

## Problemset 2

### Econometrics III

LAURA MAYORAL

Instituto de Análisis Económico and Barcelona School of Economics

Spring 2023

#### INSTRUCTIONS:

- (1) You can work in groups, max. 3 people;
- (2) If you work in groups, you can submit a group answer, clearly specifying the members of the group.
- (3) Please submit via classroom.
- (4) **Deadline:** May 15th, 6 PM.

**Note:** you can find the data for the exercises in Hansen's book [here](#)

#### 1. Answer the following questions in a concise and clear manner.

- a). Recall that in Kernel regression the optimal bandwidth,  $h^* = O(N^{-0.2})$ . Choose instead  $h' = O(N^{-0.3})$ , explain what this different bandwidth is doing, are you oversmoothing or undersmoothing?
- b) Consider now expression (9.24) in CT, what's the limit of the bias term  $\sqrt{N}hb(x_0)$  in this expression if you choose  $h' = O(N^{-0.3})$ ? Use your conclusions to discuss the benefits (dangers) of oversmoothing/undersmoothing to eliminate the bias in the asymptotic distribution.
- c) Explain what trimming is and why it's employed in nonparametric estimation.
- d). Explain why oversmoothing can be a good idea if you're estimating marginal effects in a kernel regression (hint: read section 9.5.5. CT)

#### 2. Answer the following questions in a concise and clear manner.

- a) You're interested in explaining the central values of the distribution of Y conditional on X. Discuss under what conditions the conditional expectation and the conditional median and the *best* predictors for Y given X.
- b) Assume that the distribution of  $Y|X$  is symmetric. For a finite N, would the OLS and LAD estimators be the same? and as N tends to infinity.
- c) Discuss how you would estimate these functions (assuming linearity) and also summarize their potential advantages and disadvantages.

2

**3.** Exercise 20.9, Hansen's book.

**4.** Exercise 20.15, Hansen's book.

**5.** Exercise 20.16, Hansen's book.

**6.** Exercise 20.17, Hansen's book.

**7.** Using the same as in the previous exercise, re-estimate models b) and c) using Robinson's semiparametric estimator. Comment on the similarities and differences (if any) with the previous exercise.

**8.** Exercise 24.15, Hansen's book.

**9.** Exercise 4–8, Cameron and Trivedi