

**COURSE SYLLABUS****Introduction to impact evaluation in sustainability (19164)**

Master in Sustainable Development and Global Governance

2022/2023

Course: 1st Semester: 2nd**Lecturer:** Ricardo Mora (15.2.08, ricmora@eco.uc3m.es)**Office hours:** TBA**Class time & location:** Friday 15:30-18:45 @ the UC3M Puerta de Toledo Campus

Course goals & organization

This course aims to provide you with basic quantitative skills used in evaluating the impact of public policies and interventions. The goal is to help you develop the ability to understand the properties of techniques and critically read published research. This objective will be achieved through theoretical sessions, practical sessions in the classroom and teamwork. The course is focused on developing the skills to assess the limitations of data, the appropriate empirical strategies, and the interpretation of results in empirical work.

The course is spread over 7 weeks, with 1 weekly session of 180 minutes. Usually, the session is divided into a two hour lecture and an one hour class.

Classes will consist of debate sessions, solving exercises, a case study, and one midterm exam.

Debate sessions: At the end of a 2 hour lecture, the teacher will read a statement on one topic. Everyone willing to participate in the debate will contact the teacher. A week later, participants will be assigned to two teams of five to seven members, one in favor and one against the statement. The debate will include 1) opening statements and arguments from each team (affirmative side first), 2) rebuttals of the other team's arguments (opposing team first), 3) questions, and 4) closing statements. Although voluntary, participation in the debates will be part of the grading system.

Solving exercises: The teacher will solve a list of exercises/questions related to the issues covered.

A case study: The teacher or an invited speaker will present an impact evaluation case in detail.

Midterm exam: As part of the continuous evaluation, students will sit an exam which will include exercises and questions.

In addition to theory sessions and classes, there will be a Final examination and a Homework Exercise Set:

Final examination: The final examination will have the same structure of the midterm but will last longer.

Homework Exercise Set: Students will be asked to form groups of four to five students to hand in the solution of a list of exercises at the end of the course.

All the material (program, slides, exercises) will be available at the class webpage in advance. Although students will not be asked to learn any software, during the theory and class sessions there will be illustrations on how to perform basic statistical analysis using Stata.

Grading:

The final grade will be a weighted average of the course's workload and the final examination.

Debates (group assignment)	15%
Midterm (individual)	25%
Homework Exercise Set (group assignment)	25%
Final examination (individual)	35%

Course schedule

1st Session

Exercise: Set 1.

2nd Session

Theory: Causality and random assignment.

Introduction. Potential outcomes and causality. Average treatment effects. Ignorability and randomization. A simple example.

1st Debate.

3rd Session: Case study

4th Session

Theory: Selection on observables and regression.

Introduction. Observational data. The simple linear regression model. The Ordinary Least Squares estimator. The multiple linear regression model.

Midterm exam.

5th Session

Theory: Difference-in-differences and panel data techniques.

Unobservable heterogeneity. Difference-in-differences. Panel data and fixed-effects estimators.

2nd Debate.

6th Session

Theory: Instrumental variables.

Motivation. The Instrumental Variable approach. The IV methods in the multiple regressor model. The IV approach as a local treatment effect estimator.

Exercise: Set 2.

7th Session

Theory: Matching & Regression Discontinuity.

Matching: Constructing an artificial comparison group. Propensity score matching. Limitations of Matching. Eligibility and Regression Discontinuity. Fuzzy Regression Discontinuity. Limitations of RD.

3rd Debate.

References

Textbooks:

Gertler et al. (2016). Impact evaluation in practice. 2nd Edition. World Bank Group. (available online: <http://www.worldbank.org/ieinpractice>.)

Wooldridge, J. (2015): Introductory Econometrics: A Modern Approach, 6th edition, Cengage Learning.

Bueno, E. & Fowler, A. (2021). Thinking Clearly with Data: A Guide to Quantitative Reasoning and Analysis. Princeton University Press. New Jersey.

Additional general references:

- Cunningham, S. (2021). Causal Inference: The Mixtape. Yale University Press. New Haven.
- Blundell, R., & Dias, M. C. (2009). Alternative approaches to evaluation in empirical microeconomics. *Journal of Human Resources*, 44(3), 565-640.
- Imbens, Guido W. and Jeffrey M. Wooldridge. (2009) Recent Developments in the Econometrics of Program Evaluation, *Journal of Economic Literature*, 47(1): 5-86.
- Cameron, A & Trivedi, Pravin. (2010). *Micro-Econometrics Using Stata, Revised Edition*. Stata Press.
- Khandker, Shahidur R.; Koolwal, Gayatri B.; Samad, Hussain A. (2010). *Handbook on Impact Evaluation: Quantitative Methods and Practices*. World Bank. © World Bank. <https://openknowledge.worldbank.org/handle/10986/2693>

Additional readings:

Causal inference. Measurement of counterfactuals. Random selection.

- Bertrand, M. & S. Mullainathan (2004) Are Emily and Greg More Employable Than Lakisha and Jamal? A Field Experiment on Labor Market Discrimination, *American Economic Review*, 94(4): 991-1013.
- Kremer, M., Leino, J., Miguel, E., & Zwane, A. P. (2011). Spring cleaning: Rural water impacts, valuation, and property rights institutions. *The Quarterly Journal of Economics*, 126(1), 145-205.
- Djebbari, Habiba & Lopera, María Adelaida (2014). *Impact evaluation using Stata*. Available at <https://www.pep-net.org/impact-evaluation-using-stata>
- Jessoe, K., & Rapson, D. (2014). Knowledge is (less) power: Experimental evidence from residential energy use. *American Economic Review*, 104(4), 1417-38.

Selection on observables and regression.

- Olmstead, S. M., Muehlenbachs, L. A., Shih, J. S., Chu, Z., & Krupnick, A. J. (2013). Shale gas development impacts on surface water quality in Pennsylvania. *Proceedings of the National Academy of Sciences*, 110(13), 4962-4967.
- Allcott, H., Braghieri, L., Eichmeyer, S., and Gentzkow, M. (2020). The Welfare Effects of Social Media. *American Economic Review* 110: 629-76.

Difference-in-differences.

- Kiel, K.A. & McClain, K.T. (1995). The effect of an incinerator siting on housing appreciation rates. *Journal of Urban Economics*, 37(3), 311-23.
- Schultz, T. P. (2004). School subsidies for the poor: evaluating the Mexican Progresa poverty program. *Journal of Development Economics*, 74(1), 199-250.
- Di Tella, R., & Schargrodsky, E. (2004). Do police reduce crime? Estimates using the allocation of police forces after a terrorist attack. *American Economic Review*, 94(1), 115-133.
- Aaronson, D. and B. Mazumder (2011) The Impact of Rosenwald Schools on Black Achievement, *Journal of Political Economy* 119, no. 5: 821-888.
- Kotchen, M. J., & Grant, L. E. (2011). Does daylight saving time save energy? Evidence from a natural experiment in Indiana. *Review of Economics and Statistics*, 93(4), 1172-1185.

Instrumental variables.

- Angrist, J.D. (1990), Lifetime Earnings and the Vietnam Era Draft Lottery: Evidence from Social Security Administrative Records, *The American Economic Review*, Vol. 80:3, pp. 313-336.
- Pitt, M. M., Rosenzweig, M. R., & Hassan, M. (2005). Sharing the burden of disease: gender, the household division of labor and the health effects of indoor air pollution. *CID Working Paper Series*.
- Brainerd, E., & Menon, N. (2014). Seasonal effects of water quality: The hidden costs of the Green Revolution to infant and child health in India. *Journal of Development Economics*, 107, 49-64.

Matching and Regression discontinuity

- Galasso, E., & Ravallion, M. (2004). Social protection in a crisis: Argentina's Plan Jefes y Jefas. *The World Bank Economic Review*, 18(3), 367-399.
- Onishi, J., Filmer, D. P., Friedman, J., Kandpal, E., Avalos, J., & Chaudhury, N. (2014). *Evaluating Pantawid Pamilya Using Regression Discontinuity Design: Key Results and Lessons* (No. 78134, pp. 1-55). The World Bank.
- Lee, David S. and Thomas Lemieux (2010). Regression Discontinuity Designs in Economics, *Journal of Economic Literature*, 48(2): 281-355.
- Abadie, A., & Gardeazabal, J. (2003). The economic costs of conflict: A case study of the Basque Country. *American Economic Review*, 93(1), 113-132.
- Chay, K. Y., & Greenstone, M. (2005). Does air quality matter? Evidence from the housing market. *Journal of Political Economy*, 113(2), 376-424.
- Ferraro, P. J., McIntosh, C., & Ospina, M. (2007). The effectiveness of the US endangered species act: An econometric analysis using matching methods. *Journal of Environmental Economics and Management*, 54(3), 245-261.

Debates

First Debate (suggestions):

1) Human beings are rational and react according to their own unique interests to whatever is offered to them. Hence, Impact Evaluation studies cannot give results as credible as those obtained in the natural sciences because the actions of human beings are not determined by instinct of physics.

2) The mode of dealing with conflicting evidence that is customary in Science is as follows: "Under conditions C and assuming the validity of hypothesis H, effect E must occur. Now, given C, E does not occur. Consequently H is to be refuted." In the context of Impact Evaluation, in particular when the experimenter does not have complete control of the environment, however, further modes are admissible. Here's an example: Assume that somebody chooses to explain robbery in the streets by "not enough police." This is made the basis of a plan, and the size of the police force is increased. In the subsequent years there is an increased number of arrests, although at a rate smaller than the increase in the economy. Has crime in the streets been reduced by increasing the police force? Some social scientists will say "Yes, E has occurred because the number of arrests increased". Still others will justify that E does not occur using nonscientific explanations: "If we had not increased the number of officers, the increase in crime would have been even greater"; "This case is an exception from rule H because there was an irregular influx of criminal elements"; "Time is too short to feel the effects yet". That is to say, in Impact Evaluation, the choice of explanation is arbitrary in the logical sense when the researcher does not have full control of the environment. Most likely researchers choose those explanations which are most plausible/convenient to them.

Second & Third Debates (suggestions):

3) Development economists have randomly assigned economic assistance to poor villages in order to measure the rates of return on that assistance. Prof. Jeffrey Sachs's Millennium Villages Project, an ambitious effort to help African villages escape poverty, has been criticized for, among other things, failing to randomly assign its treatments. But Professor Sachs didn't accidentally forget to randomize his assistance: It is wrong to withhold from poor people assistance that one is confident can help.

4) When social policies or events cannot be randomized, econometricians use regression techniques to evaluate their effects. These techniques are nothing more than glorified play because: (a) Individuals actions are not set to follow some kind of automatic procedure as implied in the econometric models; (b) each individual reacts to the environment in a unique, non-repeatable manner; and (c) in practice, social scientists often add factors or drop them from the equations to force the outcome of their analyses to be in line with their "gut feelings."

5) Most economists agree that the UK economy will in the long-term suffer from its departure from the European Union (Brexit). In reality, however, it will be very difficult to evaluate the costs of Brexit because the initial stages of the process were contemporaneous to the first waves of the COVID pandemic.

6) Whenever possible, social scientists should carry out their analysis at the individual level, because it is only humans who make decisions. Aggregated analyses that use higher order units, such as countries or regions, are misleading because these units are not decision makers.