COMPARISON
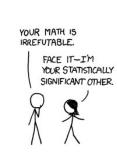
1 Significance testing

2 Significance

3 Type I and II Errors

4 Practice

Hypothesis testing

From the Reason "free minds and free markets" Foundation:

> *"A number of theorists assume that drinking has harmful economic effects, but data show that **drinking and earnings are positively correlated**. **We hypothesize that drinking leads to higher earnings by increasing social capital.** If drinkers have larger social networks, their earnings should increase. Examining the General Social Survey, we find that self-reported drinkers earn 10-14 percent more than abstainers, which replicates results from other data sets."*
>
> *(B. L. Peters, E. Stringham, "No Booze? You May Lose", 2006.)*

H_1: "An increase in social drinking leads to an increase in earnings."

Hypothesis testing

Substantive directional hypotheses

H_1 : $\pm$social drinking ($\to$ $\pm$social capital) $\to$ $\pm$earnings
H_2 : $\pm$earnings ($\to$ $\pm$disposable income) $\to$ $\pm$social drinking

Rejecting the null hypothesis H_0

H_0: no relationship between social drinking and earnings
H_a: any relationship between social drinking and earnings

Proof by contradiction

1. Get approximate upper bound of **p-value** $p = Pr(H_0)$
2. Reject or retain H_0 at **level of confidence** $\alpha = 0.05$ (or 0.01)

Significance testing

Comparing differences

- Comparing means: H_0: $\Delta = \bar{X} - \bar{Y} = 0$ `ttest`
- Comparing proportions: H_0: $\Delta = Pr(X) - Pr(Y) = 0$ `prtest`

Comparing distributions

- χ^2-test: observed vs. expected percentages   `tab_chi`
- Odds ratios: success vs. failure rates   `tabodds`

Type I and II Errors

Type I Error: rejecting H_0 when it is actually true

"Last year executed man proven innocent by DNA evidence."

- H_0: presumption of innocence…
- H_a: … until proven guilty (H_0 wrongly rejected)

Type II Error: retaining H_0 when it is actually false

"Violent father beats children after being released from custody."

- H_0: parents considered responsible
- H_a: … until proven abusive (H_0 wrongly retained)

Estimation is powerful

Significance is deceptive

Practice session

Class

```
* Get the do-file for this week.
srqm fetch week6.do
* Open to read and replicate.
doedit code/week6
```

Coursework

- Finish the do-file and read all comments at home.
- Catch up on all readings (see course website).
- Revise your code and paper after getting feedback.

Exercises

Ex 6.1. European Social Survey 2008

1. Recode `rlgblg` and `dscrgrp` to dummies.
2. Compute a proportions test for `dscrgrp` by `rlgblg`.
3. Interpret the result of the test.

Ex 6.2. European Social Survey 2008

1. Subset the data to Sweden.
2. Find a measure of support for male/female income equality.
3. Select a test to compare the variable over gender groups.