Computer Homework 5

This homework considers estimation and testing with non-linear least squares. Use the data in the *Stata* data file mls.dta. Consider the following model:

Model A: $\ln(SP) = \alpha + \beta\ SQFT + \delta\ BEDS + \theta\ SQFT \cdot BEDS + \varepsilon$

The observational subscript has been omitted to simplify notation. This model is linear in the parameters and may be estimated with OLS. Now impose the non-linear constraint $\theta=\beta\delta$. The resulting model:

Model B: $\ln(SP) = \alpha + \beta\ SQFT + \delta\ BEDS + \beta\ \delta\ SQFT \cdot BEDS + \varepsilon$

is non-linear in the parameters. Estimate models A and B.

1. In model A, the marginal value of floor space is a linear function of the number of bedrooms. Estimate the marginal value of floor space at the sample mode for the number of bedrooms. Test the significance of this estimate.

2. Test the non-linear constraint $\theta=\beta\delta$.

***Stata* Program**

Consider the following model, which is also non-linear in the parameters.

Model C: $\ln(SP) = \alpha + SQFT^{\beta} + \delta\ BEDS + \varepsilon$

The program below illustrates the use of non-linear least squares to estimate model C. Use this program as a rough guide when writing your program to estimate model B. Do not estimate model C! My comments (between /* and */) may be omitted from your program.

```
gen lsp=log(sp)
gen lsqft=log(sqft)
mat a=J(3,1,0)                          /*initialize coefficients as 3x1 vector of zeros*/
mat da=J(3,1,0)                         /*initialize NR update as 3x1 vector of zeros*/
scalar ch=1                             /*initialize convergence criteria as scalar ch*/
while ch>0.01 {                         /*start loop till convergence*/
mat a=a+da                              /*update coefficients*/
mat list a                              /*print current coefficients*/
gen pow=sqft^a[1,1]
gen x2=pow*lsqft                        /*create partials*/
gen y=lsp-a[3,1]-pow-a[2,1]*beds        /*create forecast error*/
reg y x2 beds                           /*create NR update*/
mat da=e(b)'                            /*retrieve update vector*/
mat en=(da')*da
scalar ch=(en[1,1])^0.5                 /*check Euclidian distance*/
drop pow x2 y
}
```

The next page is the *Stata* output on the final iteration.

```
a[3,1]
             y1
  x2   .76666825
beds  -.03810977
_cons   2.8042002
```

Source	SS	df	MS	Number of obs =	138
Model	8.5948e-08	2	4.2974e-08	F(2, 135) =	0.00
Residual	9.31896282	135	.069029354	Prob > F =	1.0000
Total	9.31896291	137	.068021627	R-squared =	0.0000
				Adj R-squared =	-0.0148
				Root MSE =	.26273

y	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
x2	.0000386	.0346264	0.00	0.999	-.0684416	.0685189
beds	-.0000424	.0506776	-0.00	0.999	-.1002671	.1001823
_cons	.0000988	.1412253	0.00	0.999	-.2792014	.2793989