

# ECON-122

## Introduction to Econometrics

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# Confidence interval

- ▶ another way of providing more info than just the result of a t-test
- ▶ interpretation of the confidence level of an interval (eg. 95 percent - corresponds to  $\alpha = 5$  in previous testing methods):
  - ▶ if repeated sample used to compute the confidence intervals, true value will be included in 95 percent of confidence intervals
  - ▶ DOES NOT mean that 95 percent probability of true value falling inside interval
- ▶ confidence intervals provide the range of likely values of parameters for the population, not just a point estimate

## Confidence interval cont.

- ▶ let  $c \equiv 100 - \alpha^{th}$  percentile in a  $t_{n-k-1}$  distribution (97.5<sup>th</sup> percentile in the example when  $\alpha = 5$ )
- ▶ "Fail to reject" the null if:

$$c > t > -c$$

$$c > \frac{\hat{\beta}_j - \mu}{SE(\hat{\beta}_j)} > -c$$

$$SE(\hat{\beta}_j) \cdot c > \hat{\beta}_j - \mu > -c \cdot SE(\hat{\beta}_j)$$

$$SE(\hat{\beta}_j) \cdot c - \hat{\beta}_j > -\mu > -\hat{\beta}_j - c \cdot SE(\hat{\beta}_j)$$

$$\hat{\beta}_j + SE(\hat{\beta}_j) \cdot c > \mu > \hat{\beta}_j - SE(\hat{\beta}_j) \cdot c$$

And the confidence interval is defined as:

$$[\hat{\beta}_j - SE(\hat{\beta}_j) \cdot c, \hat{\beta}_j + SE(\hat{\beta}_j) \cdot c]$$

# Confidence interval cont.

- ▶ every value outside of the confidence interval will be rejected, every value inside will fail to be rejected
- ▶ so it gives us a range of values of test statistic over which we do not reject at  $\alpha$  percent significance level for a two-tailed test
- ▶ therefore, it gives us more information as it gives answer to all possible t-tests we may want to run