

Chapter 2

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1. Let $kids$ denote the number of children ever born to a woman, and let $educ$ denote years of education for the woman. A simple model relating fertility to years of education is

$$kids = \beta_0 + \beta_1 educ + u,$$

where u is the unobserved error.

measurable

- i. What kinds of factors are contained in u ? Are these likely to be correlated with level of education?
- ii. Will a simple regression analysis uncover the ceteris paribus effect of education on fertility? Explain.

- i) a) income, age, weight, # siblings
b) income, age positively correlation
siblings negative correlation
weight no correlation

ii) ceteris paribus: holding other factors constant will change in education effect fertility => YES!

4. The data set BWGHT contains data on births to women in the United States. Two variables of interest are the dependent variable, infant birth weight in ounces ($bwght$), and an explanatory variable, average number of cigarettes the mother smoked per day during pregnancy ($cigs$). The following simple regression was estimated using data on $n = 1,388$ births:

$$\widehat{bwght} = 119.77 - 0.514 cigs$$

- i. What is the predicted birth weight when $cigs = 0$? What about when $cigs = 20$ (one pack per day)? Comment on the difference.
- ii. Does this simple regression necessarily capture a causal relationship between the child's birth weight and the mother's smoking habits? Explain.
- iii. To predict a birth weight of 125 ounces, what would $cigs$ have to be? Comment.
- iv. The proportion of women in the sample who do not smoke while pregnant is about .85. Does this help reconcile your finding from part (iii)?

i) $\widehat{bwght} = 119.77 - 0.514(0) = 119.77$
 $bwght = 119.77 - 0.514(20) = 109.49$
 The effect of smoking an additional 20 cigarettes will cause an estimated $(119.77 - 109.49)$ decrease in the birth weight.

ii) it does have negative correlation but also other factor must be consider such as age, weight of mother, health.

iii) $\frac{125 - 119.77}{-0.514} = -10.1751$
 meaning - that this number cannot expand all the factor.

iv) 85% of mothers do not smoke so this regression is biased mean. And to get an accurate sample, we should consider more smoker to get more data points which will make our regression line less limited and more accurate. We need more sample variation in the explanatory variable on SLR 3. In addition, SLR 2 means we need the sample to be a better representative. Thus, we can improve our regression fit so it is not as limited and will give us possibly inaccurate data.

Chapter 3

Q1) i) Of course, it does make sense b/c the small percentile the higher GPA.

ii) 2.676

iii) $\frac{\Delta GPA}{\Delta SAT} = 0.00148$ ceteris paribus $\therefore \Delta \text{college GPA} = 0.00148 \cdot \Delta SAT$
 $= 0.00148 \cdot 140$
 $= 0.2072$

iv) $.5 = .00148 (SAT)$
 $SAT = 337.8378$

Q₂) i) Yes, the higher the number of years, the lower the year schooling.

This is b/c of the budget constraint.

$$\rightarrow 1 = -0.094 \text{ sibs}$$

\rightarrow sibs = 10.638 to reduce years of education.

ii) If mother's yrs of schooling \uparrow by 1, the predicted years of school would increase by .131

iii) Man A predicted years of edu.

$$= 10.36 - 0.094(0) + 0.131(2) + 0.210(12)$$

$$= 10.36 + 1.572 + 2.52 = 14.452$$

Man B predicted yrs of edu.

$$= 10.36 - 0.094(0) + 0.131(16) + 0.210(16)$$

$$= 15.816$$

\therefore Predicted different is 1.364