

Economics 471: Econometrics

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Problem Set #3 – Answers

1. (a) $\widehat{colgpa} = 1.392 - 0.135 * hsperc + 0.00148 * sat$
- (b) $hsperc$ is defined so that the smaller it is, the higher the student's standing in high school. Everything else equal, the worse the student's standing in high school, the lower is his/her expected college GPA.
- (c) $\widehat{colgpa} = 1.392 - 0.135 * 20 + 0.00148 * 1050 = 2.676$
- (d) The difference between A and B is simply 140 times the coefficient on sat $0.00148(140) = 0.207$.
- (e) With $hsperc$ fixed, $\Delta\widehat{colgpa} = 0.00148\Delta sat$. We want to find Δsat such that $\Delta\widehat{colgpa} = 0.5$. Thus, $\Delta sat = 0.5/0.00148 = 337.84$.
2. (a) A larger rank means that the school has less prestige and thus lowers starting salaries.
- (b) $\beta_1 > 0$, $\beta_2 > 0$. Both $LSAT$ and GPA are measures of the quality of the entering class. Better quality should result in higher salaries. $\beta_3 > 0$, $\beta_4 > 0$. The number of volumes in the law library and tuition cost are both measures of school quality. Better quality training (schools) should result in higher salaries.
- (c) $\ln(\widehat{salary}) = 8.34 + 0.0047LSAT + 0.248GPA + 0.095 \ln(libvol) + 0.038 \ln(cost) - 0.0033rank$. The predicted difference is just the coefficient on GPA 0.248 or roughly 25%.
- (d) This is an elasticity: a one percent increase in library volumes implies a .095% increase in predicted median starting salary, *ceteris paribus*.
- (e) Lower ranking is better for predicted salary. A school with a ranking 20 less results in a predicted difference in salary of $0.0033(20)$ or roughly a 6.6% salary difference.
3. (a) The estimators are unbiased, but inefficient.
- (b) The estimators are biased unless the correlation between the excluded variable and each of the explanatory variables is zero. This is unlikely. Also note that if the excluded variable is irrelevant, this will also not bias the estimators.
- (c) The estimators are unbiased, but inefficient.
- (d) The estimators are unbiased. Only if there is perfect collinearity is the third Gauss-Markov assumption violated.