A Stage-Based Identification of Policy Effects

Abstract: We develop a method that identifies the effects of policy implemented nationwide---i.e. across all regions at the same time. Starting point is the insight that the dynamics of many outcome variables can be tracked over stages. A stage is defined as the location of a regional outcome on a reference outcome path. Our method proceeds in two steps. First, we conduct a normalization that maps the time-path of regional outcomes onto a reference outcome path using only pre-policy data. After normalization, the pre-policy outcome paths mapped onto the reference region are identical across regions which implies that the normalization controls for pre-policy regional heterogeneity (the so-called ``parallel trends") without taking a stand on its source, (un)observability or (non)constancy. Since regions can differ by stage at any point in time, the normalization uncovers variation in the stage at the time of policy implementation---even in instances where the implementation occurs at the same time across regions. Second, we use this stage variation at the time of policy implementation for a clean identification of the nationwide policy effect: a stage-leading region delivers the counterfactual path of the outcome variable after policy. Since the non-leading regions react to policy, our identification of policy effects is not subject to the Lucas critique. Our identification assumption is that the normalization conducted using pre-policy data holds post policy. We validate our method with a set of Monte-Carlo experiments that include unobserved heterogeneity. We show several applications including public health stay-home policies (i.e. the national lockdown against Covid-19 in Spain), the effects of the pill (i.e. the FDA nationwide approval of oral contraceptives in 1960 in the U.S.) on women's fertility and career choice and growth policy (e.g. German Reunification).