Topics on DSGE modeling: methods and applications to Open Macro

Prof.: Hernán D. Seoane

Office: 15.1.19

Office Hours: only by appointment

E-mail: hseoane@eco.uc3m.es

The course is divided in 3 parts

Part 1: Approximation techniques

The first part discusses solution methods that are often used to solve open economy macroeconomic models. We will focus in linearization, log-linearization methods and nonlinear perturbation.

Part 2: Empirical strategies

The second part of the course will cover topics related to VAR and DSGE estimation from (mainly) a Bayesian perspective.

Part 3: Open Macroeconomics

We will study business cycle models for small open economies. We will discuss stylized facts and modeling tools with a particular stress on the risk premium, volatilities, terms of trade and default models.

Class Schedule

Class 1: Uhlig Toolkit, Undetermined coefficients and loglinear approximations

- Taylor approximations
- Linear approximation methods
- Log-linear approximation methods
  - Directly application of Taylor's Theorem
  - Uhlig's shortcut
- Algebraic implementation and undetermined coefficients
- Application: the real business cycle model for a closed economy

References

1. Uhlig, H. (1995). A toolkit for analyzing nonlinear dynamic stochastic models easily. Institute for Empirical Macroeconomics, Federal Reserve Bank of Minneapolis.
2. Farmer, R. E. (1999). Macroeconomics of self-fulfilling prophecies. mit Press. (Chapter 2)

3. Judd, K. L. (1998). Numerical methods in economics. The MIT press. (Chapter 13)

Class 2: Solving DSGE models with perturbation method

- First order perturbation
- Higher order perturbation methods

References:

1. Aruoba, S. B., Fernandez-Villaverde, J., & Rubio-Ramirez, J. F. (2006). Comparing solution methods for dynamic equilibrium economies. Journal of Economic Dynamics and Control, 30(12), 2477-2508.
2. Schmitt-Grohe, S., & 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), 755-775.
3. Judd, K. L. (1998). Numerical methods in economics. The MIT press. (Chapter 13)

Class 3: Solving linear rational expectation models

- Blanchard and Kahn and extensions
- QZ decomposition
- Determinacy and uniqueness of equilibrium
- Different Methods (Sims, Christiano, BK, SGU, Dynare)

References:

1. Blanchard, O. J., & Kahn, C. M. (1980). The solution of linear difference models under rational expectations. Econometrica: Journal of the Econometric Society, 1305-1311.
2. Christiano, L. J. (2002). Solving dynamic equilibrium models by a method of undetermined coefficients. Computational Economics, 20(1-2), 21-55.
3. Sims, C. A. (2002). Solving linear rational expectations models. Computational Economics, 20(1), 1-20.
4. Schmitt-Grohe, S., & 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), 755-775.
5. Uhlig, H. (1995). A toolkit for analyzing nonlinear dynamic stochastic models easily. Institute for Empirical Macroeconomics, Federal Reserve Bank of Minneapolis.
6. Judd, K. L. (1998). Numerical methods in economics. The MIT press. (Chapter 13)
7. Schmitt-Grohe, S., & 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), 755-775.

Class 4: The state space representation

- State space representation of DSGE models
- Computing theoretical moments
- Filtering and Smoothing: The Kalman Filter

References

1. Schmitt-Grohe, S., & 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), 755-775.
2. Bauer, A., Haltom, N., & Rubio-Ramirez, J. F. (2003). Using the Kalman filter to smooth the shocks of a dynamic stochastic general equilibrium model (No. 2003-32).
3. Koop, G. (2003). Bayesian econometric. Wiley. (Chapter 8)
4. Kim, C. J., & Nelson, C. R. (1999). State-space models with regime switching: classical and Gibbs-sampling approaches with applications. MIT Press Books, 1.

Class 5: Empirical strategies, the Bayesian approach

- The Bayesian approach
- Priors, posterior and likelihood
- The linear regression model

References:

1. Koop, G. (2003). Bayesian econometric. Wiley.
2. Hoff, P. D. (2009). A first course in Bayesian statistical methods. Springer.

Class 6: The likelihood principle and Metropolis Hastings

- Likelihood estimation
- Metropolis-Hastings
- DSGE estimation with Metropolis-Hastings

References:

1. An, S., & Schorfheide, F. (2007). Bayesian analysis of DSGE models. Econometric reviews, 26(2-4), 113-172.
2. Koop, G. (2003). Bayesian econometric. Wiley.
3. Hamilton, J. D. (1994). Time series analysis (Vol. 2). Princeton: Princeton university press.

Classes 7: Introduction to small open economy models and motivation

- Discussion of stylized facts: emerging economies vs developed economies
- The small open economy model
- Temporary versus permanent shocks in the endowment model

- Algebraic solution and the permanent income hypothesis

References:

1. Schmitt-Grohe, S. and Uribe M (2014). Open Economy Macroeconomics Ch1 to Ch4

Class 8: The RBC small open economy model

- Introducing capital and the role of adjustment costs
- Transitory shocks and trend shocks
- Trends and signal extraction

References:

1. Schmitt-Grohe, S. and Uribe M (2014). Open Economy Macroeconomics Ch5
2. Aguiar, M., & Gopinath, G. (2007). Emerging Market Business Cycles: The Cycle Is the Trend. Journal of Political Economy, 115(1).
3. Garcia-Cicco, J., Pancrazi, R., & Uribe, M. (2010). Real Business Cycles in Emerging Countries?. American Economic Review, 100(5), 2510-31.
4. Boz, E., Daude, C., & Bora Durdu, C. (2011). Emerging market business cycles: Learning about the trend. Journal of Monetary Economics, 58(6), 616-631.

Class 9: The 2 sector RBC small open economy model and RER

- Multisector model
- The real exchange rate

References:

1. Burstein, A., Eichenbaum, M., Rebelo, S., 2005. Large devaluations and the real exchange rate. Journal of Political Economy 113, 742-784.
2. Burstein, A., Eichenbaum, M., Rebelo, S., 2006. The importance of nontradable goods prices in cyclical real exchange rate fluctuations. Japan and the World Economy 18, 247-253.
3. Burstein, A., Eichenbaum, M., Rebelo, S., 2007. Modeling exchange rate passthrough after large devaluations. Journal of Monetary Economics 54, 346-368.
4. Ouyang, A.Y., Rajan, R.S., 2013. Real exchange rate fluctuations and the relative importance of nontradables. Journal of International Money and Finance 32, 844-855.
5. Seoane(2014) “Time-Varying parameters, misspecification and the real exchange rate in emerging countries”

Class 10: Terms of trade shocks

- Stylized facts

- The real exchange rate and the role of non-tradable goods
- RBC with non-tradable, importable and exportable goods

References:

1. Schmitt-Grohe, S. and Uribe M (2014). Open Economy Macroeconomics Ch7
2. Mendoza, E. G. (1995). The terms of trade, the real exchange rate, and economic fluctuations. International Economic Review, 101-137.

Class 11: Interest rate and volatility shocks

- Stylized facts
- Working Capital constraints and interest rate shocks
- Default risk and the fiscal and monetary policies
- Sovereign Risk Premium, endogenous or exogenous?
- Risk matters: Volatility shocks

References:

1. Schmitt-Grohe, S. and Uribe M (2014). Open Economy Macroeconomics Ch6
2. Neumeyer, P. A., & Perri, F. (2005). Business cycles in emerging economies: the role of interest rates. Journal of monetary Economics, 52(2), 345-380.
3. Uribe, M., & Yue, V. Z. (2006). Country spreads and emerging countries: Who drives whom? Journal of international Economics, 69(1), 6-36.
4. Fernandez-Villaverde, J., Guerron-Quintana, P., Rubio-Ramirez, J. F., & Uribe, M. (2011). Risk Matters: The Real Effects of Volatility Shocks. The American Economic Review, 101(6), 2530-2561.

Class 12: Overborrowing

- Definition and the no overborrowing result
- Overborrowing and endogenous prices

References:

1. Schmitt-Grohe, S. and Uribe M (2014). Open Economy Macroeconomics Ch10
2. Bianchi, J. (2011). Overborrowing and Systemic Externalities in the Business Cycle. The American Economic Review, 101(7), 3400-3426.
3. Uribe, M. (2006). On overborrowing. The American economic review, 96(2), 417-421.

Class 13: Default and models of endogenous risk premium

- Sovereign default
- Volatility and sovereign default
- Sovereign default and private sector lending

References:

1. Schmitt-Grohe, S. and Uribe M (2014). Open Economy Macroeconomics Ch11
2. Arellano, C. (2008). Default risk and income fluctuations in emerging economies. The American Economic Review, 690-712.
3. Yue, V. Z. (2010). Sovereign default and debt renegotiation. Journal of International Economics, 80(2), 176-187.
4. Mendoza, E. G., & Yue, V. Z. (2012). A general equilibrium model of sovereign default and business cycles. The Quarterly Journal of Economics, 127(2), 889-946.
5. Seoane, H. D. (2014). Time-Varying Volatility, Default and the Sovereign Risk Premium.
6. Pancrazi, Seoane, Vukotic (2015). "Sovereign Risk, Private Credit and Stabilization Policies "

Evaluation

Homeworks: 60% (3hws)

Final 40%: to be determined