

IWH-DPE/CGDE

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**30 October to 2 November 2017**

**FRONTIERS IN MACROECONOMICS**

**Dynamic Macroeconomics with heterogeneous Agents: Solution Methods and Applications**

**Course outline**

Many interesting economic problems in macroeconomics have to be analysed under the empirically plausible assumption that markets are incomplete so that agents are heterogeneous. Analysing these problems with dynamic stochastic equilibrium models requires numerical approximation. This course introduces PhD students to methods which allow such numerical approximation. These methods are then applied to solve and simulate workhorse models for economies with incomplete markets. Participants will also learn about stylized empirical facts which are then interpreted and analysed with formal models. The exam will be a term paper.

**Schedule**

30 October: 9:00-12:30 and 14:00-17:30  
31 October: 9:00-12:30 and 14:00-17:30  
1 November: 9:00-12:30 and 14:00-17:30  
2 November: 9:00-12:30 and 14:00-17:30

**The course deals with the following topics:**

1. dynamic programming
  - introduction
  - some solution methods
2. application to models with exogenously incomplete markets
  - stylised facts and puzzles
  - the life-cycle model with exogenous market incompleteness
  - liquidity constraints
  - precautionary savings
  - computation of equilibrium
  - joint analysis of durable and non-durable consumption
    - the role of non-separable preferences
    - adjustment costs
    - durables as collateral
  - debt and bankruptcy
3. models with endogenous market incompleteness
  - limited commitment
  - asymmetric information

**Venue**

Halle Institute for Economic Research (IWH) – Member of the Leibniz Association, Kleine Maerkerstrasse 8, 06108 Halle (Saale), Germany, conference room (ground floor)

**Registration**

Please contact Annett Hartung, Phone: +49 345 7753 751, e-mail: [annett.hartung@iwh-halle.de](mailto:annett.hartung@iwh-halle.de), until 15 September 2017.

## Course literature

The following books give accessible **introduction and background** to some of the covered topics.

- Bagliano, Fabio-Cesare and Giuseppe Bertola: *Models for Dynamic Macroeconomics*, Oxford University Press, 2004, chapter 1.
- Bertola, Giuseppe, Richard Disney and Charles Grant: *The Economics of Consumer Credit*, MIT Press, 2006.
- Davis, Morris: *Macroeconomics*, Cambridge University Press, 2009, chapter 3.
- Deaton, Angus: *Understanding Consumption*, Oxford University Press, 1992.
- Gollier, Christian: *The Economics of Risk and Time*, MIT Press, 2001.
- Krueger, Dirk, Kurt Mitman and Fabrizio Perri, *Macroeconomics and Household Heterogeneity*, *Handbook of Macroeconomics*, vol. 2A, chapter 11, Elsevier, 2016.
- Piazzesi, Monika and Martin Schneider, *Housing and Macroeconomics*, *Handbook of Macroeconomics*, vol. 2B, chapter 19, Elsevier, 2016.

Below are **further readings** for each topic of the lecture:

### 1. Dynamic programming

- Carroll, Christopher D. (2006): *The Method of Endogenous Gridpoints for Solving Dynamic Stochastic Optimization Problems*, *Economics Letters*, vol. 91, 312–320.
- Clausen, Andrew and Carlo Strub (2016): *A General and Intuitive Envelope Theorem*, Manuscript, University of Edinburgh.
- Hintermaier, Thomas and Winfried Koeniger (2010): *The Method of Endogenous Gridpoints with Occasionally Binding Constraints among Endogenous Variables*, *Journal of Economic Dynamics & Control*, vol. 34, 2074–2088.
- Druehdahl, Jeppe and Thomas 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, Kenneth L. (1998): *Numerical Methods in Economics*, MIT Press, Cambridge, Massachusetts.
- Ljungqvist, Lars and Thomas J. Sargent (2013): *Recursive Macroeconomic Theory*, MIT Press, Cambridge, Massachusetts.
- Rendahl, Pontus (2015): *Inequality Constraints and Euler Equation Based Solution Methods*, *Economic Journal*, vol. 125, 1110-1135.
- Stokey, Nancy L. and Robert E. Lucas (1989): *Recursive Methods in Economic Dynamics*. Harvard University Press, Cambridge, Massachusetts.

### 2. Application to models with exogenously incomplete markets

- Aiyagari, S.Rao (1994): *Uninsured Idiosyncratic Risk and Aggregate Savings*, *Quarterly Journal of Economics*, vol.109, 659–684.
- Attanasio, Orazio (1999): *Consumption*, *Handbook of Macroeconomics*, vol. 1B, chapter 11, 741–812.
- Attanasio, Orazio and Steve Davis (1996): *Relative Wage Movements and the Distribution of Consumption*, *Journal of Political Economy*, vol. 1227–1262.
- Attanasio, Orazio and Guglielmo Weber (2010): *Consumption and Saving: Models of Intertemporal Allocation and their Implications for Public Policy*, *Journal of Economic Literature*, vol. 48, 693–751.
- Carroll, Christopher D. (1997): *Buffer-Stock Saving and the Life Cycle/ Permanent Income Hypothesis*, *Quarterly Journal of Economics*, vol. 112, 1–55.
- Deaton, Angus (1991): *Saving and Liquidity Constraints*, *Econometrica*, vol. 59, 1221–1248.
- Fernández-Villaverde, Jesús and Dirk Krueger (2011): *Consumption and Saving over the Life Cycle: How Important are Consumer Durables?*, *Macroeconomic Dynamics*, vol. 15, 725–770.
- Gourinchas, Pierre-Olivier and Jonathan A. Parker (2002): *Consumption over the Life Cycle*, *Econometrica*, vol. 70, 47–89.

### Household debt and bankruptcy

- Athreya, Kartik (2002): *Welfare Implications of the Bankruptcy Reform Act of 1999*, *Journal of Monetary Economics*, vol. 49, 1567–1595.
- Chatterjee, Satyajit, Dean Corbae, Makoto Nakajima and José-Víctor Ríos-Rull (2007): *A Quantitative Theory of Unsecured Credit with Risk of Default*, *Econometrica*, vol. 75, 1525–1589.

Livshits, Igor, James MacGee and Michele Tertilt (2007): Consumer Bankruptcy: a Fresh Start, *American Economic Review*, vol. 97(1), 402–418.

Hintermaier, Thomas and Winfried Koeniger (2016): Debt Portfolios and Homestead Exemptions, *American Economic Journal: Macroeconomics*, vol. 8, 103–141.

Mitman, Kurt (2016): Macroeconomic Effects of Bankruptcy and Foreclosure Policies, *American Economic Review*, vol. 106(8), 2219–2255.

### 3. Endogenous incomplete markets

Ábrahám, Árpád and Nicola Pavoni (2005): The Efficient Allocation of Consumption under Moral Hazard and Hidden Access to the Credit Market, *Journal of the European Economic Association*, vol. 3, 370–381.

Ábrahám, Árpád, Sebastian Koehne and Nicola Pavoni (2011): On the First-Order Approach in Principal-Agent Models with Hidden Borrowing and Lending, *Journal of Economic Theory*, vol. 146, 1331–1361.

Bertola, Giuseppe and Winfried Koeniger (2015): Hidden Insurance in a Moral-Hazard Economy, *Rand Journal of Economics*, vol. 46, 777–790.

Broer, Tobias, Marek Kapicka and Paul Klein (2017): “Consumption Risk Sharing with Private Information and Limited Enforcement,” *Review of Economic Dynamics*, vol. 23, 170–190.

Cole, Harold, and Narayana Kocherlakota (2001): Efficient Allocations with Hidden Income and Hidden Storage, *Review of Economic Studies*, vol. 68, 523–542.

Golosov, Mikhail, and Aleh Tsyvinski (2007): Optimal Taxation with Endogenous Insurance Markets, *Quarterly Journal of Economics*, vol. 122, 487–534.

Krueger, Dirk and Fabrizio Perri (2006): Does Income Inequality Lead to Consumption Inequality? Evidence and Theory, *Review of Economic Studies*, vol. 73, 163–193.

Pauly, Mark V. (1974): Overinsurance and Public Provision of Insurance: The Roles of Moral Hazard and Adverse Selection, *Quarterly Journal of Economics*, vol. 88, 44–62.

Rogerson, William P. (1985): Repeated Moral Hazard, *Econometrica*, vol. 53, 69–76.