

## 阮昱眾

1. Using the Hsiao, Li, and Racine (2007) test, test that the linear parametric specification is appropriate (use a wild bootstrap). Use the cross-validated bandwidth selector from the local-constant estimator with the Gaussian, Aitchison and Aitken, and Wang and van Ryzin kernels. Do you reject the null hypothesis?

Ans: We reject the null hypothesis that the linear parametric specification is appropriate.

2. Using the Racine, Hart, and Li (2006) test, test that the regressors are irrelevant individually and jointly (use a wild bootstrap). Use the cross-validated bandwidth selector from the local-linear estimator with the Gaussian, Aitchison and Aitken, and Wang and van Ryzin kernels. Do you reject these null hypotheses?

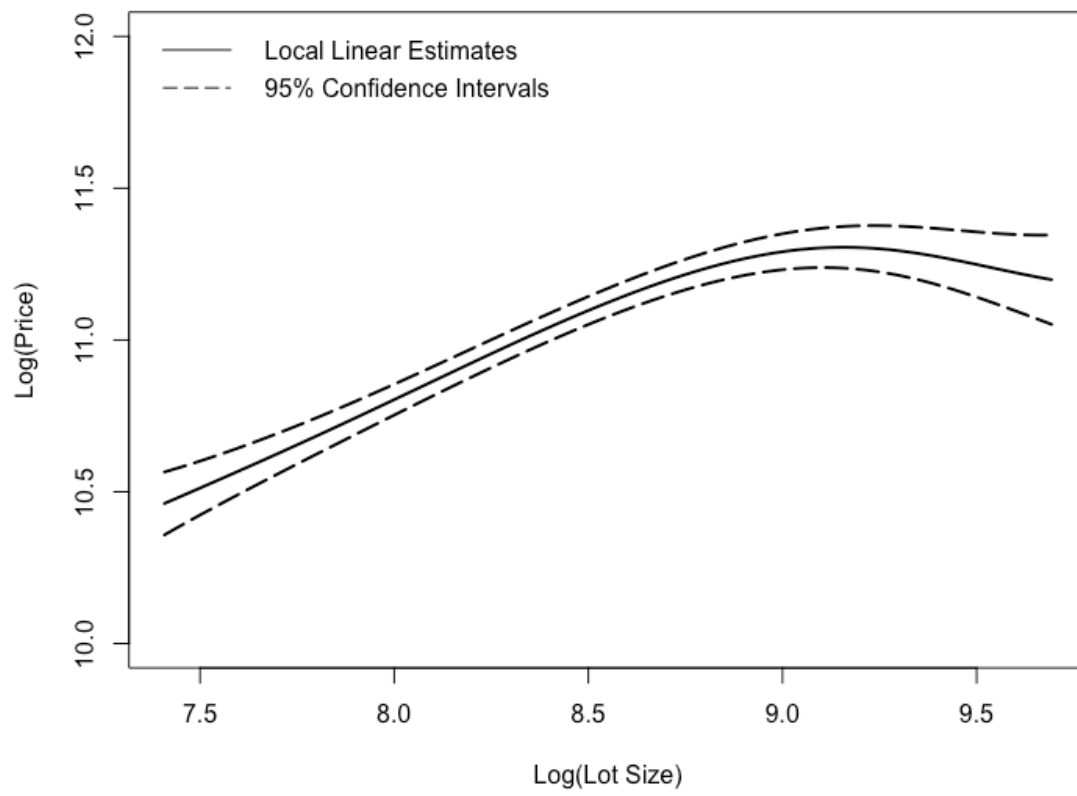
Ans: We reject the null hypothesis that the regressors are irrelevant, regardless of using an individual test or a joint test.

3. Using the cross-validated bandwidth selector from the local-linear estimator with the Gaussian, Aitchison and Aitken, and Wang and van Ryzin kernels, plot the fitted curves and gradients along with their confidence intervals in the following three cases.
  - (a) Suppose that the house has three bedrooms and is not located in a preferred neighbourhood of the city, plot the impact of the lot size on the price. Briefly illustrate the results.

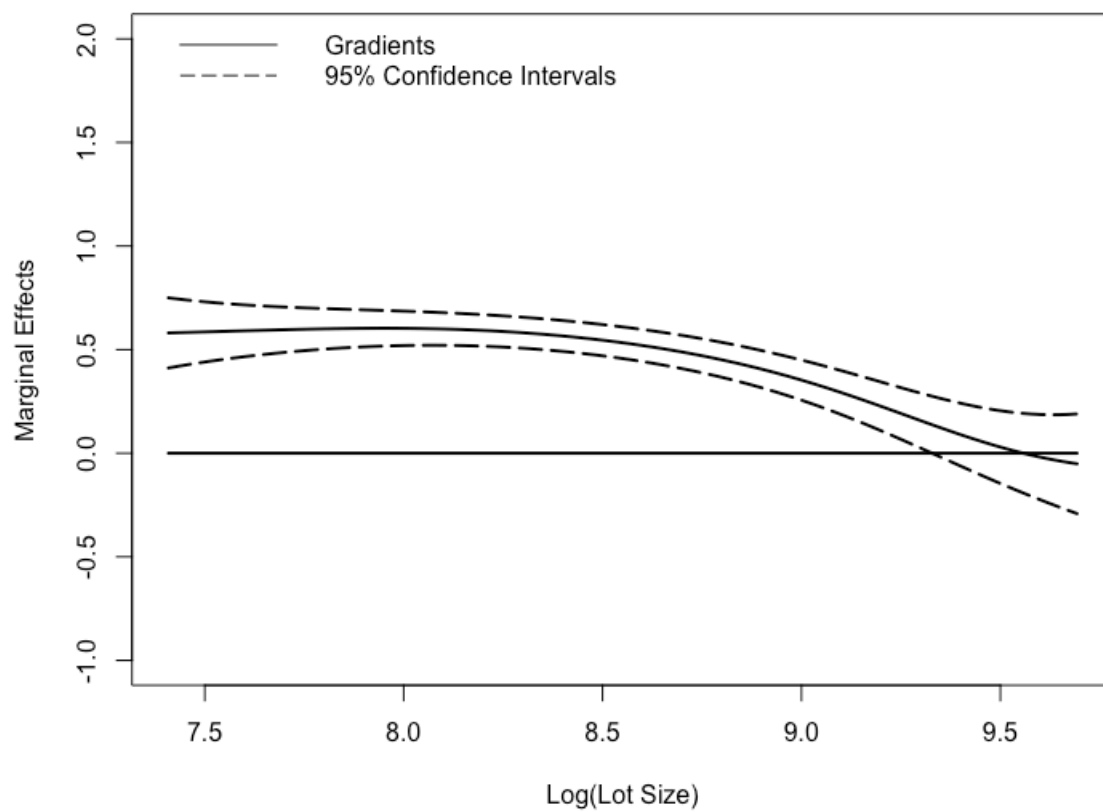
Ans: The fitted curve shows that the housing price increases as the lot size increases. However, the housing price decreases as the lot size increases after the lot size is around 9.2.

The gradients shows the marginal effects are positive and stable but become insignificant after the lot size is around 9.2.

**LLLS (Cross-Validated Bandwidth Selector) and CI (Asymptotic Variance)**

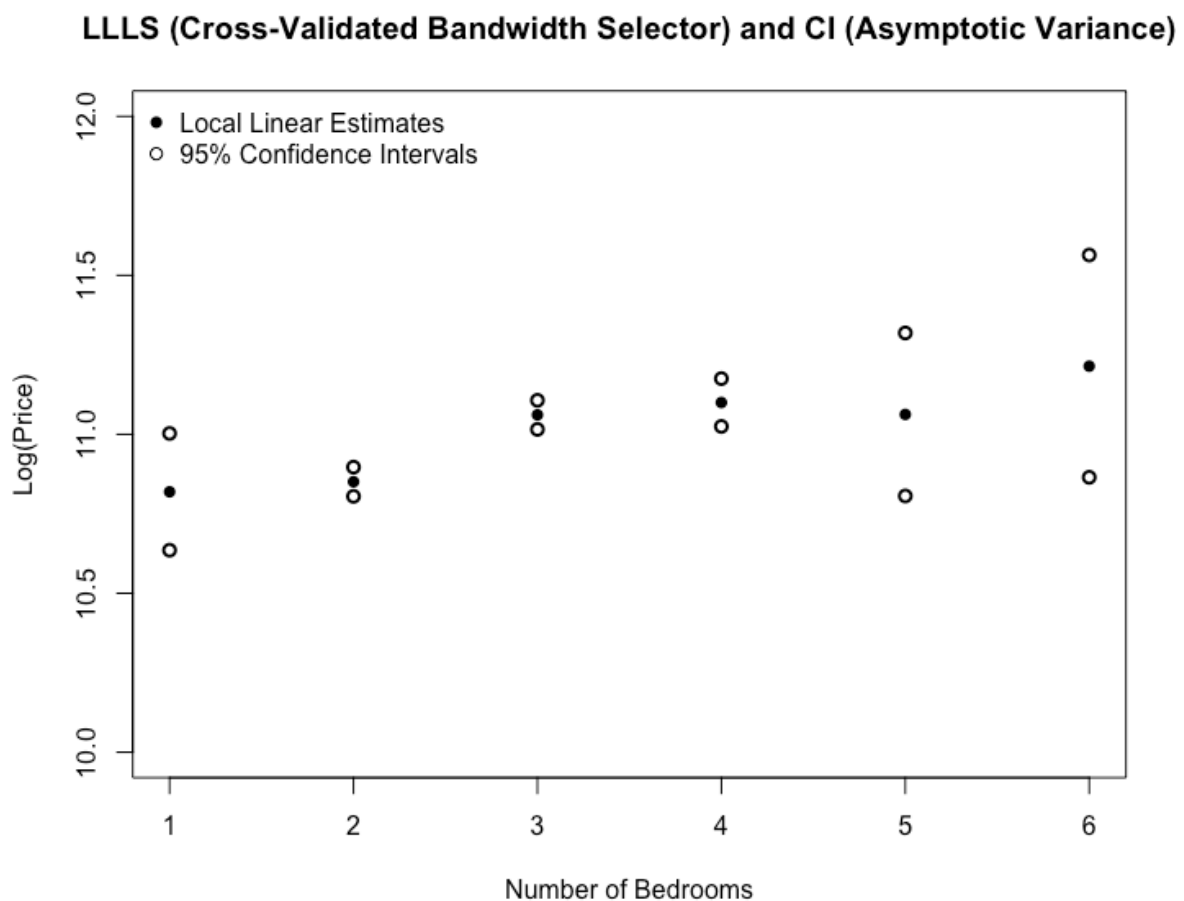


**LLLS (Cross-Validated Bandwidth Selector) and CI (Asymptotic Variance)**

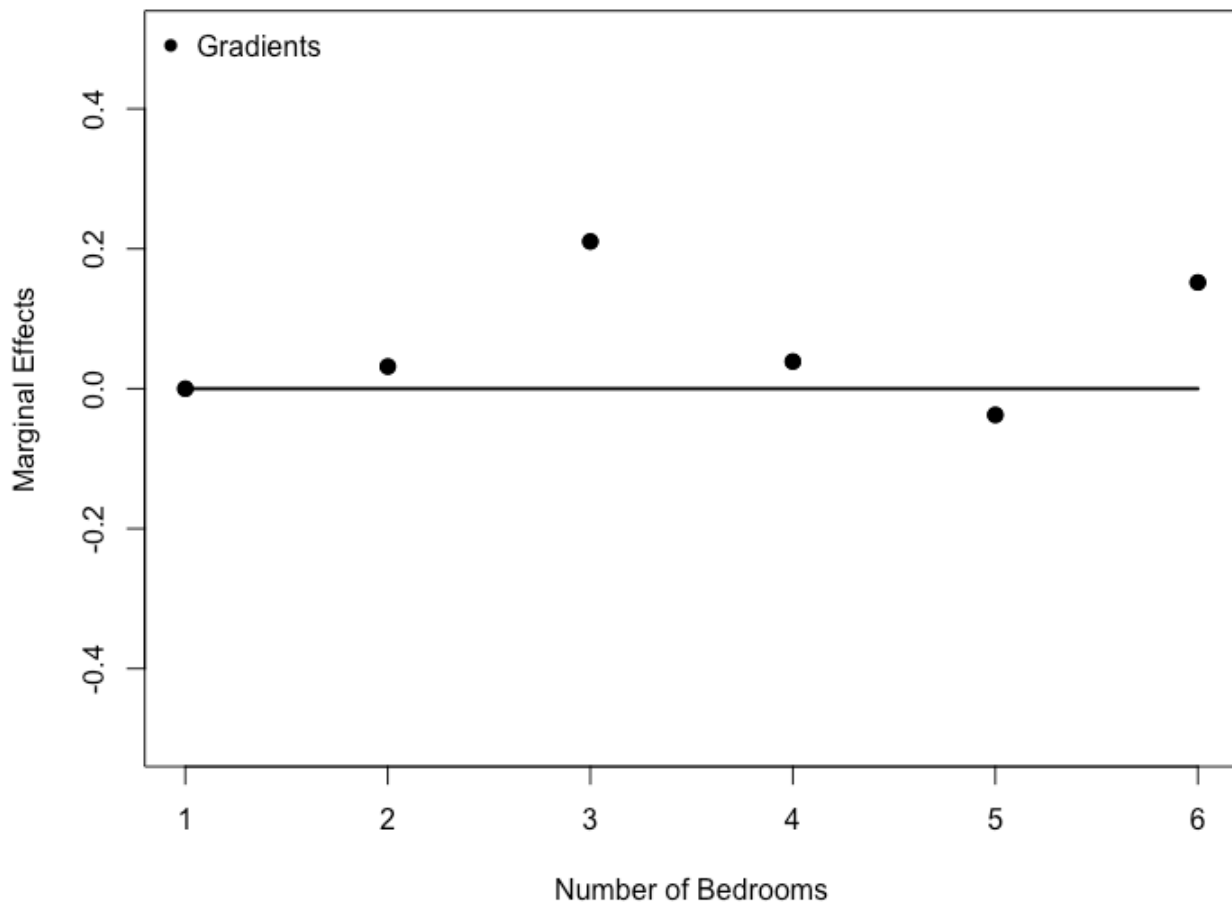


- (b) Suppose that the house has a median size of lot and is not located in a preferred neighbourhood of the city, plot the impact of the number of bedrooms on the price. Briefly illustrate the results.

Ans: The fitted points show that essentially the housing price increases as the number of bedrooms increases. The gradients show that the marginal effects are unstable.



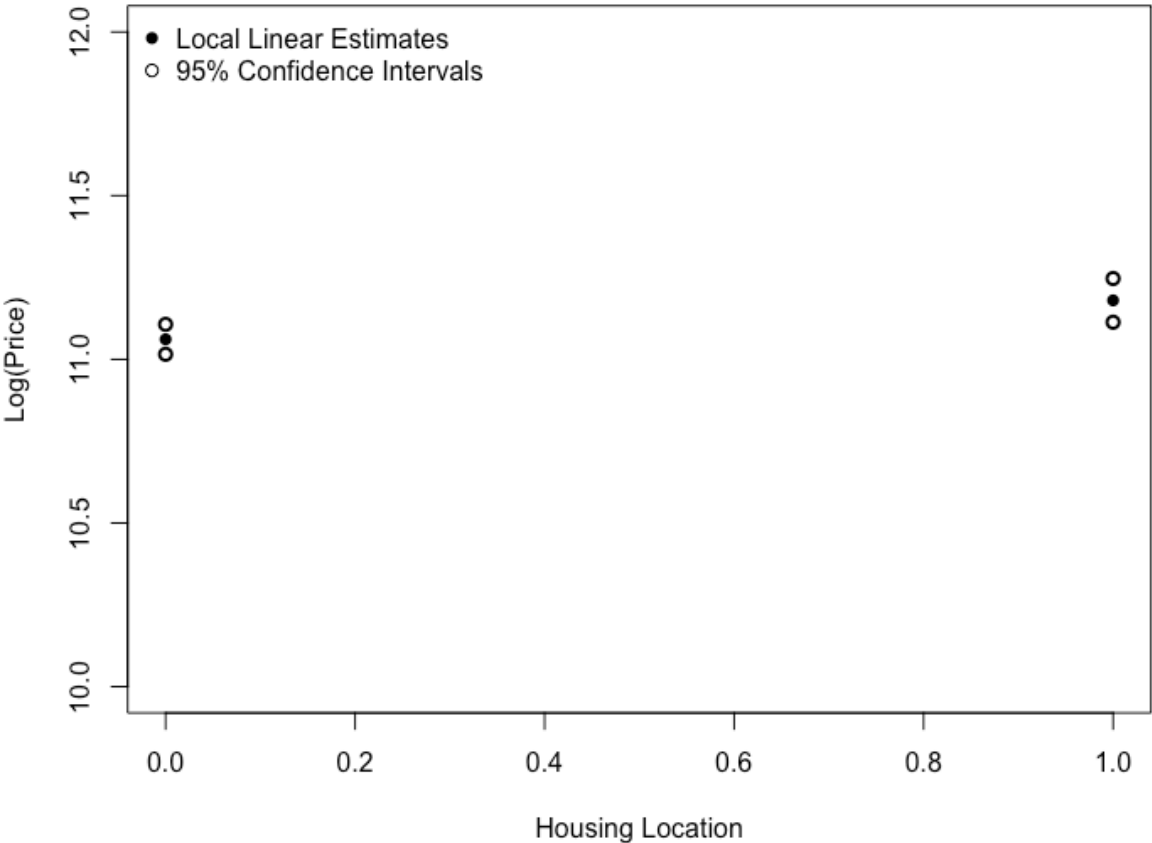
### LLLS (Cross-Validated Bandwidth Selector)



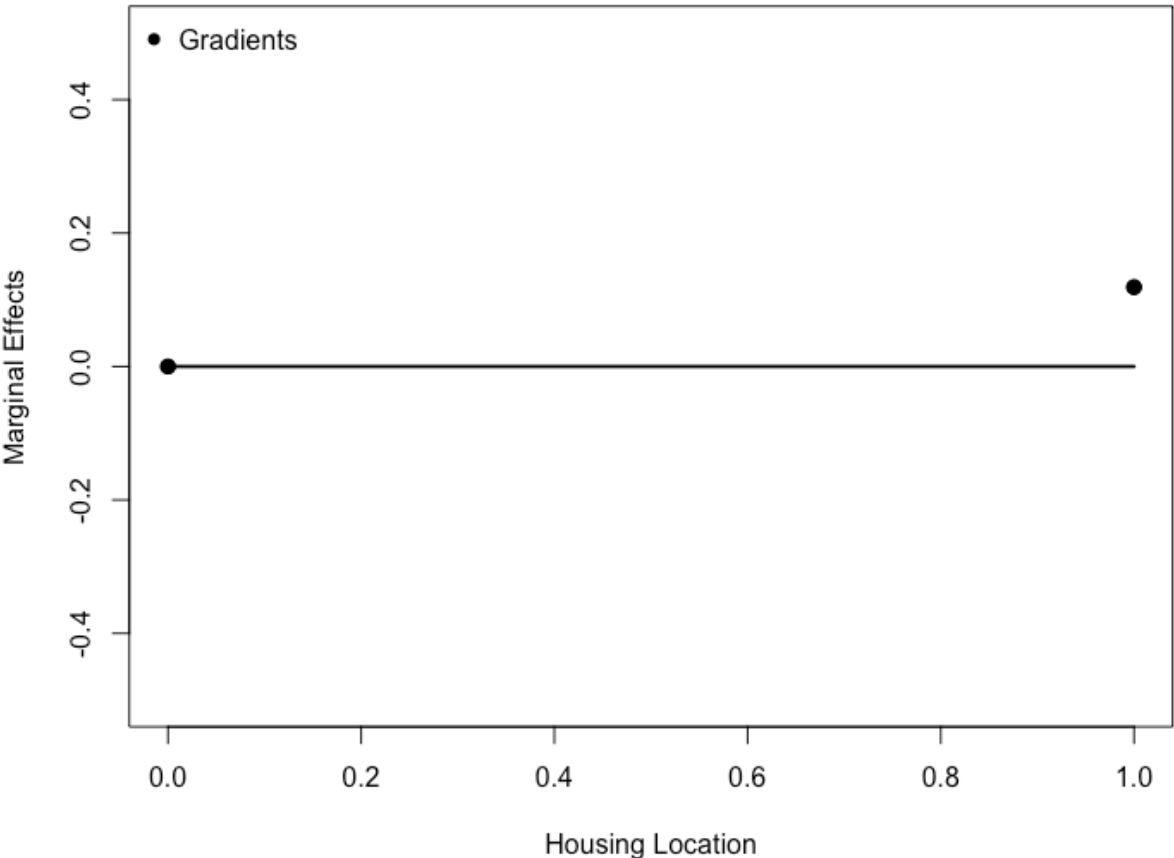
- (c) Suppose that the house has a median size of lot and three bedrooms, plot the impact of the housing location on the price. Briefly illustrate the results.

Ans: The fitted points show that a better housing location has a slightly higher housing price and a positive marginal effect.

**LLLS (Cross-Validated Bandwidth Selector) and CI (Asymptotic Variance)**



**LLLS (Cross-Validated Bandwidth Selector)**



# HW4 Theoretical Problem Set 阮显眾

$$1. \sum_{x=1}^c l(x_i, x, \lambda) = \underbrace{1 \cdot (1-\lambda)}_{1 \text{ if } x_i = x} + \underbrace{(c-1) \cdot \frac{\lambda}{c-1}}_{c-1 \text{ if } x_i \neq x} = 1$$

$$2. \hat{f}(x) = \frac{1}{n} \sum_{i=1}^n l(x_i, x, \lambda)$$

$$\Rightarrow \sum_{x=1}^c \hat{f}(x) = \frac{1}{n} \sum_{i=1}^n \sum_{x=1}^c l(x_i, x, \lambda) = \frac{1}{n} \sum_{i=1}^n 1 = \frac{1}{n} \cdot n = 1$$