Final, Econ 513, USC, Fall 2010, answers

Problem 1.

a.(10)

$$y = \beta_0 + \beta_1 d + \varepsilon$$

b.(20)

$$E(\varepsilon|d) = 0 \quad d = 0, 1$$

Conscripts had a medical test. If health has a positive effect on earnings, them $E(\varepsilon|d = 1) > E(\varepsilon|d = 0)$. On the other hand well-connected conscripts could avoid going to Vietnam (both es-presidents Clinton and Bush did not go to Vietnam). If those connections are also good for earnings than $E(\varepsilon|d = 1) < E(\varepsilon|d = 0)$. The direction of the bias is positive is the first is more important and negative if the latter is more important. Of course, other explanations can also be correct.

c. (10) The model could be

$$y_i = \beta_0 + \beta_{1i} d_i + \varepsilon_i = \beta_0 + \overline{\beta}_1 d_i + \varepsilon_i + (\beta_{1i} - \overline{\beta}_1) d_i$$

If the assumption in a. holds and if in addition

$$E(\beta_{1i} - \overline{\beta}_1 | d_i) = 0 \quad d_i = 0, 1$$

then OLS estimates the population average effect of participation $\overline{\beta}_1$.

d.(20) Because $Cov(z, d) \neq 0$ and $E(z\varepsilon) = 0$ the variable z is an instrumental variable. IV will estimate β_1 in the model in a. consistently.

e.(10) The Local Average Treatment Effect (LATE), i.e. the ATE on the compliers, i.e. the subpopulation with $d = z$.

f.(10) Conscripted men would acquire more (college) education (which is in varepsilon), so that z and ε are correlated.

Problem 2.

a.(10) No because the physician will variables as general health that affects the blood test into account when prescribing the drug.

b.(10) Compare $E(y_1|d = 1)$ and $E(y_1|d = 0)$, i.e. the average outcome in period 1 for the treated and controls.

c.(20) Let y_{01}, y_{02} be the non-treated outcomes in periods 1 and 2. If we assume

$$E(y_{02} - y_{01}|d = 1) = E(y_{02} - y_{01}|d = 0)$$

we can estimate the Average Treatment Effect on the Treated (ATET) by Dif-in-Dif.

d.(10)

$$y_{it} = \beta d_{it} + \alpha_i + \varepsilon_{it}$$

e.(20) For FE we need strict exogeneity

$$E(\varepsilon_{it}|d_{i1}, \ldots, d_{iT}) = 0$$

This precludes that the physician adjusts the medication on the basis of past test results. For FD we need

$$E(\varepsilon_{it}|d_{i,t-1}, d_{it}, d_{i,t+1}) = 0$$

This precludes that prescription in t is affected by the test outcome in period $t-1$.