

Master/PhD
Dynamic Macroeconomic Models: Theory and Practice
UNIVERSITY OF KONSTANZ, SUMMER TERM 2019

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Course Description

The course is divided in two parts. The first part is meant as an introduction to dynamic stochastic general equilibrium models (DSGE), which have become the workhorse of modern macroeconomics. We will cover both theoretical and computational aspects. In the second part of the course we will apply DSGE methods to study some recent topics in the applied macroeconomic literature.

The computational skills acquired in this course will be especially helpful for those students who plan to write their master thesis in macroeconomics.

Basic Information

Lectures. Lectures take place on Tuesday, 13:30-15:00, in **room M1001 M**. Tutorials take place bi-weekly on Tuesday, 15:15-16.45, in **room M1001 M**.

Textbooks. The lecture will mainly draw on my class notes. The material listed below contain treatments of the subjects we will study in this course and are complementary to my class notes:

DD David DeJong and Chetan Dave (2011), *Structural Macroeconometrics*, Second Edition, Princeton University Press.

C Fabio Canova (2007), *Methods for Applied Macroeconomic Research*, Princeton University Press.

LS Ljungqvist, L., and T. J. Sargent (2018), *Recursive Macroeconomic Theory*, Fourth Edition, MIT Press.

AC Adda J., and Cooper (2003) *Dynamic Economics: Quantitative Methods and Applications*, MIT Press.

M Miao J. (2014), *Economic Dynamics in Discrete Time*, MIT Press.

Evaluation. There will be bi-weekly assignments and a final exam: They will count toward the final grade as follows:

Problem sets	40%
Final	60%

Problem sets. Problem sets are an important part of the course. They will be distributed every two weeks and will familiarize students with DYNARE and other tools for solving DSGE models.

Course Outline

Part I

Methods

Topic 1: A Refresher on Recursive Methods

- Review of Dynamic Programming
- Basic References: class notes, AC Ch.2
- Advanced References: LS Ch.4

Topic 2: Linear solution techniques

- Log-linearization of Equilibrium Conditions
- Solving Linear Rational Expectation Models
- An introduction to DYNARE
- References: DD Ch.4, M Ch.2, Uhlig's toolkit
- Advanced References: [Uhlig \(1995\)](#), [Adjemian et al. \(2011\)](#), [Juillard \(2001\)](#)

Topic 3: Nonlinear solution techniques

- Iteration techniques:
 - Value Function Iteration
 - Policy Function Iteration
- Perturbation techniques: second-order and higher order
- Applications to DSGE models
- Basic Reference: class notes, DD Ch.5
- Advanced References: [Schmitt-Grohe and Uribe \(2004\)](#), [Aruoba et al. \(2006\)](#), [Carroll \(2006\)](#)

Topic 4: Empirical Methods

- Calibration: the Kydland and Prescott revolution
- Matching Moments: Generalized Method of Moments and Simulated Method of Moments

- Impulse Response Function Matching
- Maximum Likelihood
- Bayesian Methods
- Basic Reference: class notes, C Ch.5, DD Ch.12-13
- Advanced References: [Kydland and Prescott \(1982\)](#), [Ireland \(2004\)](#), [Fernandez-Villaverde and Rubio-Ramirez \(2007\)](#)

Part II

Applications

Topic 5: Macroeconomic Models with an explicit financial sector

- Workhorse models: Kiyotaki-Moore (KM) and Bernanke-Gertler-Gilchrist (BGG)
- Recent applications after financial crisis
- How to solve models with occasionally binding constraint: OCCBIN
- References: [Kiyotaki and Moore \(1997\)](#), [Bernanke et al. \(1999\)](#), [Gertler and Karadi \(2011\)](#), [Guerrieri and Iacoviello \(2015\)](#), [Guerrieri and Iacoviello \(2017\)](#)

Topic 6: Fiscal policy

- Fiscal multipliers in calibrated DSGE models
- VAR identification
- Evidence from micro data
- References: [Uhlig \(2010\)](#), [Woodford \(2011\)](#), [Christiano et al. \(2011\)](#), [Auerbach and Gorodnichenko \(2012\)](#), [Ramey and Zubairy \(2018\)](#), [Ercolani and Pavoni \(2019\)](#)

Topic 7: International Macroeconomics

- International Real Business Cycle models
- An application of IRF Matching: M. Uribe and V. Yue, “*Country spreads and emerging countries: Who drives whom?*” *Journal of International Economics* (2006)
- References: [Backus et al. \(1992\)](#), [Uribe and Yue \(2006\)](#)

Topic 8: HANK models

- A survey on New-Keynesian Economics, including heterogeneity: [Gali \(2018\)](#)
- How to solve easily (i.e. with DYNARE) heterogeneous agent models with aggregate shocks: [Winberry \(n.d.\)](#)
- HANK, TANK and RANK: [Oh and Reis \(2012\)](#), [Kaplan et al. \(2016\)](#), [McKay and Reis \(2016\)](#), [Bayer et al. \(2019\)](#), [Gornemann et al. \(2016\)](#), [Auclert \(2017\)](#)

References

- Adjemian, Stephane, Houtan Bastani, Michel Juillard, Frederic Karame, Junior Maih, Ferhat Mihoubi, George Perendia, Johannes Pfeifer, Marco Ratto, and Sebastien Villemot**, “Dynare: Reference Manual Version 4,” Dynare Working Papers 1, CEPREMAP April 2011.
- Aruoba, S. Boragan, Jesus Fernandez-Villaverde, and Juan F. Rubio-Ramirez**, “Comparing solution methods for dynamic equilibrium economies,” *Journal of Economic Dynamics and Control*, December 2006, *30* (12), 2477–2508.
- Auclert, Adrien**, “Monetary Policy and the Redistribution Channel,” NBER Working Papers 23451, National Bureau of Economic Research, Inc May 2017.
- Auerbach, Alan J. and Yuriy Gorodnichenko**, “Measuring the Output Responses to Fiscal Policy,” *American Economic Journal: Economic Policy*, May 2012, *4* (2), 1–27.
- Backus, David K, Patrick J Kehoe, and Finn E Kydland**, “International Real Business Cycles,” *Journal of Political Economy*, August 1992, *100* (4), 745–775.
- Bayer, Christian, Ralph Luetticke, Lien Pham-Dao, and Volker Tjaden**, “Precautionary Savings, Illiquid Assets, and the Aggregate Consequences of Shocks to Household Income Risk,” *Econometrica*, 2019, *87* (1), 255–290.
- Bernanke, Ben S., Mark Gertler, and Simon Gilchrist**, “Chapter 21 The financial accelerator in a quantitative business cycle framework,” in “in,” Vol. 1 of *Handbook of Macroeconomics*, Elsevier, 1999, pp. 1341 – 1393.
- Carroll, Christopher D.**, “The method of endogenous gridpoints for solving dynamic stochastic optimization problems,” *Economics Letters*, June 2006, *91* (3), 312–320.
- Christiano, Lawrence, Martin Eichenbaum, and Sergio Rebelo**, “When Is the Government Spending Multiplier Large?,” *Journal of Political Economy*, 2011, *119* (1), 78–121.
- Ercolani, Valerio and Nicola Pavoni**, “The Precautionary Saving Effect of Government Consumption,” *The B.E. Journal of Macroeconomics (Frontiers)*, January 2019, *19* (1), 1–32.

- Fernandez-Villaverde, Jesus and Juan F. Rubio-Ramirez**, “Estimating Macroeconomic Models: A Likelihood Approach,” *Review of Economic Studies*, 2007, *74* (4), 1059–1087.
- Gali, Jordi**, “The State of New Keynesian Economics: A Partial Assessment,” NBER Working Papers 24845, National Bureau of Economic Research, Inc July 2018.
- Gertler, Mark and Peter Karadi**, “A model of unconventional monetary policy,” *Journal of Monetary Economics*, January 2011, *58* (1), 17–34.
- Gornemann, Nils, Keith Kuester, and Makoto Nakajima**, “Doves for the Rich, Hawks for the Poor? Distributional Consequences of Monetary Policy,” CEPR Discussion Papers 11233, C.E.P.R. Discussion Papers April 2016.
- Guerrieri, Luca and Matteo Iacoviello**, “OccBin: A toolkit for solving dynamic models with occasionally binding constraints easily,” *Journal of Monetary Economics*, 2015, *70* (C), 22–38.
- and —, “Collateral constraints and macroeconomic asymmetries,” *Journal of Monetary Economics*, 2017, *90* (C), 28–49.
- Ireland, Peter N.**, “A method for taking models to the data,” *Journal of Economic Dynamics and Control*, March 2004, *28* (6), 1205–1226.
- Juillard, Michel**, “DYNARE: A program for the simulation of rational expectation models,” *Computing in Economics and Finance* 2001 213, Society for Computational Economics April 2001.
- Kaplan, Greg, Benjamin Moll, and Giovanni L. Violante**, “Monetary Policy According to HANK,” CEPR Discussion Papers 11068, C.E.P.R. Discussion Papers January 2016.
- Kiyotaki, Nobuhiro and John Moore**, “Credit Cycles,” *Journal of Political Economy*, April 1997, *105* (2), 211–248.
- Kydland, Finn E and Edward C Prescott**, “Time to Build and Aggregate Fluctuations,” *Econometrica*, November 1982, *50* (6), 1345–1370.
- McKay, Alisdair and Ricardo Reis**, “The Role of Automatic Stabilizers in the U.S. Business Cycle,” *Econometrica*, January 2016, *84*, 141–194.
- Oh, Hyunseung and Ricardo Reis**, “Targeted transfers and the fiscal response to the great recession,” *Journal of Monetary Economics*, 2012, *59* (S), 50–64.
- Ramey, Valerie A. and Sarah Zubairy**, “Government Spending Multipliers in Good Times and in Bad: Evidence from US Historical Data,” *Journal of Political Economy*, 2018, *126* (2), 850–901.
- Schmitt-Grohe, Stephanie and Martin Uribe**, “Solving dynamic general equilibrium models using a second-order approximation to the policy function,” *Journal of Economic Dynamics and Control*, 2004, *28* (4), 755 – 775.

- Uhlig, Harald**, “A toolkit for analyzing nonlinear dynamic stochastic models easily,” Discussion Paper 1995-97, Tilburg University, Center for Economic Research 1995.
- , “Some Fiscal Calculus,” *American Economic Review*, 2010, *100* (2), 30–34.
- Uribe, Martin and Vivian Z. Yue**, “Country spreads and emerging countries: Who drives whom?,” *Journal of International Economics*, 2006, *69* (1), 6 – 36. Emerging Markets.
- Winberry, Thomas**, “A method for solving and estimating heterogeneous agent macro models,” *Quantitative Economics*, *9* (3), 1123–1151.
- Woodford, Michael**, “Simple Analytics of the Government Expenditure Multiplier,” *American Economic Journal: Macroeconomics*, January 2011, *3* (1), 1–35.