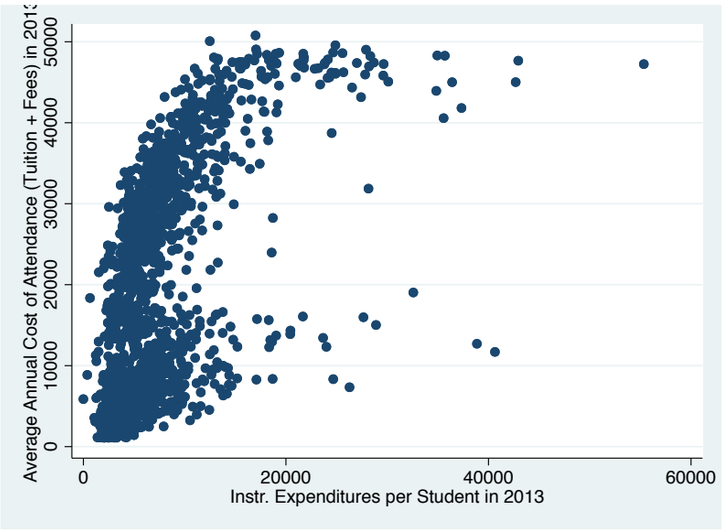
David Gabel Econometrics Final Exam Spring 2019

Test all hypothesis at the five percent level of significance

1. 10 points. I used your data set to plot the relationship between the instructional expenditures per student and the banner price of attending college (tuition + fees).



Based on this **graph** (nothing else), do you agree with this statement: expenditures per student largely explains the variation in the price of attending college (tuition and fees)? Explain.

2. (30 points) I subsequently ran the regression of sticker price (the y-variable in the graph) on the instructional expenditures per student.

Source	SS	df	MS	Number of obs	=	2,085
				F(1, 2083)	=	1357.04
Model	1.5313e+11	1	1.5313e+11	Prob > F	=	0.0000
Residual	2.3505e+11	2,083	112840395	R-squared	=	0.3945
				Adj R-squared	=	0.3942
Total	3.8818e+11	2,084	186264838	Root MSE	=	10623

sticker_pric~2013	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
exp_instr_pc_2013	1.685649	.0457583	36.84	0.000	1.595912	1.775386
_cons	4752.233	379.284	12.53	0.000	4008.418	5496.049

After reviewing the output, it occurred to me that things cost less in the South than in the East, and therefore I added regional explanatory variables.

Source	SS	df	MS	Number of obs	=	2,085
				F(4, 2080)	=	407.65
Model	1.7058e+11	4	4.2645e+10	Prob > F	=	0.0000
Residual	2.1759e+11	2,080	104612477	R-squared	=	0.4394
				Adj R-squared	=	0.4384
Total	3.8818e+11	2,084	186264838	Root MSE	=	10228

sticker_pric~2013	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
exp_instr_pc_2013	1.59956	.0448759	35.64	0.000	1.511553	1.687566
region						
Midwest	-2160.468	658.4162	-3.28	0.001	-3451.691	-869.2447
South	-6334.98	609.9406	-10.39	0.000	-7531.137	-5138.822
West	-7560.231	725.3131	-10.42	0.000	-8982.646	-6137.815
_cons	9391.122	597.8468	15.71	0.000	8218.681	10563.56

a. Test the hypothesis that prices are lower in the South.

b. Test the hypothesis that region has no statistically significant impact on the sticker price.
c. Draw a graph that illustrates the relationship between expenditures and sticker price for the East and the South. Be sure to identify the y intercepts.

3. (15 points) I then added the variable public to the equation (public = 0 if a private school; 1 if public).

Source	SS	df	MS	Number of obs	=	2,085
				F(5, 2079)	=	2147.65
Model	3.2521e+11	5	6.5043e+10	Prob > F	=	0.0000
Residual	6.2963e+10	2,079	30285406.4	R-squared	=	0.8378
				Adj R-squared	=	0.8374
Total	3.8818e+11	2,084	186264838	Root MSE	=	5503.2

sticker_pric~2013	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
exp_instr_pc_2013	.9169986	.0259665	35.31	0.000	.8660756	.9679216
region						
Midwest	-2351.337	354.2728	-6.64	0.000	-3046.103	-1656.57
South	-3498.69	330.572	-10.58	0.000	-4146.977	-2850.403
West	-3322.087	394.7383	-8.42	0.000	-4096.21	-2547.963
public	-19157.52	268.1071	-71.45	0.000	-19683.3	-18631.73
_cons	22842.03	372.7055	61.29	0.000	22111.12	23572.95

What is the predicted tuition for a public school in the South whose expenditure per student is $5,000?

4. (20 points) True or False and explain why. A student wrote: "The estimated coefficients for all the variables fall within the 95% confidence intervals for each respective variable. This shows that every variable taken into consideration for the regression is indeed significant in this model."
5. (25 points)

I obtained the following Probit parameter estimates for the probability of mortgage application denial:

Probit regression — Number of obs = 2380; LR chi2(4) = 158.57; Prob > chi2 = 0.0000; Log likelihood = -792.79939; Pseudo R2 = 0.0909

deny	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
black	.750315	.0857407	8.75	0.000	.5822664	.9183637
pi_ratio	.026944	.0036007	7.48	0.000	.0198867	.0340013
self_emplo~d	.2654096	.1019332	2.60	0.009	.0656242	.4651949
male	-.1059594	.08277	-1.28	0.200	-.2681857	.0562668
_cons	-2.15601	.1627745	-13.25	0.000	-2.475042	-1.836978

a. (10 points) A black, female mortgage applicant is self-employed and has a P/I ratio of 37 (37, not 0.37). What is the probability that her application will be denied?
b. (15 points) Suppose the black applicant reduced the ratio to 30. What effect would this have on her probability of being denied a mortgage?