ECONOMIC FORECASTING
Section 600 class meeting times: <u>Mondays, 5:45pm-8:45pm</u>
Class location: HECC 105

Instructor: Tatevik Sekhposyan
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                   Office hours: Thursdays, 10am-noon & by appointment
                   I will dedicate Friday afternoon to answering emails received during the week. If the
                   question is urgent and requires earlier response, please indicate in the subject line.

Teaching   Tong Ye; E-mail: yetongnancy@tamu.edu
Assistants: Office hours: Fridays, 9:30am-11:30am in Allen 3095, unless specified otherwise

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Course Objective

Providing a prediction is an exciting and challenging task. The objective of this course is to teach the
basic tools for data analysis, model building and estimation (mostly in the context of time series data)
with an attempt to construct accurate *point* and *density* predictions. We will study the problem of
inference and various evaluation techniques to assess the accuracy of predictions. Throughout the
course we will emphasize the importance of economic theory for understanding, explaining and,
perhaps, improving our statistical analysis and prediction outcomes. The goal is for the students to learn:

- the basic tools of time-series analysis to be able to postulate and estimate a model, conduct
  hypothesis testing, construct predictions and prediction intervals, and evaluate predictions;
- R, an econometric software program for data analysis, presentation and statistical computing.

Course Materials

Course materials are provided and updated at http://ecampus.tamu.edu/. There are multiple textbooks
listed below. "SW" is the main reference textbook. I will use materials from other readings, but they are
optional. "ET" and "H" are reference textbooks for more advanced readers. Older editions of the
textbooks, when available, can be used as well. Occasionally, I will cover materials from research
papers. More information on the additional readings will be provided throughout the course. The course
materials and homework assignments will rely on the statistical software package R. The last page of
the syllabus provides references for useful free resources on R.

Readings
  (SW)   Stock, J.H. & M.W. Watson. *Introduction to Econometrics*, 4th ed., Pearson, 2019.
  (D)   Diebold, F. *Forecasting in Economics, Business, Finance and Beyond*, 2017. A previous
          version of the book *Elements of Forecasting* (4th ed.), South-Western, could also be useful.
  (ET)   Elliott, G. & A. Timmermann. *Economic Forecasting*, Princeton University Press, 2016.
  (H)   Hamilton, J.D. *Time Series Analysis*, Princeton University Press, 1994.

Attendance

Attendance to the class is not mandatory. However, there are participation credits allocated for students
who attend and participate in class. If a student misses a class, he/she is responsible for catching up on
the material covered in the missed class – there will be no make-up sessions.

According to the Academic Rule 7 (http://student-rules.tamu.edu/rule07), if you are unable to be present during the exams or turn in the assignments by their due dates, you should notify me beforehand to make alternative arrangements. If not pre-arranged, late assignments and missed exams will earn zero points unless you can explain why you could not notify me prior to the deadline. If such a situation occurs, you should alert me no later than two working days after the missed deadline.

Grade Point Distribution

The final grade for the course is based on homework assignments, two exams, a final research project and class and FREDCast participation. If you miss the midterm exam, you will earn zero for the exam, and the final exam will become worth 50 points. The homework assignments as well as the final research project are, in general, intended to be group projects. Specifics will be provided in assignment instructions.

Homework assignments (25 points) – There will be multiple homework assignments throughout the course. Some will be individual assignments, others can be completed in groups. These assignments will be mainly empirical in nature and will require using Excel and R to conduct data analysis, model building and evaluation.

Final Research Paper (15 points) – There has been a lot of discussion recently on whether the US economy is heading to a recession. The literature has found that the information in the yield curve could predict recessions. In the final research project students will be asked to re-evaluate the predictive performance of the yield curve. The final paper is a group project in teams consisting of at most two students. It is due on April 29, 2019, end of the day.

Midterm Exam (25 points) – February 25th, Monday. This is an hour and 15-minute exam that will be administered during the regular class time.

Final Exam (25 points) – May 2nd, Thursday, 6:00pm-8:00pm.

FREDCast (5 points) – An interactive economic forecasting game that can be accessed at https://research.stlouisfed.org/useraccount/fredcast/. The aim of the game is to forecast four major economic series: GDP, CPI, unemployment rate and payroll employment for the US. The forecasts are evaluated for accuracy. The code to join the virtual league will be provided to the class.

Class Participation (5 points) – I will take note of students who participate in class discussions, ask questions and suggest answers and solutions.

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

Tentative Outline of Topics

Topic 1   Review of basic econometrics (distributions, expectations, linear regression)
Topic 2   Introduction to time series data: covariance stationary processes; ARMA processes
Topic 3   Non-stationary processes:
                deterministic and stochastic trends; unit root tests
                structural breaks; Chow and QLR tests
Topic 4   Serial correlation: problems and solutions; HAC standard errors
Topic 5   Vector autoregressions: estimation, identification, impulse responses, variance decomposition and forecasting
Topic 6   Cointegration
Topic 7   Models of conditional heteroskedasticity: ARCH and GARCH
Topic 8   Forecast Evaluation:
                tests of absolute forecasting performance
                tests of relative forecasting performance
Topic 9   Forecasting with many predictors; Model combinations

References for R

R is an open-source software, typically used for statistical computing and graphics. R runs on many operating systems, including Linux, MacOS and Windows, and since it is an open-source software, there are many packages developed for it by a variety of contributors.

To get started with this class, you need to install the R statistical software and the RStudio environment, which we will use to write code, plot, and manage data.

There are several useful (and free with a TAMU NetID via TAMU libraries) references for R. They are listed below – this list is not meant to be an exhaustive list, but rather a useful one:

Cowpertwait, P.S.P. and A.V. Metcalfe. *Introductory Time Series Analysis with R*, Springer, 2009 (link)
Kleiber, C. and A. Zeileis. *Applied Econometrics with R*, Springer, 2009 (link)
Sebastiano, M. *Introduction to Financial Econometrics*, 2017 (link)
Tsay, Ruey S. *An Introduction to Analysis of Financial Data with R*, Wiley, 2013 (link)
Zuur, A.F., Ieno, E.N. and E.H.W.G. Meesters. *A beginner's Guide to R*, Springer, 2009 (link)

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."

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."