

## Assignment #3

(due to Friday, November 18)

Answers have to be submitted in the PDF format. The homework should contain on its front page the name(s) of the student(s) as well as the SNR number(s).

Read M. Buschinsky (1998) Recent Advances in Quantile Regression Models: A Practical Guideline for Empirical Research. *The Journal of Human Resources* 33(1), 88–126 and answer the following questions. Note: you do not have to read sections III.B, IV and VIII.

1. Motivate or exemplify the importance of the quantile regression for the analysis of the wage distribution.
2. Assume the linear regression  $y_i = x_i^\top \beta + \varepsilon_i$  with  $\varepsilon_i$  following the Laplace distribution (pdf  $\exp(-|x|)/2$ ) and being independent of  $x_i$ . Using the asymptotic distribution stated in the paper, show that the median regression (i.e., the least absolute deviation estimation) has a smaller asymptotic variance than the ordinary least squares estimator.
3. Interpret the equivariance properties in (8)–(11)?
4. Are the equivariance properties (8), (10), (11) satisfied by the ordinary least squares estimator?
5. How can a set of quantile regression estimates be used for testing homoscedasticity and symmetry of the error distribution? Write down the null hypotheses of the tests.
6. The test statistics for the test of homoscedasticity are reported in Table 2. Is the homoscedasticity rejected at 5% significance level? What is the implication of conditional wage inequality?
7. Are the returns to education increasing or decreasing with the labor market experience (see Table 4)? Is this consistent with your intuition and/or some economic theory? Explain.
8. Considering young college graduates (16 years of education) with 5 years of labor market experience compared to those with 15 years of labor market experience (see Table 5), what are the most noticeable changes in the wage distribution?