving and the Life Cycle/Permanent Income Hypothesis. *The Quarterly Journal of Economics*, 112(1):1–55.
- Carroll, C. D. (2006). The Method of Endogenous Gridpoints for Solving Dynamic Stochastic Optimization Problems. *Economics Letters*, 91(3):312–320.
- Carroll, C. D. (2020). Theoretical Foundations of Buffer Stock Saving. forthcoming in Quantitative Economics.
- Carroll, C. D., Crawley, E., Slacalek, J., Tokuoka, K., and White, M. N. (2020). Sticky Expectations and Consumption Dynamics. *American Economic Journal: Macroeconomics*, 12(3):40–76.
- Carroll, C. D., Holm, M. B., and Kimball, M. S. (2021). Liquidity constraints and precautionary saving. *Journal of Economic Theory*, 195:105276.
- De Nardi, M. (2004). Wealth Inequality and Intergenerational Links. *The Review of Economic Studies*, 71(3):743–768.
- De Nardi, M. and Fella, G. (2017). Saving and wealth inequality. *Review of Economic Dynamics*, 26:280–300.
- Deaton, A. (1991). Saving and liquidity constraints. *Econometrica*, 59(5):1221–1248.
- Deaton, A. (1992). Understanding Consumption. Oxford University Press.
- Den Haan, W. J., Rendahl, P., and Riegler, M. (2018). Unemployment (Fears) and Deflationary Spirals. *Journal of the European Economic Association*, 16(5):1281–1349.
- Druedahl, J. (2021). A Guide on Solving Non-Convex Consumption-Saving Models. *Computational Economics*, 58(3):747–775.
- Druedahl, J. (2023). Documentation for GEModelTools. Technical report.
- Druedahl, J. and Partsch, E. H. (2022). Global Solutions of Heterogeneous Agent Models with Non-linear Aggregate Dynamics. Working Paper.
- Druedahl, J., Ravn, S. H., Sunder-Plassmann, L., Sundram, J. M., and WaldstrÄžm, N. (2022). The Transmission of Foreign Demand Shocks. Working Paper.
- Eslami, K. and Phelan, T. (2023). The Art of Temporal Approximation An Investigation into Numerical Solutions to Discrete and Continuous-Time Problems in Economics.
- Fagereng, A., Gomez, M., Holm, M., Moll, B., and Natvik, G. (2022). Asset-Price Redistribution. Working Paper.
- Friedman, M. (1957). A theory of the consumption function. Princeton university Press for NBER.
- Guvenen, F. (2011). Macroeconomics With Heterogeneity: A Practical Guide. NBER Working Paper 17622.

- Hagedorn, M., Manovskii, I., and Mitman, K. (2019). The Fiscal Multiplier. NBER Working Paper 25571.
- Harmenberg, K. and Oberg, E. (2021). Consumption dynamics under time-varying unemployment risk. *Journal of Monetary Economics*, 118:350–365.
- Heathcote, J., Storesletten, K., and Violante, G. L. (2009). Quantitative Macroeconomics with Heterogeneous Households. *Annual Review of Economics*, 1(1):319–354.
- Hubmer, J., Krusell, P., and Smith., A. A. (2021). Sources of US Wealth Inequality: Past, Present, and Future. *NBER Macroeconomics Annual*, 35:391–455. Publisher: The University of Chicago Press.
- Huggett, M. (1996). Wealth distribution in life-cycle economies. *Journal of Monetary Economics*, 38(3):469–494.
- Kaplan, G., Moll, B., and Violante, G. L. (2018). Monetary Policy According to HANK. *American Economic Review*, 108(3):697–743.
- Kaplan, G. and Violante, G. L. (2014). A Model of the Consumption Response to Fiscal Stimulus Payments. *Econometrica*, 82(4):1199–1239.
- Kaplan, G. and Violante, G. L. (2018). Microeconomic Heterogeneity and Macroeconomic Shocks. *Journal of Economic Perspectives*, 32(3):167–194.
- Kaplan, G. and Violante, G. L. (2021). The Marginal Propensity to Consume in Heterogeneous Agent Models. page 52.
- Kase, H., Melosi, L., and Rottner, M. (2022). Estimating Nonlinear Heterogeneous Agents Models with Neural Networks. Federal Reserve Bank of Chicago, WP 2022-26.
- Kirkby, R. (2017). Transition paths for Bewley-Huggett-Aiyagari models: Comparison of some solution algorithms. Working Paper.
- Krusell, P. and Smith, A. A. (1998). Income and wealth heterogeneity in the macroeconomy. *Journal of Political Economy*, 106(5):867–896.
- Maliar, L., Maliar, S., and Winant, P. (2021). Deep learning for solving dynamic economic models. *Journal of Monetary Economics*, 122:76–101.
- McKay, A. and Reis, R. (2016). The Role of Automatic Stabilizers in the U.S. Business Cycle. *Econometrica*, 84(1):141–194.
- Mian, A., Straub, L., and Sufi, A. (2021). Indebted Demand. *The Quarterly Journal of Economics*, 136(4):2243–2307.
- Modigliani, F. and Brumburg, R. (1954). Utility Analysis and the Consumptio Function: An Interpretation of Cross-Section Data. In Kurihara, K. and Brunswick, N., editors, *Post-Keynesian Economics*, pages 338–436. Rutgers University Press.

- Ocampo, S. and Robinson, B. (2022). Computing Longitudinal Moments for Heterogeneous Agent Models. Working Paper.
- Ravn, M. O. and Sterk, V. (2021). Macroeconomic Fluctuations with HANK & SAM: an Analytical Approach. *Journal of the European Economic Association*, 19(2):1162–1202.
- Rendahl, P. (2022). Continuous vs. Discrete Time: Numerical Gains from Trade. Technical report.
- Sommer, K. and Sullivan, P. (2018). Implications of US Tax Policy for House Prices, Rents, and Homeownership. *American Economic Review*, 108(2):241–274.
- Tan, E. (2020). A fast and low computational memory algorithm for non-stochastic simulations in heterogeneous agent models. *Economics Letters*, 193:109285.
- Violante, G. L. (2021). What have we learned from HANK models, thus far? *Proceedings of the ECB Forum on Central Banking* 2021.
- Werning, I. (2015). Incomplete Markets and Aggregate Demand. NBER Working Paper 21448.
- Young, E. R. (2010). Solving the incomplete markets model with aggregate uncertainty using the Krusell-Smith algorithm and non-stochastic simulations. *Journal of Economic Dynamics and Control*, 34(1):36–41.