

ECON 689: Special Topics in Empirical Methods for Macroeconomics
Texas A&M University, Fall 2018
Prof. Tatevik Sekhposyan

Meeting time: Mondays and Wednesdays, 1:05pm-2:20pm

Meeting location: ALLN 3033

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Office hours and location: Mondays and Wednesdays, 3:00pm-4:00pm & by appointment in ALLN 3060

Course materials: provided and updated at <http://ecampus.tamu.edu/>

Course Description and Objectives

This course examines econometric models and methods used to study time series data, with emphasis on applications in macroeconomics. The focus will be on estimation techniques and inference in the context of serially correlated and potentially large datasets as well as on the identification challenges in macroeconomic models. The course is designed to:

- Introduce the students to the state-of-the-art statistical techniques used in current empirical macroeconomic studies;
- Enhance the ability of the students to read and critically evaluate scientific contributions of manuscripts published in leading economics journals;
- Promote programming skills such that by the end of the course the students have developed a toolkit that could be easily applied to study macroeconomic problems of empirical nature;
- Prepare the students for independent research.

Course Material

The course will rely on textbooks as well as journal articles. Below are textbook references that are in general useful for empirical research in macroeconomics. Among the textbooks in the list, Hamilton (1994) and Kilian and Lütkepohl (2017) are the main references for the course.

- Canova, F. (2007), *Methods for Applied Macroeconomic Research*, Princeton University Press.
- DeJong, D.N. and D. Chetan (2011), *Structural Macroeconometrics*, Princeton University Press.
- Elliott, G. and A. Timmermann (2016), *Economic Forecasting*, Princeton University Press.
- Hamilton, J.D. (1994), *Times Series Analysis*, Princeton University Press.
- Herbst, E. and F. Schorfheide (2016), *Bayesian Estimation of DSGE Models*, Princeton University Press.
- Kilian, L. and H. Lütkepohl (2017), *Structural Vector Autoregressive Analysis*, Cambridge University Press. (May be downloaded from: www.personal.umich.edu/~lkilian/book.html.)
- Kim, C.J. and C.R. Nelson (1999), *State-Space Models with Regime Switching: Classical and Gibbs-Sampling Approaches with Applications*, MIT Press.

The detailed list of journal articles that will be considered throughout the course is provided under the tentative course outline. If necessary, I reserve the right to somewhat deviate from the provided list to align better with the research interests of the students.

In addition, there are a few comprehensive references for the state of the empirical research in macroeconomics that I strongly advise everyone to review. The first is a series of lectures titled “What’s

New in Econometrics –Time Series” delivered by James H. Stock and Mark W. Watson during the NBER Summer Institute in 2008. The slides and the videos of the lectures are available at http://www.nber.org/minicourse_2008.html. There is a similar set of lectures delivered by the same professors as part of the 2015 AEA continuing education program. The series of lecture notes and webcasts are available at <https://www.aeaweb.org/webcasts/2015/continuing-education.php>. There is also a fantastic review of all that is new in time series econometrics in Stock, J.H. and M.W. Watson (2017), “Twenty years of time series econometrics in ten pictures,” *Journal of Economic Perspectives* 31, 58-86. You might also find useful the various handbooks, such as the Handbook of Econometrics, the Handbook of Forecasting and the Handbook of Macroeconomics.

Grading

The final grade for the course is based on homework assignments, in-class presentation, referee report and research paper.

- **Homework assignments (20%):** There will be *at least* four assignments throughout the course. The assignments will be primarily empirical in nature and will require coding in MATLAB, Python or R. You are free to choose among these languages as well as use parts of codes you find on the Internet. However, I ask you to document the codes properly and acknowledge the original sources. The problem sets should be completed and turned in independently, though you can collaborate with other students (in fact, collaboration is encouraged). All collaborations should be properly acknowledged.
- **Presentation (15%):** You will be assigned a research paper related to the topics of the course. You are expected to present the paper to the class, highlighting the importance of the research question, the appropriateness of the methodology used for the proposed question, as well as the relevance of the findings. The in-class presentation should be 30-40 minutes long. We will coordinate the sequence of the presentations in class, in the beginning of the semester.
- **Referee Report (15%):** You will pick an unpublished paper from a provided list and write a referee report on that paper. The referee reports are due on the last day of the class, by the end of the business day on **December 5th, 2018**. I will provide examples of referee reports and talk more about how to structure a referee report in class.
- **Research paper (50%):** The paper should be related to the topics covered in class. The research paper does not have to propose an original idea. It can be a replication of an existing empirical study, an evaluation of various estimation and testing procedures via a Monte Carlo study or a reassessment of an empirical study for a different dataset. A two-page research proposal is due on **November 19th, 2018** (before class time). A complete paper is due before **January 14, 2019**.

Final grades are assigned according to the scale: 90-100=A, 80-89=B, 70-79=C, 50-69=D and <50=F.

Tentative Outline of Topics

I. Introduction: Stationary Time Series

Detrending the Data

- Baxter, M. and R. King (1999), “Measuring the business cycle: Approximate band-pass filters for economic time series,” *Review of Economics and Statistics* 81, 575-593.

- Hamilton, J.D. (2017), “Why you should never use the Hodrick-Prescott filter,” *Review of Economics and Statistics*, forthcoming.
- Hodrick, R. and E. Prescott (1997), “Post-war US business cycles: An empirical investigation,” *Journal of Money, Credit and Banking* 29, 1-16.
- Stock, J.H. and M.W. Watson (1999), “Business cycle fluctuations in US macroeconomic time series,” *Handbook of Macroeconomics*, J.B. Taylor and M. Woodford (eds), Vol. 1a, Amsterdam: North Holland, 3-64.
- Stock, J.H. and M.W. Watson (2002), “Has the business cycle changed? Evidence and explanations,” *NBER Macroeconomics Annual* 17, M. Gertler and K. Rogoff (eds), MIT Press.

Inference

- Andrews, D.W.K (1991), “Heteroskedasticity and autocorrelation consistent covariance matrix estimation,” *Econometrica* 59, 817-858.
- Newey, W.K. and K.D. West (1987), “A simple positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix,” *Econometrica* 55, 703-708.

II. Multivariate Stationary Analysis

Estimation and Inference – VARs

- Kilian, L. (1998), “Small sample confidence intervals for IRFs,” *Review of Economics and Statistics* 2, 218-230.
- Kilian, L. and P.-L. Chang (2000), “How accurate are confidence intervals for impulse responses in large VAR models?” *Economics Letters* 69, 299-307.
- Stock, J.H. and M.W. Watson (2001), “Vector autoregressions,” *Journal of Economic Perspectives* 15, 101-116.

Causal Analysis – SVARs

a. General Overview

- Nakamura, E. and J. Steinsson (2018), “Identification in macroeconomics,” *Journal of Economic Perspectives* 32, 59-86.
- Ramey, V. (2016), “Macroeconomic shocks and their propagation,” *Handbook of Macroeconomics*, J.B. Taylor and H. Uhlig (eds), Vol. 2, Amsterdam: North Holland, 71-162.
- Sims, C.A. (1980), “Macroeconomics and reality,” *Econometrica* 48, 1-48.

b. Specifics of Identification

Identification with short run restrictions

- Christiano, L., Eichenbaum, M. and C. Evans (2005), “Nominal rigidities and the dynamic effects of a shock to monetary policy,” *Journal of Political Economy* 113(1), 1-45.

Identification with long run restrictions

- Blanchard, O.J. and D. Quah (1989), “Dynamic effects of aggregate demand and supply disturbances,” *American Economic Review* 79, 655-673.
- Chari, V.V., Kehoe, P.J. and E. McGrattan (2007), “A critique of structural VARs using real business cycle theory” (aka “Are structural VARs with long-run restrictions useful in developing business cycle theory?”), *Federal Reserve Bank of Minneapolis Working Paper Series* 634.

Identification through heteroskedasticity

- Rigobon, R. (2003), “Identification through heteroskedasticity,” *Review of Economics and Statistics* 85, 777-792.
- Wright, J. (2012), “What does monetary policy do to long-term interest rates at the zero-lower bound?” *Economic Journal* 122, F447-F466.

High frequency identification

- Cochrane, J.H. and M. Piazzesi (2002), “The Fed and interest rates: A high-frequency identification,” *American Economic Review* 92, 90-95.
- Faust, J., Swanson, E. and J. Wright (2004), “Identifying VARs based on high-frequency futures data,” *Journal of Monetary Economics* 51, 1107-1131.

Identification through external instruments

- Stock, J.H. and M.W. Watson (2012), “Disentangling the channels of the 2007-09 recession,” *Brookings Papers on Economic Activity*, Spring, 81-156.
- Stock, J.H. and M.W. Watson (2017), “Identification and Estimation of Dynamic Causal Effects in Macroeconomics,” Sargan Lecture at the Royal Economic Society.

Identification through heterogeneity

- De Graeve, F. and A. Karas (2014), “Evaluating Theories of Bank Runs with Heterogeneity Restrictions,” *Journal of the European Economic Association* 12(4), 969-996.

Identification through sign restrictions

- Baumeister, C. and J.D. Hamilton (2015), “Sign restrictions, structural vector autoregressions and useful prior information,” *Econometrica* 83, 1963-1999.
- Uhlig, H. (2005), “What are the effects of monetary policy on output? Results from an agnostic identification procedure,” *Journal of Monetary Economics* 52, 381-419.

III. Multivariate Stationary Analysis – Large Datasets

Bayesian VARs

- Bańbura, M., Giannone, D., and R. Lucrezia (2010), “Large Bayesian vector auto regressions,” *Journal of Applied Econometrics* 25, 71-92.
- Del Negro, M. and F. Schorfheide (2004), “Priors from general equilibrium models for VARs,” *International Economic Review* 45, 643-673.
- Doan, T., Litterman, R. and C. Sims (1984), “Forecasting and conditional projection using realistic prior distributions,” *Econometric Reviews* 3, 1-100.
- Giannone, D., Lenza, M., and G.E. Primiceri (2015), “Prior selection for vector autoregressions,” *Review of Economics and Statistics* 97, 412-435.
- McCracken, M., Owyang, M. and T. Sekhposyan (2017), “Real-time forecasting with a large, mixed frequency, Bayesian VAR,” *St. Louis Fed Working Paper* 2015-030.
- Waggoner, D.F. and T. Zha (1999), “Conditional forecasts in dynamic multivariate models,” *Review of Economics and Statistics* 81, 639-651.
- Waggoner, D.F. and T., Zha (2003), “A Gibbs sampler for structural vector autoregressions.” *Journal of Economic Dynamics and Control* 28, 349-366.

Factor Model and FAVAR

- Bai, J. and S. Ng (2002), “Determining the number of factors in approximate factor models,” *Econometrica* 70, 191-221.
- Bernanke, B.S. and J. Boivin (2003), “Monetary policy in a data-rich environment,” *Journal of Monetary Economics* 50, 525-546.
- Bernanke, B.S., Boivin, J. and P. Elias (2005), “Measuring the effects of monetary policy: A factor augmented vector autoregressive (FAVAR) approach,” *Quarterly Journal of Economics* 120, 387-422.
- Giannone, D., Reichlin, L. and D. Small (2008), “Nowcasting: The real-time informational content of macroeconomic data,” *Journal of Monetary Economics* 55, 665-676.
- Kose, M.A., Otrok, C. and C.H. Whiteman (2003), “International business cycles: world, region, and country-specific factors,” *American Economic Review* 93, 1216-1239.
- Stock, J.H. and M.W. Watson (2002), “Forecasting using principal components from a large number of predictors,” *Journal of the American Statistical Association* 97, 1167-1179.
- Stock, J.H. and M.W. Watson (2005), “Implications of dynamic factor models for VAR analysis,” *NBER Working Paper* 11467.

IV. Time Series Models with Latent Variables

- Carter, C.K. and R. Kohn (1994), “On Gibbs sampling for state space models,” *Biometrika* 81, 541-553.
- Chib, S. and E. Greenberg (1995), “Understanding the Metropolis-Hastings algorithm,” *American Statistician* 49, 327-335.
- Clark, T. (2011), “Real-time density forecasts from VARs with stochastic volatility,” *Journal of Business and Economic Statistics* 3, 327-341.
- Cogley, T., Morozov, S. and T.J. Sargent (2005), “Bayesian fan charts for U.K. inflation: Forecasting and sources of uncertainty in an evolving monetary system,” *Journal of Economic Dynamics and Control* 29, 1893–1925.
- Cogley, T. and T.J. Sargent (2014), “Measuring price-level uncertainty and instability in the U.S., 1850-2012,” *Review of Economics and Statistics* 97, 827-838.
- Del Negro, M. and G.E. Primiceri (2015), “Time varying structural vector autoregressions and monetary policy: A corrigendum,” *Review of Economic Studies* 82, 1342-1345.
- Fernández-Villaverde, J., Rubio-Ramírez J., Sargent, T.J. and M.W. Watson (2007), “ABCs (and Ds) of understanding VARs,” *American Economic Review* 97, 1021-1026.
- Hamilton, J.D. (1989), “A new approach to the economic analysis of nonstationary time series and the business cycle,” *Econometrica* 57, 357-384.
- Hansen, B. (1992), “The likelihood ratio test under non-standard conditions: Testing the Markov switching model of GNP,” *Journal of Applied Econometrics* 7, S61-S82.
- Primiceri, G.E. (2005), “Time varying structural VAR autoregressions and monetary policy,” *Review of Economic Studies* 72, 821-852.
- Stock, J.H. and M.W. Watson (2007), “Has inflation become harder to forecast?” *Journal of Money, Credit and Banking* 39, 3-34.

Supplemental University-Wide Policy and Resources

Academic integrity: “Students are expected to adhere to the Aggie Honor Code throughout the course: “An Aggie does not lie, cheat, or steal or tolerate those who do.” Upon accepting admission to Texas A&M University, a student immediately assumes a commitment to uphold the Honor Code, to accept responsibility for learning, and to follow the philosophy and rules of the Honor System. Students will be required to state their commitment on examinations and other academic work. Ignorance of these rules does not exclude any member of the TAMU community from the requirements or the processes of the Honor System. For additional information, you may visit <http://aggiehonor.tamu.edu>.”

Attendance: According to the Academic Rule 7 (<http://student-rules.tamu.edu/rule07>), if you are unable to turn in the assignments by the due dates, you should notify me beforehand to make alternative arrangements. If not pre-arranged, late assignments will earn zero points unless you can explain why you could not notify me prior to the deadline. If such situation occurs, you should alert me not later than two business days after the missed deadline.

Students with disabilities: “The Americans with Disabilities ACT (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Disabilities Services, currently located in the Disabilities Building at the Student Services at White Creek complex on West Campus or call 979 - 845-1637. For additional information visit <http://disability.tamu.edu>”

Title IX and Statement on Limits to Confidentiality: Texas A&M University and the College of Liberal Arts are committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws provide guidance for achieving such an environment. Although class materials are generally considered confidential pursuant to student record policies and laws, University employees — including instructors — cannot maintain confidentiality when it conflicts with their responsibility to report certain issues that jeopardize the health and safety of our community. As the instructor, I must report (per Texas A&M System Regulation 08.01.01) the following information to other University offices if you share it with me, even if you do not want the disclosed information to be shared:

- Allegations of sexual assault, sexual discrimination, or sexual harassment when they involve TAMU students, faculty, or staff, or third parties visiting campus.

These reports may trigger contact from a campus official who will want to talk with you about the incident that you have shared. In many cases, it will be your decision whether you wish to speak with that individual. If you would like to talk about these events in a more confidential setting, you are encouraged to make an appointment with the Student Counseling Service (<https://scs.tamu.edu/>).

Students and faculty can report non-emergency behavior that causes them to be concerned at <http://tellsomebody.tamu.edu>.