

November 6, 2016
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POSTGRADUATE COURSE IN
LINEAR REGRESSION MODELS FOR CONTINUOUS AND BINARY DATA
Day 2
Morning exercises:

Part A

Back to the lung function data (`lung`) you looked at Monday morning.
We will consider the multiple regression of PEFR on height and woman
(generate `woman=(sex==1)`):

$$PEFR = \beta_0 + \beta_1 \cdot height + \beta_2 \cdot woman + E$$

1. What are the assumptions behind the model?
Which of the assumptions, did you check (informally) day 1 morning?
2. Estimate the model.
What is the interpretation of the estimates?
3. What is the difference (with CI) in the expected PEFR for a woman and a man
both with height 170 cm?
What is the difference (with CI) in the expected PEFR for a woman and a man
both with height 160 cm?
4. Try to check some of the assumption behind the model.
5. Do any of the data points stick out?

Part B

Here we look at the model from the lecture today (`fram200`).

$$\ln(sbp) = \beta_0 + \beta_1 \cdot age + \beta_2 \cdot woman + \beta_3 \cdot \ln(bmi) + E$$

6. Fit the model using 50 years as reference for age and 22 kg/m² for BMI.
Give an interpretation of the estimated parameters.
7. Based on the model: Find (*without* confidence interval) the **median** `sbp` for a
man, 55 year old with a `bmi` of 25 kg/m².
8. Check some of the aspects of the model, by plotting the residuals versus `age`,
`ln(bmi)` and `sex`.
What can you see in these plots? What have you checked?

Add $(age-50)^2$ to the model and fit it.

9. Comment on the estimates. How have they changed?
Is the coefficient for $(age-50)^2$ statistical significant?
Which assumption of the first model have you checked?