HANKEN SCHOOL OF ECONOMICS

RESEARCH METHODS FOR REAL ESTATE (17755b)

EXAM 14.1.2012

Time for the exam: 3 h

Allowed means: Hand calculator. Statistical tables (enclosed)

Answer all six questions! Good luck!

In Appendix estimation results are given for data with n = 179 observations from North Andover, Massachusetts, 1978, with the following variables

price = selling price of house in US dollars
age= age of house
age2 = age squared
nbh = neighborhood, number of, 1 to 6
cbd = distance to central business district (feet)
rooms = number of rooms in house
inst = distance to interstate, feet
land = square footage of lot

Three of the variables are used in logarithmic form (natural logarithms):

lprice = ln(*price*)
linst= ln(*inst*)
lland = ln(*land*)

Also note that *lintstsq* = *inst* squared. Answer the following questions on basis of the output in the Appendix.

1. (i) Write down the population model which has been estimated.
   (ii) What assumptions are made in addition to the population model?

2. (i) What signs are expected for the estimated coefficients on the variables *rooms* and *lland*?
   (ii) Give an interpretation of the estimated coefficient for the variable *rooms*. I.e. how does *price* react to a change in the variable *rooms*?
   (iii) Give an interpretation of the estimated coefficient for the variable *lland*. I.e. how does *price* react to a change in the variable *land*?

3. For each of the variables *rooms* and *lland*, decide whether it is a significant explanatory variable. In both cases, formulate hypotheses (null and alternative hypothesis) and perform a statistical test.

4. Considering that *age* of the house appears in the model both in linear and in quadratic form,

   (i) what is the total effect on *price* of a change in *age*?
   (ii) describe how one can test for the total effect of *age* on price, i.e. how one can test simultaneously for the effects of *age* and *age2*.

5. Is the model as a whole significant? Formulate hypotheses (null and alternative hypothesis) and perform a statistical test of the overall significance of the model.

6. Describe briefly the following concepts
   (i) Dummy variable
   (ii) Heteroscedasticity
   (iii) Multicollinearity

Appendix.

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	lland, nbh, age2, rooms, cbd, linst, age, lintstsq		Enter

a. All requested variables entered.

b. Dependent Variable: lprice

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.767[a]	.589	.569	.2408145

a. Predictors: (Constant), lland, nbh, age2, rooms, cbd, linst, age, lintstsq

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	14.113	8	1.764	30.420	.000[a]
	Residual	9.859	170	.058		
	Total	23.971	178			

a. Predictors: (Constant), lland, nbh, age2, rooms, cbd, linst, age, lintstsq

b. Dependent Variable: lprice

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	8.893	4.527		1.964	.051
	age	-.011	.002	-1.160	-5.641	.000
	age2	5.387E-5	.000	.890	4.557	.000
	nbh	.010	.010	.057	1.007	.315
	cbd	-1.078E-5	.000	-.276	-.856	.393
	rooms	.133	.022	.348	6.002	.000
	linst	-.030	1.082	-.068	-.028	.978
	lintstsq	1.579E-5	.067	.001	.000	1.000
	lland	.192	.039	.452	4.945	.000

a. Dependent Variable: lprice