

Model Selection with the Lasso under Heteroscedasticity

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Poisson-like model

$$Y = X\beta^* + \epsilon$$

$$E(\epsilon|X) = 0$$

$$\text{var}(\epsilon|X) = c \text{diag}(|X\beta^*|)$$

Model Selection with the Lasso

$$\hat{\beta}(\lambda) = \operatorname{argmin}_b \frac{1}{2n} \|Y - Xb\|_2^2 + \|b\|_1$$

Provides sparse estimates.

If the true parameter is sparse, can we estimate the sparsity pattern?

Findings

- Our results for model selection consistency show that an extra condition is necessary beyond those for the homoskedastic case.