Shrinkage Methods

In this exercise we would like to get familiar with the R package *glmnet* and employ the shrinkage methods presented in the course (see **Chapter 4**). After having read the documentation of the R package *glmnet* and installed it, load the *Zambia* dataset and work on the continuous covariates to solve the following exercises.

1 Ridge Regression

(a) Use the function *glmnet()* to perform a Ridge regression on *Zambia* dataset, plot the values as a function of λ and comment on the results.

(b) Use the function *cv.glmnet()* to perform model selection based on 10-fold Cross Validation (i.e. method to select the λ parameter), plot the results and comment the graph that you obtain. Which values of λ are shown by default?

(c) Use the function *predict()* to retrieve the final model estimates and perform a simple linear model on the same covariates, what can you conclude?

2 Lasso

1. Use the function *glmnet()* to perform a lasso on *Zambia* dataset, plot the values as a function of λ and comment on the results.

2. Use the function *cv.glmnet()* to perform model selection based on 10-fold Cross Validation, plot the results and comment the graph that you obtain. Which values of λ are shown by default? What can you conclude on the choice of λ in terms of model selection?

3. Use the function *predict()* to retrieve the final model chosen by 10-fold CV (given lasso ordering) and perform a linear model on the covariates present in the final model. What can you conclude observing the estimates?