

Econometrics - Advanced Methods

Regression Shrinkage Methods

A. Let $\hat{\beta}_{R,\lambda}$ be the minimizer of the following criterion function

$$\hat{Q}_R = \frac{1}{n} \|y - X\beta\|_2^2 + \frac{\lambda}{2n} \|\beta\|_2^2$$

1. Use “EAM2019 - class 5A.do”. Calculate $\hat{\beta}_{R,\lambda}$ (in Mata) for any value of λ you want. Keep in mind we usually don’t want to shrink the constant. Check your results with the user-written command `lasso2` using the same λ .
2. Now, set $p = 50$ and $n = 30$. Why does the OLS estimation not work?
3. Why does $\hat{\beta}_{R,\lambda}$ work?

B. Let’s move on to Lasso regressions. Open “EAM2019 - class 5B.do”.

1. Calculate $\hat{\beta}_{L,\lambda}$ for any value of λ and check if it is a Lasso solution.
2. Replicate the Post-Lasso estimates.
3. Cross-validation is a good way to determine a data-driven value of λ . Have a look at the help file of `cvlasso` to learn how you can use cross-validation in this command. Use “EAM2019 - class 5C.do” to implement Lasso with cross-validation.