C15.9 (i) The IV (2SLS) estimates are

$$\widehat{\log(wage)} = \underset{(.54)}{5.22} + \underset{(.0337)}{.0936\ educ} + \underset{(.0084)}{.0209\ exper} + \underset{(.0027)}{.0115\ tenure} - \underset{(.050)}{.183\ black}$$

$n = 935,\ R^2 = .169$

(ii) The coefficient on $\hat{educ}_i$ in the second stage regression is, naturally, .0936. But the reported standard error is .0353, which is slightly too large.

(iii) When instead we (incorrectly) use $\hat{educ}_i$ in the second stage regression, its coefficient is .0700 and the corresponding standard error is .0264. Both are too low. The reduction in the estimated return to education from about 9.4% to 7.0% is not trivial. This illustrates that it is best to avoid doing 2SLS manually.

C15.10 (i) The simple regression gives

$$\widehat{\log(wage)} = \underset{(.09)}{1.09} + \underset{(.007)}{.101\ educ}$$

$n = 1{,}230,\ R^2 = .162$

Given the above estimates, the 95% confidence interval for the return to education is roughly 8.7% to 11.5%.

(ii) The simple regression of *educ* on *ctuit* gives

$$\widehat{educ} = \underset{(.07)}{13.04} - \underset{(.084)}{.049\ ctuit}$$

$n = 1{,}230,\ R^2 = .0003$

While the correlation between *educ* and *ctuit* has the expected negative sign, the *t* statistic is only about −.59, and this is not nearly large enough to conclude that these variables are correlated. This means that, even if *ctuit* is exogenous in the simple wage equation, we cannot use it as an IV for *educ*.

(iii) The multiple regression equation, estimated by OLS, is