Handout 1. The literature on matching difference in difference: theory, application, and comparison

The original papers:

- Heckman, J., Ichimura, H., & Todd, P. (1997). Matching as an econometric evaluation estimator: evidence from evaluating a job training programme. *Review of Economic Studies*, 64 (4): 605-654.
- Heckman, J., Ichimura, H., Smith, J., & Todd, P. (1998). Characterizing selection bias using experimental data. *Econometrica*, 66(5), 1017-1098.

Comparison of estimators: propensity scores matching, difference-in-differences matching, etc.:

- Heckman, J., Ichimura, H., & Todd, P. (1997). Matching as an econometric evaluation estimator: evidence from evaluating a job training programme. *Review of Economic Studies*, 64(4): 605-654.

  "We test and reject the identifying assumptions that justify the classical method of matching. We present a nonparametric conditional difference-in-differences extension of the method of matching that is consistent with the classical index-sufficient sample selection model and is not rejected by our tests of identifying assumptions. This estimator is effective in eliminating bias, especially when it is due to temporally invariant omitted variables."

- Smith, J. A. & Todd, P. (2005), Does Matching Address LaLonde's Critique of Nonexperimental Estimators. *Journal of Econometrics*, 125(1-2): 305-353.

  "Our results show that program impact estimates generated through propensity

  score matching are highly sensitive to choice of variables used in estimating the propensity scores and sensitive to the choice of analysis sample. Among the estimators we study, the difference-in-differences matching estimator is the most robust. We attribute its better performance to the fact that it eliminates temporarily-invariant sources of bias…"

- Blundell, R., & Costa Dias, M. (2000). Evaluation Methods for Nonexperimental Data. *Fiscal Studies*, 21(4), 427-468.

  "a careful combination of matching and differencing can provide useful insights into the impact of some policy interventions."

Studies applying the same approach (i.e., run Panel DID on matched observations):

- Greenaway, D., Gullstrand, J. & Kneller, R. (2005). Exporting May Not Always Boost Firm Productivity. *Review of World Economics*, 141(4), 561–582.
- Heyman, F., Sjöholm, F. & Tingvall, P. G. (2007). Is there really a foreign ownership wage premium? Evidence from matched employer–employee data. *Journal of International Economics* 73, 355–376.
- Gustafsson, A., Stephan, A., Hallman, A. & Karlsson, N. (2016). The 'sugar rush' from innovation subsidies: a robust political economy perspective. *Empirica*, 43, 729-756.
- Freier, R., Schumann, M. and Siedler, T. (2015). The earnings returns to graduating with honors– Evidence from law graduates. *Labour Economics,* 34: 39–50.
- Arnold, J., & Javorcik, B. (2009). Gifted kids or pushy parents? Foreign direct investment and plant productivity in Indonesia. *Journal of International Economics*, 79(1), 42-53.
- Volpe Martincus, C., & Carballo, J. (2008). Is export promotion effective in developing countries? Firm-level evidence on the intensive and extensive margins of exports. *Journal of International Economics*, 76(1), 89-106.

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Non-panel applications:

- Görg, H., Henry, M., & Strobl, E. (2008). Grant support and exporting activity. *Review of Economics and Statistics*, 90(1), 168-174.

A flexible Stata command and a helpful literature review:

- Dettmann, E., Giebler, A., & Weyh, A. (2019). *flexpaneldid: A Stata command for causal analysis with 546 varying treatment time and duration*. IWH Discussion Papers.

Application in R and a good theoretical background:

- Imai, K., Kim, I.S., & Wang, E. (2023). Matching methods for causal inference with time-series cross-sectional data. *American Journal of Political Science*, 67(3), 587–605.