Two-way Fixed Effects and Differences-in-Differences Estimators with Several Treatments

**Author:**Clément de Chaisemartin, Xavier D'Haultfoeuille

We study two-way-fixed-effects regressions (TWFE) with several treatment variables. Under a parallel trends assumption, we show that the coefficient on each treatment identifies a weighted sum of that treatment’s effect, with possibly negative weights, plus a weighted sum of the effects of the other treatments. Thus, those estimators are not robust to heterogeneous effects and may be contaminated by other treatments’ effects. When a treatment is omitted from the regression, we obtain a new omitted variable bias formula, where bias can arise even if the treatments are not correlated with each other, but can be smaller than in the TWFE regression with all treatments. We propose an alternative difference-in-differences estimator, robust to heterogeneous effects and immune to the contamination problem. In the application we consider, the TWFE regression identifies a highly non-convex combination of effects, with large contamination weights, and one of its coefficients significantly differs from our heterogeneity-robust estimator.

**Url:**<https://www.nber.org/papers/w30564>