T711
Parlar

2022-01-30

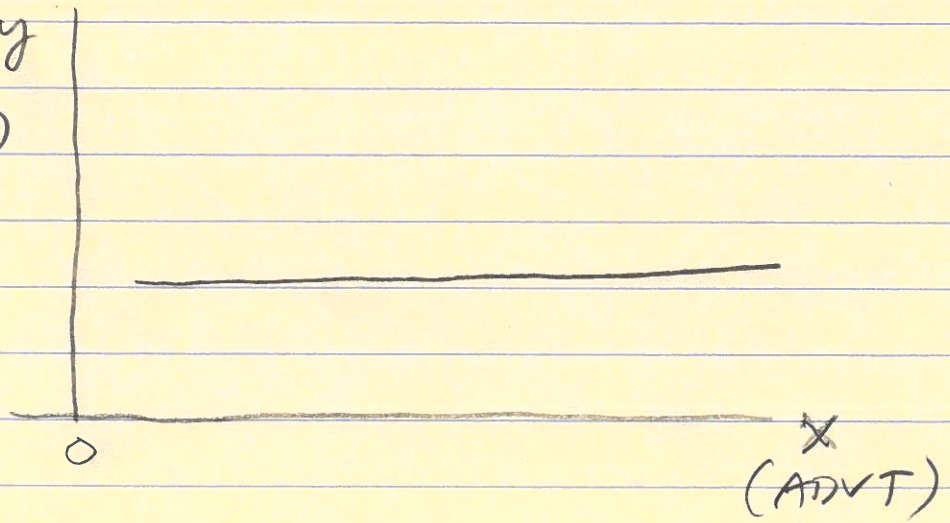
Null hypothesis for the insignifance of the explanatory variable: A graphical explanation

- Suppose you want to analyze the relationship between the variables x (ADVT) and y (SALES).

- You haven't performed a regression analysis yet.

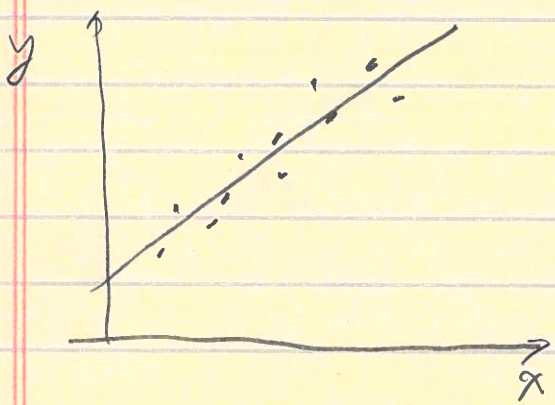
- But you are in a pessimistic mood and you suspect that x doesn't explain y, i.e., x doesn't affect y at all.

- That is, if you had all available (x, y) data points (which you don't have), and a line was fit, it would look like this.



. So, you say: H_0: x is not significant

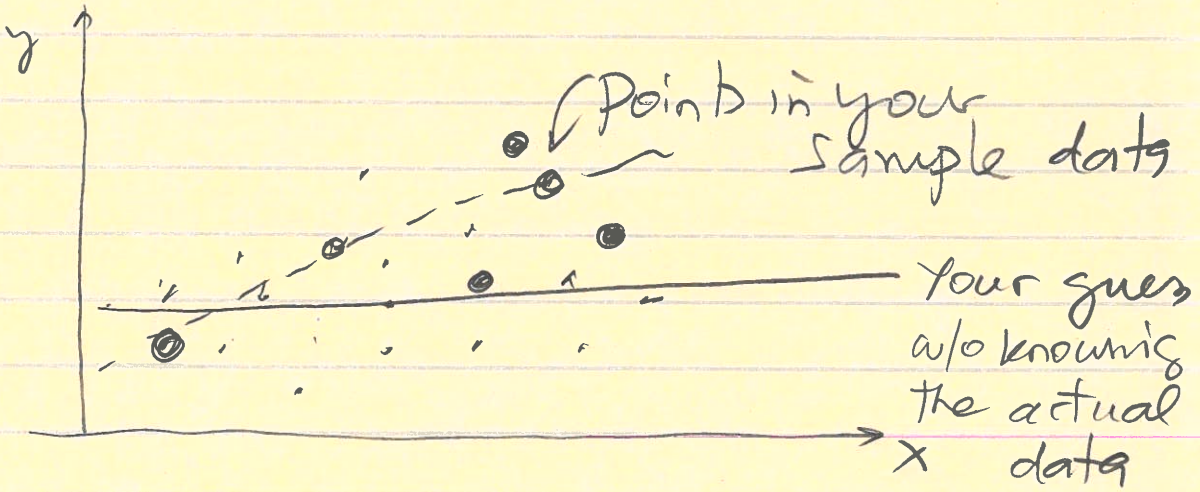
(1) . Now, you collect data and get your linear fit as follows



This has high signal (response) but low noise (uncertainty) since most points are so close to the line.

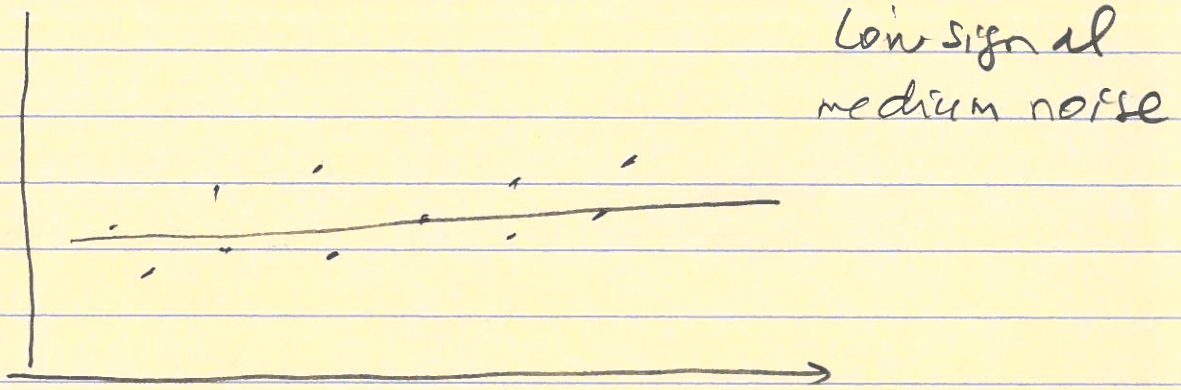
. If H_0 were true (flat line) such a high signal vs. low noise should not happen, but it just did. (In fact, it may happen with an extremely small probability → p-value.)

. Maybe the true data values are like this.



. So, reject Ho because you observed an unusual outcome w.r.t. your hypothesis.

(2) Suppose your data (actual sample) and the fit are like this



- Not too different from your hypothesis. If Ho were true, you would find this result with a very high probability (p-value).

. So, you don't reject Ho and say that x is not significant