

ARE 213 Problem Set 1B

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Question 1

In Problem Set 1a, you used linear regression to relate infant health outcomes and maternal smoking during pregnancy. Please answer the following questions.

- (a) Under the assumption of random assignment conditional on the observables, what are the sources of misspecification bias in the estimates generated by the linear model estimated in Problem Set 1a?

Question 2

Describe the propensity score approach to the problem of estimating the average causal effect of smoking when the treatment is randomly assigned conditional on the observables. How does it reduce the dimensionality problem of multivariate matching?

We know that if we condition on observables, we will get a consistent estimate of the ATE under the assumption. However, if the observables are high dimensional, it might be difficult to find a comparison unit with the same values of the observables. From lecture, we know that it is sufficient instead to condition on the propensity score. Using the propensity score allows us to compare treated and control units with the same probability of being treated. The propensity score does not require that all values of the observables be the same and so therefore avoids problems of multidimensionality.

Try a few ways to estimate the effects of maternal smoking on birthweight:

2a

- a) First create the propensity score. For our purposes let's use a logit specification. First specify the logit using all of the "predetermined" covariates (don't include interactions). Next, include only those "predetermined" covariates that enter significantly in the first logit specification. How comparable are the propensity scores? If they are similar does this imply that we have the "correct" set of covariates in the logit specification used for our propensity score?