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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 educ 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***:

มี ^ เพราะว่าถูก predict or explain

$$\widehat{bwght} = 119.77 - 0.514\, cigs$$ → biased regression if u_i has relation w/ $\hat{y}$

i. What is the predicted birth weight when $cigs = 0$? What about when $cigs = 20$ (one pack per day)? Comment on the difference.

119.77 , 109.49

mother smoke 20 cigs per day their born infant will weigh less than non-smoking mothers

ii. Does this simple regression necessarily capture a causal relationship between the child's birth weight and the mother's smoking habits? Explain. it does have negative correlation but also other factor must be consider such as age, weight of the mother, health

iii. To predict a birth weight of 125 ounces, what would *cigs* have to be? Comment. $\frac{125 - 119.77}{-0.514} = -10.1751$ → this mean this regression cannot explained all the factor

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)? 85 % of mothers do not smoke so this regression is biased mean ค่าใกล้ 0 , มี same x value ; non-smoking mother

SLR

1. Using the data in GPA2 on 4,137 college students, the following equation was estimated by OLS:

college gpa — hs percentile

$$\widehat{colgpa} = 1.392 - .0135\, hsperc + .00148\, sat$$
$$n = 4{,}137,\ R^2 = .273,$$

where *colgpa* is measured on a four-point scale, *hsperc* is the percentile in the high school graduating class (defined so that, for example, $\boldsymbol{hsperc = 5}$ means the *top* 5% of the class), and *sat* is the combined math and verbal scores on the student achievement test.

i. Why does it make sense for the coefficient on *hsperc* to be negative?
the small percentile the higher gpa

ii. What is the predicted college GPA when $\boldsymbol{hsperc = 20}$ and $\boldsymbol{sat = 1{,}050}$?
2.676

iii. Suppose that two high school graduates, A and B, graduated in the same percentile from high school, but Student A's SAT score was 140 points higher (about one standard deviation in the sample). What is the predicted difference in college GPA for these two students? Is the difference large? → no, small only!
$\frac{\partial GPA}{\partial SAT} = .00148$ ceteris paribus $\therefore \Delta$ college gpa $= .00148 \cdot \Delta SAT$
$= .00148 \cdot 140$
$= 0.2072$

iv. Holding *hsperc* fixed, what difference in SAT scores leads to a predicted *colgpa* difference of .50, or one-half of a grade point? Comment on your answer.
$\Delta GPA = .00148 \cdot \Delta SAT$
$0.5 = .00148 \cdot \Delta SAT$
$\Delta SAT = 337.84$
the difference in SAT score is too LARGE

2. The data in WAGE2 on working men was used to estimate the following equation:

$$\widehat{educ} = 10.36 - .094\ sibs + .131\ meduc + .210\ feduc$$
$$n = 722, R^2 = .214,$$

where *educ* is years of schooling, *sibs* is number of siblings, *meduc* is mother's years of schooling, and *feduc* is father's years of schooling.

i. Does *sibs* have the expected effect? Explain. Holding *meduc* and *feduc* fixed, by how much does *sibs* have to increase to reduce predicted years of education by one year? (A noninteger answer is acceptable here.) $\frac{\partial educ}{\partial sibs} = -0.094 \rightarrow \Delta educ = -0.094\ \Delta siblings$

$1 = -0.094\ \Delta siblings \rightarrow -10.64$ ที่น้องต้องลด 10.64 คน ถึงจะได้ yrs of educ เพิ่ม 1 ปี ceteris paribus

ii. Discuss the interpretation of the coefficient on *meduc*.

A year of mother schooling increase .131yr of educ

iii. Suppose that Man A has no siblings, and his mother and father each have 12 years of education. Man B has no siblings, and his mother and father each have 16 years of education. What is the predicted difference in years of education between B and A? ห้ามต่าง

$\Delta educ = 10.36 + (4).131 + (4).210 = 1.364 \rightarrow$ change in educ A and B