

# Applications of econometrics

## Syllabus

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### **A Goals of the course**

This course aims to provide students with an intensive training in quantitative analysis reproducing papers published in top reviews in different fields of applied econometrics as development economics, political economy, urban economics or economics of science. Each session will be associated with a particular method to provide a knowledge of what is currently used by applied economists. The whole course will be based on python and stata.

### **B Content of each session**

Students have to prepare each session before 1) reading the required paper, 2) answering the questions sets that will be corrected throughout the course. Students should bring their laptops and have python installed on their device.

### **C Course evaluation**

Students will be graded on a personal project that will be presented at the end of the course during 15 minutes.

## D List of the sessions

### Session I Data Management and econometrics packages with python, Stata and LaTeX

#### I.1 Goal of the session

This introductory aims at refreshing students with their knowledge of python and stata. . This session should provide students with the understanding that a research program requires : clean and commented code with well organised datasets to allow reproductibility

- **Skills developed** : Python programing, Stata Programing, object oriented programing, loops, functions, pandas, geopandas, numpy, statsmodel, SQL dataset , postgresql, Latex, Overleaf

#### I.2 Mandatory readings

- None

### Session II OLS and Randomized Controlled Trials

#### II.1 Goal of the session

This sessions aims to provide the students with the basic knowledge of OLS and randomized Controlled Trials. After refreshing the basic principles of these methods , we will discuss and reproduce a paper of Duflo, Dupas and Kremer. This will allow us to learn how to :

- use cross sectional data
- Produce descriptive statistics
- Realize a balanced test
- Estimate Average Treatment effects with OLS

#### II.2 Mandatory Readings

- Esther Duflo, Pascaline Dupas et Michael Kremer. Education, hiv, and early fertility : Experimental evidence from kenya. *American Economic Review*, 105 (9):2757–97, 2015

### Session III Difference-in-Difference and Event Studies

#### III.1 Goal of the session

This session aims at introducing the use of OLS to estimate difference-in-difference and event studies. Using a paper investigating the link between austerity and Brexit, we will see

- How to use panel data
- How to estimate simple difference-in-difference estimator

- How to estimate and plot event-studies coefficients

### III.2 Mandatory readings

- Thiemo Fetzer. Did austerity cause brexit? *American Economic Review*

## Session IV Hedonic regression

### IV.1 Goal of the session

This session aims at providing the basic insights of hedonic regression models to create price indices and perform real estate appraisal.

- **Concepts :** Hedonic regression , real estate market, OLS

### IV.2 Mandatory readings

- Christian Gouriéroux et Anne Laferrère. Managing hedonic housing price indexes : The french experience. *Journal of Housing Economics*, 18(3):206–213, 2009

## Session V 2SLS with cross sectional data

### V.1 Goal of the session

We will reproduce the second step of a work on the cost of agglomeration to introduce the theory of Two Stages Least Squares and over-identification tests.

- Cross sectional data
- 2SLS
- Over-identification tests

### V.2 Mandatory readings

- Pierre-Philippe Combes, Gilles Duranton et Laurent Gobillon. The costs of agglomeration : House and land prices in french cities. *The Review of Economic Studies*, 86(4):1556–1589, 2018

## Session VI Non linear models

### VI.1 Goal of the session

We will introduce non linear models as probit and logit and see a recent application based on Poisson regression.

- Non linear models
- Counting Models
- Poisson regression

## VI.2 Mandatory readings

- Pierre Azoulay, Christian Fons-Rosen et Joshua S Graff Zivin. Does science advance one funeral at a time? *American Economic Review*, 109(8):2889–2920, 2019

## Session VII Personal Project Preparation

### VII.1 Goal of the session

This session will be dedicated to the preparation of the personal research projects that should be presented at the end of the semester. Students should come with an idea and a dataset to analyze.

### VII.2 Mandatory readings

- None

## Session VIII Introduction to Big Data and Web scraping

### VIII.1 Goal of the session

We will introduce new methods developed by data scientists

- Webscraping
- Non linear models
- Regression trees
- Random Forests
- Lasso regressions

### VIII.2 Mandatory readings

- Hal R Varian. Big data : New tricks for econometrics. *Journal of Economic Perspectives*, 28(2):3–28, 2014

## Session IX Introduction to Time Series Analysis

### IX.1 Goal of the session

This session aims at introducing the basic concepts of times series analysis. We will rely on simple example and the reading of a paper recently published in the Journal of Financial Economics.

### IX.2 Mandatory readings

- Guido Baltussen, Sjoerd van Bakkum et Zhi Da. Indexing and stock market serial dependence around the world. *Journal of Financial Economics*, 132(1): 26–48, 2019