Topics in Applied Econometrics

Course lecturer: Prof Thomas Cornelissen, University of York, UK.

This short course covers a selection of econometric research methods that are increasingly used in applied empirical research in economics but not currently covered in standard econometric textbooks. The course will cover the following three topics:

Marginal Treatment Effects (MTE): Marginal treatment effects constitute an extension of conventional instrumental variables (IV) estimation. Rather than identifying one local average treatment effect (LATE), as conventional IV analysis does, the MTE method allows identifying a whole distribution of treatment effects from which meaningful and policy-relevant aggregate treatment effects can be derived.

Multiple High-Dimensional Fixed Effects: Applied economists increasingly estimate panel regression models with multiple high-dimensional fixed effects (such as worker and firm fixed effects in wages or teacher, student and school fixed effects in educational achievement). In large datasets with many panel units these models are computationally intensive and the challenge is to find the most appropriate algorithm to run them in an efficient way within given computer memory and time constraints. Further issues relate to the identification of the effects, the quality and precision of their estimation, and potential biases when estimated fixed effects are used for subsequent analysis.

Multiple hypothesis testing: Applied researchers often test the statistical significance of many coefficients, for example when they estimate the effects of a treatment on a large number of available outcome measures. Applying conventional individual hypothesis tests in this case is flawed and leads to a higher than desired type I error rate. That is, the probability of finding *at least one* statistically significant coefficient although the true value of all coefficients is zero increases with the number of hypotheses tested. Methods of multiple hypothesis testing allow correcting this problem and fixing the overall type I error rate for the group of hypotheses at the desired level.

The course will cover theory and practice of these topics. It will consist of lectures combined with presentations of selected papers for each topic area by some of the course participants. There will also be the opportunity for individual meetings to discuss individual research projects with the course lecturer.

Prerequisites: There are no formal prerequisites for this course, but basic familiarity with IV estimation, panel regression methods and statistical hypothesis testing will be expected.

Topics in Applied Econometrics: Teaching Plan

Wednesday, 5th December 2018

9:00 – 10:30: Marginal Treatment Effects part 1 (Lecture)

11:00 – 12:30: Marginal Treatment Effects part 2 (Lecture)

14:00 – 15.30: Marginal Treatment Effects (Paper Presentations)

16:00 – 17:00: Slots to discuss individual research projects

Thursday, 6th December 2018

9:00 – 10:30: Multiple high-dimensional fixed effects part 1 (Lecture)

11:00 – 12:30: Multiple high-dimensional fixed effects part 2 (Lecture)

14:00 – 15.30: Multiple high-dimensional fixed effects (Paper Presentations)

16:00 – 17:00: Slots to discuss individual research projects

Friday, 7th December 2018

9:00 – 10:30: Multiple hypothesis testing (Lecture)

[11:00 – 12.00: Vortrag Forschungsseminar]

14:00 – 15.30: Multiple hypothesis testing (Paper Presentations)

16:00 – 17:00: Slots to discuss individual research projects

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List of Suggested Papers for Presentations

All suggested papers are applied papers that employ the respective methods. Each presentation should be 30 minutes, allowing for 5 minutes of discussion.

Multiple High-Dimensional Fixed Effects

Card, David, Ana Rute Cardoso, and Patrick Kline. 2016. "Bargaining, Sorting, and the Gender Wage Gap: Quantifying the Impact of Firms on the Relative Pay of Women." *The Quarterly Journal of Economics* 131 (2): 633–86.

Card, David, Jörg Heining, and Patrick Kline. 2013. "Workplace Heterogeneity and the Rise of West German Wage Inequality." *The Quarterly Journal of Economics* 128 (3): 967–1015.

Cornelissen, Thomas, Christian Dustmann, and Uta Schönberg. 2017. "Peer Effects in the Workplace." *American Economic Review* 107 (2): 425–56.

Rockoff, Jonah E. 2004. "The Impact of Individual Teachers on Student Achievement: Evidence from Panel Data." *The American Economic Review* 94 (2): 247–52.

Marginal Treatment Effects

Aakvik, A., Heckman, J. J., & Vytlacil, E. J. (2005). Estimating treatment effects for discrete outcomes when responses to treatment vary: an application to Norwegian vocational rehabilitation programs. *Journal of Econometrics*, 125, 15–51.

Carneiro, Pedro, James J Heckman, and Edward J Vytlacil. 2011. "Estimating Marginal Returns to Education." *American Economic Review* 101 (6): 2754–81.

Cornelissen, Thomas, Christian Dustmann, Anna Raute, and Uta Schönberg. 2018. "Who Benefits from Universal Child Care? Estimating Marginal Returns to Early Child Care Attendance." Journal of Political Economy, *fortcoming*. Working paper version available at http://www.cream-migration.org/publ_uploads/CDP_08_18.pdf

Multiple Testing

Anderson, M. L. (2008). Multiple Inference and Gender Differences in the Effects of Early Intervention: A Reevaluation of the Abecedarian, Perry Preschool, and Early Training Projects. *Journal of the American Statistical Association*, *103*, 1481–1495.

Dobbie, W., & Fryer, R. G. (2015). The Medium-Term Impacts of High-Achieving Charter Schools. *Journal of Political Economy*, *123*, 985–1037.

Heckman, J., Moon, S. H., Pinto, R., Savelyev, P., & Yavitz, A. (2010). Analyzing social experiments as implemented: A reexamination of the evidence from the HighScope Perry Preschool Program. *Quantitative Economics*, *1*, 1–46.