

INTERNATIONAL FINANCE SEMINAR:
Introductory Machine Learning for Exchange Rate Forecasting

SPRING 2020

(tentative)

Course Description

- This course provides a basic knowledge of empirical international finance. Emphasis is on techniques of **big data analysis for foreign currency investment using Bayesian machine learning**.
- Using Korean macro and financial data, students will test the uncovered interest rate parity condition, PPP condition, and Mundell-Fleming model. Next, we will use these models for forecasting exchange rates and foreign currency portfolio selection.
- Knowledge in Korean is required as many materials and data sets are provided in Korean.
- Each class consists of two sections: lecture and Matlab programming exercises
- Students are expected to learn about **international finance, data analysis, and Matlab programming**.

Instructor

- Kyu Ho Kang, email: kyuho@korea.ac.kr, office: Political science and economics building 328

Time and Location

- Monday and Wednesday 9:00AM - 10:15AM, Woodang hall 108

Office Hours

- Wednesday 1:30PM - 2:30PM or by appointment.

Textbook

Pick one of the following:

- Introduction to Bayesian Econometrics, 2012, Edward Greenberg, Second Edition
- 베이시안 계량경제학, 강규호, 박영사

Prerequisite

The following prerequisites are **strongly** required.

- Intermediate Macroeconomics, Econometrics I, Mathematics for Economists, Statistics for Economists
- **No prior Matlab programming experience is required**

Grading Policy

- There will be weekly Matlab programming homeworks, two quizzes, one term paper, and one presentation in class. They will count toward the grade as follows.

Matlab programming assignments	5 × 6
Midterm exam	20 × 1
Term paper	30 × 1
Presentation (Final exam week)	20 × 1
Total	100

- **The grade distribution can change depending on the overall performance of the class.**
- There will not be any make-up exams except as required by university policy. Each assignment has a due date and a due time, which will be posted on the course web page timely.

Term paper and presentation

- Each student is required to submit his or her own term paper in *English or Korean* depending on the student's preference.

- The term paper is evaluated in terms of three items: (i) *is the question raised by the presenter is interesting or important?*, (ii) *are the econometric model and estimation procedure well-designed for answering to the question?*, and (iii) *are the empirical findings and interpretations logically convincing?*. There is no disadvantage for poor language skill.
- The presentation will take approximately 10 minutes. The instructor and TA will ask a few questions about the term paper.

Academic Integrity

This course applies a very strict set of criteria regarding academic integrity and the consequences for violating course policies are serious. **You are strongly encouraged to discuss any topic including ideas about how to complete assignments.** But, under no circumstances will exchange of answers via written or electronic means be permitted between individuals. It is considered dishonest either to read another students solution or to provide anyone with a copy of your work. Be very careful when working with others on individual assignments as this is generally discouraged. **The work you submit must be your own original writing or coding effort.**

Other Important Notes

- There could be one or two makeup classes if the course progress is too slow.
- Please feel free to stop by my office during the office hour.
- No attendance check.

Topics

The following schedule shows the topics that will be covered in each of the term's lectures. This schedule should be considered tentative, as it is likely to change during the course, depending on various factors such as the students' preference and the course progress. Should changes be made, they will be posted on the Blackboard and announced in class. The course website in Blackboard will always contain the latest schedule.

1. Basic Econometric Tools

- (a) Basic concept of Bayesian econometrics, **Week 1**

- (b) Prior, likelihood, and posterior, **Week 2**
- (c) Linear regression and Gibbs sampling, **Week 3**
- (d) Model comparison, **Week 4**

2. Application I: empirical tests of theories

- (a) Empirical testing uncovered interest rate parity conditions, **Week 5**
- (b) Empirical testing absolute and relative PPPs, **Week 6**

3. Supervised Learning

- (a) Bayesian variable selection, **Week 7**

4. Unsupervised Learning

- (a) Mixture model **Week 8**
- (b) Principal component analysis **Week 9**

5. Application II: exchange rate forecasting via Big data analysis

- (a) Exchange rate forecasting, **Weeks 10 and 11**
- (b) Evaluation of density forecasting, **Weeks 12 and 13**
- (c) Foreign currency portfolio selection, **Week 14**

6. Presentation Weeks 15 and 16