

Homework III  
Elements of Econometrics- II  
Spring 2019  
Due on 04/02/2019.

Instructions:

1. You have to present your results in classroom by using your power-point slides. I will ask questions during your presentation.
2. Group work, with at most 3 students per group.
3. You will have to turn in your power point slides, do file and answer sheet on 04/02/2019 by noon.
4. On paper submissions only.
5. I will grade not only your answers to questions below but also your answers to questions I will ask during your presentation.
6. Group work means that each individual in the group is responsible for the grade of the whole group. Wrong/Right answers during presentation in classroom will penalize/benefit all members of the group.

The data used here come from the Medical Expenditure Panel Survey (MEPS).

We want to analyze medical expenditures of individuals 65 years and older who qualify for health care under the US Medicare program.

The dependent variable is the log of total expenditure (ltotexp). The explanatory variables are an indicator for supplementary private insurance (suppins), one health-status variable (totchr), and three sociodemographic variables (age, female, white). The data are available at the mus03data.dta file.

Follow the instructions and answer the questions below.

1. Use the following code to summarize the data

```
. * Read in log of medical expenditures data and summarize
. use mus03data.dta, clear
. drop if ltotexp == .
. summarize ltotexp suppins totchr age female white, separator (0)
```

2. Use the command qplot to summarize graphically the quantiles of ltotexp. In other words, type the following code

```
. * Quantile plot for ltotexp using user-written command qplot
. qplot ltotexp, recast(line) scale(1.5)
```

Interpret this graph.

3. Use the command qreg to estimate the LAD (median) regression of the model with the dependent and explanatory variables as in question 1. In other words, type the code

```
. * Basic quantile regression for  $\tau = 0.5$ 
```

```
. qreg ltotexp suppins totchr age female white
```

Interprete your results.

4. With the dependent variable ltotexp, the results from qreg give marginal effects for  $\ln(\text{totexp})$ , but we want instead to compute the marginal effect on totexp, not ltotexp. The equivariance property of quantile regression (explain what is this) allows us to transform the original results from  $\ln(\text{totexp})$  to totexp. Explain why this is not possible for an OLS regression.

Use the following code to convert QR coefficients in logs to levels

```
.* Obtain multiplier to convert QR coeffs in logs to average median effect (AME) in levels
```

```
. quietly predict xb
. generate expxb=exp(xb)
. quietly summarize expxb
. display "Multiplier of QR in logs coeffs to get AME in levels =" r(mean)
```

By how much one more chronic condition increases the conditional median of expenditures ? (hint: note that  $\frac{\partial Q_{0.5}(y|x)}{\partial x_j} = \exp(x/\beta) \beta_j$ )

5. Now we will compare our estimates at different quantiles, specifically the quartiles  $\tau = 0.25, \tau = 0.5$ , and  $\tau = 0.75$ . You are supposed to compare the results with OLS estimates as well. In order to do so, you need to write the following code

```
.* compare (1) OLS; (2-4) coeffs across quantiles
. quietly regress ltotexp suppins totchr age female white
. estimates store OLS
. quietly qreg ltotexp suppins totchr age female white, quantile(0.25)
. estimates store QR_25
. quietly qreg ltotexp suppins totchr age female white, quantile(0.50)
. estimates store QR_50
. quietly qreg ltotexp suppins totchr age female white, quantile(0.75)
. estimates store QR_75
. set seed 10101
. quietly bsqreg ltotexp suppins totchr age female white, quant (0.50)
reps(400)
. estimates store BSQR_50
. estimates table OLS QR_25 QR_50 QR_75 BSQR_50, b(%7.3f) se
```

Interpret your results. By how much one more chronic condition increases the conditional 0.25 and 0.75 quantile of expenditures ? Compare your results to the one obtained in question 4.

Question 6. An attractive way to present QR results is via a graphical display of coefficients of interest and their respective confidence intervals. This can be done automatically by the user-written grqreg command, which provides 95% confidence intervals in addition to estimated coefficients. We use grqreg with the options cons to include the intercept in the graph, ci to include a 95% confidence interval, and ols and olsi to include the OLS coefficient and its 95%

confidence interval. The graph option `scale(1.1)` is added to increase the size of the axis titles. You have to use the following code:

```
. *Plots of each regressor's coefficients as quantile  $\tau$  varies
. quietly bsqreg ltotexp suppins totchr age female white, quantile(0.50) reps
(400)
. label variable suppins "=1 if supp ins"
. label variable totchr "# of chronic condns"
. grqreg, cons ci ols olsi scale(1.1)
Interpret your results.
```