Economics 784, Advanced Macroeconomics
Empirical and Computational Methods

James M. Nason
Department of Economics

Spring 2018
NC State University

I. Administration

Instructor: James M. Nason
email: jmnason@ncsu.edu
Meet: Monday & Wednesday
Time: 1:30pm–2:45pm

Office: Rm. 4116, Nelson Hall
tel: (919) 513–2884
Location: TBA
Office Hours: By appointment

II. Objectives

Develop empirical methods and computational tools to evaluate monetary theories and policy.

III. Materials

We study published and working papers. There is no assigned textbook, but F. Canova's, Methods for Applied Macroeconomic Research (2007, Princeton University Press) and E. Herbst and F. Schorfheide's Bayesian Estimation of DSGE Models (2015, Princeton University Press) should be useful. Moreover, students are expected to work at the level of

Amisano, G., C. Giannini 1997. Topics in Structural VAR Econometrics, Second Edition. New York, NY: Springer-Verlag Science.

De Jong, J.N., C. Dave 2011. Structural Macroeconometrics, Second Edition. Princeton, NJ: Princeton University Press.

Durbin, J., S.J. Koopman 2012. Time Series Analysis by State Space Methods, Second Edition. Oxford, UK: Oxford University Press.

Gelman, A., J.B. Carlin, H.S. Stern, D.B. Rubin 2004. Bayesian Data Analysis, Second Edition. New York, NY: Chapman & Hall/CRC.

Geweke, J. 2010. Complete and Incomplete Econometric Models. Princeton, NJ: Princeton University Press.

Geweke, J. 2005. Contemporary Bayesian Econometrics and Statistics. New York, NY: John Wiley & Sons, Inc.

Hamilton, J.D. 1994. Time Series Analysis. Princeton, NJ: Princeton University Press.

Harvey, A.C. 1991. Forecasting, Structural Time Series Models and the Kalman Filter. Cambridge, UK: Cambridge University Press.

Heer, B., A. Maussner 2009. Dynamic General Equilibrium Modeling, Second Edition. New York, NY: Springer-Verlag Science.

Kim, C-J., C.R. Nelson 1999. State-Space Models with Regime Switching. Cambridge, MA: MIT Press.

Lütkepohl, H. 2006. New Introduction to Multiple Time Series Analysis. New York, NY: Springer-Verlag Science.

Marimon, R., A. Scott 1999. Computational Methods for the Study of Dynamic Economies, Oxford, UK: Oxford University Press.

Sargent, T.J. 1987. Macroeconomic Theory, Second Edition. New York, NY: Academic Press.

IV. Lecture Notes

Material for Economics 784 (*i.e.*, this course outline and lecture notes) are available online.

V. Requirements

(A) Final grades will be based on course performance during the Spring 2018 semester (January 8, 2018–April 28, 2018). During the Spring 2018 semester, there will be problem sets and a final project. More information will be provided on the problem sets, assignments, and a final paper. I encourage group study sessions when working on the problem sets.

(B) The course aims to give students empirical and computational skills needed to conduct research on monetary economic questions using state of the art tools. Achieving these aims requires a platform on which to develop and practice these tools. Economics 784 will rely on the JULIA computing language. JULIA is a high level dynamic computing language (*i.e.*, uses standard language to express programming concepts and commands unlike Fortran or C++). Econometricians and macroeconomists should find the transition to programming in JULIA easy because it is similar in appearance to packages widely used statistical and computational software programs. Along with numerical accuracy, a robust compiler, and good library math functions, JULIA has built in distributed parallel execution that takes advantage of the latest multi-core, multi-threaded processors. Since Economics 784 seeks to teach students several Monte Carlo simulation algorithms, JULIA has a comparative advantage compared with other computing platforms.

The good news is that JULIA operates on the open source principle. JULIA makes available documentation about its commands and structure and information about writing code.

Another useful resource for JULIA (and also Python) is the QUANTITATIVE ECONOMICS website maintained by Tom Sargent and John Stachurski. They provide online tutorials to learn write JULIA code. Part I of these lectures explains how to install JULIA on your laptop and/or desktop PC. These steps will be reviewed during the first lecture of Economics 784 on Wednesday January 8, 2018. If possible, bring your laptop to class.

Economics 784 hopes to evolve as a lecture, say, on each Monday followed by an occasional class on the next Wednesday in which this material will turned into JULIA code. The goal is to give students experience coding in JULIA that will be useful in conducting their dissertation research.

VI. Some Important Dates for the Spring 2018 Semester

More information will be provided about problem sets and other assignments during the Spring 2018 semester. The course requires a final project that has to be handed in to the instructor no later than the last class, Wednesday April 25, 2018. During the semester, the terms of the final project will be discussed.

VII. Operating Procedures

Late problem sets, late assignments, and a late final paper will not be accepted without prior arrangement. I make no exceptions.

EXCUSES: Your rule of thumb should be, "Would I try this on my boss (the person who writes my annual review and signs my pay check)?" If not, please do not try it on me.

VII. Course Outline and Schedule of Topics

0. Introduction, Computing, and Other Matters: 01/08/2018.

1. Monetary DSGE Models: Calibration, Solution, and Estimation

(*A*) Linear Approximate DSGE Models: 01/10, 01/17, 01/22, and 01/24/2018.

Canova (2007, chs. 2, 4.7, 7, and 11.4), Creal (2007), An and Schorfheide (2007), Geweke (2010), De Jong and Dave (2011, chs. 2 and 4), Flury and Shephard (2011), **Guerrón-Quintana and Nason (2013)**, and **Kano and Nason (2014)**.

(*B*) Solving and Estimating Nonlinear DSGE Models: 01/29/ and 01/31/2018.

Guerrón-Quintana, Fernández-Villáverde, and Rubio-Ramírez (2010), De Jong and Dave (2011, ch. 5), and Herbst and Schorfheide (2014).

2. Vector Autoregressions: Theory and Methods

(*A*) Introduction to VARs: 02/05 and 02/07/2018.

Sims (1980), Hamilton (1994, chs. 1, 2, 3, 4, 10, and 11), Lütkepohl (2006, chs. 2, 3, 4 and 2013), **Canova (2007, ch. 4)**, Sims, Stock, and Watson (1990), and Mittnik and Zadrozny (1993).

(*B*) Bayesian VARs: 02/12, 02/14, 02/19, and 02/21/2018.

Canova (2007, chs. 9, 10.1, 10.2, and 10.3), Koop and Korobilis (2010), Lütkepohl (2006, 5), Sims and Zha (1998, 1999), Robertson and Tallman (2001), Waggoner and Zha (2003a, b).

(*C*) Identification: 02/26, 02/28, and 03/12–14/2018.

Blanchard and Quah (1989), **Lippi and Reichlin (1994)**, **Amisano and Giannini (1997)**, Faust and Leeper (1997), **Leeper (1997)**, **Faust (1998)**, Pagan and Robertson (1998), **Taylor (2004)**, **Uhlig (2005)**, **Fernández-Villáverde, Rubio-Ramírez, and Sargent (2005**, and with **Watson, 2007)**, **Canova (2006)**, Gospodinov (2010), **Rubio-Ramírez, Waggoner, and Zha (2010)**, Leeper, Walker, and Yang (2013), Kilian (2013), Inoue and Kilian (2013), **Giacomini and Kitagawa (2015)**, **Baumeister and Hamilton** (2015), and Arias, Rubio-Ramírez, and Waggoner (2017).

(*D*) Using VARs to Evaluate Monetary Policy: 03/19–21, 03/26, and 03/28/2018.

Sims (1980), Gordon and Leeper (1994), Strongin (1995), Eichenbaum and Evans (1995), Leeper, Sims, and Zha (1996), Cushman and Zha (1997), **Bernanke and Mihov (1998)**, Christiano, Eichenbaum, and Evans (1999), Faust and Rogers (2003), **Leeper and Zha (2003)**, **Faust, Swanson, and Wright (2004)**, Bouakez and Normandin (2010), and Bekaert, Hoerova, and Duca (2013).

(*E*) Markov-Switching and Time-Varying Parameter BVARs: 04/02–04 and 04/09/2018.

Canova (2007, chs. 10.4 and 11.3), Cogley and Sargent (2005), **Primiceri (2005)**, Sims and Zha (2006), **Sims, Waggoner, and Zha (2008)**, Cogley, Primiceri, and Sargent (2010), Herwartz and Lütkepohl (2014), and Nason and Tallman (2015).

(*F*) A TVP-SVAR to Evaluate Monetary Policy: 04/11, 04/16–18, 04/23, and 04/25/2018.

Canova and Pérez Forero (2015) and Del Negro and Primiceri (2015)

Bold faced material is most likely to be discussed in class.

References

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Cushman, D.O., T. Zha 1997. Identifying monetary policy in a small open economy under flexible exchange rates. *Journal of Monetary Economics* 39, 433–448.

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