Problem 3.9, page 108 in 5e Wooldridge

The following equation describes the median housing price in a community in terms of amount of pollution (*nox* for nitrous oxide) and the average number of rooms in the houses in the community (*rooms*):

$$\log(price) = \beta_0 + \beta_1 \log(nox) + \beta_2 rooms + u$$

(i) What are the probable signs of β_1 and β_2? What is the interpretation of β_1? Explain.

(ii) Why might *nox* [or more precise, $\log(nox)$] and *rooms* be negatively correlated? If this is the case, does the simple regression of $\log(price)$ on $\log(nox)$ produce an upward or downward biased estimator of β_1?

(iii) Using the data in HPRICE2.DTA, the following equations were estimated:

$$\widehat{\log(price)} = 11.71 - 1.043 \log(nox), \qquad n = 506, R^2 = .264$$
$$\widehat{\log(price)} = 9.23 - .718 \log(nox) + .306 rooms, \qquad n = 506, R^2 = .514$$

Is the relationship between the simple and multiple regression estimates of the elasticity of *price* with respect to *nox* what you would have predicted, given your answer in part (ii)? Does this mean that $-.718$ is definitely closer to the true elasticity than -1.043?