ECO375 Tutorial 2
Wooldridge: Chapter 3 and Appendix D and E

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ECO375 Tutorial 2

Welcome back!

Today's coverage:

- Chapter 3, #10 i) and ii) (in slides)
- Appendix D, #1 (on the board)
- Appendix D, #3 (on the board)
- Appendix E, #2 (on the board)
- If time permits, Appendix E, #1 (on the board)

Chapter 3, # 10

Suppose that you are interested in estimating the ceteris paribus relationship between y and x_1. For this purpose, you can collect data on two control variables, x_2 and x_3. (For concreteness, you might think of y as final exam score, x_1 as class attendance, x_2 as GPA up through the previous semester and x_3 as SAT or ACT score). Let $\tilde{\beta}_1$ be the simple regression estimate from y on x_1 and let $\hat{\beta}_1$ be the multiple regression estimate from y on x_1, x_2, x_3.

i) If x_1 is highly correlated x_2 and x_3 in the sample and x_2 and x_3 have large partial effects on y, would you expect $\tilde{\beta}_1$ and $\hat{\beta}_1$ to be very similar or very different? Explain.

Chapter 3, # 10

i) If x_1 is highly correlated x_2 and x_3 in the sample and x_2 and x_3 have large partial effects on y, would you expect $\tilde{\beta}_1$ and $\hat{\beta}_1$ to be very similar or very different? Explain.

This is an omitted variable problem. In the simpler case where there is only x_1 and x_2 we know that the relationship between the simple and multiple regression coefficients is $\tilde{\beta}_1 - \hat{\beta}_1 = \hat{\beta}_2\tilde{\delta}_1$ (3.23) where $\tilde{\delta}_1$ is the slope coefficient from the simple regression of x_2 on x_1 . If x_1 and x_2 are highly correlated then $\tilde{\delta}_1$ is potentially large and if x_2 has a large partial effect on y then $\hat{\beta}_2$ is also potentially large, meaning that $\tilde{\beta}_1$ and $\hat{\beta}_1$ could be very different. This intuition extends naturally to the case with x_2 and x_3.

ii) If x_1 is almost uncorrelated with x_2 and x_3, but x_2 and x_3 are highly correlated, will $\tilde{\beta}_1$ and $\hat{\beta}_1$ tend to be similar or very different? Explain.

ii) If x_1 is almost uncorrelated with x_2 and x_3, but x_2 and x_3 are highly correlated, will $\tilde{\beta}_1$ and $\hat{\beta}_1$ tend to be similar or very different? Explain.

Recall that there is only an omitted variable problem if x_1 is correlated with the omitted variables x_2 and x_3 and the omitted variables have a direct partial effect on y. The correlation between x_2 and x_3 is irrelevant if x_1 is almost uncorrelated with both of them, so we should expect $\tilde{\beta}_1$ and $\hat{\beta}_1$ to be similar. There may be exceptions if, for example, the partial effects of x_2 and x_3 on y are very large.