

Worksheet week # 7

1. Answer the following questions about a data on the sales prices of houses in the UK.
The variables in this study are:

$HPRICE_i$	Sales price for house i
$ASSESS_i$	Assessed price of house i
$LOTSIZE_i$	Size of lot (in m ²) for house i
$BDRMS_i$	Number of bedrooms for house i
$BATH_i$	Number of bathrooms for house i
$OCEAN_i$	Dummy variable indicating that house i is located within 10 miles of the ocean
$LAKE_i$	Dummy variable indicating that house i is located within 10 miles of the lake
$URBAN_i$	Dummy variable indicating that house i is located in an area classified as urban
$INTERCEPT$	Intercept in the model
SSE	Sum of squared residuals

Table 1 lists coefficients with standard errors in parentheses below the coefficients.

Table 1: Results of regressions

Dependent variable $HPRICE_i$, $n = 238$							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$ASSESS_i$		0.90 (0.03)	0.90 (0.03)	0.91 (0.03)	0.90 (0.03)	0.89 (0.03)	0.90 (0.03)
$LOTSIZE_i$	0.0035 (0.00002)	0.00059 (0.00002)	0.00059 (0.00002)	0.00057 (0.00002)	0.00058 (0.00002)	0.00059 (0.00002)	0.00060 (0.00002)
$BDRMS_i$		11.5 (2.32)	9.74 (3.11)	7.65 (3.29)	8.74 (3.54)	10.43 (3.77)	
$BATH_i$			3.57 (2.24)	3.78 (1.11)			
$OCEAN_i$			15.6 (11.43)	14.32 (5.21)	16.76 (4.32)	15.32 (4.98)	14.56 (7.01)
$URBAN_i$				9.54 (8.99)	10.29 (5.43)		12.32 (5.22)
$LAKE_i$				11.36 (4.28)		12.87 (8.32)	11.98 (6.43)
$INTERCEPT$	261.9 (11.98)	-38.91 (6.78)	-40.30 (7.32)	-43.21 (6.99)	- 36.54 (5.87)	-42.37 (7.22)	-38.44 (9.43)
SSE	145.69	142.99	136.66	134.54	135.38	135.22	136.54
R^2	0.143	0.158882	0.196118	0.208588	0.203647	0.204588	0.196824

- (a) Using the reported regressions, could you test whether the value of the house due to lot size near water was different from the value of the lot away from the water at the 5% level, controlling for assessed value, lot size and the number of bedrooms? If so, perform the test. If not, explain what results you would need to do the test.
- (b) Could you test whether bathrooms change the house value controlling for assessed value, lot size and the number of bedrooms at the 5% level? If so, perform the test. If not, explain what results you would need to do the test.
- (c) Can you test whether the assessed value and number of bedrooms are jointly significant, controlling for lot size? If yes, perform the test at 5% level. If not, explain what you would need to perform this test.
- (d) Could you test whether all 7 of the listed variables (excluding the intercept) are jointly significant at the 5% level? Be sure to state any assumptions you are making.

2. Consider the following model:

$$\log(\text{price}) = \beta_0 + \beta_1 \log(\text{assess}) + \beta_2 \log(\text{sqrft}) + \beta_3 \log(\text{lotsize}) + \beta_4 d_bdrms + \varepsilon, \quad (1)$$

where *price* is house price, *assess* is the assessed housing value (before the house was sold), *lotsize* is size of the lot (in feet), *sqrft* is square footage, and *d_bdrms* is a dummy variable indicating if the house has more than 3 bedrooms.

- (a) Use the data *housing.gdt* to estimate the model (1). First transform the first four variables in logarithms, then construct the dummy variable as

$$d_bdrms = \begin{cases} 1 & \text{if } bdrms > 3 \\ 0 & \text{otherwise} \end{cases}$$

and run the regression. Interpret the coefficients.

- (b) Now, suppose we would like to test whether the assessed housing price is a rational valuation: if this is the case, then a 1% change in *assess* should be associated with a 1% change in *price*. In addition, *lotsize*, *sqrft*, and *d_bdrms* should not help to explain $\log(\text{price})$, once the assessed value has been controlled for. Define the hypotheses to be tested, the test statistic, and explain how would you conduct the test. Then test for rational valuation in Gretl.