

In the comparative interrupted time series design (also called the method of difference-in-differences), the change in outcome in a group exposed to treatment in the periods before and after the exposure is compared with the change in outcome in a control group not exposed to treatment in either period. The standard difference-in-difference estimator for a comparative interrupted time series design will be biased for estimating the causal effect of the treatment if there is an interaction between history in the after period and the groups; for example, there is a historical event besides the start of the treatment in the after period that benefits the treated group more than the control group. We present a bracketing method for bounding the effect of an interaction between history and the groups that arises from a time invariant unmeasured confounder having a different effect in the after period than the before period. The method is applied to a study of the effect of the repeal of Missouri's permit-to-purchase handgun law on its firearm homicide rate. We estimate that the effect of the permit-to-purchase repeal on Missouri's firearm homicide rate is bracketed between 0.9 and 1.3 homicides per 100,000 people, corresponding to a percentage increase of 17% to 27% (95% confidence interval: 0.6, 1.7 or 11%, 35%). A placebo study provides additional support for the hypothesis that the repeal has a causal effect of increasing the rate of state-wide firearm homicides.