Class 8. Heteroscedasticity

Advanced Econometrics I

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Problem 1

Suppose Winnie the Pooh estimated the following model:

$$y_i = \alpha + \beta \times x_i + u_i.$$

However, after that his friend Piglet told him that his model suffers from heteroscedasticity. More specifically, Piglet is sure that heteroscedasticity has the following form:

$$\sigma_{ui}^2 = \sigma_u^2 x_i^4.$$

What modification should Winnie the Pooh implement to get efficient estimates?

Problem 2

A researcher wants to implement a Goldfeld-Quandt test for heteroscedasticity. His model has the following form:

$$y_i = \alpha + \beta_1 \times x_1 + \beta_2 \times x_2 + \varepsilon_i.$$

His total sample consists of 30 observations. He preliminary ordered these observations with respect to variance and divided them into 3 groups. For the group with the lowest variance he got that $RSS = 10.28$, while the group with the largest variance provided $RSS = 14.51$. Help researcher to make a right statistical inference.

Problem 3

Using the dataset data.xlsx estimate the following model:

$$price\_msq_i = \beta_0 + \beta_1 \times dist_i + \alpha_2 \times livesp_i + \varepsilon_i$$

(a) Check the model for heteroscedasticity via the Goldfeld-Quandt, Breusch-Pagan, and White tests.

(b) If the heteroscedasticity occurs, estimate the model with the robust estimate of covariance matrix.