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IZA

Discussion of

In pursuit of balance

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Randomized controlled trials

Randomized experiments now very popular

But implementing random experiments is not taught in econometrics

Basic idea: 1) Randomly allocate people to control versus treatment
2) and compare average outcome of treated and control

But inefficient (particularly with small samples)

Ex post balance: e.g. by regression methods on X

Ex ante balance: stratification, pair-matching, re-randomization

→ This paper - summarizes some results for design in clinical trials
- examines balance and inference with 4 typical datasets

Randomization methods:

- Stratification (also on Y_{t-1} !)

- Pair-wise matching (Mahalanobis distance)

- Re-randomization methods

→ Overall pair-wise matching seems to perform best

→ Include rather many variables in *X*

1) Optimal greedy algorithm takes several days with n=300 in Stata
→ Develop faster code and share it with researchers

2) Pair-wise matching combined with re-randomization is missing

Overall pair-wise matching seems to perform best

- in achieving balance and also with respect to power of test

For inference important to include randomization variable in regression

When pair-wise matching, include a dummy for each pair

$$Y_i = \alpha + \beta D_i + \xi_1 \text{Pair}_1 + \xi_2 \text{Pair}_2 + \xi_3 \text{Pair}_3 \ldots$$

But: How to proceed in non-linear model (incidental parameters problem)

- Compare randomization based inference to model based inference

Implementation of randomized controlled trials

Hence: Implementation of experiments not so trivial (with small samples)

Randomization methods matter and should be accounted for in inference

Yet in practice more problems may occur:

- Non-compliance with protocol (local average treatment effect)
- Changing treatment dose over time
- Combinations of treatment over time

- Missing baseline data
- Attrition, non-response and loss to follow up (particularly long-term)

Not everything under control of experimenter

Build in multiple IV to control for these problems

Learn more from biometrics/biostats literature on longitudinal trials
But: biostats/clinical trials like ML and not IV

→ Need to learn more about experiments in imperfect conditions

→ Paper McKenzie & Bruhn right direction

→ How to do inference in IV setup with heterogenous Treatment Effects