

Advance Econometric Theory (EC481)

Problem Set #1

1. Consider the following regression model

$$y_i = \alpha + \beta x_i + \varepsilon_i,$$

where the error term is known to be independent of the covariate and to be symmetrically distributed about zero. The true values of α, β are zero. We are going to compare two estimation procedures (least squares and least absolute deviations) in two different sampling schemes. First, suppose that ε_i is uniformly distributed on $[-1/2, 1/2]$. Second suppose that $\varepsilon_i = \pm 1/2$ with equal probabilities $1/2$. In both cases compute the population moment function $G(\theta)$. Use this to show that in the former sampling scheme there is a unique minimum for both estimation methods provided the covariates have positive variance, but that in the second sampling scheme, the least absolute deviation method will not be consistent.

2. Consider the following regression model

$$y_i = \theta x_i + \varepsilon_i,$$

where (y_i, x_i) are i.i.d. and the error term satisfies $E(\varepsilon_i | x_i) = 0$. Consider the following sample moment condition

$$G_n(\theta) = \frac{1}{n} \sum_{i=1}^n (y_i - \theta x_i)^3 x_i.$$

Provide the additional conditions that guarantee that $\hat{\theta} = \arg \min \|G_n(\theta)\|$ is consistent.