MGT-581

Introduction to econometrics

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Cursus	Sem.	Type
Financial engineering minor	H	Opt.
Financial engineering	MA1, MA3	Obl.
Management of technology		Opt.
Management, Technology and Entrepreneurship minor	H	Opt.
Managmt, tech et entr.	MA1, MA3	Obl.

Language of teaching	English
Credits	4
Session	Winter
Semester	Fall
Exam	Written
Workload	120h
Weeks	14
Hours	**4 weekly**
Lecture	2 weekly
Exercises	2 weekly
Number of positions	

Summary

The course provides an introduction to econometrics for economics and financial applications. The objective is to learn how to make valid (i.e., causal) inference from economic and social data.

Content

- Causal inference
- Linear model
- Estimation (ordinary least square, maximum likelihood)
- Inference (hypothesis testing, confidence intervals)
- Panel data
- Experiments and quasi-experiments
- Instrumental variable
- Introduction to time series

Keywords

Econometrics; Statistics; Data analysis; Causality; Data science; Ordinary least squares; Linear model

Learning Prerequisites

Important concepts to start the course

- Sound understanding of statistics and probability concepts (central limit theorem, hypothesis testing, etc.).
- Matrix algebra.
- Familarity with R (or Python) is helpful.

Learning Outcomes

By the end of the course, the student must be able to:

- Recognize pitfalls and bias in data collection and econometric models
- Illustrate the concept of endogeneity
- Check the validity of an econometric result
- Quantify an economic relationship

- Design an appropriate regression model
- Interpret coefficients of econometric regressions
- Carry out hypothesis testing

Transversal skills

- Demonstrate a capacity for creativity.
- Demonstrate the capacity for critical thinking
- Use both general and domain specific IT resources and tools
- Use a work methodology appropriate to the task.

Teaching methods

Lectures provide the theoretical knowledge and exercise sessions illustrate theory using computer exercises.

Expected student activities

- Attendance and participation at lectures and exercise sessions
- Submission of problem sets

Assessment methods

- Individual problem sets: 40%
- Written exam during the exam session : 60%

Resources

Virtual desktop infrastructure (VDI)

No

Bibliography

The course will be based on (ref. not compulsory)

- Morgan, Steven L., and Christopher Winship. 2014. *Counterfactuals and Causal Inference: Methods and Principles for Social Research*. 2nd Edition. Cambridge University Press
- James H. Stock and Mark W. Watson. *Introduction to Econometrics*. 3rd Edition. Pearson.
- Verbeek, M. 2017. *A Guide to Modern Econometrics*. 5th Edition. John Wiley & Sons.

Additional useful references:

- Angrist, J.D. and Pischke, J.-S. 2009. *Mostly Harmless Econometrics: An Empiricist's Companion*. Princeton University Press.
- Aronow, Peter M., and Benjamin T. Miller. 2019. Foundations of Agnostic Statistics. Cambridge University Press.
- Cameron, A.C. and Trivedi, P.K. 2010. *Microeconometrics Using Stata*. Stata Press.
- Gelman, Andrew, and Jennifer Hill. 2007. *Data Analysis Using Regression and Multilevelâ##Hierarchical Models*. Cambridge University Press.
- Greene, W.H. 2011. *Econometric Analysis*. Prentice Hall.
- Wooldridge, J.M. 2012. *Introductory Econometrics: A Modern Approach*. Cengage Learning.

Ressources en bibliothèque

- Counterfactuals and Causal Inference / Morgan
- Introduction to econometrics / Stock & Watson
- A Guide to Modern Econometrics / Verbeek
- Mostly Harmless Econometrics / Angrist
- Foundations of Agnostic Statistics / Aronow
- Microeconomics using Stata / Cameron
- Data Analysis Using Regression and Multilevel Hierarchical Models / Gelman
- Introductory econometrics / Woolridge
- Econometric analysis / Greene

Notes/Handbook

Students are provided with notes when applicable.

Moodle Link

- https://go.epfl.ch/MGT-581