

V22 - Estimation – Part 5

- Why we pair data
- Paired data setup for statistical analysis

Course: Statistical Testing & Regression
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Why Pair?

- ❖ Before & After Studies
- ❖ Same person both before & after intervention



- ❖ If test same child's ability before & after new teaching method:

- Better than testing method using 2 independent groups (with & without)
- Control for variables between students such as prior knowledge, capability, parental oversight, socio-economic status, etc.

Person	Before (x1)	After (x2)
→ Person	25	35

- ❖ Eliminates/controls for other sources of variability

- Experimental units same on variables not being tested

- ❖ Pairing reduces variance

$$\text{Var}(d) = \text{Var}(X - Y) = \sigma_X^2 + \sigma_Y^2 - 2\text{Cov}(X, Y)$$

because subtracting positive covariance



Paired Data Setup

n rows, subjects, pairs

n = 4

<u>i</u>	X1 (Before)	X2 (After)	d_i
1	1	2	1
2	3	5	2
3	4	7	3
4	5	9	4
5	6	11	5
6	7	13	6

sample differences
(X₁-X₂)

or X₂-X₁

2-1
5-3

AVG = \bar{d}
3.5
STDEV = s_d
1.9

- \bar{d} is average of all differences d_i 's
- s_d is standard deviation of all differences d_i 's





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THE END

