Web Appendix for "Testing Local Average Treatment Effect Assumptions"

Ismael mourifié and Yuanyuan Wan

In this web-appendix, we use Monte Carlo simulations to illustrate our procedure. We consider three data generating processes (DGPs). In all three designs, $Z \in \{0,1\}$ with $\mathbb{P}(Z=1)=0.5$, $Y = D+U$, where $U \sim N(-1, 0.25)$. The three DGPs differ in the treatment functions. In DGP1, we set $D = 1\{V \leq 2Z - 0.5\}$; in DGP2, we set $D = 1\{V \leq 0.25\}$; in DGP3, we set $D = 1\{|V - Z + 0.5| \geq 1\}$. In all three cases $V \sim N(0, 0.25)$. Let ρ be the correlation coefficient of U and V. The purpose is to test the hypothesis

$$H_0 : \theta_0 \equiv \sup_{v \in \mathcal{V}} \theta(v) \leq 0, \quad H_1 : \theta_0 > 0,$$

In this design, DGP1 belongs to "the interior" of H_0 in the sense that $\theta_0 < 0$, DGP2 is a least favorable null (the knife-edge case) such that $\theta(v) = 0$ for all $v \in \mathcal{V}$, and DGP3 violates the CMC (note that LI holds in all three DGPs) such that $\theta(v) > 0$ for some $v \in \mathcal{V}$. Let $\alpha \in (0, 0.5)$ be a pre-specified significance level; we then expect that the rejection frequencies in those three DGPs shall be close to 0, α and 1, respectively.

TABLE 1. Rejection Frequency (clrtest)

	Parametric			Local		
Sig. level	10%	5%	1%	10%	5%	1%
DGP1						
$n = 200$	0%	0%	0%	0%	0%	0%
$n = 400$	0%	0%	0%	0%	0%	0%
$n = 800$	0%	0%	0%	0%	0%	0%
DGP2						
$n = 200$	10.8%	5.8%	1.5%	13.9%	7.7%	2.6%
$n = 400$	10.2%	5.9%	0.7%	11.5%	5.7%	1.2%
$n = 800$	10.0%	5.8%	1.4%	11.5%	5.9%	0.9%
DGP3						
$n = 200$	89.9%	83.6%	59.6%	55.5%	40.5%	19.3%
$n = 400$	99.4%	88.1%	91.6%	75.5%	63.4%	26.7%
$n = 800$	100%	100%	99.8%	91.4%	83.8%	63.3%

Based on 1000 replications.

Table 1 lists the simulation results of our test based on the "clrtest" command under difference choices of sample size and DGPs. In addition to the local linear regression, we also investigate the rejection frequency using the "parametric regression" option, which assumes that the conditional expectation to be estimated is linear in the conditioning variables. For detailed descriptions of the Stata package, see Chernozhukov, Kim, Lee, and Rosen (2015). All results are computed based on 1000 replications. For DGP3 where the CMC fails to hold, the null hypothesis of LI+LM is rejected with high probability even when the sample size is small, for example when $n = 200$. For DGP2, considered as the least favorable null, the rejection rate is close to the target levels. It is not surprising to see the test does not reject DGP1 since it is in the interior of the H_0.

References

CHERNOZHUKOV, V., W. KIM, S. LEE, AND A. M. ROSEN (2015): *Stata Journal,*15(1), 21–44.