

Causal Inference with Applications to the Economics of Innovation
Tel Aviv University April 2016
Mini-course Syllabus

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Office hour: by appointment

Course outline: In this course we study selected techniques for estimating causal relationships with applications to important questions in the economics of innovation. Econometric topics covered include differences in differences, matching methods, and IV to estimate local and marginal treatment effects. We will study empirical articles that apply these methods in the study of innovation topics, including measurement of knowledge spillovers, impact of patents on R&D incentives and cumulative innovation, and the diffusion of technology. If time permits we will also study structural models for estimating the value of patent rights and constructing quality-adjusted measures of innovation. For each topic, the lecture will cover relevant econometric techniques and 1-2 empirical papers.

Teaching

Lectures: There will be four 3-hour sessions over a period of two weeks. The first lecture will cover the key econometric methods relevant to the papers we will later read. The following three lectures will be devoted primarily to discussing the assigned papers. You are expected to contribute to the discussion and, to this end, you should definitely read the assigned articles (identified with an asterisk) **before** the lecture. If there is student demand, I am willing to arrange an additional two-hour session each week to discuss papers in more detail or for broader discussion of the topics and related papers.

Class Organisation:

In addition to a 2-hour final examination after the course, each student will be required to prepare **two** "referee reports" on papers which will be assigned. These reports will be due by 30 April 2016 (two weeks after the final exam) and will count for a total of 30% of the final grade (the final exam counts for 70%). The comments should be 4-5 pages long and should address the following points:

- Why the paper is important to you (or why not)?
- A description of the main features of the model (if there is one), its empirical implications and the empirical identification strategy.
- Key empirical findings

- Main strengths and/or weaknesses of the paper?
- How could the paper be usefully extended (directions for future research)?

General Reading

Angrist, Josh and Steve Pischke (2009) *Mostly Harmless Econometrics*, Princeton University Press (strongly recommended textbook)

Imbens, Guido and Jeffrey Wooldridge NBER lectures (most advanced series)
<http://www.nber.org/minicourse3.html>

Starred readings are required. Others are supplementary.

Lecture 1: Causal Inference: Diff in Diffs, Matching Methods and IV (LATE)

Angrist, Josh and Steve Pischke (2009)

Lecture 2: Patent Rights and Innovation Incentives

*Budish, Eric, Benjamin Roin and Heidi Williams, “Do Firms Underinvest in Long-Term Research? Evidence from Cancer Clinical Trials,” *American Economic Review* (2014)

Galasso, Alberto and Mark Schankerman, “Patents Rights and Innovation by Small and Large Firms,” *NBER Working Paper* (2016), revised March 2016

Lecture 3: Heterogeneous Treatment Effects

Angrist, Josh and Steve Pischke (2009)

*Carneiro, Pedro, James Heckman and Edward Vytlacil (2011), “Estimating Marginal Returns to Education,” *American Economic Review*, 101(6): 2754-2781

*Alberto Galasso, Mark Schankerman and Carlos Serrano (2013), “Trading and Enforcing Patent Rights,” *RAND Journal of Economics*, 44(2): 275-312

Lecture 4: Patent Rights and Cumulative Innovation I

*Williams, Heidi (2013), “Intellectual Property Rights and Innovation: Evidence from the Human Genome,” *Journal of Political Economy*, 121: 1-27

Sampat, Baven and Heidi Williams (2014), “How Do Patents Affect Follow-On Innovation? Evidence from the Human Genome,” mimeo

*Moser, Petra (2012), “Compulsory Licensing: Evidence from the Trading with the Enemy Act” *American Economic Review*, 102(1): 396-427

*Furman, Jeffrey and Scott Stern (2011), "Climbing atop the Shoulders of Giants: The Impact of Institutions on Cumulative Research," *American Economic Review*, 101: 1933-1963

*Alberto Galasso and Mark Schankerman (2015), "Patents and Cumulative Innovation: Causal Evidence from the Courts," *Quarterly Journal of Economics*, 130(1): 317-369

Duggan, Mark, Craig Garthwaite and Aparajita Goyal (2016), "The Market Impacts of Pharmaceutical Product Patents in Developing Countries: Evidence from India," *American Economic Review*, 106(1):

Supplementary Lecture 1: Patent Rights and Spillovers/Diffusion of Knowledge

*Azoulay, Pierre, Joshua Graff Zivin and Jialan Wang (2010), "Superstar Extinction," *Quarterly Journal of Economics*, 125 (2): 549-589

Cockburn, Lanjouw and Schankerman (2016), "Patents and the Global Diffusion of New Drugs," *American Economic Review*, 106(1)

Branstetter, Lee, Raymond Fishman and C. Fritz Foley (2006), "Do Stronger Intellectual Property Rights Increase International Technology Transfer? Empirical Evidence from U.S. Firm-level Panel Data," *Quarterly Journal of Economics*, 121(1): 321-349

Supplementary Lecture 2: Structural Models of the Value of Patents

*Schankerman, Mark and Ariel Pakes (1986), "Estimates of the Value of Patent Rights in European Countries During the Post-1950 Period," *Economic Journal*, 96: 1052-1076

Schankerman, Mark (1998), "How Valuable is Patent Protection? Estimates by Technology Field," *RAND Journal of Economics*, 29(1): 77-107

*Pakes, Ariel (1986), "Patent as Options: Some Estimates of the Value of Holding European Patent Stocks," *Econometrica*, 54: 755-784