

# PS C236A/ Stat C239A

## Problem Set 5

Due: October 9, 2009

**Problem 1** For this problem, you will critique “Water for Life: The Impact of the Privatization of Water Services on Child Mortality”, by Sebastian Galiani, Paul Gertler, and Ernesto Schargrosky. Please write a page or two addressing the following questions:

- a. Describe and discuss the identification strategy of the paper. What are the weaknesses? What parts do you find convincing?
- b. Explain the importance of section II.B in the article? Would you do it any differently?
- c. Perform the following thought experiment: hold the estimation procedure in section III constant and assuming that you have access to all existing data in Argentina, what data would you include to improve the validity of the estimates? Now do the reverse. Holding the data constant, discuss what parts you would change and/or add to the estimation procedures to increase confidence in the validity of the results.
- d. Overall, are you convinced that their conclusions are correct?

**Problem 2** For this problem, you will perform several propensity score matching exercises using the “Water for Life” data.

The unit of observation are municipalities in Argentina, and the treatment under study is the privatization of municipal water services. All 435 municipalities in this sample had public water services in the year 1990, but by the year 1999, 123 municipalities had privatized their water services. Of the 123 municipalities that privatized between 1990 and 1999, 83 municipalities privatized between 1998 and 1999. The original panel structure of the dataset has been simplified into a cross section; for each municipality, the dataset you will be working with has the covariates for each year between 1990 and 1999. The treatment indicator has been defined as equal to one if the municipality privatized its water services sometimes between 1991 and 1999, and equal to zero if a municipality whose water services were public in 1990 never privatized between 1991 and 1999.

The outcome of interest is total child mortality.

- a. Estimate the propensity score model used in the paper and trim the dataset using the procedure described on page 102. Check balance on pre-treatment covariates using the `MatchBalance` function in the `Matching` package. Report these balance statistics and plots illustrating balance before and after matching. In your judgement is balance adequate?
- b. Using propensity score matching, try to achieve the best balance you can on baseline covariates using any combination of the covariates included in the data set. Which estimand do you choose and why? What is your propensity score model? Report your balance statistics and plots, if useful.
- c. Estimate and report the average treatment effect using the propensity score model from part a. To do this, you can use the `Match` function in the `Matching` package. Is it similar to the estimate reported in the original paper?

- d. Estimate and report the causal effect of water privatization estimated after using the propensity score model in part b. How does it compare to the treatment effect estimated in the original paper?