Topics in Macroeconomics and Public Economics
Modelling Business Cycles

Keith Kuester

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Outline: The course focuses on DSGE models of the business cycle. Now or later in their research career students may have a nice macro idea to work on (a policy question of economic importance), that – for a first pass or for good – can be approached with simplifying assumptions (such as doing away with heterogeneity). This course focuses on a variety of those environments. We will discuss the economics (the application) as much as the techniques used to solve the models. The target audience for this course are both students primarily concerned with modeling and students who plan to do data work, but expect to need a macro model to make their point.

The course will use Matlab. There is no formal programming prerequisite. But some affinity to programming is a must-have. That said, most of the students in macro at Bonn will already be familiar with the material in Christian Bayer's and Donghai Zhang's "Dynamic Macroeconomics" course. Other students may have taken the International Econ course in the Master's program. These courses have discussed, among other things, how to solve linearized DSGE models.

This topics course will cover models that have an occasionally-binding constraint at the aggregate level (think the zero lower bound or financial frictions absent heterogeneity) and study approximate solutions based on perfect foresight, or piece-wise linear approximations. We will, then, introduce the Ramsey problem in 1st-order perturbation methods, so as to solve for optimal policy from the time-less perspective. Next, we will extend the techniques to higher-order perturbation, so as to capture asymmetries and compute welfare. The plan is to use the simple New-Keynesian model to replicate some of the existing results on optimal monetary policy. We will use 3-rd order perturbation in models where shocks to aggregate risk matter. Last, time permitting, we will discuss models with ambiguity aversion or disaster risk.

Grading:

The final grade for the course will be based on

- a short research project of your own, to be submitted toward the end of term.
- preparation of reference code.

Course dates: We will meet once a week Th., 2.15 to 3.45 pm. Either in SR 0.017, or on Zoom. Problem sets are due every 2nd week. The first meeting will be on October 29th.

Office hours: After the course, or email me: keith.kuester@uni-bonn.de.

Prerequisites: Training in macroeconomics at the Masters level is a must, as is affinity to programming. Having training at the PhD course-program level, the Dynamic Macro course, Monetary Economics, or International Economics, would be an advantage.

1. Occasionally binding constraints:
   (a) piece-wise linear approximation of the ZLB. Guerrieri and Iacoviello (2015).
   (b) perfect foresight solutions in linearized economies. Holden (2020).
   (c) perfect foresight in non-linear economies. Stacked time.
2. Perturbation.
   (a) Ramsey-optimal policies. Applications:
      - Jung and Kuester (2015).
      - Challe (2020).
   (b) Review basics in linear algebra. Magnus and Neudecker (1999).
   (c) Second-order perturbation. Schmitt-Grohe and Uribe (2004).
   (d) Higher-order perturbation. Andreasen et al. (2017). Applications:
      - Uncertainty/volatility: Fernández-Villaverde et al. (2015) (fiscal), Caldara et al. (2020) (trade policy).
      - Tail risk, and DNWR: Kim and Ruge-Murcia (2019).
   (e) ZLB and higher-order perturbation: Andreasen and Kronborg (2020).
3. Dealing with ambiguity aversion. Saijo (forthcoming).
4. Taylor projection. Levintal (2018).

References

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Andreasen, M. M. and Kronborg, A. (2020), 'The Extended Perturbation Method: With Applications to the New Keynesian Model and the Zero Lower Bound,' mimeo, Aarhus University.

Caldara, D., Iacoviello, M., Molligo, P., Prestipino, A., and Raffo, A. (2020), 'The Economic Effects of Trade Policy Uncertainty,' *Journal of Monetary Economics*, 109(C), pp. 38–59.

Challe, E. (2020), 'Uninsured Unemployment Risk and Optimal Monetary Policy in a Zero-Liquidity Economy,' *American Economic Journal: Macroeconomics*, 12(2), pp. 241–83.

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Guerrieri, L. and Iacoviello, M. (2015), 'OccBin: A Toolkit for Solving Dynamic Models with Occasionally Binding Constraints Easily,' *Journal of Monetary Economics*, 70, pp. 22 – 38.

Holden, T. D. (2020), 'Computation of Solutions to Dynamic Models with Occasionally Binding Constraints,' mimeo, Bundesbank.

Jung, P. and Kuester, K. (2015), 'Optimal Labor-Market Policy in Recessions,' *American Economic Journal: Macroeconomics*, 7(2), pp. 124–56.

Kim, J. and Ruge-Murcia, F. (2019), 'Extreme Events and Optimal Monetary Policy,' *International Economic Review*, 60(2), pp. 939–963.

Levintal, O. (2018), 'Taylor Projection: A New Solution Method for Dynamic General Equilibrium Models,' *International Economic Review*, 59(3), pp. 1345–1373.

Magnus, J. R. and Neudecker, H. (1999), *Matrix Differential Calculus with Applications in Statistics and Econometrics*, Wiley, Chichester, UK.

Saijo, H. (forthcoming), 'Redistribution and Fiscal Uncertainty Shocks,' *International Economic Review*.

Schmitt-Grohe, S. and Uribe, M. (2004), 'Solving Dynamic General Equilibrium Models Using a Second-order Approximation to the Policy Function,' *Journal of Economic Dynamics and Control*, 28(4), pp. 755–775.