

EE325: Introductory Econometrics, Semester 1/2017

Homework 5

Due to Submission: Sunday 24 December 2017 at the B.E. Office by 5 p.m.

1. Consider the following model:

$$\text{Bwghtlbs} = \beta_1 + \beta_2 \text{cigs} + \beta_3 \text{faminc} + \beta_4 \text{cigtax} + \beta_5 \text{cigprice} + u$$

Where the dependent variable, infant birth weight in pounds (bwghtlbs), and explanatory variables, average number of cigarettes the mother smoke per day during pregnancy (cigs), annual family income (faminc), cigarette tax (cigtax) and the average price of cigarettes (cigprice)

. regress bwghtlbs cigs faminc cigtax cigprice

Source	SS	df	MS	Number of obs	=	1,388
Model	72.6029938	4	18.1507484	F(4, 1383)	=	11.56
Residual	2171.97404	1,383	1.57048014	Prob > F	=	0.0000
				R-squared	=	0.0323
				Adj R-squared	=	0.0295
Total	2244.57703	1,387	1.61829634	Root MSE	=	1.2532

bwghtlbs	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
cigs	-.029325	.0057234	-5.12	0.000	-.0405524	-.0180976
faminc	.0057549	.0018481	3.11	0.002	.0021295	.0093803
cigtax	.0092232	.0090334	1.02	0.307	-.0084975	.0269439
cigprice	-.0008785	.0069032	-0.13	0.899	-.0144204	.0126633
_cons	7.247245	.7450263	9.73	0.000	5.785741	8.708749

Command: Corr bwghtlbs cigs faminc cigtax cigprice (correlation between each explanatory variables)

	bwghtlbs	cigs	faminc	cigtax	cigprice
bwghtlbs	1.0000				
cigs	-0.1508	1.0000			
faminc	0.1089	-0.1730	1.0000		
cigtax	0.0478	0.0294	0.0179	1.0000	
cigprice	0.0492	0.0097	0.0955	0.8759	1.0000

- Is the multicollinearity in regression result of Table1? Provide full explanation.
- How do you describe OLS estimators when multicollinearity exists? Do they satisfy "BLUE" properties? Specify a remedial measure

2. Consider the Static Phillips curve model that explained the inflation-unemployment trade-off in the United states given by:

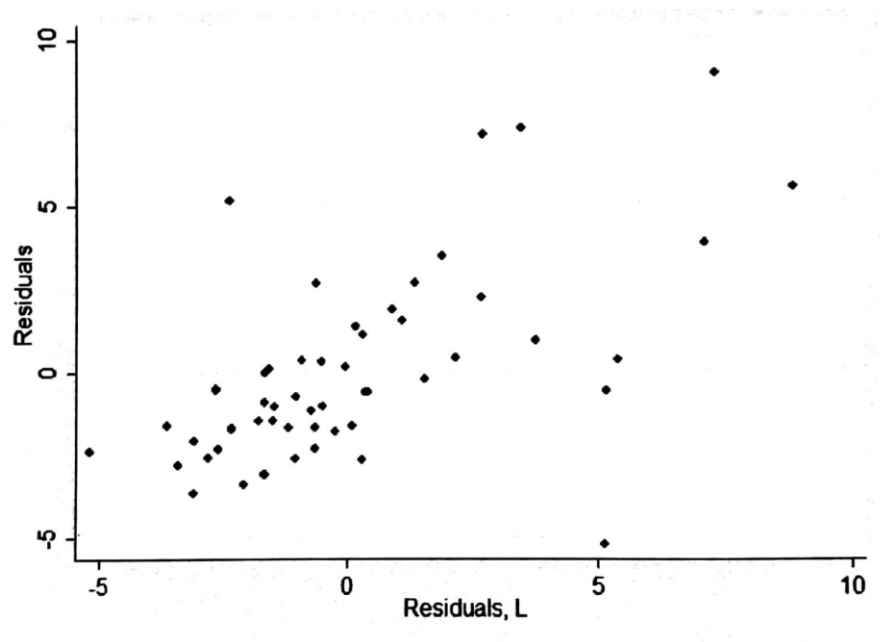
$$\text{Inf}_t = \beta_1 + \beta_2 \text{unem}_t + u_t$$

Where

Inf is the annual inflation rate

Unem is the unemployment rate

Command: *scatter uhat L1.uhat (scatter plot with residual and residual Lag1)*



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. tsset year
      time variable:  year, 1948 to 2003
      delta: 1 unit

. estat dwatson

Durbin-Watson d-statistic( 2, 56) = .8014823
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- From the figure, is there the problem of autocorrelation? Briefly explain how to detect.
- Based on the test, Is there positive serial correlation in the disturbances at 5 percent level of significance? Show your work.

3. Consider a wage determination model as follows:

$$\log(\text{wage}) = \beta_0 + \beta_1 \text{edu} + \beta_2 \text{exper} + \beta_3 \text{tenure} + \beta_4 \text{married} + \beta_5 \text{black} + \beta_6 \text{south} + \beta_7 \text{urban} + u$$

Where educ, exper and tenure are all relevant productivity characteristics. Married, black, south, and urban are qualitative variables.

Married =1 if married,

Black =1 if black,

South =1 if living in the south,

and urban =1 if living in urban

The estimation result is reported as below

Source	SS	df	MS	Number of obs = 935		
Model	41.8377619	7	5.97682312	F(7, 927) = 44.75		
Residual	123.818521	927	.133569063	Prob > F = 0.0000		
Total	165.656283	934	.177362188	R-squared = 0.2526		
				Adj R-squared = 0.2469		
				Root MSE = .36547		

logwage	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
educ	.0654307	.0062504	10.47	0.000	.0531642	.0776973
exper	.014043	.0031852	4.41	0.000	.007792	.020294
tenure	.0117473	.002453	4.79	0.000	.0069333	.0165613
married	.1994171	.0390502	5.11	0.000	.1227801	.276054
black	-.1883499	.0376666	-5.00	0.000	-.2622717	-.1144281
south	-.0909036	.0262485	-3.46	0.001	-.142417	-.0393903
urban	.1839121	.0269583	6.82	0.000	.1310056	.2368185
_cons	5.395497	.113225	47.65	0.000	5.17329	5.617704

- a) Holding other factors fixed. What is the approximate difference in monthly salary between blacks and nonblacks? Is this difference statistically significant at the 5 percent level of significance? Show your work.

Next, we extend the original model to allow the return to education to depend on race by adding the interaction “blackeduc” to the equation and obtain the following result:

Source	SS	df	MS	Number of obs = 935		
Model	42.0055468	8	5.25069335	F(8, 926) = 39.32		
Residual	123.650736	926	.133532113	Prob > F = 0.0000		
				R-squared = 0.2536		
				Adj R-squared = 0.2471		
Total	165.656283	934	.177362188	Root MSE = .36542		

logwage	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
educ	.0671153	.0064277	10.44	0.000	.0545008	.0797298
exper	.0138259	.0031906	4.33	0.000	.0075642	.0200876
tenure	.011787	.0024529	4.81	0.000	.0069732	.0166009
married	.1989077	.0390474	5.09	0.000	.1222761	.2755393
black	.0948086	.2553994	0.37	0.711	-.4064202	.5960375
south	-.0894495	.0262769	-3.40	0.001	-.1410187	-.0378803
urban	.1838523	.0269547	6.82	0.000	.130953	.2367516
blackeduc	-.0226236	.0201827	-1.12	0.263	-.0622326	.0169854
_cons	5.374817	.1147027	46.86	0.000	5.14971	5.599925

- b) Interpret the coefficient of blackeduc. Set the hypothesis testing and test whether the return to education does depend on race the 1 percent level of significance.